



**GATEWAY COUNTY SERVICE AREA
WATER TREATMENT PLANT
IMPROVEMENTS**

**COUNTY OF IMPERIAL
PROJECT NUMBER 6914GTWTP**

**PROJECT MANUAL
VOLUME 1 OF 3
CONTRACT DOCUMENTS,
STANDARD GENERAL CONDITIONS,
AND SUPPLEMENTARY CONDITIONS**

JULY 12, 2024

**THG PROJECT NO.
542.116E**

TABLE OF CONTENTS

00100. Advertisement for Bids..... 00100-1

00200. Instructions to Bidders

 Article 1-Defined Terms..... 00200-1

 Article 2- Bidding Documents..... 00200-1

 Article 3-Qualifications of Bidders..... 00200-3

 Article 4-PreBid Conference..... 00200-3

 Article 5-Site and Other Areas; Existing Site Conditions; Examination of Site: Owner’s Safety
 Program; Other Work at the Site 00200-3

 Article 6-Bidder’s Representations and Certification..... 00200-5

 Article 7-Interpretations and Addenda..... 00200-5

 Article 8-Bid Security..... 00200-6

 Article 9-Contract Times..... 00200-6

 Article 10-Substitute and “Or Equal” Items..... 00200-7

 Article 11- Subcontractors, Suppliers, and Others 00200-7

 Article 12- Preparation of Bid..... 00200-8

 Article 13-Basis of Bid..... 00200-9

 Article 14-Submittal of Bid..... 00200-9

 Article 15-Modification or Withdrawal of Bid..... 00200-10

 Article 16-Opening of Bids..... 00200-10

 Article 17-Bids to Remain Subject To Acceptance..... 00200-10

 Article 18-Evaluation of Bids and Award of Contract 00200-10

 Article 19-Bonds and Insurance..... 00200-11

 Article 20-Signing of Agreement 00200-11

 Article 21-Sales and Use Taxes..... 00200-12

 Article 22-Contracts to be Assigned..... 00200-12

 Article 23-Federal Requirements..... 00200-12

 Article 24-Workers’ Compensation Requirements..... 00200-12

 Article 25-Wage Rate Requirements..... 00200-12

 Article 26-Subcontractor Listing Law..... 00200-13

 Article 27-Registration With Department of Industrial Relations..... 00200-14

00300. Wage Requirements..... 00300-1

00410. Bid Form

 Article 1-Owner and Bidder..... 00410-1

 Article 2-Attachments to this Bid..... 00410-1

 Article 3-Basis of Bid-Lump Sum Bid and Unit Prices..... 00410-2

 Article 4-Basis of Bid – Cost Plus Fee..... 00410-5

 Article 5-Price Plus Time Bid..... 00410-5

 Article 6-Time of Completion..... 00410-5

 Article 7-Bidder’s Acknowledgements: Acceptance Period, Instructions, and Receipt of Addenda... 00410-5

 Article 8-Bidder’s Representations and Certifications..... 00410-6

00420. Non Collusion Affidavit..... 00420-1

00430. Bid Bond..... 00430-1

00440. Certifications of Non-Segregated Facilities..... 00440-1

00450. Certification Regarding Debarment, Suspension, Ineligibility, and Voluntary Exclusion 00450-1

Gateway County Service Area Water Treatment Plant Improvements

00451.	Federal and State Contract Language Inclusion	00451-1
00452.	Iran Contracting Act Certification	00452-1
00460.	Certification for Contracts, Grants and Loans	00460-1
00470.	Contractor’s Certification Regarding Worker’s Compensation Insurance	00470-1
00480.	Tabulation of Subcontractors	00480-1
00490.	Bidder Qualifications Statement	00490-1
00500.	Tabulation of Major Material Suppliers	00500-1
00510.	Notice of Award and Acceptance Notice	00510-1
00521.	Agreement for Construction Services	00521-1
00550.	Notice to Proceed	00550-1
00610.	Performance Bond	00610-1
00615.	Payment Bond	00615-1
00620.	Contractor’s Application for Payment	00620-1
00625.	Certificate of Substantial Completion	00625-1
00700.	Standard General Conditions of the Construction Contract	00700-1
	Article 1–Definitions and Terminology.....	00700-5
	Article 2-Preliminary Matters.....	00700-9
	Article 3-Contract Documents: Intent, Amending, Reuse.....	00700-11
	Article 4- Site; Subsurface and Physical Conditions; Hazardous Environmental Conditions	00700-13
	Article 5- Bonds and Insurance	00700-17
	Article 6- Contractor’s Responsibilities	00700-21
	Article 7- Other Work at the Site	00700-31
	Article 8- Owner’s Responsibilities	00700-32
	Article 9- Engineer’s Status During Construction	00700-34
	Article 10-Change in the Work; Claims	00700-36
	Article 11-Cost of the Work; Allowances; Unit Price Work	00700-37
	Article 12-Change of Contract Price; Change of Contract Times.....	00700-40
	Article 13- Tests and Inspections; Correction, Removal, or Acceptance of Defective Work	00700-42
	Article 14-Payments to Contractor and Completion.....	00700-45
	Article 15- Suspension of Work and Termination	00700-51
	Article 16-Dispute Resolution.....	00700-53
	Article 17- Miscellaneous.....	00700-54
	Article 18- Federal Requirements.....	00700-54
00800.	Supplementary Conditions	00800-1
	Special ConditionsSee Special Conditions for Table Of Contents in Volume 3 of 3	
	Technical SpecificationsSee Technical Specifications for Table Of Contents in Volume 3 of 3	
	Wastewater Treatment Plant Improvement PlansSee Drawings for Sheet Index	

1. ADVERTISEMENT FOR BIDS

**County of Imperial
155 South 11th Street
El Centro, CA 92243**

Separate sealed BIDS for the construction of the **Gateway County Service Area Water Treatment Plant Improvements** will be received by the **Office of the Clerk of the Board of Supervisors** located at **940 W. Main Street, Suite 209, El Centro, CA 92243** until **2:00 p.m.** (prevailing local time) on **August 30, 2024**, and then at the **Board of Supervisors Chambers** will be publicly opened and read aloud.

The County of Imperial intends to improve the Gateway County Service Area Water Treatment Plant that is located at 1499 Highway 98, Calexico, CA 92231. The Scope of Work includes but is not limited to the following: Replacement of the water treatment plant booster pump station which conveys potable water to the water pipeline distribution system, installation of piping and valves downstream of the booster pump station, improvements to the electrical system and the installation of an emergency standby generator set to provide an emergency power supply to the new booster pumps.

The Bidding Documents may be examined at the following locations:

Imperial County Department of Public Works
155 S. 11th Street
El Centro, CA 92243
Phone: (442) 265-1818
www.publicworks.imperialcounty.org

Copies of the Bidding Documents may be obtained at the office of the **Imperial County Department of Public Works, 155 S. 11th Street, El Centro, CA 92243** upon the nonrefundable payment of \$175.00 for each set. Alternately, the Bidding Documents may be found on Imperial County Public Works website under “Projects Out to Bid” at: www.publicworks.imperialcounty.org. It is recommended that Bidders register as a plan holder with the Imperial County Department of Public Works.

A **Pre-Bid Conference** for prospective Bidders will be held at the **County of Imperial Public Works Department Office** located at 155 S. 11th Street, El Centro, CA 92243 at **9:00 am** (prevailing local time), on **August 20, 2024**. Those attending the Pre-Bid Conference shall sign a Pre-Bid Conference attendance list.

Prospective Bidders shall be licensed Contractors in the State of California and shall be skilled and regularly engaged in the general class or type of work called for under the Contract. Each Bidder shall have a Class A California Contractor’s license. All subcontractors shall have a Class A, B or C California Contractors License appropriate for the work to be completed.

SAM.gov registration, with a Unique Entity Identifier (UEI), is required for Bidders and Subcontractors for this project. If the Bidder and Subcontractors are not fully registered with a UEI and provided with the Bid, the Bidder and Subcontractors are to submit proof of active registration with the Bid, such as screenshot or registration completion receipt. The Bidder and Subcontractors must have completed the SAM.gov registration process with a UEI prior to Award of Contract.

The female and minority goals are applicable to the Contractor's aggregate onsite construction work force whether or not part of that work force is performing work on a federal or federally assisted construction contract or subcontract as follows: Goals for female participation in each trade is 6.9%. Goals for minority participation for each trade is 16.2% for Imperial County – Non SMSA (Standard Metropolitan Statistical Areas) Counties.

The Contract executed between the General Contractor and the Awarding agency and the General Contractor and any subcontractor at any tier, for the performance of work on the public works project shall contain the complete verbiage as found in the contract between the Imperial County and the General Contractor including at a minimum a copy of the provisions of California Labor Codes, Sections 1726, 1771, 1775, 1776, 1777.5, 1813, and 1815.

This project is subject to compliance monitoring and enforcement by the California Department of Industrial Relations. California Department of Industrial Relations regulations and reporting requirements applicable to the proposed work must be complied with for this project.

The Contractor and subcontractors listed on the bid proposal for this public works project shall be registered with the Department of Industrial Relations pursuant to Labor Code section 1725.5 [with limited exceptions from this requirement for bid purposes only under Labor Code section 1771.1(a)]. No Contractor or subcontractor may be 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.

Notice is hereby given that, pursuant to 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 of per diem wages and the general prevailing rate for holidays and overtime work for each craft, classification, or type of worker required to execute the Contract. A copy of said prevailing rate of per diem wages is on file in the principal office of the Owner, to which reference is hereby made for further particulars. Said prevailing rate of per diem wages will be made available to any interested party upon request, and a copy thereof shall be posted at each job site.

Prohibition against Contracting with Debarred Contractors and Subcontractors: A debarred Contractor is prohibited from performing work on a public works project pursuant to Section 1777.1 or 1777.7 of the Labor Code. The County of Imperial shall not enter into any agreement with any Contractor without the prior determination that the Contractor, and its subcontractors, are not listed on the Federal Consolidated List of Debarred, Suspended and Ineligible Contractors.

A Bid Security shall accompany the Bid in the form of a certified or cashier's check or Bid Bond for ten (10) percent of the Total Bid amount.

Pursuant to California Civil Code Section 9550, the successful bidder shall, before commencement of work, furnish a payment bond to and approved by the Owner, if the public works contract exceeds twenty-five thousand dollars (\$25,000) in the amount of 100% of the contract amount. The successful Bidder shall also provide a performance bond in the amount of 100% of the contract amount.

8.7.24

(Date)

Blanca Acosta

Blanca Acosta, Clerk of the Board of Supervisors
Imperial County, California

2. INSTRUCTIONS TO BIDDERS

TABLE OF ARTICLES	Page
Article 1 - Defined Terms	00200-1
Article 2 - Bidding Documents	00200-1
Article 3 - Qualifications of Bidders	00200-3
Article 4 – Pre-Bid Conference	00200-3
Article 5 – Site and Other Areas; Existing Site Conditions; Examination of Site; Owner’s Safety Program; Other Work at the Site	00200-3
Article 6 – Bidder’s Representations and Certifications	00200-5
Article 7 - Interpretations and Addenda	00200-5
Article 8 - Bid Security	00200-6
Article 9 - Contract Times	00200-6
Article 10 - Substitute and “Or-Equal” Items	00200-7
Article 11 - Subcontractors, Suppliers, and Others	00200-7
Article 12 - Preparation of Bid	00200-8
Article 13 - Basis of Bid	00200-9
Article 14 – Submittal of Bid	00200-9
Article 15 - Modification or Withdrawal of Bid	00200-10
Article 16 - Opening of Bids	00200-10
Article 17 - Bids to Remain Subject to Acceptance	00200-10
Article 18 - Evaluation of Bids and Award of Contract	00200-10
Article 19 – Bonds and Insurance	00200-11
Article 20 – Signing of Agreement	00200-11
Article 21 – Sales and Use Taxes	00200-12
Article 22 – Contracts to be Assigned	00200-12
Article 23 – Federal Requirements	00200-12
Article 24 – Worker’s Compensation Requirements	00200-12
Article 25 – Wage Rate Requirements	00200-12
Article 26 – Subcontractor Listing Law	00200-13
Article 27 – Registration with Department of Industrial Relations	00200-14

ARTICLE 1 - DEFINED TERMS

- 1.01 Terms used in these Instructions to Bidders have the meanings indicated in the General Conditions and Supplementary Conditions. Additional terms used in these Instructions to Bidders have the meanings indicated below:
 - A. *Issuing Office*—The office from which the Bidding Documents are to be issued, and which registers plan holders. The Issuing Office is : **Imperial County Department of Public Works, 155 South 11th Street, El Centro, CA 92243. Phone: (442) 265-1818, <https://publicworks.imperialcounty.org>**

ARTICLE 2 - BIDDING DOCUMENTS

- 2.01 Bidder shall obtain a complete set of Bidding Requirements and proposed Contract Documents (together, the Bidding Documents.) *See the Agreement for a list of the Contract Documents.* It is Bidder’s responsibility to determine that it is using a complete set of documents in the preparation of a Bid. Bidder assumes sole responsibility for errors or misrepresentations resulting from the use of incomplete documents, by Bidder itself or by its prospective Subcontractors and Suppliers.

- 2.02 Bidding Documents are made available for the sole purpose of obtaining Bids for completion of the Project and permission to download or distribution of the Bidding Documents does not confer a license or grant permission or authorization for any other use. Authorization to download documents, or other distribution, includes the right for plan holders to print documents solely for their use, and the use for their prospective Subcontractors and Suppliers, provided the plan holder pays all costs associated with printing or reproduction. Printed documents may not be re-sold under any circumstances.
- 2.03 Owner has established a Bidding Documents Website as indicated in the Advertisement or Invitation for Bids. Owner recommends that Bidder register as a plan holder with the Issuing Office at such website, and obtain a complete set of the Bidding Documents from such website. Bidders may rely that sets of Bidding Documents obtained from the Bidding Documents Website are complete, unless an omission is blatant. *Registered plan holders will receive Addenda issued by Owner.*
- 2.04 Bidder may register as a plan holder and obtain complete sets of Bidding Documents, in the number and format stated in the Advertisement or Invitation for Bids, from the Issuing Office. Bidders may rely that sets of Bidding Documents obtained from the Issuing Office are complete, unless an omission is blatant. *Registered plan holders will receive Addenda issued by Owner.*
- 2.05 Plan rooms (including construction information subscription services, and electronic and virtual plan rooms) may distribute the Bidding Documents, or make them available for examination. Those prospective bidders that obtain an electronic (digital) copy of the Bidding Documents from a plan room are encouraged to register as plan holders from the Bidding Documents Website or Issuing Office. *Owner is not responsible for omissions in Bidding Documents or other documents obtained from plan rooms, or for a Bidder's failure to obtain Addenda from a plan room.*
- 2.06 Electronic Documents
- A. When the Bidding Requirements indicate that electronic (digital) copies of the Bidding Documents are available, such documents will be made available to the Bidders as Electronic Documents in the manner specified.
1. Bidding Documents will be provided in Adobe PDF (Portable Document Format) (.pdf) that is readable by Adobe Acrobat Reader Version **2017** or later. It is this intent of the Engineer and Owner that such Electronic Documents are to be exactly representative of the paper copies of the documents. However, because the Owner and Engineer cannot totally control the transmission and receipt of Electronic Documents nor the Contractor's means of reproduction of such documents, the Owner and Engineer cannot and do not guarantee that Electronic Documents and reproductions prepared from those versions are identical in every manner to the paper copies.
- B. Unless otherwise stated in the Bidding Documents, the Bidder may use and rely upon complete sets of Electronic Documents of the Bidding Documents, described in Paragraph 2.06.A above. However, Bidder assumes all risks associated with differences arising from transmission/receipt of Electronic Documents versions of Bidding Documents and reproductions prepared from those versions and, further, assumes all risks, costs, and responsibility associated with use of the Electronic Documents versions to derive information that is not explicitly contained in printed paper versions of the documents, and for Bidder's reliance upon such derived information.

ARTICLE 3 - QUALIFICATIONS OF BIDDERS

- 3.01 Deleted
- 3.02 Deleted
- 3.03 Bidder is to submit the following information with its Bid to demonstrate Bidder's qualifications to perform the Work, within the five (5) days of the Owner's request:
 - A. Written evidence establishing its qualifications such as financial data, previous experience, and present commitments.
 - B. A written statement that Bidder is authorized to do business in the state where the Project is located, or a written certification that Bidder will obtain such authority prior to the Effective Date of the Contract.
 - C. Bidder's state or other contractor license number, if applicable.
 - D. Subcontractor and Supplier qualification information.
 - E. Other required information regarding qualifications.
- 3.04 A Bidder's failure to submit required qualification information within the times indicated may disqualify Bidder from receiving an award of the Contract.
- 3.05 No requirement in this Article 3 to submit information will prejudice the right of Owner to seek additional pertinent information regarding Bidder's qualifications.
- 3.06 Bidder is to submit the Qualification Statement form included in these Bidding Documents.

ARTICLE 4 – PRE-BID CONFERENCE

- 4.01 A Pre-Bid Conference will be held at the time and location indicated in the Advertisement or Invitation for Bids. Representatives of Owner and Engineer will be present to discuss the Project. Those attending the Pre-Bid Conference shall sign a Pre-Bid Conference attendance list.
- 4.02 Information presented at the Pre-Bid Conference does not alter the Contract Documents. Owner will issue Addenda to make any changes to the Contract Documents that result from discussions at the Pre-Bid Conference. Information presented, and statements made at the Pre-Bid Conference will not be binding or legally effective unless incorporated in an Addendum.

ARTICLE 5 – SITE AND OTHER AREAS; EXISTING SITE CONDITIONS; EXAMINATION OF SITE; OWNER'S SAFETY PROGRAM; OTHER WORK AT THE SITE

- 5.01 Site and Other Areas
 - A. The Site is identified in the Bidding Documents. By definition, the Site includes rights-of-way, easements, and may include other lands furnished by Owner for the use of the Contractor. Any additional lands required for temporary construction facilities, construction equipment, or storage of materials and equipment, and any access needed for such additional lands, are to be obtained and paid for by the Contractor.

5.02 Existing Site Conditions

A. *Subsurface and Physical Conditions; Hazardous Environmental Conditions*

1. The Supplementary Conditions identify the following regarding existing conditions at or adjacent to the Site:
 - a. Those reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data.
 - b. Those drawings known to Owner of existing physical conditions at or adjacent to the Site, including those drawings depicting existing surface or subsurface structures at or adjacent to the Site (except Underground Facilities), that contain Technical Data.
 - c. Reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site.
 - d. Technical Data contained in such reports and drawings.
2. Owner will make copies of reports and drawings referenced above available to any Bidder on request. These reports and drawings are not part of the Contract Documents, but the Technical Data contained therein upon whose accuracy Bidder is entitled to rely, as provided in the General Conditions, has been identified and established in the Supplementary Conditions. Bidder is responsible for any interpretation or conclusion Bidder draws from any Technical Data or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings.
3. If the Supplementary Conditions do not identify Technical Data, the default definition of Technical Data set forth in Article 1 of the General Conditions will apply.

B. *Underground Facilities:*

1. Underground Facilities are shown or indicated on the Drawings, pursuant to Paragraph 4.04 of the General Conditions, and not in the drawings referred to in Paragraph 5.02.A of these Instructions to Bidders. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data.

5.03 Other Site-related Documents

- A. No other Site-related documents are available.

5.04 Site Visit and Testing by Bidders

- A. Bidder is required to visit the Site and conduct a thorough visual examination of the Site and adjacent areas. During the visit the Bidder must not disturb any ongoing operations at the Site.
- B. A Site visit is scheduled following the Mandatory Pre-Bid Conference. Maps to the Site will be available at the Mandatory Pre-Bid Conference. All Contractors attending the Mandatory Pre-Bid Conference shall be required to attend the site visit.
- C. **Deleted**
- D. Bidders visiting the Site are required to arrange their own transportation to the Site.
- E. All access to the Site other than during a regularly scheduled Site visit must be coordinated through the following Owner or Engineer contact for visiting the Site: **Imperial County Department of Public**

Works, 155 South 11th Street, El Centro, CA 92243. Phone: (442) 265-1818, <https://publicworks.imperialcounty.org> . Bidder must conduct the required Site visit during normal working hours.

- F. Bidder is not required to conduct any subsurface testing, or exhaustive investigations of Site conditions.
- G. On request, and to the extent Owner has control over the Site, and schedule permitting, the Owner will provide Bidder general access to the Site to conduct such additional examinations, investigations, explorations, tests, and studies as Bidder deems necessary for preparing and submitting a successful Bid. Owner will not have any obligation to grant such access if doing so is not practical because of existing operations, security or safety concerns, or restraints on Owner's authority regarding the Site. Bidder is responsible for establishing access needed to reach specific selected test sites.
- H. Bidder must comply with all applicable Laws and Regulations regarding excavation and location of utilities, obtain all permits, and comply with all terms and conditions established by Owner or by property owners or other entities controlling the Site with respect to schedule, access, existing operations, security, liability insurance, and applicable safety programs.
- I. Bidder must fill all holes and clean up and restore the Site to its former condition upon completion of such explorations, investigations, tests, and studies.

5.05 Owner's Safety Program

- A. Site visits and work at the Site may be governed by an Owner safety program. If an Owner safety program exists, it will be noted in the Supplementary Conditions.

5.06 Other Work at the Site

- A. Reference is made to Article 7 of the Supplementary Conditions for the identification of the general nature of other work of which Owner is aware (if any) that is to be performed at the Site by Owner or others (such as utilities and other prime contractors) and relates to the Work contemplated by these Bidding Documents. If Owner is party to a written contract for such other work, then on request, Owner will provide to each Bidder access to examine such contracts (other than portions thereof related to price and other confidential matters), if any.

ARTICLE 6 – BIDDER'S REPRESENTATIONS AND CERTIFICATIONS

6.01 Express Representations and Certifications in Bid Form, Agreement

- A. The Bid Form that each Bidder will submit contains express representations regarding the Bidder's examination of Project documentation, Site visit, and preparation of the Bid, and certifications regarding lack of collusion or fraud in connection with the Bid. Bidder should review these representations and certifications, and assure that Bidder can make the representations and certifications in good faith, before executing and submitting its Bid.
- B. If Bidder is awarded the Contract, Bidder (as Contractor) will make similar express representations and certifications when it executes the Agreement.

ARTICLE 7 - INTERPRETATIONS AND ADDENDA

- 7.01 Owner on its own initiative may issue Addenda to clarify, correct, supplement, or change the Bidding Documents.

- 7.02 Bidder shall submit all questions about the meaning or intent of the Bidding Documents to Engineer in writing. Contact information and submittal procedures for such questions are as follows:
- A. **Imperial County Department of Public Works, 155 South 11th Street, El Centro, CA 92243. Phone: (442) 265-1818, <https://publicworks.imperialcounty.org>**
- 7.03 Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by Addenda delivered to all registered plan holders. **Questions received less than ten (10) days prior to the date for opening of Bids may not be answered.**
- 7.04 Only responses set forth in an Addendum will be binding. Oral and other interpretations or clarifications will be without legal effect. Responses to questions are not part of the Contract Documents unless set forth in an Addendum that expressly modifies or supplements the Contract Documents.

ARTICLE 8 - BID SECURITY

- 8.01 A Bid must be accompanied by Bid security made payable to Owner in an amount of **10 percent** of Bidder's maximum Bid price (determined by adding the base bid and all alternates) and in the form of a Bid bond issued by a surety meeting the requirements of Paragraph 5.01 of the General Conditions. Such Bid bond will be issued in the form included in the Bidding Documents.
- 8.02 The Bid Security of the apparent Successful Bidder will be retained until Owner awards the contract to such Bidder, and such Bidder has executed the Contract, furnished the required Contract security, and met the other conditions of the Notice of Award, whereupon the Bid security will be released. If the Successful Bidder fails to execute and deliver the Contract and furnish the required Contract security within 15 days after the Notice of Award, Owner may consider Bidder to be in default, annul the Notice of Award, and the Bid security of that Bidder will be forfeited, in whole in the case of a penal sum bid bond, and to the extent of Owner's damages in the case of a damages-form bond. Such forfeiture will be Owner's exclusive remedy if Bidder defaults.
- 8.03 The Bid Security of other Bidders that Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of 7 days after the Effective Date of the Contract or 61 days after the Bid opening, whereupon Bid security furnished by such Bidders will be released.
- 8.04 Bid security of other Bidders that Owner believes do not have a reasonable chance of receiving the award will be released within 7 days after the Bid opening.

ARTICLE 9 - CONTRACT TIMES

- 9.01 The number of days within which, or the dates by which, the Work is to be (a) substantially completed and (b) ready for final payment, and (c) Milestones (if any) are to be achieved, are set forth in the Agreement.
- 9.02 **Deleted**
- 9.03 Provisions for liquidated damages, if any, for failure to timely attain a Milestone, Substantial Completion, or completion of the Work in readiness for final payment, are set forth in the Agreement.

ARTICLE 10 – SUBSTITUTE AND “OR EQUAL” ITEMS

10.01 Deleted

10.02 The Contract for the Work, as awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents, and those “or-equal” or substitute or materials and equipment subsequently approved by Engineer prior to the submittal of Bids and identified by Addendum. No item of material or equipment will be considered by Engineer as an “or-equal” or substitute unless written request for approval has been submitted by Bidder and has been received by Engineer within 10 days of the issuance of the Advertisement for Bids or Invitation to Bidders. Each such request must comply with the requirements of Paragraphs 6.05 and 6.06 of the General Conditions, and the review of the request will be governed by the principles in those paragraphs. ~~Each such request shall include the Manufacturer’s Certification for Compliance with AIS. Refer to the Manufacturer’s Certification form provided in these construction Contract Documents.~~ The burden of proof of the merit of the proposed item is upon Bidder. Engineer’s decision of approval or disapproval of a proposed item will be final. If Engineer approves any such proposed item, such approval will be set forth in an Addendum issued to all registered Bidders. Bidders cannot rely upon approvals made in any other manner. ~~Substitutes and “or-equal” materials and equipment may be proposed by Contractor in accordance with Paragraphs 7.05 and 7.06 of the General Conditions after the Effective Date of the Contract. Each such request shall include Manufacturer’s Certification letter to document compliance with AIS requirements of Section 746 of Title VII of the Consolidated Appropriations Act of 2017 (Division A – Agriculture, Rural Development, Food and Drug Administration, and Related Agencies Appropriations Act, 2017) and subsequent statutes mandating domestic preference, if applicable. Refer to Manufacturer’s Certification Letter provided in these Contract Documents.~~

10.03 All prices that Bidder sets forth in its Bid will be based on the presumption that the Contractor will furnish the materials and equipment specified or described in the Bidding Documents, as supplemented by Addenda. Any assumptions regarding the possibility of post-Bid approvals of “or-equal” or substitution requests are made at Bidder’s sole risk.

ARTICLE 11 - SUBCONTRACTORS, SUPPLIERS, AND OTHERS

11.01 Deleted

11.02 The apparent Successful Bidder, and any other Bidder so requested, must submit to Owner a list of the Subcontractors or Suppliers proposed for the following portions of the Work ~~within five days after Bid opening:~~

- A. **Any subcontractor who will perform work in excess of one-half percent of the total bid.**
- B. **Bidder is to submit the Tabulation of Subcontractors form included in these Bidding Documents.**

11.03 If requested by Owner, such list must be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor or Supplier. If Owner or Engineer, after due investigation, has reasonable objection to any proposed Subcontractor, Supplier, individual, or entity, Owner may, before the Notice of Award is given, request apparent Successful Bidder to submit an acceptable substitute, without an increase in Bid price.

11.04 If apparent Successful Bidder declines to make any such substitution, Owner may award the Contract to the next lowest Bidder that proposes to use acceptable Subcontractors and Suppliers. Declining to make requested substitutions will constitute grounds for forfeiture of the Bid security of any Bidder. Any Subcontractor or Supplier, so listed and against which Owner or Engineer makes no written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner and Engineer subject to subsequent revocation of such acceptance as provided in Paragraph 6.06 of the General Conditions.

11.05 The Contractor shall not award work to Subcontractor(s) in excess of the limits stated in SC 6.06H.

ARTICLE 12 – PREPARATION OF BID

12.01 The Bid Form is included with the Bidding Documents.

- A. All blanks on the Bid Form must be completed in ink and the Bid Form signed in ink. Erasures or alterations must be initialed in ink by the person signing the Bid Form. A Bid price must be indicated for each section, Bid item, alternate, adjustment unit price item, and unit price item listed therein.
- B. If the Bid Form expressly indicates that submitting pricing on a specific alternate item is optional, and Bidder elects to not furnish pricing for such optional alternate item, then Bidder may enter the words “No Bid” or “Not Applicable.”

12.02 If Bidder has obtained the Bidding Documents as Electronic Documents, then Bidder shall prepare its Bid on a paper copy of the Bid Form printed from the Electronic Documents version of the Bidding Documents. The printed copy of the Bid Form must be clearly legible, printed on 8½ inch by 11-inch paper and as closely identical in appearance to the Electronic Document version of the Bid Form as may be practical. The Owner reserves the right to accept Bid Forms which nominally vary in appearance from the original paper version of the Bid Form, providing that all required information and submittals are included with the Bid.

12.03 A Bid by a corporation must be executed in the corporate name by a corporate officer (whose title must appear under the signature), accompanied by evidence of authority to sign. The corporate address and state of incorporation must be shown. The corporate seal must be affixed and attested by the corporate secretary or an assistant corporate secretary.

12.04 A Bid by a partnership must be executed in the partnership name and signed by a partner (whose title must appear under the signature), accompanied by evidence of authority to sign. The official address of the partnership must be shown.

12.05 A Bid by a limited liability company must be executed in the name of the firm by a member or other authorized person and accompanied by evidence of authority to sign. The state of formation of the firm and the official address of the firm must be shown.

12.06 A Bid by an individual must show the Bidder’s name and official address.

12.07 A Bid by a joint venture must be executed by an authorized representative of each joint venturer in the manner indicated on the Bid Form. The joint venture must have been formally established prior to submittal of a Bid, and the official address of the joint venture must be shown.

12.08 All names must be printed in ink below the signatures.

12.09 The Bid must contain an acknowledgment of receipt of all Addenda, the numbers of which must be filled in on the Bid Form.

12.10 Postal and e-mail addresses and telephone number for communications regarding the Bid must be shown.

12.11 The Bid must contain evidence of Bidder’s authority to do business in the state where the Project is located, or Bidder must certify in writing that it will obtain such authority within the time for acceptance of Bids and attach such certification to the Bid.

12.12 If Bidder is required to be licensed to submit a Bid or perform the Work in the state where the Project is located, the Bid must contain evidence of Bidder’s licensure, or Bidder must certify in writing that it will obtain such licensure within the time for acceptance of Bids and attach such certification to the Bid. Bidder’s state contractor license number, if any, must also be shown on the Bid Form.

ARTICLE 13 – BASIS OF BID

13.01 *Lump Sum*

- A. Bidders must submit a Bid on a lump sum basis as set forth in the Bid Form.

13.02 **Deleted**

13.03 **Deleted**

13.04 **Deleted**

13.05 *Unit Price*

- A. Bidders must submit a Bid on a unit price basis for each item of Work listed in the unit price section of the Bid Form.
- B. The “Bid Price” (sometimes referred to as the extended price) for each unit price Bid item will be the product of the “Estimated Quantity”, which Owner or its representative has set forth in the Bid Form, for the item and the corresponding “Bid Unit Price” offered by the Bidder. The total of all unit price Bid items will be the sum of these “Bid Prices”; such total will be used by Owner for Bid comparison purposes. The final quantities and Contract Price will be determined in accordance with Paragraph 11.03 of the General Conditions.
- C. Discrepancies between the multiplication of units of Work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.

13.06 *Allowances*

- A. For cash allowances the Bid price must include such amounts as the Bidder deems proper for Contractor's overhead, costs, profit, and other expenses on account of cash allowances, if any, named in the Contract Documents, in accordance with Paragraph 11.02.B of the General Conditions.

13.07 **Deleted**

ARTICLE 14 – SUBMITTAL OF BID

14.01 The Bidding Documents include one separate unbound copy of the Bid Form, and, if required, the Bid Bond Form. The unbound copy of the Bid Form is to be completed and submitted with the Bid security and the other documents required to be submitted under the terms of Article 2 of the Bid Form.

14.02 A Bid must be received no later than the date and time prescribed and at the place indicated in the Advertisement or Invitation for Bids and must be enclosed in a plainly marked package with the Project title, and, if applicable, the designated portion of the Project for which the Bid is submitted, the name and address of Bidder, and must be accompanied by the Bid security and other required documents. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid must be enclosed in a separate package plainly marked on the outside with the notation “BID ENCLOSED.” A mailed Bid must be addressed to the location designated in the Advertisement.

- 14.03 Bids received after the date and time prescribed for the opening of bids, or not submitted at the correct location or in the designated manner, will not be accepted and will be returned to the Bidder unopened.

ARTICLE 15 – MODIFICATION AND WITHDRAWAL OF BID

- 15.01 An unopened Bid may be withdrawn by an appropriate document duly executed in the same manner that a Bid must be executed and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids. Upon receipt of such notice, the unopened Bid will be returned to the Bidder.
- 15.02 If a Bidder wishes to modify its Bid prior to Bid opening, Bidder must withdraw its initial Bid in the manner specified in Paragraph 15.01 and submit a new Bid prior to the date and time for the opening of Bids.
- 15.03 If within 24 hours after Bids are opened any Bidder files a duly signed written notice with Owner and promptly thereafter demonstrates to the reasonable satisfaction of Owner that there was a material and substantial mistake in the preparation of its Bid, the Bidder may withdraw its Bid, and the Bid security will be returned. Thereafter, if the Work is rebid, the Bidder will be disqualified from further bidding on the Work.

ARTICLE 16 – OPENING OF BIDS

- 16.01 Bids will be opened at the time and place indicated in the Advertisement or Invitation for Bids and, unless obviously non-responsive, read aloud publicly. An abstract of the amounts of the base Bids and major alternates, if any, will be made available to Bidders after the opening of Bids.
- 16.02 **Deleted**

ARTICLE 17 – BIDS TO REMAIN SUBJECT TO ACCEPTANCE

- 17.01 All Bids will remain subject to acceptance for the period of time stated in the Bid Form, but Owner may, in its sole discretion, release any Bid and return the Bid security prior to the end of this period.

ARTICLE 18 – EVALUATION OF BIDS AND AWARD OF CONTRACT

- 18.01 Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. Owner also reserves the right to waive all minor Bid informalities not involving price, time, or changes in the Work.
- 18.02 Owner will reject the Bid of any Bidder that Owner finds, after reasonable inquiry and evaluation, to not be responsible.
- 18.03 If Bidder purports to add terms or conditions to its Bid, takes exception to any provision of the Bidding Documents, or attempts to alter the contents of the Contract Documents for purposes of the Bid, whether in the Bid itself or in a separate communication to Owner or Engineer, then Owner will reject the Bid as nonresponsive.
- 18.04 If Owner awards the contract for the Work, such award will be to the responsible Bidder submitting the lowest responsive Bid.
- 18.05 *Evaluation of Bids*
- A. In evaluating Bids, Owner will consider whether the Bids comply with the prescribed requirements, and such alternates, unit prices, and other data, as may be requested in the Bid Form or prior to the Notice of Award.

- B. Deleted
- C. Deleted
- D. Deleted
- E. Deleted
- F. Deleted

- 18.06 In evaluating whether a Bidder is responsible, Owner will consider the qualifications of the Bidder and may consider the qualifications and experience of Subcontractors and Suppliers proposed for those portions of the Work for which the identity of Subcontractors and Suppliers must be submitted as provided in the Bidding Documents.
- 18.07 Owner may conduct such investigations as Owner deems necessary to establish responsibility, qualifications, and financial ability of Bidders and any proposed Subcontractors or Suppliers.
- 18.08 ~~The Contract is to be funded in whole or in part by with funds by the United State Department of Agriculture (USDA) Rural Utilities Service through its Rural Utilities Service program as administered through the USDA Rural Development offices. Concurrence by USDA Rural Development in the award of the Contract is required before the Award of Contract.~~
- 18.09 ~~The Contract is to be funded in part with funds by the California Department of Housing and Community Development (HCD) through its Community Development Block Grant (CDBG) Program. Concurrence by HCD in the award of the Contract is required before the Award of Contract.~~
- 18.10 ~~The Award of Contract is not to be issued prior to the clearance of the Environmental Assessment through its Finding of No Significate Impact (FONSI) and Notice of Intent to Request Release of Funds (NOL/RROF) that has been cleared and approved by the CDBG Program.~~

ARTICLE 19 – BONDS AND INSURANCE

- 19.01 Article 5 of the General Conditions, as may be modified by the Supplementary Conditions, sets forth Owner’s requirements as to performance and payment bonds, other required bonds (if any), and insurance. When the Successful Bidder delivers the executed Agreement to Owner, it must be accompanied by required bonds and insurance documentation.
- 19.02 Article 8, Bid Security, of these Instruction to Bidders addresses any requirements for providing bid bonds as part of the bidding process.

ARTICLE 20 – SIGNING OF AGREEMENT

- 20.01 When Owner issues a Notice of Award to the successful Bidder, it will be accompanied by the unexecuted counterparts of the Agreement along with the other Contract Documents as identified in the Agreement. Within 15 days thereafter, Successful Bidder must execute and deliver the required number of counterparts of the Agreement and any bonds and insurance documentation required to be delivered by the Contract Documents to Owner. Within 10 days thereafter, Owner will deliver one fully executed counterpart of the Agreement to Successful Bidder, together with printed and electronic copies of the Contract Documents as stated in Paragraph 2.02 of the General Conditions.

ARTICLE 21 – SALES AND USE TAXES

21.01 Contractor shall pay all sales, use and other taxes as specified in Paragraph 6.10 of the General Conditions.

ARTICLE 22 – CONTRACTS TO BE ASSIGNED

22.01 **There are no procurement contracts of which the Contractor will be required to accept assignment previously entered into by the Owner for the direct purchase of goods and special services.**

ARTICLE 23 – FEDERAL REQUIREMENTS

23.01 If the contract price is in excess of \$100,000, provisions of the Contract Work Hours and Safety Standards Act at 29 CFR 5.5(b) apply.

23.02 **Federal requirements of Article 18 of the General Conditions apply to this Contract.**

~~23.03 American Iron and Steel requirements apply to this project.~~

23.04 **All types of business entity formations, including sole proprietorships and non-profit organizations, are considered entities under the federal regulations and must be registered in SAM.gov.**

SAM.gov registration, with a Unique Entity Identifier (UEI), is required for Bidders and Subcontractors for this project. If the Bidder and Subcontractors are not fully registered with a UEI and provided with the Bid, the Bidder and Subcontractors are to submit proof of active registration with the Bid, such as screenshot or registration completion receipt. The Bidder and Subcontractors must have completed the SAM.gov registration process with a UEI prior to Award of Contract.

ARTICLE 24 – WORKERS’ COMPENSATION REQUIREMENTS

24.01 As required by Section 1860 of the California Labor Code and in accordance with the provisions of Section 3700 of the Labor Code, every contractor will be required to secure the payment of workers’ compensation to its employees.

24.02 In accordance with Section 1861 of the California Labor Code, the contractor shall furnish the owner with a statement as follows: “I am aware of the provisions of 3700 of the Labor Code which requires every employer to be insured against liability for worker’s compensation or to undertake self-insurance in accordance with the provisions of that code, and I will comply with such provisions before commencing the performance of the work of this contract.”

ARTICLE 25 – WAGE RATE REQUIREMENTS

25.01 The prevailing wage rates of the State of California apply to this contract as do any requirements of the State of California associated with the use of these State Prevailing wages.

25.02 Prevailing Wages: Notice is hereby given that pursuant to 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 of per diem wages and the general prevailing rate for holidays and overtime work for each craft, classification, or type of worker required to execute the contract. A copy of said prevailing rate of per diem wages is on file in the principal office of the owner, to which reference is hereby made for further particulars. Said prevailing rate

of per diem wages will be made available to any interested party upon request, and a copy thereof shall be posted at each job site.

- 25.03 Statutory Penalty For Failure to Pay Minimum Wages: In accordance with 1775 (a) through (c) of the California Labor Code, the contractor shall as a penalty to the State of political subdivision on whose behalf a contract is made or awarded, forfeit the current statutory penalty for each calendar day or portion thereof, for each worker paid less than the prevailing wage rates as determined by the director for the work or craft in which the worker is employed for any public work done under the contract by the contractor or, except as provided in subdivision 1775 (b), by any subcontractor under the contractor.
- 25.04 Statutory Penalty for Unauthorized Overtime Work: In accordance with Section 1813 of the California Labor Code, the contractor shall as a penalty to the State or political subdivision on whose behalf the contract is made or awarded, forfeit the current statutory penalty for each worker employed in the execution of the contract by the respective contractor or subcontractor for each calendar day during which said worker is required or permitted to work more than 8 hours in any one calendar day and 40 hours in any one calendar week in violation of Sections 1810-1815 of the California Labor Code.
- 25.05 Requirements: Contractor agrees to comply with Sections 1777.5, 1777.6 and 1777.7 of the California Labor Code relating to the employment of apprentices. The responsibility for compliance with these provisions is fixed with the prime contractor for all apprenticeship occupations. Under these sections of the law, contractors and subcontractors must employ apprentices in apprenticeship occupations, where journeymen in the craft are employed on the public work, in a ratio of not less than one apprentice hour for each five journeymen hours (unless an exemption is granted in accordance with 1777.5) and contractors and subcontractors shall not discriminate among otherwise qualified employees as indentured apprentices on any public work solely on the ground of race, religious creed, color, national origin, ancestry, sex, or age, except as provided in 3077 of the Labor Code. Only apprentices, as defined in 3077, which provides that an apprentice must be at least 16 years of age, who are in training under apprenticeship standards and who have signed written apprentice agreements will be employed on public works in apprenticeship occupations.
- 25.06 Payroll Records: Contractor shall keep accurate payroll records in format specified by the Division of Labor Standards Enforcement. Said information shall include, but not be limited to, a record of the name, address, social security number, work classification, straight time and overtime hours worked each day and week, and actual per diem wages paid to each journeyman, apprentice, or worker employed by the contractor. Copies of such record shall be made available for inspection at all reasonable hours, and a copy shall be made available to employee or his authorized representative, the Division of Labor Standards Enforcement, and the Division of Apprenticeship Standards in compliance with California Labor Code, Section 1776. Contractor and subcontractors shall furnish and submit electronic certified payrolls directly to the Labor Commissioner, and duplicate copies available to the owner.

ARTICLE 26 – SUBCONTRACTOR LISTING LAW

- 26.01 In accordance with Section 4104 of the California Public Contract Code, each bidder, in his or her bid, shall set forth the name and the location of the place of business of each subcontractor who will perform work or labor or render service to the prime contractor in or about the construction of the work or improvement, or a subcontractor licensed by the State of California who, under subcontract to the prime contractor, specially fabricates and installs a portion of the work or improvement according to detailed drawings contained in the plans and specifications, in an amount in excess of one-half of one percent of the prime contractor's total Lump Sum bid.
- 26.02 In accordance with Section 4107 of the California Public Contract Code, no contractor whose bid is accepted shall without consent of the owner either: (a) substitute a person as a subcontractor in place of the subcontractor listed in the original bid; or (b) permit a subcontract to be voluntarily assigned or transferred or allow it to be performed by anyone other than the original subcontractor listed in the original

bid; or (c) sublet or subcontract any portion of the work in excess of one-half of one percent of the prime contractor's total bid as to which his or her original bid did not designate a subcontractor.

- 26.03 Penalties for failure to comply with the foregoing sections of the California Public Contract Code are set forth in Sections 4106, 4110, and 4111 of the Public Contract Code. A prime contractor violating this law violates his or her contract and the awarding authority may exercise the option, in its own discretion, of (1) canceling his or her contract or (2) assessing the prime contractor a penalty in an amount of not more than 10 percent of the amount of the subcontract involved, and this penalty shall be deposited in the fund out of which the prime contract is awarded. In any proceedings under this section the prime contractor shall be entitled to a public hearing and to five (5) days' notice of the time and place thereof.

ARTICLE 27 – REGISTRATION WITH DEPARTMENT OF INDUSTRIAL RELATIONS

- 27.01 This project is subject to compliance monitoring and enforcement by the Department of Industrial Relations. No contractor or subcontractor may be listed on a bid proposal for a public works project unless registered with the Department of Industrial Relations pursuant to Labor Code Section 1725.5 [with limited exceptions from this requirement for bid purposes only under Labor Code Section 1711.1(a)]. No contractor or subcontractor may be awarded a contract for public work on a public work on a public works project unless registered with the Department of Industrial Relations pursuant to Labor Code Section 1725.5.

3. WAGE REQUIREMENTS

Federal Davis-Bacon and Related Acts

- ~~A. This Public Works project is a multi-agency funded project and requires compliance with both California's Department of Industrial Relations requirements and the California Labor Codes for a Public Works project and the federal, Davis Bacon and Related Acts. This includes the current wage decisions.~~
- ~~B. This project requires compliance with the Davis Bacon and Related Acts (DBRA) and adherence to the current U.S. Department of Labor Wage Decision. The Contractor and subcontractors must comply with the minimum rates for wages for laborers and mechanics as determined by the Secretary of Labor in accordance with the provisions of the Davis Bacon Act (DBA) CA20230002, dated 09/15/2023, as specified in 29 CFR Parts 1, 3, 5, 6 and 7, and Related Acts. The Contract provisions and related matters set forth in 29 CFR Part 5 Section 5.5 are hereby made a part of this Contract. Attention is called to the fact that not less than the minimum salaries and wages set forth in the Contract Documents must be paid on this project. The Wage Decision, including modification, must be posted by the Contractor on the job site.~~
- ~~C. Published in Chapter 3, section 276(a) 7 et seq. of U.S.C. Title 40. The DBRA requires all contractors and subcontractors performing work on federal construction contracts or federally assisted contracts in excess of \$2,000 to pay their laborers and mechanics not less than the prevailing wage rates and fringe benefits for corresponding classes of laborers and mechanics employed on similar projects in the area. The prevailing wage rates and fringe benefits are determined by the Secretary of Labor for inclusion in covered contracts.~~

California Department of Industrial Relations

- A. This is a Public Works Project subject to the rate of prevailing wages as established by the California Department of Industrial Relations. The California date for the wage decisions is the date of the bid advertising thus requiring compliance with **California, Imperial County 2024-1 and various pre determined increases.**
- B. Notice is hereby given that, pursuant to 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 of per diem wages and the general prevailing rate for holidays and overtime work for each craft, classification, or type of worker required to execute the Contract. A copy of said prevailing rate of per diem wages is on file in the principal office of the Owner, to which reference is hereby made for further particulars. Said prevailing rate of per diem wages will be made available to any interested party upon request, and a copy thereof shall be posted at each job site.
- C. This project is subject to compliance monitoring and enforcement by the Department of Industrial Relations. Prospective Bidders may obtain the general wage rates directly from the State of California Department of Industrial Relations at their web site at www.dir.ca.gov or by requesting a CD from the State. The Contractor shall keep an up-to-date listing of the general prevailing wage rates posted at the jobsite at all times.

- D. All contractors and subcontractors are subject to the application of Section 1720 et seq. of the California Labor Code which details the regulations and procedures governing the payment of State prevailing wages. ~~Bidders are notified that the higher of either the Davis-Bacon or the State prevailing wage rate shall apply.~~
- E. All contractors and subcontractors who bid or work on a public works project must register and pay an annual fee to the State of California, Department of Industrial Relations (DIR) per SB 854.
- F. No Contractor or subcontractor may be listed on a bid proposal for a public works project unless registered with the Department of Industrial Relations pursuant to Labor Code section 1725.5 [with limited exceptions from this requirement for bid purposes only under Labor Code section 1771.1(a)].
- G. No Contractor or subcontractor may be 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.
- H. The awarding body must post or require the prime Contractor to post job site notices prescribed by regulation. (See 8 Calif. Code Reg. §16451(d) for the notice that previously was required for projects monitored by the CMU.)
- I. *All contractors and subcontractors must furnish electronic certified payroll records directly to the Labor Commissioner (aka California Division of Labor Standards Enforcement).*
- J. All contractors and subcontractors are subject to the provisions of Section 3700 of the California Labor Code which requires that every employer be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of the code.

Statutory Penalty for Failure to Pay Minimum Wage

- A. In accordance with 1775 of the California Labor Code, the Contractor shall as a penalty to the State or political subdivision on whose behalf a Contract is made or awarded, forfeit **fifty dollars (\$50.00)**, or latest rate, for each calendar day or portion thereof, for each worker paid less than the stipulated prevailing rate for any public work done under the Contract by the Contractor or by any Subcontractor under the Contractor.

Statutory Penalty for Unauthorized Overtime Work

- A. In accordance with 1813 of the California Labor Code, the Contractor shall as a penalty to the State or political subdivision on whose behalf the Contract is made or awarded, forfeit **twenty-five dollars (\$25.00)** for each worker employed in the execution of the Contract by the Contractor or by any Subcontractor for each calendar day during which said worker is required or permitted to work more than eight hours in any one calendar day and forty hours in any one calendar week in violation of 1810-1815 of the California Labor Code.

Apprenticeship Requirements

- A. The CONTRACTOR agrees to comply with 1777.5, 1777.6 and 1777.7 of the California Labor Code relating to the employment of apprentices. The responsibility for compliance with these provisions is fixed with the prime contractor for all apprenticeship occupations. Under these sections of the law, Contractors and Subcontractors must employ apprentices in apprenticeship occupations, where journeymen in the craft

are employed on the public work, in a ratio of not less than one (1) apprentice hour for each five (5) journeymen hours (unless an exemption is granted in accordance with 1777.5) and Contractors and Subcontractors shall not discriminate among otherwise qualified employees as indentured apprentices on any public work solely on the ground of race, religious creed, color, national origin, ancestry, sex, or age, except as provided in 3077 of the Labor Code. Only apprentices, as defined in 3077, which provides that an apprentice must be at least sixteen (16) years of age, who are in training under apprenticeship standards and who have signed written apprentice agreements will be employed on public works in apprenticeship occupations.

Copeland “Anti-Kickback” Act

- A. Published in Chapter 3, section 276(c) of U.S.C. Title 40. The Copeland “Anti-Kickback” Act generally prohibits federal contractors or subcontractors engaged in building construction or repair from inducing an employee to give up any part of the compensation to which he or she is entitled under his or her employment contract and requires such contractors and subcontractors to submit weekly statements of compliance.

Payroll Records

- A. The Contractor shall keep accurate payroll records on forms provided by the Division of Labor Standards Enforcement, or alternatively, the Contractor shall keep accurate payroll records containing the same information. Said information shall include, but not be limited to, a record of the name, address, social security number, work classification, straight time and overtime hours worked each day and week, and actual per diem wages paid to each journeyman, apprentice, or worker employed by the Contractor. Such record shall be made available for inspection at all reasonable hours, and a copy shall be made available to the employee or his authorized representative, the Division of Labor Standards Enforcement, and the Division of Apprenticeship Standards in compliance with California Labor Code, Section 1776. Upon written notice from the OWNER or the Division of Labor Standards Enforcement, the Contractor shall, within **ten (10) days**, file with the Owner a certified copy of the payroll records. The Contractor shall cause an identical clause to be included in every subcontract for the Work.

HUD Contract Requirements

- ~~A. The Contractor and Subcontractors on this project must comply with U.S. Department of Housing and Urban Development (HUD) contract provisions 24 CFR part 85.36(i), the Federal Davis-Bacon and Related Acts, California Department of Regulations Wage Determinations and California Labor Codes pertaining to Public Works projects.~~

Project Specific Wage Rates

- ~~A. The following Federal (Davis Bacon and Related Acts) specific wage rates follow this specifications section.~~

4. BID FORM FOR CONSTRUCTION CONTRACT

ARTICLE 1—OWNER AND BIDDER

- 1.01 This Bid is submitted to: **Imperial County**
Office of the Clerk of the Board of Supervisors
940 W. Main Street, Suite 209
El Centro, CA 92243
- 1.02 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

ARTICLE 2—ATTACHMENTS TO THIS BID

- 2.01 The following documents are submitted with and made a condition of this Bid:
- A. Signed Non-Collusion Affidavit (Section 00420 – Non Collusion Affidavit);
 - B. Required Bid Security (Section 00430 – Bid Bond);
 - C. If Bid amount exceeds \$10,000, signed Compliance Statement/Certifications of Non-Segregated Facilities (Section 00440 – Compliance Statement);
 - D. If Bid amount exceeds \$25,000, signed Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion - Lower Tier Covered Transactions (Section 00450 – Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion);
 - E. If Bid amount exceeds \$25,000, Federal and State Contract Language Inclusion (Section 00451 – Federal and State Contract Language Inclusion);
 - F. If Bid amount is or exceeds \$1,000,000, signed Iran Contracting Act Certification (Section 00452 – Iran Contracting Act Certification);
 - G. If Bid amount exceeds \$100,000, signed Certification for Contracts, Grants, and Loans (Section 00460 - Certification for Contracts, Grants and Loans);
 - H. Signed Worker’s Compensation Certification (Section 00470 – Contractor’s Certification Regarding Worker’s Compensation Insurance)
 - I. List of Proposed Subcontractors (Section 00480 Tabulation of Subcontractors);
 - J. Required Bidder Qualification Statement with supporting data (Section 00490 – Bidder Qualifications Statement);
 - K. List of Major Material Suppliers (Section 00500 – Tabulation of Major Material Suppliers);
 - L. Evidence of authority to do business in the state of the Project; or a written covenant to obtain such authority within the time for acceptance of Bids (On Bid Form);
 - M. Contractor’s license number as evidence of Bidder’s State Contractor’s License or a covenant by Bidder to obtain said license within the time for acceptance of Bids; Contractor’s DIR Registration Number and Contractor’s Sam.gov UEI Number (on Bid Form);

ARTICLE 3—BASIS OF BID—LUMP SUM BID

3.01 *Lump Sum Bids*

- A. Each Basis of Bid Item shall be completed in accordance with the Project Manual as defined in Supplementary Condition Item SC-1.01.A.35 on page 00800-2, the Improvement Plans dated 7/12/2024 and any Addendum(a).
- B. Bidder will perform the following work for the indicated lump sum amounts.
- C. Bidder acknowledges that:
 - 1. Each Lump Sum Amount includes an amount considered by Bidder to be adequate to cover Contractor’s overhead and profit for each separately identified item.
 - 2. ~~Estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for all Unit Price Work will be based on actual quantities, determined as provided in the Contract Document.~~

<u>Item No.</u>	<u>Description</u>	<u>Lump Sum Amount</u>
1.	COMPLETION OF <i>PROJECT MOBILIZATION</i> IN ACCORDANCE WITH TECHNICAL SPECIFICATION SECTION 01505; THE IMPROVEMENT PLANS; THE PROJECT MANUAL AND ANY ADDENDUM(A).	\$ _____
2.	COMPLETION OF <i>SUBMITTAL DOCUMENTS</i> PER TECHNICAL SPECIFICATION SECTION 01300; THE IMPROVEMENT PLANS; THE PROJECT MANUAL AND ANY ADDENDUM(A).	\$ _____
3.	COMPLETE <i>SITE DEMOLITION</i> ITEMS IN ACCORDANCE WITH DEMOLITION SITE PLAN SHEET 3, TECHNICAL SPECIFICATION SECTION 02050; THE PROJECT MANUAL AND ANY ADDENDUM(A).	\$ _____
4.	COMPLETE <i>LOCATION OF UNDERGROUND UTILITIES</i> IN ACCORDANCE WITH UNDERGROUND UTILITY NOTE ON PLAN SHEET 3; THE PROJECT MANUAL AND ANY ADDENDUM(A).	\$ _____
5.	<i>CONSTRUCT PARKING LOT, GENERATOR SET FOUNDATION SHADE STRUCTURE AND ALL OTHER ITEMS</i> AS ILLUSTRATED ON PLAN SHEETS 4, 5, 6 AND 7; TECHNICAL SPECIFICATION SECTIONS 02200, 03100, 03200, 03290, 03300 AND 03315; THE PROJECT MANUAL AND ANY ADDENDUM(A).	\$ _____

<u>Item No.</u>	<u>Description</u>	<u>Lump Sum Amount</u>
6.	<i>COMPLETE EARTHWORK RELATED GEOTECHNICAL TESTING AS INCLUDED IN EARTHWORK TECHNICAL SPECIFICATION 02200 – SUBSECTION 3.09; THE PLANS; THE PROJECT MANUAL AND ANY ADDENDUM(A).</i>	\$ _____
7.	<i>COMPLETE CONCRETE RELATED GEOTECHNICAL TESTING AS INCLUDED IN CAST-IN-PLACE CONCRETE TECHNICAL SPECIFICATION SECTION 03300 – SUBSECTION 1.05; THE PLANS; THE PROJECT MANUAL AND ANY ADDENDUM(A).</i>	\$ _____
8.	<i>COMPLETE CONSTRUCTION STAKING AS INCLUDED IN EARTHWORK TECHNICAL SPECIFICATION 02200 – SUBSECTION 3.11; THE PLANS; THE PROJECT MANUAL AND ANY ADDENDUM(A).</i>	\$ _____
9.	<i>COMPLETE OPERATIONS BUILDING SITE/DEMOLITION WORK IN ACCORDANCE WITH PLAN SHEET 8; THE PROJECT MANUAL AND ANY ADDENDUM(A).</i>	\$ _____
10.	<i>COMPLETE INSTALLATION OF THE VERTICAL MULTISTAGE BOOSTER PUMP STATION, PUMP SKID, ELECTRICAL CONTROL PANEL WITH AIR CONDITIONING SYSTEM, FLOW METERING SYSTEM, PIPING, FITTINGS, VALVES AND ALL OTHER ITEMS ILLUSTRATED ON PLAN SHEETS 9, 10, 11, 12 AND 14; TECHNICAL SPECIFICATION SECTIONS 01660, 01730, 02050, 02630, 02640, 02650, 02666, 02670, 03100, 03200, 15,380, 15,400 AND 15450; SPECIAL CONDITION SECTION 00840-1; THE PROJECT MANUAL AND ANY ADDENDUM(A).</i>	\$ _____
11.	<i>COMPLETE THE INSTALLATION OF THE SHORT DURATION TEMPORARY BYPASS SYSTEM IN CONFORMANCE WITH THE SHORT DURATION TEMPORARY BYPASS KEYNOTES AND NOTES ON PLAN SHEET 13; TEMPORARY PERCOLATION POND CALLOUTS AND PLAN ILLUSTRATION ON PLAN SHEET 13; DETAIL I ON PLAN SHEET 14; ELECTRICAL PLAN SHEETS 15 THROUGH 17; ELECTRICAL TECHNICAL SPECIFICATIONS; SPECIAL CONDITION SECTION 00840- SUBSECTION 1; THE PROJECT MANUAL AND ANY ADDENDUM(A).</i>	\$ _____

<u>Item No.</u>	<u>Description</u>	<u>Lump Sum Amount</u>
12.	<p><i>COMPLETE THE INSTALLATION OF THE LONG TERM DURATION TEMPORARY BYPASS SYSTEM IN CONFORMANCE WITH THE LONGTERM DURATION TEMPORARY BYPASS KEYNOTES ON PLAN SHEET 13; SECTION M-M ON PLAN SHEET 14; DETAIL J ON PLAN SHEET 14; ELECTRICAL PLAN SHEETS 15 THROUGH 17; ELECTRICAL TECHNICAL SPECIFICATIONS; SPECIAL CONDITION SECTION 00840 - SUBSECTION 1; THE PROJECT MANUAL AND ANY ADDENDUM(A).</i></p>	\$ _____
13.	<p><i>COMPLETE THE INSTALLATION OF THE ELECTRICAL AND CONTROL SYSTEM WORK INCLUDING THE WORK REQUIRED UNDER THE IMPERIAL IRRIGATION DISTRICT CUSTOMER SERVICE PROPOSAL INCLUDED IN SPECIAL CONDITION SECTION 00840-2; ON ELECTRICAL PLAN SHEETS 15 THROUGH 17, THE ELECTRICAL TECHNICAL SPECIFICATIONS, SPECIAL CONDITION SECTION 00840 – SUBSECTION 1 AND 3; ALL ELECTRICAL WORK ASSOCIATED WITH PLAN SHEETS 3, 4, 5, 9, 11, 13 AND 14; ELECTRICAL POWER AND CONTROL CIRCUITRY INSTALLATION FOR THE FLOWMETERING SYSTEM; POWER AND CONTROL CIRCUITRY INSTALLATION FOR THE BOOSTER PUMP STATION CONTROL PANEL AND AIR CONDITIONING SYSTEM; POWER AND CONTROL CIRCUITRY FOR THE MULTISTAGE VERTICAL BOOSTER PUMP STATION; POWER AND CONTROL CIRCUITRY FOR THE GENERATOR SET AND AUTOMATIC TRANSFER SWITCH, ALL ELECTRICAL WORK ASSOCATED WITH TECHNICAL SPECIFICATION SECTION 15380; COMPLETION OF WORK ASSOCIATED WITH TECHNICAL SPECIFICATIONS 01660, 01730; THE PROJECT MANUAL AND ANY ADDENDUM(A). FOR CLARIFICATION PURPOSES THE GENERATOR SET EARTH PAD, PCC PAD AND GRADING WORK IS INCLUDED IN ITEM 5 OF THIS BASIS OF BID – BID FORM. THE INSTALLATION OF THE GENERATOR SET, TRANSFER SWITCH, GENERATOR CONDUITS AND CONDUCTORS, GENERATOR REMOTE ANNUNCIATOR AND ALL OTHER GENERATOR ELECTRICAL ITEMS ARE INCLUDED WITH THIS BASIS OF BID – BID FORM ITEM.</i></p>	\$ _____

BASE BID – TOTAL OF ITEMS 1 THROUGH 13 \$ _____

NOTE: THE AWARD OF CONTRACT WILL BE DETERMINED BY THE LOWEST, RESPONSIVE, RESPONSIBLE **BASE BID**.

ARTICLE 4—BASIS OF BID—COST PLUS FEE

Deleted

ARTICLE 5—PRICE PLUS TIME BID

Deleted

ARTICLE 6—TIME OF COMPLETION

6.01 Bidder agrees that the Work will be substantially complete and will be completed and ready for final payment in accordance with Paragraph 14.06 of the General Conditions on or before the dates or within the number of calendar days indicated in the Agreement.

6.02 Deleted

6.03 Deleted

6.04 Bidder accepts the provisions of the Agreement as to liquidated damages.

ARTICLE 7—BIDDER’S ACKNOWLEDGEMENTS: ACCEPTANCE PERIOD, INSTRUCTIONS, AND RECEIPT OF ADDENDA

7.01 *Bid Acceptance Period*

A. This Bid will remain subject to acceptance for 60 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

7.02 *Instructions to Bidders*

A. Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security.

7.03 *Receipt of Addenda*

A. Bidder hereby acknowledges receipt of the following Addenda:

Addendum Number	Addendum Date

ARTICLE 8—BIDDER’S REPRESENTATIONS AND CERTIFICATIONS

8.01 *Bidder’s Representations*

A. In submitting this Bid, Bidder represents the following:

1. Bidder has examined and carefully studied the Bidding Documents, including Addenda.
2. Bidder has visited the Site, conducted a thorough visual examination of the Site and adjacent areas, and become familiar with the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
3. Bidder is familiar with all Laws and Regulations that may affect cost, progress, and performance of the Work.
4. Bidder has carefully studied the reports of explorations and tests of subsurface conditions at or adjacent to the Site and the drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, with respect to the Technical Data in such reports and drawings.
5. Bidder has carefully studied the reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, with respect to Technical Data in such reports and drawings.
6. Bidder has considered the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Technical Data identified in the Supplementary Conditions or by definition, with respect to the effect of such information, observations, and Technical Data on (a) the cost, progress, and performance of the Work; (b) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, if selected as Contractor; and (c) Bidder’s (Contractor’s) safety precautions and programs.
7. Based on the information and observations referred to in the preceding paragraph, Bidder agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract.
8. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.
9. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and of discrepancies between Site conditions and the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.
10. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.
11. The submission of this Bid constitutes an incontrovertible representation by Bidder that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

8.02 *Bidder’s Certifications*

A. The Bidder certifies the following:

1. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation.
2. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid.
3. Bidder has not solicited or induced any individual or entity to refrain from bidding.

Gateway County Service Area Water Treatment Plant Improvements

- 4. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 8.02.A:
 - a. Corrupt practice means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process.
 - b. Fraudulent practice means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition.
 - c. Collusive practice means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels.
 - d. Coercive practice means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

BIDDER hereby submits this Bid as set forth above:

Bidder:

_____ *(typed or printed name of organization)*

By: _____ *(individual's signature)*

Name: _____ *(typed or printed)*

Title: _____ *(typed or printed)*

Date: _____ *(typed or printed)*

If Bidder is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.

Attest: _____ *(individual's signature)*

Name: _____ *(typed or printed)*

Title: _____ *(typed or printed)*

Date: _____ *(typed or printed)*

Address for giving notices:

Gateway County Service Area Water Treatment Plant Improvements

Bidder's Contact:

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Phone: _____

Email: _____

Address: _____

Bidder's Contractor License No.

Employer's Tax ID Number _____

5. NON COLLUSION AFFIDAVIT
(Public Contract Code Section 7106)

State of California

County of _____

_____, being first duly sworn, deposes and says that he or she is _____ of _____, the party making the foregoing bid, 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 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.

By: _____

Subscribed and sworn to before me on _____
(Date)

(Notary Public)

(SEAL

6. BID BOND

Any singular reference to Bidder, Surety, Owner, or other party shall be considered plural where applicable.

BIDDER (Name and Address):

SURETY (Name and Address of Principal Place of Business):

OWNER (Name and Address):

**County of Imperial
Imperial County Department of Public Works
940 W. Main Street, Suite 209
El Centro, CA 92243**

BID:

Bid Due Date:

Project: **Gateway County Service Area Water Treatment Plant Improvements**

BOND

Bond Number:

Date (Not later than Bid due date):

Penal sum _____ (Words) _____ (Figures)

Surety and Bidder, intending to be legally bound hereby, subject to the terms printed on the reverse side hereof, do each cause this Bid Bond to be duly executed on its behalf by its authorized officer, agent, or representative.

BIDDER

SURETY

Bidder's Name and Corporate Seal (Seal) _____
Surety's Name and Corporate Seal (Seal)

By: _____
Signature and Title

By: _____
Signature and Title
(Attach Power of Attorney)

Attest: _____
Signature and Title

Attest: _____
Signature and Title

Note: Above addresses are to be used for giving required notice.

1. The Bidder and the Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to pay to the Owner upon default of the Bidder the penal sum set forth on the face of this Bond. Payment of the penal sum is the extent of the Surety's liability.
2. Default of the Bidder shall occur upon the failure of the Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by the Owner) the executed Agreement required by the Bidding Documents and the Performance and Payment Bonds required by the Bidding Documents.
3. This obligation shall be null and void if:
 - 3.1 The Owner accepts the Bidder's Bid and the Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by the Owner) the executed Agreement required by the Bidding Documents and the Performance and Payment Bonds required by the Bidding Documents, or
 - 3.2 All Bids are rejected by the Owner, or
 - 3.3 The Owner fails to issue a Notice of Award to the Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by the Bidder and, if applicable, consented to by the Surety when required by Paragraph 5 hereof).
4. Payment under this Bond will be due and payable upon default by the Bidder and within **thirty (30) calendar days** after receipt by the Bidder and the Surety of written notice of default from Owner, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.
5. The Surety waives notice of any and all defenses based upon or arising out of any time extension to issue the Notice of Award agreed to in writing by the Owner and the Bidder, provided that the total time for issuing the Notice of Award including extensions shall not in the aggregate exceed **one hundred and twenty (120) days** from Bid due date without the Surety's written consent.
6. No suit or action shall be commenced under this Bond prior to **thirty (30) calendar days** after the notice of default required in Paragraph 4 above is received by the Bidder and the Surety and in no case later than **one (1) year** after the Bid due date.
7. Any suit or action under this Bond shall be commenced only in a court of competent jurisdiction located in the State of California.
8. Notices required hereunder shall be in writing and sent to the Bidder and the Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Registered or Certified Mail, return receipt requested, postage pre-paid, and shall be deemed to be effective upon receipt by the party concerned.
9. The Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of the Surety to execute, seal, and deliver such Bond and bind the Surety thereby.
10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond shall be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect.
11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

7. CERTIFICATION OF NON-SEGREGATED FACILITIES

A certification of Nonsegregated Facilities, as required by the May 9, 1967, order (32F.R. 7439, May 19, 1967) on Elimination of Segregated Facilities, by the Secretary of Labor, must be submitted prior to the award of a subcontract exceeding \$10,000 which is not exempt from the provisions of the Equal Opportunity Clause. The certification may be submitted either for each subcontract or for all subcontracts during a period (i.e., quarterly, semiannually, or annually)

NOTE: The penalty for making false statements in offers is prescribed in 18 U.S.C. 1001.

Date: _____

Signature of Bidder or Prospective Contractor

Address (including Zip Code)

8. CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION – LOWER TIER COVERED TRANSACTIONS

This certification is required by the regulations implementing Executive Order 12549, Debarment and Suspension, 7 CFR Part 3017.510, Participants' responsibilities. The regulations were published as Part IV of the January 30, 1989, Federal Register (pages 4722-4733). Copies of the regulations may be obtained by contacting the Department of Agriculture agency with which this transaction originated.

(BEFORE COMPLETING CERTIFICATION, READ INSTRUCTIONS ON REVERSE)

- (1) The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.
- (2) Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

Organization Name PR/Award Number or Project Name

Name(s) and Title(s) of Authorized Representative(s)

Signature(s) Date

Form AD-1048 (1/92)

Instructions for Certification

1. By signing and submitting this form, the prospective lower tier participant is providing the certification set out on the reverse side in accordance with these instructions.
2. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.
3. The prospective lower tier participant shall provide immediate written notice to the person to whom this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.
4. The terms “covered transaction,” “debarred,” “suspended,” “ineligible,” “lower tier covered transaction,” “participant,” “person,” “primary covered transaction,” “principal,” “proposal,” and “voluntarily excluded,” as used in this clause, have the meanings set out in the Definitions and Coverage sections of rules implementing Executive Order 12549. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations.
5. The prospective lower tier participant agrees by submitting this form that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated.
6. The prospective lower tier participant further agrees by submitting this form that it will include this clause titled “Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion – Lower Tier Covered Transactions,” without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions.
7. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that it is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant may decide the method and frequency by which it determines the eligibility of its principles. Each participant may, but is not required to, check the Nonprocurement List.
8. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of a participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.
9. Except for transactions authorized under paragraph 5 of these instructions, if a participant in a covered transaction knowingly entered into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

Form AD-1048 (1/92)

9. FEDERAL AND STATE CONTRACT LANGUAGE INCLUSION

Required contract language for all state Public Works construction contracts between an awarding agency and the bidder (prime contractor); subcontractor contracts with the prime contractor; and any lower tier subcontracts.

CALIFORNIA LABOR CODES:

This Public Works project is funded by Agencies in California and requires compliance with the California Labor Standards, California Code of Regulations pertaining to Public Works projects, California Labor Codes and the California prevailing wage requirements with special attention to CLC §1720, CLC §1770, CLC § 1771, CLC § 1775, CLC § 1776, CLC §1777.5, CLC §1777.7, CLC §1810 through § 1815 and CLC §3700.

The contract executed between the contractor and the subcontractor or the performance of work on the public works project shall include a copy of the provisions of Sections 1771, 1775, 1776, 1777.5, 1813, and 1815.

CLC § 1727; (a) Before making payments to the contractor of money due under a contract for public work, the awarding body shall withhold and retain there from all amounts required to satisfy any civil wage and penalty assessment issued by the Labor Commissioner under this chapter. The amounts required to satisfy a civil wage and penalty assessment shall not be disbursed by the awarding body until receipt of a final order that is no longer subject to judicial review. Etc.

CLC § 1729; It shall be lawful for any contractor to withhold from any subcontractor under him sufficient sums to cover any penalties withheld from him by the awarding body on account of the subcontractor's failure to comply with the terms of this chapter, and if payment has already been made to the subcontractor the contractor may recover from him the amount of the penalty or forfeiture in a suit at law.

CLC § 1729; It shall be lawful for any contractor to withhold from any subcontractor under him sufficient sums to cover any penalties withheld from him by the awarding body on account of the subcontractor's failure to comply with the terms of this chapter, and if payment has already been made to the subcontractor the contractor may recover from him the amount of the penalty or forfeiture in a suit at law. Etc.

CLC § 1771.2; A joint labor-management committee established pursuant to the federal Labor Management Cooperation Act of 1978 (Section 175a of Title 29 of the United States Code) may bring an action in any court of competent jurisdiction against an employer that fails to pay the prevailing wage to its employees, as required by this article.

PENALTIES FOR INCORRECT WAGES

CLC § 1775; (a) (1) The contractor and any subcontractor under the contractor shall, as a penalty to the state or political subdivision on whose behalf the contract is made or awarded, forfeit not more than fifty dollars (\$50) for **each calendar day**, or portion thereof, for each worker paid less than the prevailing wage rates as determined by the director for the work or craft in which the worker is employed for any public work done under the contract by the contractor or, except as provided in subdivision (b), by any subcontractor under the contractor.

CLC § 1776; Each contractor and subcontractor shall keep accurate payroll records, showing the name, address, social security number, work classification, straight time and overtime hours worked each day and week, and the actual per diem wages paid to each journeyman, apprentice, worker, or other employee employed by him or her in connection with the public work. Each payroll record shall contain or be verified by a written declaration that it is made under penalty of perjury, stating both of the following:

APPRENTICE REQUIREMENTS

CLC § 1777.5; When the contractor to whom the contract is awarded by the state or any political subdivision, in performing any of the work under the contract, employs workers in any apprenticeable craft or trade, the contractor shall employ apprentices in at least the ratio set forth in this section and may apply to any apprenticeship program in the craft or trade that can provide apprentices to the site of the public work for a certificate approving the contractor under the apprenticeship standards for the employment and training of apprentices in the area or industry affected.

APPRENTICE PENALTIES

CLC § 1777.7; A contractor or subcontractor that is determined by the Chief of the Division of Apprenticeship Standards to have knowingly violated Section 1777.5 shall forfeit as a civil penalty an amount not exceeding one hundred dollars (\$100) for each full calendar day of noncompliance. The amount of this penalty may be reduced by the Chief if the amount of the penalty would be disproportionate to the severity of the violation. A contractor or subcontractor that knowingly commits a second or subsequent violation of Section 1777.5 within a three-year period, where the noncompliance results in apprenticeship training not being provided as required by this chapter, shall forfeit as a civil penalty the sum of not more than three hundred dollars (\$300) for each full calendar day of noncompliance.

CLC § 1860; The awarding body shall cause to be inserted in every public works contract a clause providing that, in accordance with the provisions of Section 3700 of the Labor Code, every contractor will be required to secure the payment of compensation to his employees.

CONFLICT OF INTEREST:

Contractor needs to be aware of the following provisions regarding current or former state employees. If Contractor has any questions on the status of any person rendering services or involved with the Agreement, the Department must be contacted immediately for clarification. The following explanations are general in nature. Please review the actual text of the statutes for detailed application.

Public Contracts Code section 10410 – Current State Employees:

- 1) No officer or employee shall engage in any employment, activity or enterprise from which the officer or employee receives compensation or has a financial interest, and which is sponsored or funded by any state agency, unless the employment, activity or enterprise is required as a condition of regular state employment.
- 2) No officer or employee shall contract on his or her own behalf as an independent contractor with any state agency to provide goods or services.

Public Contract Code section 10411—Former State Employees:

- 1) For the two-year period from the date, he or she left state employment, no former state officer or employee may enter into a contract in which he or she engaged in any of the negotiations, transactions, planning, arrangements or any part of the decision-making process relevant to the contract while employed in any capacity by any state agency.
- 2) For the twelve-month period from the date, he or she left state employment, no former state officer or employee may enter into a contract with any state agency if he or she was employed by that state agency in a policy-making position in the same general subject area as the proposed contract within the twelve (12) month period prior to his or her leaving state service.

Public Contracts Code section 10420:

If Contractor violates any provisions of above paragraphs, such action by Contractor shall render this Agreement void.

Public Contracts Code section 10430 (e):

Members of boards and commissions are exempt from this section if they do not receive payment other than payment of each meeting of the board or commission, payment for preparatory time and payment for per diem.

NONDISCRIMINATION:

The Contractor will not discriminate against any employee or applicant for employment because of race, color, creed, religion, ancestry, national origin, sex, disability or other handicap, age, marital/familial status, or status with regard to public assistance. The Contractor will take affirmative action to insure that all employment practices are free from such discrimination. Such employment practices include, but are not limited to, the following: hiring, upgrading, demotion, transfer, recruitment or recruitment advertising, layoff, termination, rates of pay or other forms of compensation, and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the contracting agency setting forth the provisions of the nondiscrimination clause.

TERMINATION OF CAUSE:

The City/County may terminate this Agreement and be relieved of any payments should the Contractor fail to perform the requirements of this Agreement at the time and in the manner herein provided. In the event of such termination, the City/County may proceed with the work in any manner deemed proper by the City/County. All costs to the City/County shall be deducted from any sum due the Contractor under this Agreement and the balance, if any, shall be paid to the Contractor.

TERMINATION FOR CONVENIENCE:

Either party may terminate this Agreement in its entirety for convenience after providing the other party 30 days written notice in advance. Any or all finished or unfinished deliverables prepared by the Contractor under this Agreement shall, at the option of the Grantee, become the property of the Grantee.

CHILD SUPPORT COMPLIANCE ACT:

For any agreement in excess of \$100,000, the Contractor acknowledges in accordance with, that:

- 1) The contractor recognizes the importance of child and family support obligations and shall fully comply with all applicable state and federal laws relating to child and family support enforcement, including, but not limited to, disclosure of information and compliance with earnings assignment orders, as provided in Chapter 8 (commencing with section 5200) of Part 5 of Division 9 of the Family Code; and
- 2) The contractor, to the best of its knowledge is fully complying with the earnings assignment orders of all employees and is providing the names of all new employees to the New Hire Registry maintained by the California Employment Development Department.

UNION ORGANIZING:

By signing this agreement, Contractor hereby acknowledges the applicability of Government Code section 16645 through section 16649 to this agreement.

- a. Contractor will not assist, promote or deter union organizing by employees performing work on a state construction contract, including a public works contract.
- b. No state funds received under this agreement will be used to assist, promote or deter union organizing.
- c. Contractor will not, for any business conducted under this agreement, use any state property to hold meetings with employees or supervisors, if the purpose of such meetings is to assist, promote or deter union organizing, unless the state property is equally available to the general public for holding meetings.
- d. If Contractor incurs costs, or makes expenditures to assist, promote or deter union organizing, the Contractor will maintain records sufficient to show that no reimbursement from state funds has been sought for these costs, and that Contractor shall provide those records to the Attorney General upon request.

DRUG FREE WORKPLACE:

By signing this Agreement, Contractor hereby certifies under penalty of perjury under the laws of the State of California that Contractor will comply with the requirements of the Drug-Free Workplace Act of 1990 (Gov. Code, §8350 et seq.) and will provide a drug-free workplace by taking the following actions:

- a. Publish a statement notifying employees that unlawful manufacture, distribution, dispensation, possession or use of a controlled substance is prohibited and specifying actions to be taken against employees for violations.
- b. Establish a Drug-Free Awareness Program to inform employees about: (1) the dangers of drug abuse in the workplace; (2) the Contractor's policy of maintaining a drug-free workplace; (3) any available counseling, rehabilitation and employee assistance programs; and (4) penalties that may be imposed upon employees for drug abuse violations.

- c. Every employee who works at the Property will: (1) receive a copy of the Contractor's drug-free workplace policy statement; and (2) agree to abide by the terms of the Contractor's statement as a condition of employment at the Property.

Failure to comply with these requirements may result in suspension of payments under the Agreement or termination of the Agreement or both and Contractor may be ineligible for award of any future state agreements if the department determines that any of the following has occurred: (1) the Contractor has made false certification or violated the certification by failing to carry out the requirements as noted above. (Gov. Code, §8350 et seq.)

THE IMMIGRATION REFORM AND CONTROL ACT: (E-VERIFY.COM):

The Immigration Reform and Control Act of 1986 (IRCA) legally mandates that U.S. employers verify the employment eligibility status of newly-hired employees. IRCA made it unlawful for employers to knowingly hire or continue to employ unauthorized workers. In response to the law, the Immigration and Naturalization Service (INS), now an integrated component of the Department of Homeland Security (DHS), created Form I-9 and mandated its accurate and timely completion by all U.S. employers and their employees.

For employers who fail to properly complete, retain, or make I-9 Forms available for inspection, fines range from \$100 to \$1,100 per individual I-9.

For employers who knowingly hire or knowingly continue to employ unauthorized workers, civil penalties range from \$250 to \$11,000 per violation.

For employers engaging in a pattern or practice of knowingly hiring or continuing to employ unauthorized workers, fines can be as much as \$3,000 per employee and/or 6 months of imprisonment. <http://www.formi9.com/index.aspx>

SECTION 504 OF THE REHABILITATION ACT:

Nondiscrimination Under Federal Grants and Programs

No otherwise qualified individual with a disability in the United States, as defined in section 7(20), shall, solely by reason of her or his disability, be excluded from the participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance or under any program or activity conducted by any Executive agency or by the United States Postal Service. The head of each such agency shall promulgate such regulations as may be necessary to carry out the amendments to this section made by the Rehabilitation, Comprehensive Services, and Developmental Disabilities Act of 1978. Copies of any proposed regulation shall be submitted to appropriate authorizing committees of Congress, and such regulations may take effect no earlier than the thirtieth day after the date on which such regulation is so submitted to such committees.

THE CONTRACT WORK HOURS AND SAFETY STANDARDS ACT, AS AMENDED (CWHSSA):

Published in Chapter 5, Subchapter II, section 327 et seq. of U.S.C. Title 40. The Contract Work Hours and Safety Standards Act (CWHSSA) applies to federal service contracts and federal and federally assisted construction contracts over \$100,000. It requires contractors and subcontractors on covered contracts to pay laborers and mechanics employed in the performance of the contracts one and one-half times their basic rate of pay for all hours worked over 40 in a workweek. This Act also prohibits unsanitary, hazardous, or dangerous working conditions on federal and federally financed and assisted construction projects.

THE FAIR LABOR STANDARDS ACT (FLSA):

Is published in Chapter 9, sections 201 et seq. of U.S.C. Title 29 which prescribes standards for the basic minimum wage and overtime pay, affects most private and public employment. It requires employers to pay covered employees who are not otherwise exempt at least the federal minimum wage and overtime pay of one-and-one-half-times the regular rate of pay. For nonagricultural operations, it restricts the hours that children under age 16 can work and forbids the employment of children under age 18 in certain jobs deemed too dangerous. For agricultural operations, it prohibits the employment of children under age 16 during school hours and in certain jobs deemed too dangerous. The Act is administered by the Employment Standards Administration's Wage and Hour Division within the U.S. Department of Labor.

ACCESS AND RETENTION OF RECORDS (24 CFR 92.508):

The awarding agency, the State of California, the U S DOL, the Comptroller General of the United States, or any of their duly authorized representatives, shall have access to any books, documents, papers, and records of the contractor which are directly pertinent to this specific contract, for the purpose of making audit, examination, excerpts, and transcriptions. Under federal regulations all required records must be maintained by the contractor for five years after grantee makes final payments and all other pending matters are closed (this is two years longer than the old federal requirement of three years). The Contractor agrees to the above specified requirements.

WORKMAN'S COMP. & LIABILITY INSURANCE:

Contractor shall at his own expense carry all workmen's compensation insurance to protect Contractor's employees and public liability insurance necessary for the full protection of Contractor and Awarding Agency from injury to persons or property arising from the acts of Contractor or his Subcontractors during the progress of the work. Certificates of such insurance shall be filed with Awarding Agency and with the Construction Lender if Awarding Agency so requires and shall be subject to the approval of both of them as to adequacy of protection.

INSURANCE & BONDING:

The Contractor shall carry sufficient insurance coverage for unemployment, disability, and liability to protect contract assets from loss due to theft, fraud and/or undue physical damage, and as a minimum shall purchase a blanket fidelity bond covering all employees in an amount equal to cash advances from the Grantee. The Consultant shall comply with the bonding and insurance requirements of Attachment B of OMB Circular A-110, Bonding and Insurance.

CLEAN AIR ACT:

The contractor is required to comply with all aspects for the federal Clean Air Act which is the law that defines EPA's responsibilities for protecting and improving the nation's air quality and the stratospheric ozone layer. The last major change in the law, the Clean Air Act Amendments of 1990, was enacted by Congress in 1990. Legislation passed since then has made several minor changes. The Clean Air Act, like other laws enacted by Congress, was incorporated into the United States Code as Title 42, Chapter 85. The House of Representatives maintains a current version of the U.S. Code, which includes Clean Air Act changes enacted since 1990.

LOBBYING:

The Contractor hereby certifies that:

- a. No Federal appropriated funds have been paid or will be paid, by or on behalf of it, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress 'in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any

Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement;

b. If any funds other than Federal appropriated funds have been paid or will be paid to any persons for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, it will complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its 'instructions;

c. It will require that the language of paragraph (d) of this certification be included in the award documents for all sub-awards at all tiers (including subcontracts, sub-grants, and contracts under grants, loans, and cooperative agreements) and that all Consultants shall certify and disclose accordingly; and

d. Lobbying Certification - Paragraph_This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$ 100,000 for each such failure.

§ 200.323 - PROCUREMENT OF RECOVERED MATERIALS

A non-Federal entity that is a state agency or agency of a political subdivision of a state and its contractors must comply with section 6002 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act. The requirements of Section 6002 include procuring only items designated in guidelines of the Environmental Protection Agency (EPA) at 40 CFR part 247 that contain the highest percentage of recovered materials practicable, consistent with maintaining a satisfactory level of competition, where the purchase price of the item exceeds \$10,000 or the value of the quantity acquired during the preceding fiscal year exceeded \$10,000; procuring solid waste management services in a manner that maximizes energy and resource recovery; and establishing an affirmative procurement program for procurement of recovered materials identified in the EPA guidelines.

The Contractor must comply with Section 6002 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act. The requirements of Section 6002 include procurement only items designated in guidelines of the Environmental Protection Agency (EPA) at 40 CFR Part 247 that contain the highest percentage of recovered materials practicable, consistent with maintaining a satisfactory level of competition, where the purchase of the item exceeds \$10,000 or the value of the quantity acquired during the preceding fiscal year exceeded \$10,000; procuring solid waste management services in a manner that maximizes energy and resource recovery; and establishing an affirmative procurement program for procurement of recovered materials identified in the EPA guidelines.

§ 200.216 - PROHIBITION ON CERTAIN TELECOMMUNICATIONS AND VIDEO SURVEILLANCE SERVICES OR EQUIPMENT:

- (a) Recipients and subrecipients are prohibited from obligating or expending loan or grant funds to:
- (1) Procure or obtain;
 - (2) Extend or renew a contract to procure or obtain; or
 - (3) Enter into a contract (or extend or renew a contract) to procure or obtain equipment, services, or systems that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system. As described in Public Law 115-232, section 889, covered telecommunications equipment is telecommunications equipment produced by Huawei Technologies Company or ZTE Corporation (or any subsidiary or affiliate of such entities).
 - (i) For the purpose of public safety, security of government facilities, physical security surveillance of critical infrastructure, and other national security purposes, video surveillance and telecommunications equipment produced by Hytera Communications Corporation, Hangzhou Hikvision Digital Technology Company, or Dahua Technology Company (or any subsidiary or affiliate of such entities).
 - (ii) Telecommunications or video surveillance services provided by such entities or using such equipment.
 - (iii) Telecommunications or video surveillance equipment or services produced or provided by an entity that the Secretary of Defense, in consultation with the Director of the National Intelligence or the Director of the Federal

Bureau of Investigation, reasonably believes to be an entity owned or controlled by, or otherwise connected to, the government of a covered foreign country.

- (b) In implementing the prohibition under Public Law 115-232, section 889, subsection (f), paragraph (1), heads of executive agencies administering loan, grant, or subsidy programs shall prioritize available funding and technical support to assist affected businesses, institutions and organizations as is reasonably necessary for those affected entities to transition from covered communications equipment and services, to procure replacement equipment and services, and to ensure that communications service to users and customers is sustained.
- (c) See Public Law 115-232, section 889 for additional information.
- (d) See also § 200.471.

In the performance of this Agreement, Contractor is prohibited from using covered telecommunications equipment or services as a substantial or essential component of any system or as critical technology as part of any system. Unless otherwise set forth in Public Law 115-232, section 889, The term "covered telecommunications equipment or services" means any of the following:

1. *Telecommunications equipment produced by Huawei Technologies Company or ZTE Corporation (or any subsidiary or affiliate of such entities).*
2. *For the purpose of public safety, security of government facilities, physical security surveillance of critical infrastructure, and other national security purposes, video surveillance and telecommunications equipment produced by Hytera Communications Corporation, Hangzhou Hikvision Digital Technology Company, or Dahua Technology Company (or any subsidiary or affiliate of such entities).*
3. *Telecommunications or video surveillance services provided by such entities or using such equipment.*
4. *Telecommunications or video surveillance equipment or services produced or provided by an entity that the Secretary of Defense, in consultation with the Director of the National Intelligence or the Director of the Federal Bureau of Investigation, reasonably believes to be an entity owned or controlled by, or otherwise connected to, the government of a covered foreign country.*

The provisions in this section shall be included in all subcontracts.

§ 200.322 - DOMESTIC PREFERENCES FOR PROCUREMENTS:

- (a) As appropriate and to the extent consistent with law, the non-Federal entity should, to the greatest extent practicable under a federal award, provide a preference for the purchase, acquisition, or use of goods, products, or materials produced in the United States (including but not limited to iron, aluminum, steel, cement, and other manufactured products). The requirements of this section must be included in all subawards including all contracts and purchase orders for work or products under this award.
- (b) For purposes of this section:
 - (1) "Produced in the United States" means, for iron and steel products, that all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States.
 - (2) "Manufactured products" means items and construction materials composed in whole or in part of non-ferrous metals such as aluminum; plastics and polymer-based products such as polyvinyl chloride pipe; aggregates such as concrete; glass, including optical fiber; and lumber.

In the performance of this Agreement, Contractor shall, as appropriate and to the greatest extent practicable, purchase, acquire, and/or use goods, products, and materials produced in the United States (including but not limited to iron, aluminum, steel, cement, and other manufactured products). The requirements of this section must be included in all subcontracts.

For purposes of this section:

1. *"Produced in the United States" means, for iron and steel products, that all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States.*
2. *"Manufactured products" means items and construction materials composed in whole or in part of non-ferrous metals such as aluminum; plastics and polymer-based products such as polyvinyl chloride pipe; aggregates such as concrete; glass, including optical fiber; and lumber.*

ENERGY EFFICIENCY:

The Contractor shall comply with mandatory standards and policies relating to energy efficiency which are contained in the California energy conservation plan issued in compliance with the Energy Policy and Conservation Act (Public Law 94-163).

The Contractor shall comply with mandatory standards and policies relating to energy efficiency which are contained in the California energy conservation plan issued in compliance with the Energy Policy and Conservation Act (Public Law 94-163).

The Contractor is encouraged to implement green infrastructure policies to the extent practicable and is encouraged, where appropriate, to utilize construction methods that emphasize high quality, durability, energy efficiency, a healthy indoor environment, sustainability, and water or mold resistance, including how it will support adoption and enforcement of modern building codes and reduction of hazard risk, including possible sea level rise, storm surge, and flooding. All rehabilitation, reconstruction, and new construction should be designed to incorporate principles of sustainability, including water and energy efficiency, Resilience, and mitigating the impact of future disasters. Whenever feasible, Contractor should follow best practices such as those provided by the U.S. Department of Energy Home Energy Professionals: Professional Certifications and Standard Work Specifications.

ARCHITECTURAL BARRIERS ACT AND THE AMERICANS WITH DISABILITIES ACT:

The Architectural Barriers Act of 1968 (42 U.S.C. 4151-4157) requires certain Federal and Federally funded buildings and other facilities to be designed, constructed, or altered in accordance with standards that ensure accessibility to, and use by, people with physical disabilities.

The Architectural Barriers Act of 1968 (42 U.S.C. 4151-4157) requires certain Federal and Federally funded buildings and other facilities to be designed, constructed, or altered in accordance with standards that ensure accessibility to, and use by, people with physical disabilities. A building or facility designed, constructed, or altered with funds allocated or reallocated under this subpart after November 21, 1996 and that meets the definition of residential structure as defined in 24 CFR 40.2, or the definition of building as defined in 41 CFR 101-19.602(a), is subject to the requirements of the Architectural Barriers Act of 1968 and shall comply with the Uniform Federal Accessibility Standards. For general type buildings, these standards are in appendix A to 41 CFR part 101-19.6. For residential structures, these standards are available from the Department of Housing and Urban Development, Office of Fair Housing and Equal Opportunity, Disability Rights Division, Room 5240, 451 Seventh Street, SW, Washington, DC 20410; telephone (202) 708-2333 (voice) or (202) 708-1734 (TTY) (these are not toll-free numbers).

**STANDARD CONTRACT LANGUAGE REQUIRED FOR ALL
CONTRACTS AND SUBCONTRACTS**

1. The Civil Rights, HCD, and Age Discrimination Acts Assurances:

During the performance of this Contract, the Contractor assures that no otherwise qualified person shall be excluded from participation or employment, denied program benefits, or be subjected to discrimination based on race, color, national origin, sex, age, or handicap, under any program or activity funded by this Contract, as required by Title VI of the Civil Rights Act of 1964, Title I of the Housing and Community Development Act of 1974, as amended, and the Age Discrimination Act of 1975, and all implementing regulations.

2. State Nondiscrimination Clause:

- a. During the performance of this contract, Contractor and its subcontractors shall not unlawfully discriminate, harass, or allow harassment against any employee or applicant for employment because of the following: race, religion, color, national origin, ancestry, disability, medical condition, marital status, age (over 40) or sex. Contractors and subcontractors shall insure that the evaluation and treatment of their employees and applicants for employment are free of such discrimination and harassment. Contractors 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 Code of Regulations, Title 2, Section 7258.0 *et seq.*) The applicable regulations of the Fair Employment and Housing Commission implementing Government Code, Section 12990 (a-f), set forth in Chapter 5 of Division 4 of Title 2 of the California Code of Regulations are incorporated into this contract by reference and made a part hereof as if set forth in full, Contractor and its subcontractors shall give written notice of their obligations under this clause to labor organizations with which they have a collective bargaining or other agreement.
- b. This Contractor shall include the nondiscrimination and compliance provisions of this clause in all subcontracts to perform work under the contract.

STANDARD EQUAL OPPORTUNITY CLAUSE
(CONSTRUCTION OVER \$10,000)

The Contractor hereby agrees that it will incorporate or cause to be incorporated into any contract for construction work, or modification thereof, as defined in the regulations of the Secretary of Labor at 41 CFR Chapter 60, which is paid for in whole or in part with funds obtained from the Federal Government or borrowed on the credit of the Federal Government pursuant to a grant, contract, loan insurance, or guarantee, or undertaken pursuant to any Federal program involving such grant, contract, loan, insurance, or guarantee, the following equal opportunity clause:

During the performance of this contract, the Contractor agrees as follows:

1. The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, national origin or disabilities. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, or national origin. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.
2. The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, national origin or disabilities.
3. The Contractor will send to each labor union or representative of workers with which the Contractor has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representatives of the Contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
4. The Contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.
5. The Contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to its books, records, and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.
6. In the event of the Contractor's noncompliance with the discrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or in part and the Contractor may be declared ineligible for further government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rules, regulations, or orders of the Secretary of Labor, or as otherwise provided by law.
7. The Contractor will include the portion of the sentence immediately preceding paragraph "1" and the provisions of paragraphs "1" through "7" in every contract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to Section 504 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each contractor or vendor. The Contractor will take such action with respect to any contract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance; provided, however, that in the event a Contractor becomes involved in, or is threatened with, litigation with a contractor or vendor as a result of such direction by the administering agency, the Contractor may request the United States to enter into such litigation to protect the interests of the United States.
8. The Contractor further agrees that it will be bound by the above equal opportunity clause with respect to its own employment practices when it participates in federally- assisted construction work; provided that if the Contractor so participating is a State or

local government, the above equal opportunity clause is not applicable to any agency, instrumentality, or subdivision of such government which does not participate in work on or under the contract.

9. The Contractor agrees that it will assist and cooperate actively with the administering agency and the Secretary of Labor in obtaining the compliance of Contractors and subcontractors with the equal opportunity clause and the rules, regulations, and relevant orders of the Secretary of Labor, that it will furnish the Department and HUD and the Secretary of Labor such information as they may require for the supervision of such compliance, and that it will otherwise assist the administering agency in the discharge of the agency's primary responsibility for securing compliance.
10. The Contractor further agrees that it will refrain from entering into any contract or contract modification subject to Executive Order 11246 of September 24, 1965, with a contractor debarred from, or who has not demonstrated eligibility for, government contracts and federally-assisted construction contracts, pursuant to the Executive Order and will carry out such sanctions and penalties for violation of the equal opportunity clause as may be imposed upon contractors and subcontractors by the administering agency or the Secretary of Labor pursuant to Part II, Subpart D of the Executive Order. In addition, the Contractor agrees that if it fails or refuses to comply with these undertakings, the administering agency may take any or all of the following actions: Cancel, terminate, or suspend in whole or in part this funding commitment (contract, loan, grant, insurance, guarantee); refrain from extending any further assistance to the applicant under the program with respect to which the failure or refund occurred until satisfactory assurance of future compliance has been received from such Contractor; and refer the case to the Department of Justice for appropriate legal proceedings.

MBE/WBE STANDARD
BID DOCUMENT LANGUAGE FOR CONSTRUCTION CONTRACTS OVER \$10,000

(The following notice shall be included in and shall be a part of all solicitations for offers and bids on all Federal and Federally assisted construction contracts or subcontracts in excess of \$10,000 to be performed in geographical areas designated by the Secretary of Labor.)

Notice of Requirement for Affirmative Action to Ensure Equal Employment Opportunity (Executive Order 11246)

1. The Offeror's or Bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment Opportunity Construction Contract Specifications" set forth herein.
2. The goals and timetables for minority and female participation, expressed in percentage terms for the contractor's aggregate workforce in each trade on all construction work in the covered areas are as follows:

Time- tables	Goals for female participation in each trade
From December 30, 1980, until further notice	6.9%

Time- tables	Goals for minority participation for each trade
From November 3, 1980, until further notice	16.2% - Imperial County – Non SMSA Counties 16.9% - San Diego County – SMSA Counties

These goals are applicable to all contractor's construction work (whether or not it is Federal or Federally assisted) performed in the covered area. If the contractor performs construction work in a geographical area located outside of the covered area, it shall apply the goals established for such geographical area where the work is actually performed. With regard to this second area, the contractor also is subject to the goals for both its Federally involved and non-Federally involved construction.

The contractor's compliance with the Executive Order and the regulations in 41 CFR Part 60-4 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the specifications set forth in 41 CFR 60-4.3(a), and its efforts to meet the goals established for the geographical area where the contract resulting from this solicitation is to be performed. The hours of minority and female employment and training must be substantially uniform through the length of the contract, and in each trade, and the contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from contractor to contractor or from project to project for the sole purpose of meeting the contractor's goals shall be a violation of the contract, the Executive Order and the regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.

3. The contractor shall provide written notification to the Director of the Office of Federal Contract Compliance Programs, U.S. Department of Labor, within 10 working days of award of any construction subcontract in excess of \$10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the name, address, and telephone number of the subcontract; estimated starting and completion dates of the subcontract; and the geographical area in which the contract is to be performed.
4. As used in this notice, and in the contract resulting from this solicitation, the "covered area" is (insert description of the geographical areas where the contract is to be performed giving the state, county, and city, if any).

MBE/WBE
STANDARD CONTRACT LANGUAGE - CONSTRUCTION OVER \$10,000

FEMALE AND MINORITY GOALS AND TIMETABLES

The following goals and timetables for female utilization shall be included in all Federal and Federally-assisted construction contracts and subcontracts in excess of \$10,000. The goals are applicable to the contractor's aggregate on-site construction workforce whether or not part of that workforce is performing work on a Federal or Federally-assisted construction contract or subcontract.

AREA COVERED
 (Goals for females apply nationwide)

<u>Timetable</u>	<u>Goal</u>
From December 30, 1980, until further notice	6.9%

Until further notice, the following goals for minority utilization in each construction craft and trade shall be included in all Federal or Federally-assisted construction contracts and subcontracts in excess of \$10,000 to be performed in the respective geographical areas. The goals are applicable to each nonexempt contractor's total on-site construction workforce, regardless of whether or not part of that workforce is performing work on a Federal, Federally-assisted, or non-Federally related project, contract, or subcontract.

Construction contractors participating in an approved Hometown Plan (see 41 CFR 60-4.5) are required to comply with the goals of the Hometown Plan with regard to construction work they perform in the area covered by the Hometown Plan. With regard to all their other covered construction work, such contractors are required to comply with the applicable SMSA or EA goal contained in this appendix.

SMSA/Non-SMSA Counties

<u>Area Covered</u>	<u>Goal Percent</u>
Imperial County – Non SMSA Counties	16.2%
San Diego County – SMSA Counties	16.9%

MBE/WBE SUGGESTED
BID DOCUMENT LANGUAGE FOR
MINORITY/WOMEN'S BUSINESS ENTERPRISE CONSTRUCTION PROJECTS

- (a) It is the policy of the County of Imperial to take positive steps to maximize the utilization of minority and women's business enterprises in all contract activity administered by the _____ County of Imperial.
- (b) The contractor will utilize his best efforts to carry out this policy in the award of his subcontracts to the fullest extent consistent with the efficient performance of this contract. As used in this contract, the term "minority or women's business enterprise" means a business, at least 50% of which is owned by minority group members or women or, in the case of publicly-owned businesses, at least 51% of the stock is owned by minority group members or women. For the purpose of this definition, minority group members are Black, Hispanics, Asians, Native Americans, Alaskans or Pacific Islanders.
- (c) The contractor will submit the following statement as part of his/her sealed bid:

I have taken affirmative action to seek out and consider minority and women's business enterprises for the portions of work to be subcontracted. Such actions are fully documented in my records and available upon request. Results are as follows:

Name and Address of Minority/
 Women's Firms Contractor

<u>Dollar Value of</u>	<u>Anticipates Utilizing*</u>	<u>Category of Work Participation</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Total Bid _____ Total Subcontract Amount

Minority/Women's Enterprise Total of Subcontract Amount

*Indicate whether business is owned by a minority or a woman.

NOTE: Use additional sheets of paper to demonstrate Good Faith Effort, if necessary.

STANDARD FEDERAL EQUAL EMPLOYMENT OPPORTUNITY
CONSTRUCTION CONTRACT SPECIFICATIONS (CONSTRUCTION OVER \$10,000)

1. As used in these specifications:

- a. "Covered area" means the geographical area described in the solicitation from which this contract resulted.
- b. "Director" means Director, Office of Federal Contract Compliance Programs, United States Department of Labor, or any person to whom the Director delegates authority.
- c. "Employer identification number" means the federal social security number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941.
- d. "Minority" includes:
 - (1) Black (all persons having origins in any of the Black African racial groups not of Hispanic origin).
 - (2) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish culture or origin, regardless of race).
 - (3) Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, southeast Asia, the Indian subcontinent or the Pacific Islands).
 - (4) American Indian or Alaskan Native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).

2. Whenever the Contractor, or any subcontractor at any tier, contracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of \$10,000 the provisions of these specifications and the notice which contains the applicable goals for minority and women participation, and which is set forth in the solicitations from which this contract resulted.

3. If the Contractor is participating (pursuant to 41 CFR 60-4.5) in a Hometown Plan approved by the U. S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the plan area (including goals and timetables) shall be in accordance with that plan for those trades which have unions participating in the plan. Contractors must be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each Contractor or subcontractor participating in an approved plan is individually required to comply with its obligations under the EEO clause, and to make a good faith effort to achieve each goal under the plan in each trade in which it has employees. The overall good faith performance by other contractors or subcontractors toward a goal in an approved plan does not excuse any covered contractor's or subcontractor's failure to take good faith efforts to achieve the plan's goals and timetables.

4. The Contractor shall implement the specific affirmative action standards provided in paragraphs 7.a. through 7.p. of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and women utilization the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. Covered construction contractors performing construction work in geographical areas where they do not have a federal or federally assisted construction contract shall apply the minority and women goals established for the geographical area where the work is being performed. Goals are published periodically in the Federal Register in notice form and such notices may be obtained from any Office of Federal Contract Compliance Programs or from federal procurement contracting officers. The Contractor is expected to make substantially uniform progress in meeting its goals in each craft during the period specified.

5. Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the Contractor has a collective bargaining agreement, to refer either minorities or women shall excuse the Contractor's obligations under these specifications, Executive Order 11246, or the regulations promulgated pursuant thereto.

6. **In order for the nonworking training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the contractor during the training period, and the contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.**
7. **The Contractor shall take specific affirmative action's to ensure equal employment opportunity.** The evaluation of the Contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these efforts fully and shall implement affirmative action steps at least as extensive as the following:
- a. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and in all facilities at which the Contractor's employees are assigned to work. The Contractor, where possible, will assign two or more women to each construction project. The Contractor shall specifically ensure that all foremen, superintendents, and other on-site supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minority individuals or women working at such sites or in such facilities.
 - b. Establish and maintain a current list of minority and women recruitment sources, provide written notification to minority and women recruitment sources and to community organizations when the contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.
 - c. Maintain a current file of the names, addresses and telephone numbers of each minority and female off the street applicant and minority or women referral from a union, a recruitment source or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the contractor by the union or, if referred, not employed by the contractor, this shall be documented in the file with the reason therefore, along with whatever additional actions the contractor may have taken.
 - d. Provide immediate written notification to the Director when the union or unions with which the contractor has a collective bargaining agreement has not referred to the contractor a minority person or woman sent by the Contractor or when the contractor has other information that the union referral process has impeded the contractor's efforts to meet its obligations.
 - e. Develop on the job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the contractor's employment needs, especially those programs funded or approved by the Department of Labor. The contractor shall provide notice of these programs to the sources compiled under 7b. above.
 - f. Disseminate the contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.
 - g. Review at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination or other employment decisions, including specific review of these items with on-site supervisory personnel such as superintendents, general foremen, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.
 - h. Disseminate the contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and women-focused news media, and providing written notification to and discussing the contractor's EEO policy with other contractors and subcontractors with whom the contractor does or anticipates doing business.
 - I. Direct its recruitment efforts, both oral and written, to minority, women and community organizations, to schools with minority- and women-students and to minority and women-recruitment and training organizations serving the contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the contractor shall send written notification to

organizations such as the above, describing the openings, screening procedures, and tests to be used in the selection process.

- j. Encourage present minority and women employees to recruit other minority persons and women and, where reasonable, provide after-school summer and vacation employment to minority and female youth both on the site and in other areas of a contractor's workforce.
 - k. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR Part 60.3.
 - l. Conduct at least annually, an inventory and evaluation at least of all minority and women personnel for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., or other advancement opportunities.
 - m. Ensure that seniority practices, job classifications, work assignments and other personnel practices, do not have a discriminatory effect by continually monitoring all personnel- and employment-related activities to ensure that the EEO policy and the Contractor's obligations under these specifications are being carried out.
 - n. Ensure that all facilities and company activities are non-segregated except that separate or single user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.
 - o. Document and maintain a record of all solicitations of offers for subcontracts from minority- and women-owned construction companies, contractors and suppliers, including circulation of solicitations to minority- and women-focused Contractor associations and other business associations.
 - p. Conduct a review, at least annually, of all supervisors' adherence to and performance under the contractor's EEO policies and affirmative action obligations.
- 8. Contractors are encouraged to participate in voluntary associations which** assist in fulfilling one or more of their affirmative action obligations (7.a. through 7.p.). The efforts of a contractor association, joint contractor/union, contractor/community, or other similar group of which the contractor is a member and participant, may be asserted as fulfilling any one or more of its obligations under 7.a. through 7.p. of these specifications provided that the contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the contractor's minority and women workforce participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation to comply, however, is the Contractor's and failure of such a group to fulfill an obligation shall not be a defense for the Contractor's noncompliance.
- 9. A single goal for minorities and a separate single goal for women have** been established. The Contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both men and women, and all women, both minority and non-minority. Consequently, the Contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for example, even though the Contractor has achieved its goals for women generally, the Contractor may be in violation of the Executive Order if a specific minority group of women is underutilized).
- 10. The Contractor shall not use the goals and timetables or affirmative action** standards to discriminate against any person because of race, color, religion, sex or national origin.
- 11. The Contractor shall not enter into any subcontract with any person or firm** debarred from government contracts pursuant to Executive Order 11246.
- 12. The Contractor shall carry out such sanctions and penalties for violation of** these specifications and of the Equal Opportunity Clause, including suspension, termination and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Office of Federal Contract Compliance Programs. Any Contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.

13. **The Contractor, in fulfilling its obligations under these specifications, shall** implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph 7 of these specifications, to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR 60-4.8.
14. **The Contractor shall designate a responsible official to monitor all** employment related activity to ensure that the company's EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the government and to keep records. Records shall at least include for each employee the name, address, telephone number, construction trade, union affiliation, if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice, trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, Contractors shall not be required to maintain separate records.
15. **Nothing herein provided shall be construed as a limitation upon the** application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area resident (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).
16. **By the submission of this bid, the bidder, offeror, applicant, or** subcontractor certifies that he/she does not maintain or provide for his/her employees any segregated facility at any of his/her establishments, and that he/she does not permit employees to perform their services at any location under his/her control where segregated facilities are maintained. He/she certifies further that he/she will not maintain or provide for employees any segregated facilities at any of his/her establishments, and he/she will not permit employees to perform their services at any location under his/her control where segregated facilities are maintained. The bidder, offeror, applicant, or subcontractor agrees that a breach of this certification is a violation of the Equal Opportunity Clause of this contract. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms, and other storage or dressing areas,* transportation and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, color, religion, or national origin, habits, local custom, or otherwise. He/she further agrees that (except where he/she has obtained identical certifications from proposed subcontractors for specific time periods) he/she will obtain identical certifications from proposed subcontractors prior to the award of subcontracts exceeding \$10,000 which are not exempt from the provisions of the Equal Opportunity Clause; that he/she will retain such certifications in his/her files; and that he/she will forward the following notice to such proposed subcontractors (except where proposed subcontractors have submitted identical certifications for specific time periods). ***Parking lots, drinking fountains, recreation or entertainment areas.**

CALIFORNIA STATE LABOR STANDARDS AND PREVAILING WAGES

All contractors and subcontractors shall give the following certification and provide this certification within 10 days after the execution of any contract or subcontract.

- A. "I am aware of the provisions of Section **1720 et seq.** of the California Labor Code which requires that the State prevailing wage rate shall be paid to employees where this rate exceeds the Federal wage rate."
- B. "It is further agreed that, except as may be provided in Section **1810-1814** of the California Labor Code, the maximum hours a worker is to be employed is limited to eight hours a day and 40 hours a week and the subcontractor shall forfeit, as a penalty, \$25 for each worker employed in the execution of the subcontract for each calendar day during which a worker is required or permitted to labor more than eight hours in any calendar day or more than 40 hours in any calendar week."
- C. "I am aware of the provisions of California Labor Code Section **1815** notwithstanding the provisions of 1810-1814 inclusive, of this code, and notwithstanding any stipulation inserted in any contract pursuant to the requirements of said sections, work performed by employees of contractors in excess of 8 hours per day, and 40 hours during any one week, shall be permitted upon public work upon compensation for all hours worked in excess of 8 hours per day at not less than 1-1/2 times the basic rate."
- D. "I am aware of the provisions of California Labor Code, Section **1777.5** which requires the employment of apprentices on all public works projects and the payment of training contributions to the proper agency."
- E. Section **1861** of the California Labor Code; Each contractor to whom a public works contract is awarded shall sign and file with the awarding body the following certification prior to performing the work of the contract: "I am aware of the provisions of Section 3700 of the Labor Code which require every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of that code, and I will comply with such provisions before commencing the performance of the work of this contract."

Federal and State Contract Language Inclusion Certification

The bidder, under penalty of perjury, certifies that they shall comply with the provisions of the Federal and State Contract Language as indicated within this section. The provisions apply to all work performed on the contract including work performed by subcontract. The unmodified Federal and State Contract Language is required to be physically incorporated into each contract, subcontract and subsequent lower-tier subcontracts. The provisions may not be incorporated by reference.

The bidder is responsible for compliance with the requirements by all subcontractors and lower tier subcontractors.

(Organization/Firm)

(Name & Title of Authorized Representative)

(Signature)

(Date)

10. IRAN CONTRACTING ACT CERTIFICATION

Pursuant to Public Contract Code (PCC) section 2204, the following Iran Contracting Act certification is required if your bid totals \$1,000,000 or more.

If your bid totals \$1,000,000 or more, you must complete only one of the following two paragraphs. To complete paragraph 1, check the corresponding box and complete the certification. To complete paragraph 2, simply check the corresponding box.

- 1. We are not on the current list of persons engaged in investment activities in Iran created by the California Department of General Services (DGS) pursuant to PCC 2203(b), and we are not a financial institution extending twenty million dollars (\$20,000,000) or more in credit to another person, for 45 days or more, if that other person will use the credit to provide goods or services in the energy sector in Iran and is identified on the current list of persons engaged in investment activities in Iran created by DGS.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct and that this declaration is executed on

_____ (date),

at _____ (city), _____ (state).

_____ (signature)

_____ (printed name)

OR

- 2. We have received written permission from the Agency to submit a bid pursuant to PCC 2203(c) or (d). A copy of the written permission from the Agency is included with our bid.

11. CERTIFICATION FOR CONTRACTS, GRANTS AND LOANS

The undersigned certifies, to the best of his or her knowledge and belief, that:

1. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant or Federal loan, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant or loan.
2. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant or loan, the undersigned shall complete and submit Standard Form – LLL, “Disclosure of Lobbying Activities,” in accordance with its instructions.
3. The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including contracts, subcontracts, and subgrants under grants and loans) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by Section 1354, Title 34, US Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

(Organization/Firm)

(Name & Title of Authorized Representative)

(Signature)

(Date)

**12. CONTRACTOR'S CERTIFICATION REGARDING WORKER'S
COMPENSATION INSURANCE**

State of California

County of _____

I am aware of the requirements that every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of that applicable codes, and I will comply with such provisions before commencing the performance of the work of this Contract.

(Organization/Firm)

(Name & Title of Authorized Representative)

(Signature)

(Date)

13. TABULATION OF SUBCONTRACTORS

No.	Subcontractor	Work To Be Performed
1.	Name:	
	Address:	
	DIR Registration No:	
	CA Contractor's License No:	
	Sam.gov UEI No:	
	Percent of Total Contract:	
2.	Name:	
	Address:	
	DIR Registration No:	
	CA Contractor's License No:	
	Sam.gov UEI No:	
	Percent of Total Contract:	
3.	Name:	
	Address:	
	DIR Registration No:	
	CA Contractor's License No:	
	Sam.gov UEI No:	
	Percent of Total Contract:	

Gateway County Service Area Water Treatment Plant Improvements

No.	Subcontractor	Work To Be Performed
4.	Name:	
	Address:	
	DIR Registration No:	
	CA Contractor's License No:	
	Sam.gov UEI No:	
	Percent of Total Contract:	
5.	Name:	
	Address:	
	DIR Registration No:	
	CA Contractor's License No:	
	Sam.gov UEI No:	
	Percent of Total Contract:	
6.	Name:	
	Address:	
	DIR Registration No:	
	CA Contractor's License No:	
	Sam.gov UEI No:	
	Percent of Total Contract:	

Gateway County Service Area Water Treatment Plant Improvements

No.	Subcontractor	Work To Be Performed
7.	Name:	
	Address:	
	DIR Registration No:	
	CA Contractor's License No:	
	Sam.gov UEI No:	
	Percent of Total Contract:	
8.	Name:	
	Address:	
	DIR Registration No:	
	CA Contractor's License No:	
	Sam.gov UEI No:	
	Percent of Total Contract:	
9.	Name:	
	Address:	
	DIR Registration No:	
	CA Contractor's License No:	
	Sam.gov UEI No:	
	Percent of Total Contract:	

Gateway County Service Area Water Treatment Plant Improvements

(ATTACH ADDITIONAL NUMBERED PAGES IF NEEDED)

14. BIDDER QUALIFICATION STATEMENT

The bidder shall submit, as part of its proposal, the following statements as to its experience qualifications. The bidder certifies that all statements and information set forth are true and accurate.

- a. The bidder has been engaged in the contracting business under its present business name for _____ years.
- b. Experience in work of nature similar in type and magnitude to that set forth in the specification extends over a period of _____ years.
- c. The bidder, as Contractor, has satisfactorily completed all contracts awarded to it, except as follows: (Name any and all exceptions and reasons therefore. Bidder should attach additional pages if necessary).
 - 1. _____
 - 2. _____
 - 3. _____
- d. The following below contracts cover work similar in type and magnitude to that set forth in the specification have been satisfactorily completed within the last **ten (10) years** for the following owners (person, firms or authorities). Bidder to attach additional pages as necessary.

No.	Owner	Telephone No.	Contract Amount	Type of Work	Year Complete
1.					
2.					
3.					
4.					
5.					
6.					

15. TABULATION OF MAJOR MATERIAL SUPPLIERS

The contractor shall indicate opposite each item of equipment or material listed below the name of the manufacturer and supplier of the equipment or material proposed to be furnished under the bid.

No.	Item	Manufacturer	Supplier
1.	Class 2 base		
2.	PCC Concrete		
3.	Shade Structure for Electrical Panels		
4.	Emergency Generator Set and Generator Remote Annunciator		
5.	Automatic Transfer Switch		
6.	Service Entrance Section		
7.	Electrical Panels		
8.	Ductile Iron Pipe, Fittings and Hardware		
9.	8-inch pressure relief valve		
10.	OS & Y and Non-Rising Stern Gate Valves		
11.	8-inch Electromagnetic Flowmeter		

Gateway County Service Area Water Treatment Plant Improvements

No.	Item	Manufacturer	Supplier
12.	Vertical Multistage, booster pumps, suction piping, discharge piping, valves, check valves, pressure booster expansion tank, VFD's and electrical control panel		
13.	Pump Skid Frame and Skid		
14.	Pipe Supports		
15.	Pressure Gauges		
16.	Short Duration Centrifugal Pump		
17.	Shade Structure of Long-Term Bypass Pumping System		
18.	Air Conditioning System for Booster Pump Station Electrical Control Plan		
19.	Temporary Generator Sets for Long-Term Bypass Pumping System		
20.	Pipe Chase Fiberglass Grates		

Gateway County Service Area Water Treatment Plant Improvements

(ATTACH ADDITIONAL NUMBERED PAGES IF NEEDED)

16. NOTICE OF AWARD

Dated: _____

Project: Gateway County Service Area – Water Treatment Plant Improvements	Owner: County of Imperial	Owner's Contract No.: 6914GTWTP
Contract:		Engineer's Project No.: 542.116
Bidder:		
Bidder's Address (send Certified Mail, Return Receipt Requested):		

You are notified that your Bid dated _____ for the above Contract has been considered. You are the Successful Bidder and are awarded a Contract for the construction of the **Gateway County Service Area – Water Treatment Plant Improvement Project**.

The Contract Price of your Contract is _____ Dollars (\$_____).

You must comply with the following conditions within **ten (10) days** of the date you receive this Notice of Award.

1. Deliver to the Owner four (4) fully executed counterparts of the Contract Documents.
2. Deliver with the executed Contract Documents the Performance and Payment Bonds and Insurance Certificate as specified in the Instructions to Bidders (Article 20), and General Conditions (Paragraph 5.01)

Failure to comply with these conditions within the time specified will entitle the Owner to consider you in default, annul this Notice of Award and declare your Bid Security forfeited.

Within **ten (10) days** after you comply with the above conditions, the Owner will return to you one (1) fully executed counterpart of the Contract Documents.

You are required to return an acknowledged copy of this NOTICE OF AWARD to the OWNER.

County of Imperial

(Owner)

(Authorized Signature)

(Title)

16. ACCEPTANCE NOTICE

Receipt of above NOTICE OF AWARD is hereby acknowledged

By: _____,

this the _____ day of _____, 2022.

By: _____
(Authorized Signature)

(Title)

Copy to County of Imperial.

1 **AGREEMENT FOR CONSTRUCTION SERVICES**

2 <<Business Name>>

3 THIS AGREEMENT FOR CONSTRUCTION SERVICES (“Agreement”), made and entered into
4 effective the ____ day of _____, 2024, by and between the COUNTY OF IMPERIAL, a political
5 subdivision of the State of California, through its Department of Public Works (“COUNTY”)
6 and <<Business Name>>, a «Contractor_Business_Type» licensed to do business within the State of
7 California (“CONTRACTOR”) (individually, “Party;” collectively, “Parties”) shall be as follows:

8 **RECITALS**

9 **WHEREAS**, COUNTY desires to retain a qualified individual, firm or business entity to provide
10 professional construction services for Gateway County Service Area Water Treatment Plant Improvements
11 (“Project”); and

12 **WHEREAS**, COUNTY wishes to engage CONTRACTOR for performance of such services as are
13 provided for herein and CONTRACTOR is willing to accept such engagement.

14 **NOW, THEREFORE**, COUNTY and CONTRACTOR have and hereby agree to the following:

15 **1. DEFINITIONS.**

16 **1.1.** “Invitation for Bid” shall mean the document entitled, “Gateway County Service Area
17 Water Treatment Plant Improvements,” dated «Date_of_Advertisement for Bids», which
18 includes all special notices, addendums, exhibits and Plans and Specifications as defined
19 in Paragraph 1.3. The Invitation for Bid is attached hereto as **Exhibit “A”** and
20 incorporated herein as though fully set forth.

21 **1.2.** “Bid Proposal” shall mean CONTRACTOR’s document entitled “Gateway County
22 Service Area Water Treatment Plant Improvements,” dated «Date_of_Bid Proposal» and
23 submitted to the Clerk of the Board. The Proposal is attached hereto as **Exhibit “B”** and
24 incorporated herein as though fully set forth.

25 **1.3.** “Plans and Specifications” shall mean the plans and specifications approved by the
26 Director of Public Works, or his/her designee, for Project Number 6914GTWTP. While
27 COUNTY is responsible for the completeness and accuracy of the Plans and
28 Specifications for the Project, CONTRACTOR is required to review the Plans and

1 Specifications and promptly report any errors or omissions to COUNTY.

2 **2. CONTRACT COORDINATION.**

3 **2.1.** The Director of Public Works or his/her designee shall be the representative of COUNTY
4 for all purposes under this Agreement. The Director of Public Works or his/her designee
5 is hereby designated as the Contract Manager for COUNTY. He/she shall supervise the
6 progress and execution of this Agreement.

7 **2.2.** CONTRACTOR shall assign a single Contract Manager to have overall responsibility for
8 the progress and execution of this Agreement. Should circumstances or conditions
9 subsequent to the execution of this Agreement require a substitute Contract Manager for any
10 reason, the Contract Manager designee shall be subject to the prior written acceptance and
11 approval of COUNTY's Contract Manager.

12 **3. SCOPE OF WORK TO BE PERFORMED BY CONTRACTOR.**

13 **3.1.** CONTRACTOR shall furnish all work, labor, tools, equipment, materials, supervision,
14 scheduling, coordination and contract administration necessary to construct and complete
15 the Project in a good, expeditious, workman-like and substantial manner under the terms of
16 and in full and complete compliance with this Agreement ("Work").

17 **3.2.** CONTRACTOR shall comply with and perform work consistent with all terms,
18 conditions and requirements of the Plans, Specifications, the Invitation for Bids and this
19 Agreement.

20 **3.3.** All described work shall be constructed, installed, placed and performed in conformance
21 with the Plans and Specifications and all Special Provisions contained therein and as directed
22 by COUNTY's engineer.

23 **3.4.** In the event of a conflict among this Agreement, the Invitation for Bid and the Proposal, the
24 Invitation for Bid shall take precedence over the Proposal and this Agreement shall take
25 precedence over both.

26 **3.5.** CONTRACTOR shall perform such other tasks as necessary and proper for the full
27 performance of the obligations assumed by CONTRACTOR hereunder; including but not
28 limited to any additional work or change orders agreed upon pursuant to written

1 authorization as described in Section 5. Proposed additional work or change order requests,
2 when applicable, will be attached and incorporated herein under **Exhibit “B”** (as “B-1,” “B-
3 2,” etc.).

4 **4. TRENCHING REQUIREMENTS AND UTILITY RELOCATION.**

5 **4.1. Four Feet (4’) Below the Surface.** In the event the Project involves digging trenches or
6 other excavations that extend deeper than four feet (4’) below the surface,
7 CONTRACTOR shall:

8 **4.1.1.** Promptly, and before the following conditions are disturbed, notify COUNTY, in
9 writing, of any:

- 10 (a) Material that CONTRACTOR believes may be material that is hazardous
11 waste, as defined in Health & Safety Code §25117, that is required to be
12 removed to a Class I, Class II or Class III disposal site in accordance with
13 provisions of existing law;
- 14 (b) Subsurface or latent physical conditions at the site differing from those
15 indicated by information about the site made available to bidders prior to
16 the deadline for submitting bids; and
- 17 (c) Unknown physical conditions at the site of any unusual nature, different
18 materially from those ordinarily encountered and generally recognized as
19 inherent in work of the character provided for in the Agreement.

20 **4.1.2.** In response to any written notice generated pursuant to Subparagraph 4.1.1,
21 COUNTY shall promptly investigate the conditions, and if it finds that the
22 conditions do materially so differ, or do involve hazardous waste, and cause a
23 decrease or increase in CONTRACTOR’s cost of, or the time required for,
24 performance of any part of the Work, COUNTY shall issue a change order under
25 the procedures described in this Agreement.

26 **4.1.3.** In the event that a dispute arises between COUNTY and CONTRACTOR whether
27 the conditions materially differ, or involve hazardous waste, or cause a decrease
28 or increase in CONTRACTOR’s cost of, or time required for, performance of any

1 part of the Work, CONTRACTOR shall not be excused from any scheduled
2 completion date provided for by this Agreement, but shall proceed with all Work
3 to be performed under this Agreement. CONTRACTOR shall retain any and all
4 rights provided either by contract or by law which pertain to the resolution of
5 disputes and protests between the Parties.

6 **4.2. Trenching Requirements – Project in Excess of Twenty-Five Thousand Dollars (\$25,000)**
7 **and Five Feet (5’) Below the Surface.** For projects involving both an estimated expenditure
8 in excess of twenty-five thousand dollars (\$25,000) and the excavation of any trench five
9 feet (5’) or more in depth, CONTRACTOR shall submit a detailed plan showing the
10 design of shoring, bracing, sloping or other provisions to be made for worker protection
11 from the hazard of caving ground during the excavation of such trench. The plan must
12 be accepted by COUNTY (or by a registered civil or structural engineer, employed by
13 COUNTY, to whom authority to accept has been delegated) in advance of excavation. If
14 such plan varies from the shoring system standards, the plan shall be prepared by a
15 registered civil or structural engineer. Nothing in this Paragraph shall allow
16 CONTRACTOR to use a shoring, sloping, or protective system less effective than that
17 required by California Construction Safety Orders. Further, nothing in this Paragraph
18 shall be construed to impose tort liability on COUNTY or any of its employees.

19 **4.3. Utilities Relocation.** In the event that CONTRACTOR, in the scope of work, encounters
20 utilities not shown on COUNTY’S plans, COUNTY shall compensate CONTRACTOR
21 for utilities relocation work. COUNTY shall also waive liquidated damages for any delay
22 that occurs as a result of said encounter and/or relocation of utilities.

23 **5. CHANGE ORDERS.**

24 **5.1. Change Orders.** CONTRACTOR shall make no changes to the Work to be performed
25 pursuant to this Agreement, including but not limited to additions, deletions, modifications
26 or substitutions, nor shall CONTRACTOR perform any extra work (collectively, “Change
27 Order Work”) without the prior written consent of COUNTY. If CONTRACTOR
28 encounters conditions it considers different from those described in **Exhibit “A”** to this

1 Agreement, CONTRACTOR may request a change order in conformance with COUNTY's
2 standard procedure ("Change Order"). If COUNTY approves the request, CONTRACTOR
3 will execute a Change Order and CONTRACTOR's execution of the Change Order shall
4 confirm approval thereof. COUNTY may order additional work, and CONTRACTOR shall
5 perform such changes in the Work as directed by COUNTY in any Change Order prepared
6 by CONTRACTOR. COUNTY's rights to eliminate portions of the Work or to initiate a
7 Change Order shall not be limited in any way. The Change Order shall be in writing and
8 shall include:

9 **5.1.1.** Any and all supporting documents and drawings depicting the source and location
10 of the desired change, and explain in detail the field conditions and reasons for the
11 requested change;

12 **5.1.2.** Any change or adjustment to the compensation set forth in this Agreement as a result
13 of changes in the Work based on a lump sum or time and material basis, as may be
14 directed by COUNTY; and

15 **5.1.3.** Any request for adjustments to time for completion of the Project.

16 **5.2.** Payment for Change Order Work. CONTRACTOR shall not be entitled to receive any
17 compensation for work, labor, materials or changes of any kind, regardless of whether
18 ordered by COUNTY or any of its representatives, unless a Change Order has been
19 submitted in writing and approved prior to the commencement of any Change Order Work
20 as described above. If the changes are required by any inspecting governmental agencies or
21 utility companies, or are otherwise required to comply with any codes, laws, rules or
22 regulations, including those set forth in this Agreement, then CONTRACTOR shall not be
23 entitled to any increases in the compensation set forth in this Agreement or other
24 compensation as a result of the changes.

25 **5.3.** Disputed Change Order Work. Any dispute concerning the performance of such Change
26 Order Work or the amount of compensation to be paid to CONTRACTOR by COUNTY
27 shall not affect CONTRACTOR's obligation to perform such Change Order Work.
28 CONTRACTOR agrees that it shall timely complete all Change Order Work even if there

1 shall be a dispute between CONTRACTOR and COUNTY over the amount or scope of the
2 Change Order Work. CONTRACTOR shall have the right to be compensated for any
3 undisputed Change Order Work amounts as determined to be undisputed in COUNTY's
4 sole discretion.

5 **5.4. Authorized Representative.** No Change Order shall be valid or binding against COUNTY
6 unless such Change Order has been executed by COUNTY's designated representative, who
7 is the Director of Public Works. COUNTY shall notify CONTRACTOR in writing if the
8 designated representative is changed.

9 **5.5. Limits.** When applicable, the authority to execute a Change Order on this Project shall not
10 exceed the amount allowed by law pursuant to Public Contract Code sections 20137-20142
11 et seq. Where Change Orders are in an amount between ten percent (10%) and twenty-five
12 percent (25%) of the amount set forth in this Agreement and based on a need for additional
13 quantities due to an increase in the unit quantities required to complete the project in excess
14 of the COUNTY's Engineer's estimate of unit quantities as set forth in the Invitation to Bid,
15 CONTRACTOR shall be paid pursuant to Public Contract Code sections 20143 and 20139
16 and section 4 of the Standard Specifications, State of California, Business, Transportation
17 and Housing Agency, May 2006 Issued by the Department of Transportation ("Caltrans
18 Standard Specifications") referred to in **Exhibit "A"** and incorporated herein by reference.

19 **6. REPRESENTATIONS BY CONTRACTOR.**

20 **6.1.** CONTRACTOR understands and agrees that COUNTY has limited knowledge in the
21 construction specified in the description of work. CONTRACTOR has represented itself to
22 be expert in these fields and understands that COUNTY is relying upon such representation.

23 **6.2.** CONTRACTOR represents and warrants that it is a lawful entity possessing all required
24 licenses and authorities to do business in the State of California and perform all aspects
25 of this Agreement.

26 **6.3.** CONTRACTOR shall not commence any work under this Agreement or provide any
27 other services, or materials, in connection therewith until CONTRACTOR has received
28 written authorization from the Director of Public Works, or his/her designee ("Notice to

1 Proceed”) to do so.

2 **6.4.** CONTRACTOR represents and warrants that the people executing this Agreement on
3 behalf of CONTRACTOR have the authority of CONTRACTOR to sign this Agreement
4 and bind CONTRACTOR to the performance of all duties and obligations assumed by
5 CONTRACTOR herein.

6 **6.5.** CONTRACTOR represents and warrants that any employee, contractor, subcontractor and
7 agent who will be performing any of the duties and obligations of CONTRACTOR herein
8 possess all required licenses and authorities, as well as the experience and training, to
9 perform such tasks.

10 **6.6.** CONTRACTOR represents and warrants that the allegations contained in its Proposal are
11 true and correct.

12 **6.7.** CONTRACTOR understands that COUNTY considers the representations made herein
13 to be material and would not enter into this Agreement with CONTRACTOR if such
14 representations were not made.

15 **6.8.** Retention and Access of Books and Records. CONTRACTOR represents and warrants
16 that it shall maintain books, records, documents, reports and other materials developed
17 under this Agreement as follows:

18 **6.8.1.** CONTRACTOR shall hold and possess as the property of COUNTY all papers,
19 books, files, correspondence and other records of all kinds which at any time shall
20 come into its possession or under its control relating only to services performed
21 by CONTRACTOR under this Agreement for a minimum period of five (5) years,
22 or for any longer period required by law, from the date said papers came into the
23 possession of CONTRACTOR pursuant to this Agreement.

24 **6.8.2.** Any records or documents required to be maintained by CONTRACTOR
25 pursuant to this Agreement shall be made available to COUNTY for inspection or
26 audit, at any time during CONTRACTOR’s regular business hours provided
27 COUNTY provides CONTRACTOR with seven (7) days advanced written or oral
28 notice. Copies of such documents shall, at no cost to COUNTY, be provided to

COUNTY for inspection at CONTRACTOR's address indicated for receipt of notices under this Agreement.

6.8.3. CONTRACTOR shall surrender all papers maintained by CONTRACTOR pursuant to Subparagraph 6.8.1 of this Agreement within thirty (30) days of termination of this Agreement.

6.8.4. CONTRACTOR represents and warrants that it has not been engaged by, nor will it be engaged by and owes no duty of performance to any other person or entity that would constitute a conflict. For breach or violation of this warranty, COUNTY shall amongst other remedies at law, have the right to terminate this Agreement without liability, or at its sole discretion, to deduct from the Agreement price or consideration, or otherwise recover the full amount of such fee, commission, percentage brokerage fee, gift or contingent fee paid or received from another entity or person.

6.9. CONTRACTOR shall perform pursuant to this Agreement in accordance with and in full compliance with all applicable Federal, State and local statutes, rules, regulations and policies and procedures, regardless of whether they are expressly set forth in this Agreement. It is understood that in the event COUNTY is investigated or audited by any State or Federal governmental agency, or any other recognized investigative/auditing entity, CONTRACTOR shall fully cooperate with such agencies' reasonable and lawful request for information.

7. TERM OF AGREEMENT.

This Agreement shall commence on the date first written above and shall remain in effect until the services provided as outlined in Section 3, ("SCOPE OF WORK TO BE PERFORMED BY CONTRACTOR"), have been completed, unless otherwise terminated as provided for in this Agreement.

8. COMPENSATION.

The total compensation payable under this Agreement shall be in accordance with the item prices incorporated within the Proposal submitted by CONTRACTOR for labor, materials and all other services related to the performance of this Agreement, attached hereto as **Exhibit "B"** and incorporated herein

1 as though fully set forth. The total compensation payable under this Agreement shall not exceed
2 <<Compensation Amount>>

3 **9. PAYMENT AND RETENTION OF FUNDS.**

4 COUNTY shall pay CONTRACTOR for completed and approved services upon presentation
5 and approval of its itemized billing, subject to the following.

6 **9.1. Retention.**

7 **9.1.1.** In accordance with Cal. Pub. Contract Code §§ 7201 and 9203, COUNTY shall
8 generally retain five percent (5%) of the total compensation payable under this
9 Agreement until the Work to be performed has been completed in accordance with
10 this Agreement, as determined by COUNTY, and payment in full of all of
11 CONTRACTOR's subcontractors has been certified.

12 **9.1.2.** The 5% retention amount may be exceeded if the COUNTY's Board of Supervisors
13 has approved a finding, during a properly noticed and normally scheduled public
14 hearing conducted either prior to or concurrent with authorizing this Project to go
15 out to bid, that the Project is substantially complex and therefore requires a higher
16 retention amount than 5%. Should the retention amount exceed 5% for this Project,
17 then the actual retention amount will be listed in the Plans and Specifications, along
18 with the findings justifying the increased retention amount.

19 **9.2. Substitution of Retention.**

20 **9.2.1.** CONTRACTOR may elect to substitute securities for any retention of funds by
21 COUNTY to ensure performance under this Agreement. At the request and
22 expense of CONTRACTOR, securities equivalent to the amount retained shall be
23 deposited with the COUNTY, or with a state or federally chartered bank in this state
24 as the escrow agent, who shall then return the securities to CONTRACTOR once
25 the Work to be performed has been completed in accordance with this Agreement,
26 as determined by COUNTY, and payment in full of all of CONTRACTOR's
27 subcontractors has been certified.

28 **9.2.2.** Alternatively, CONTRACTOR may request and COUNTY shall make payment of

1 retentions earned directly to the escrow agent at the expense of CONTRACTOR.
2 CONTRACTOR, at its sole cost and expense, may direct the investment of the
3 payments into securities, and CONTRACTOR shall receive the interest earned on
4 the investments upon the same terms provided for in this Section for securities
5 deposited by CONTRACTOR. Once the Work to be performed has been
6 completed in accordance with this Agreement, as determined by COUNTY, and
7 payment in full of all of CONTRACTOR's subcontractors has been certified,
8 CONTRACTOR shall receive from the escrow agent all securities, interest, and
9 payments received by the escrow agent from COUNTY, pursuant to the terms of
10 this Section.

11 **9.2.3.** Securities eligible for investment under this Section shall include those listed in Cal.
12 Gov. Code § 16430, bank or savings and loan certificates of deposit, interest-bearing
13 demand deposit accounts, standby letters of credit, or any other security mutually
14 agreed to by COUNTY and CONTRACTOR. CONTRACTOR shall be the
15 beneficial owner of any securities substituted for retained funds and shall receive
16 any interest thereon.

17 **9.2.4.** Substitution of securities shall be conducted through an Escrow Agreement
18 substantially similar to that found in Cal. Pub. Contract Code § 22300(f).

19 **9.2.5.** Notwithstanding any other provision in this Section, substitution of securities is
20 prohibited where funding for the Project, in whole or in part, will be provided by
21 the Farmers Home Administration of the United States Department of Agriculture
22 pursuant to the Consolidated Farm and Rural Development Act (7 U.S.C. Sec. 1921
23 et seq.), or where otherwise disallowed by federal law.

24 **10. METHOD OF PAYMENT.**

25 **10.1.** CONTRACTOR shall at any time prior to the fifteenth (15th) day of any month, submit
26 to COUNTY's Director of Public Works or his/her designee, a complete and accurate
27 written claim for compensation for services performed. The claim shall be in a format
28 approved by COUNTY. COUNTY shall make no payment prior to the claims being

1 approved in writing by the Director of Public Works or his/her designee.

2 **10.2.** After determining that the claim is a proper payment request, the Director of Public
3 Works, or his/her designee, shall submit to COUNTY's Auditor/Controller undisputed
4 and properly submitted claims approved for payment within ten (10) days following the
5 date the claim was submitted to his/her Department.

6 **10.3.** CONTRACTOR may expect to receive payment within a reasonable time thereafter and
7 in any event in the normal course of business within thirty (30) days after the undisputed
8 and properly submitted claim is submitted.

9 **10.4.** Any claim determined to be an improper payment request shall be returned to
10 CONTRACTOR as soon as practicable, but not later than seven (7) days, after receipt with
11 a written explanation as to why the claim is an improper request for payment.

12 **10.5.** In order for prompt payment to be made by COUNTY pursuant to Public Contract Code
13 §20104.50, CONTRACTOR must properly fill out all written claims for compensation for
14 services performed.

15 **10.6.** COUNTY shall pay interest at the legal rate set forth in Code of Civil Procedure §685.010
16 in the event payment is not made within thirty (30) days of an undisputed properly submitted
17 request.

18 **11. INDEMNIFICATION.**

19 **11.1.** CONTRACTOR agrees to the fullest extent permitted by law to indemnify, defend,
20 protect and hold COUNTY and its representatives, officers, directors, designees,
21 employees, agents, successors and assigns harmless from any and all claims, expenses,
22 liabilities, causes of action, demands, losses, penalties, attorneys' fees and costs, in law
23 or equity, of every kind and nature whatsoever arising out of or in connection with
24 CONTRACTOR's negligent acts and omissions or willful misconduct under this
25 Agreement ("Claims"), whether or not arising from the passive negligence of COUNTY,
26 but does not include Claims that are finally determined to be the result of the sole
27 negligence or willful misconduct of COUNTY.

28 **11.2.** CONTRACTOR agrees to defend with counsel acceptable to COUNTY, indemnify and

1 hold COUNTY harmless from all Claims, including but not limited to:

2 **11.2.1.** Personal injury, including but not limited to bodily injury, emotional injury,
3 sickness or disease or death to persons including but not limited to COUNTY’s
4 representatives, officers, directors, designees, employees, agents, successors and
5 assigns, subcontractors and other third parties and/or damage to property of
6 anyone (including loss of use thereof) arising out of CONTRACTOR’s negligent
7 performance of, or willful misconduct surrounding, any of the terms contained in
8 this Agreement, or anyone directly or indirectly employed by CONTRACTOR or
9 anyone for whose acts CONTRACTOR may be liable;

10 **11.2.2.** Liability arising from injuries to CONTRACTOR and/or any of
11 CONTRACTOR’s employees or agents arising out of CONTRACTOR’s
12 negligent performance of, or willful misconduct surrounding, any of the terms
13 contained in this Agreement, or anyone directly or indirectly employed by
14 CONTRACTOR or anyone for whose acts CONTRACTOR may be liable;

15 **11.2.3.** Penalties imposed upon account of the violation of any law, order, citation, rule,
16 regulation, standard, ordinance or statute caused by the negligent action or
17 inaction, or willful misconduct of CONTRACTOR or anyone directly or
18 indirectly employed by CONTRACTOR or anyone for whose acts
19 CONTRACTOR may be liable, including but not limited to:

20 (a) Any loss of funding, penalties, fees, or other costs resulting from
21 CONTRACTOR’s failure to adhere to Disadvantaged Business Enterprise
22 requirements and/or goals, as determined by COUNTY or such other
23 lawful entity in charge of monitoring Disadvantaged Business Enterprise
24 compliance;

25 (b) Any loss of funding, penalties, fees, or other costs resulting from
26 CONTRACTOR’s failure to adhere to prevailing wage requirements, as
27 determined by COUNTY, the California Department of Industrial
28 Relations, or such other lawful entity in charge of monitoring prevailing

wage compliance;

11.2.4. Infringement of any patent rights which may be brought against COUNTY arising out of CONTRACTOR's work;

11.2.5. Any violation or infraction by CONTRACTOR of any law, order, citation, rule, regulation, standard, ordinance or statute in any way relating to the occupational health or safety of employees; and

11.2.6. Any breach by CONTRACTOR of the terms, requirements or covenants of this Agreement.

11.3. The indemnification provisions of this Agreement shall extend to Claims occurring after this Agreement is terminated, as well as while it is in force.

12. INDEPENDENT CONTRACTOR.

12.1. In all situations and circumstances arising out of the terms and conditions of this Agreement, CONTRACTOR is an independent contractor, and as an independent contractor, the following shall apply:

12.2. CONTRACTOR is not an employee or agent of COUNTY and is only responsible for the requirements and results specified by this Agreement.

12.3. CONTRACTOR shall be responsible to COUNTY only for the requirements and results specified by this Agreement and except as specifically provided in this Agreement, shall not be subject to COUNTY's control with respect to the physical actions or activities of CONTRACTOR in fulfillment of the requirements of this Agreement.

12.4. CONTRACTOR is not, and shall not be, entitled to receive from, or through, COUNTY, and COUNTY shall not provide, or be obligated to provide, CONTRACTOR with Worker's Compensation coverage or any other type of employment or worker insurance or benefit coverage required or provided by any Federal, State or local law or regulation for, or normally afforded to, an employee of COUNTY.

12.5. CONTRACTOR shall not be entitled to have COUNTY withhold or pay, and COUNTY shall not withhold or pay, on behalf of CONTRACTOR, any tax or money relating to the Social Security Old Age Pension Program, Social Security Disability Program, or any

1 other type of pension, annuity, or disability program required or provided by any Federal,
2 State or local law or regulation.

3 **12.6.** CONTRACTOR shall not be entitled to participate in, or receive any benefit from, or
4 make any claim against any COUNTY fringe benefit program, including, but not limited
5 to, COUNTY's pension plan, medical and health care plan, dental plan, life insurance
6 plan, or any other type of benefit program, plan, or coverage designated for, provided to,
7 or offered to COUNTY's employee.

8 **12.7.** COUNTY shall not withhold or pay, on behalf of CONTRACTOR, any Federal, State,
9 or local tax, including, but not limited to, any personal income tax, owed by
10 CONTRACTOR.

11 **12.8.** CONTRACTOR is, and at all times during the term of this Agreement shall represent and
12 conduct itself as, an independent contractor, not an employee of COUNTY.

13 **12.9.** CONTRACTOR shall not have the authority, express or implied, to act on behalf of, bind
14 or obligate COUNTY in any way without the written consent of COUNTY.

15 **13. INSURANCE.**

16 **13.1.** CONTRACTOR hereby agrees at its own cost and expense to procure and maintain,
17 during the entire term of this Agreement and any extended term therefore, insurance in a
18 sum acceptable to COUNTY and adequate to cover potential liabilities arising in
19 connection with the performance of this Agreement and in any event not less than the
20 minimum limit set forth in the "Minimum Insurance Amounts" attachment to the Plans
21 and Specifications which are incorporated as if set forth fully herein.

22 **13.2. Special Insurance Requirements.** All insurance required shall:

23 **13.2.1.** Be procured from California admitted insurers (licensed to do business in
24 California) with a current rating by Best's Key Rating Guide, acceptable to
25 COUNTY. A rating of at least A-VII shall be acceptable to COUNTY; lesser
26 ratings must be approved in writing by COUNTY.

27 **13.2.2.** Be primary coverage as respects COUNTY and any insurance or self-insurance
28 maintained by COUNTY shall be in excess of CONTRACTOR's insurance

1 coverage and shall not contribute to it.

2 **13.2.3.** Name COUNTY as an additional insured on all policies, except Workers'
3 Compensation, and provide that COUNTY may recover for any loss suffered by
4 COUNTY by reason of CONTRACTOR's negligence.

5 **13.2.4.** State that it is primary insurance and regards COUNTY as an additional insured
6 and contains a cross-liability or severability of interest clause.

7 **13.2.5.** Not be canceled, non-renewed or reduced in scope of coverage until after thirty
8 (30) days written notice has been given to COUNTY. However, CONTRACTOR
9 may not terminate such coverage until it provides COUNTY with proof that equal
10 or better insurance has been secured and is in place. Cancellation or change
11 without the prior written consent of COUNTY shall, at the option of COUNTY,
12 be grounds for termination of this Agreement.

13 **13.2.6.** If this Agreement remains in effect more than one (1) year from the date of its
14 original execution, COUNTY may, at its sole discretion, require an increase in the
15 amount of liability insurance to the level then customary in similar COUNTY
16 Agreements by giving sixty (60) days notice to CONTRACTOR.

17 **13.3.** Additional Insurance Requirements.

18 **13.3.1.** COUNTY is to be notified immediately of all insurance claims. COUNTY is also
19 to be notified if any aggregate insurance limit is exceeded.

20 **13.3.2.** The comprehensive or commercial general liability shall contain a provision of
21 endorsements stating that such insurance:

- 22 (a) Includes contractual liability;
- 23 (b) Does not contain any exclusions as to loss or damage to property caused
24 by explosion or resulting from collapse of buildings or structures or
25 damage to property underground, commonly referred to by insurers as the
26 "XCU Hazards";
- 27 (c) Does not contain a "pro rata" provision which looks to limit the insurer's
28 liability to the total proportion that its policy limits bear to the total

1 coverage available to the insured;

2 (d) Does not contain an “excess only” clause which requires the exhaustion
3 of other insurance prior to providing coverage;

4 (e) Does not contain an “escape clause” which extinguishes the insurer’s
5 liability if the loss is covered by other insurance;

6 (f) Includes COUNTY as an additional insured; and

7 (g) States that it is primary insurance and regards COUNTY as an additional
8 insured and contains a cross-liability or severability of interest clause.

9 **13.4. Deposit of Insurance Policy.** Promptly on issuance, reissuance, or renewal of any
10 insurance policy required by this Agreement, CONTRACTOR shall, if requested by
11 COUNTY, cause to be given to COUNTY satisfactory evidence that insurance policy
12 premiums have been paid together with a duplicate copy of the policy or a certificate
13 evidencing the policy and executed by the insurance company issuing the policy or its
14 authorized agent.

15 **13.5. Certificates of Insurance.** Complete copies of certificates of insurance for all required
16 coverages including additional insured endorsements shall be attached hereto as **Exhibit**
17 **“C”** and incorporated herein as though fully set forth.

18 **13.6. Additional Insurance.** Nothing in this, or any other provision of this Agreement, shall be
19 construed to preclude CONTRACTOR from obtaining and maintaining any additional
20 insurance policies in addition to those required pursuant to this Agreement.

21 **14. WORKERS’ COMPENSATION CERTIFICATION.**

22 **14.1.** Prior to the commencement of work, CONTRACTOR shall sign and file with COUNTY
23 the following certification: “I am aware of the provisions of California Labor Code
24 §§3700 et seq. which require every employer to be insured against liability for workers’
25 compensation or to undertake self-insurance in accordance with the provisions of that
26 code, and I will comply with such provisions before commencing the performance of the
27 work of this contract.”

28 **14.2.** This certification is included in this Agreement and signature of the Agreement shall

1 constitute signing and filing of the certificate.

2 **14.3.** CONTRACTOR understands and agrees that any and all employees, regardless of hire
3 date, shall be covered by Workers' Compensation pursuant to statutory requirements
4 prior to beginning work on the Project.

5 **14.4.** If CONTRACTOR has no employees, initial here: _____.

6 **15. WARRANTY.**

7 **15.1. One Year Warranty.** CONTRACTOR agrees to provide a one-year warranty for all of its
8 work and component parts and guarantees that all work shall be performed in a
9 professional and workman-like manner and be free from defects except the vertical
10 multistage booster pump station shall have a 24 month warranty. CONTRACTOR
11 guarantees to timely correct all work performed by it under this Agreement which
12 COUNTY determines to be defective in design, material and/or workmanship within a
13 period of one (1) year from the date of the completion of the Work. The warranties set
14 forth in this Agreement shall be in addition to, and not in lieu of, all other statutory and
15 case law warranties and obligations of CONTRACTOR. CONTRACTOR expressly
16 agrees that all warranties made by CONTRACTOR, all obligations under this Agreement
17 and all remedies for breach of such warranties shall survive this Agreement in the event
18 it is terminated or expires for any reason prior to the running of the full warranty periods
19 listed above.

20 **15.2. Materials.** All materials furnished by CONTRACTOR shall be new, manufactured
21 during the current year, of first quality and carrying full manufacturer's warranty.
22 CONTRACTOR shall be responsible for any expiration of manufacturer or other
23 warranties of material or equipment being supplied for this Agreement. CONTRACTOR
24 guarantees that all warranties of material and equipment shall become effective when the
25 project is accepted by COUNTY's Board of Supervisors, not at time of installation by
26 CONTRACTOR.

27 **15.3. Manufacturers' Warranty Information.** CONTRACTOR agrees to promptly provide such
28 information and maintenance recommendations to COUNTY at the inception of

1 CONTRACTOR's work to the extent such information is reasonably available.

2 **16. DEFAULT AND REMEDIES.**

3 **16.1. Default.** In the event that (i) CONTRACTOR files a petition requesting relief under any
4 bankruptcy act, or is adjudged as bankrupt, or makes a general assignment for the benefit
5 of creditors or has a receiver appointed on account of its insolvency, or (ii)
6 CONTRACTOR refuses or is unable, for whatever reason, to supply enough properly
7 skilled workers or proper materials to complete the Project, or (iii) CONTRACTOR fails
8 to follow the directions of COUNTY, or (iv) CONTRACTOR fails to make prompt
9 payment to its subcontractors and suppliers for materials or labor supplied or permits any
10 lien to be imposed upon all or any portion of the Project, or (v) CONTRACTOR
11 disregards any laws or orders of any public or private authority having jurisdiction over
12 the Work or the Project, or (vi) CONTRACTOR fails to perform in accordance with any
13 of the terms of this Agreement or breaches any provision of this Agreement, COUNTY
14 may give notice of such failure or breach to CONTRACTOR, identifying the failure or
15 breach of this Agreement. Should any such failure or breach continue for twenty-four
16 (24) hours after delivery of notice without a good faith effort on the part of
17 CONTRACTOR to commence all necessary corrective action, or should such a breach
18 continue despite CONTRACTOR's efforts for forty-eight (48) hours, then at that time
19 such failure shall be deemed a default by CONTRACTOR under this Agreement and
20 COUNTY shall have all rights and remedies available at law or in equity, including the
21 right to terminate this Agreement. Without limiting its rights and remedies, COUNTY
22 may then proceed as follows:

23 **16.1.1.** Without terminating this Agreement or the obligations of CONTRACTOR
24 hereunder as to all of the Work required to be performed or furnished by
25 CONTRACTOR pursuant to this Agreement, COUNTY may require
26 CONTRACTOR, at CONTRACTOR's expense, to cure such default(s) as may
27 exist in the performance of CONTRACTOR's obligations hereunder within forty-
28 eight (48) hours after such default(s) has/have occurred including but not limited

1 to repairing, replacing and correcting material or Work determined by COUNTY
2 to be defective or not complying with the requirements of this Agreement. Should
3 CONTRACTOR fail to timely repair, replace and/or correct non-complying or
4 defective materials and workmanship or otherwise cure its default(s) hereunder,
5 and in the case of emergencies in which case COUNTY may act immediately if
6 CONTRACTOR is not available or is not responding, and without further notice,
7 COUNTY may make required repairs, replacements and other corrections or
8 otherwise remedy the default by CONTRACTOR pursuant to the subparagraph
9 below.

10 **16.1.2.** Without terminating this Agreement or the obligations of CONTRACTOR
11 hereunder as to all of the Work required to be performed or furnished by
12 CONTRACTOR pursuant to this Agreement, COUNTY may engage another
13 contractor to perform such portion of CONTRACTOR's Work required pursuant
14 to this Agreement or furnish any materials or other items required hereunder as
15 COUNTY in its sole discretion may deem necessary to avoid delay in the progress
16 of the Work, and in connection therewith, COUNTY may perform such Work or
17 any portion thereof itself or have the same performed by others and COUNTY
18 may procure all necessary materials, equipment or other items required for the
19 continued progress of such Work. The costs incurred by COUNTY as a result of
20 engaging another contractor shall be deducted from the compensation payable
21 pursuant to this Agreement and if COUNTY's costs exceed or may reasonably be
22 anticipated to exceed the balance of the compensation due to CONTRACTOR for
23 such work, such excess, or anticipated excess, shall be immediately due and owing
24 from CONTRACTOR to COUNTY and may be withheld from any funds due to
25 CONTRACTOR pursuant to this Agreement or any other agreement.

26 **16.1.3.** COUNTY may terminate CONTRACTOR's right to perform upon written notice
27 and COUNTY shall then have the option of completing the Work or any portion
28 thereof by exercise of its interest under the performance bond issued in favor by

1 CONTRACTOR, or having such Work in whole or in part be completed by others
2 for CONTRACTOR's account. A calculation shall take place at the conclusion
3 of the Project wherein to the degree the sum of COUNTY's costs and any amounts
4 paid to complete the Project exceed the compensation payable pursuant to this
5 Agreement, then any such excess shall be immediately due and owing from
6 CONTRACTOR to COUNTY.

7 **16.2. Damages.** CONTRACTOR shall be liable for all damages suffered by COUNTY by
8 reason of CONTRACTOR's default in any provision of this Agreement and the exercise
9 of COUNTY of its option to terminate this Agreement shall not release CONTRACTOR
10 of such liability. CONTRACTOR shall have no right to receive any further payment after
11 a default has occurred until such time as the Work to be performed by CONTRACTOR
12 pursuant hereto has been completed and accepted by COUNTY and damages suffered by
13 COUNTY, if any, ascertained. Damages shall include by way of illustration, but not of
14 exclusion, COUNTY's costs of completing the Work which exceeds the compensation
15 payable pursuant to this Agreement, other general, liquidated, special or consequential
16 damages, attorney fees and costs.

17 **16.3. Actions After Default.** Should COUNTY exercise any of its options, remedies or rights
18 granted pursuant to the terms of this Agreement in the event of a default by
19 CONTRACTOR, COUNTY at its sole election may, but shall not be obligated to, use
20 any materials, supplies, tools or equipment on the work site which belong to
21 CONTRACTOR to complete the Work required to be completed by CONTRACTOR,
22 whether such work is completed by COUNTY or by others, and CONTRACTOR agrees
23 that it shall not remove such materials, supplies, tools and equipment from the work site
24 unless directed in writing by COUNTY to do so.

25 **16.4. Limit on Force Majeure Damages.** CONTRACTOR shall not be responsible for repairing
26 or restoring damage to work caused by an act of God in excess of five (5) percent of the
27 contract amount, provided that the work damaged is built in accordance with accepted
28 and applicable building standards and the plans and specifications of COUNTY. In the

1 event of such damage, COUNTY may, at its option, elect to terminate this Agreement.
2 For purposes of this Agreement, an “act of God” shall be defined as an earthquake in
3 excess of 3.5 on the Richter Scale and a tidal wave.

4 **16.5. Resolution of Claims.** COUNTY and CONTRACTOR agree to follow and comply with
5 the mediation, arbitration, claim, civil action procedure and trial de novo provisions set
6 forth in California Public Contracts Code §§ 9204 and 20104 – 20104.6.

7 **16.6. No Limitation of Rights.** The options and rights granted to COUNTY herein shall not be
8 deemed as limitations upon the other rights and remedies of COUNTY in the event of a
9 failure of performance or breach by CONTRACTOR, and COUNTY shall be entitled to
10 exercise the rights and remedies hereinabove specified and all other rights and remedies
11 which may be provided in this Agreement or by law or in equity, either cumulatively or
12 consecutively, and in such order as COUNTY in its sole discretion shall determine.

13 **17. NON-DISCRIMINATION.**

14 **17.1.** During the performance of this Agreement, CONTRACTOR and its subcontractors shall
15 not unlawfully discriminate, harass or allow harassment against any employee or
16 applicant for employment because of sex, race, color, ancestry, religious creed, national
17 origin, physical disability (including HIV and AIDS), mental disability, medical
18 condition (cancer), age (over forty (40)), marital status and denial of family care leave.

19 **17.2.** CONTRACTOR and its subcontractors shall insure that the evaluation and treatment of
20 their employees and applicants for employment are free from such discrimination and
21 harassment.

22 **17.3.** CONTRACTOR and its subcontractors shall comply with the provisions of the Fair
23 Employment and Housing Act (Gov. Code §12990 (a-f) et seq.) and the applicable
24 regulations promulgated thereunder (California Code of Regulations, Title 2, Section
25 7285 et seq.).

26 **17.4.** The applicable regulations of the Fair Employment and Housing Commission
27 implementing Government Code §12990 (a-f), set forth in Chapter 5 of Division 4 of
28 Title 2 of the California Code of Regulations, are incorporated into this Agreement by

reference and made a part hereof as if set forth in full.

17.5. The applicable regulations of Section 504 of the Rehabilitation Act of 1973 (29 U.S.C. §794 (a)) are incorporated into this Agreement by reference and made a part hereof as if set forth in full.

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

17.7. CONTRACTOR shall include the nondiscrimination and compliance provisions of this clause in all subcontracts to perform Work under this Agreement.

18. **DISADVANTAGED BUSINESS ENTITY COMPLIANCE.**

18.1. When applicable, CONTRACTOR and its subcontractors shall reference and abide by the guidance and Disadvantaged Business Enterprise (“DBE”) specifications contained in the California Department of Transportation’s Standard Specifications.

18.2. CONTRACTOR represents and warrants that is has fully read the applicable DBE requirements pertaining to this Project and has fully and accurately completed any and all required DBE forms.

18.3. CONTRACTOR represents and warrants that it will comply with all applicable DBE requirements for this Project.

18.4. CONTRACTOR shall comply with the applicable DBE provisions attached hereto as **Exhibit “D”** and incorporated by this reference as though fully set forth herein.

18.5. If any state or federal funds are withheld from COUNTY or not reimbursed to COUNTY due to CONTRACTOR’s failure to either comply with the DBE requirements set forth in the RFP and this Agreement, or to meet the mandatory DBE goals as determined by COUNTY, Caltrans, the Federal Highway Administration, and/or any other state or federal agency contributing funds to the Project, then CONTRACTOR shall fully reimburse COUNTY the amount of funding lost. COUNTY reserves the right to deduct any such loss in funding from the amount of compensation due to CONTRACTOR under this Agreement.

1 **18.6.** In addition to the above, CONTRACTOR’s failure to comply with DBE
2 requirements/goals shall subject it to such sanctions as are permitted by law, which may
3 include, but shall not be limited to the following:

4 **18.6.1.** Termination of this Agreement;

5 **18.6.2.** Withholding monthly progress payments;

6 **18.6.3.** Denial of payment for any portion of the Project that was committed at the time
7 of the execution of this Agreement to be performed by a DBE subcontractor, but
8 was completed by CONTRACTOR or a substitute non-DBE subcontractor;

9 **18.6.4.** Compensatory, special, incidental, liquidated and other damages; and/or

10 **18.6.5.** Designation of CONTRACTOR as “nonresponsible,” and disqualification from
11 bidding on future public works projects advertised by COUNTY.

12 **19. PREVAILING WAGE.**

13 **19.1.** CONTRACTOR and its subcontractors shall pay all workers employed on the Project the
14 higher of either the rates determined by the Director of the California Department of
15 Industrial Relations (“DIR”) or, when applicable, the Davis-Bacon Federal wage rates as
16 supplemented by the Department of Labor regulations. The Davis-Bacon Federal wage
17 rates are attached to the RFP. Copies of the State prevailing rate of per diem wages are
18 on file with the Department of Industrial Relations, Division of Apprenticeship Standards,
19 445 Golden Gate Avenue, San Francisco, California, and at COUNTY’s Department of
20 Public Works, and are available to CONTRACTOR and any other interested party upon
21 request. CONTRACTOR shall post the prevailing rate of per diem wages to be posted at
22 the Project site.

23 **19.2.** CONTRACTOR is responsible for compliance with the provisions herein.

24 **19.3. Mandatory Registration with the Department of Industrial Relations – NEW**
25 **REQUIREMENTS PURSUANT TO SB 854.**

26 **19.3.1.** CONTRACTOR and its subcontractors shall register with the DIR and pay all
27 applicable fees as set forth in Labor Code section 1725.5.

28 **19.3.2.** CONTRACTOR and its subcontractors acknowledge that they shall not be listed

1 on any bid proposal for a public works project (submitted on or after March 1,
2 2015) unless registered with the DIR pursuant to Labor Code section 1725.5. The
3 requirements of this section shall apply unless one of the limited exceptions
4 provided under Labor Code Section 1771.1(a) applies.

5 **19.3.3.** CONTRACTOR and its subcontractors acknowledge that they shall not be
6 awarded any contract for public work on a public works project (awarded on or
7 after April 1, 2015) unless registered with the DIR pursuant to Labor Code section
8 1725.5.

9 **19.3.4.** The Project described herein is subject to compliance monitoring and enforcement
10 with the DIR.

11 **19.3.5.** For further information concerning compliance with SB 854, please visit:
12 <http://www.dir.ca.gov/Public-Works/SB854.html>.

13 **19.4. Cognizance of Violations by County.**

14 **19.4.1.** CONTRACTOR understands and agrees that COUNTY shall take cognizance of
15 violations of Chapter 1 of Part 7 of Division 2 of the California Labor Code
16 committed in the course of the execution of this Agreement, and shall promptly
17 report any suspected violations to the Labor Commissioner.

18 **19.4.2.** If CONTRACTOR determines as a result of its own investigation that there has
19 been a violation of Chapter 1 of Part 7 of Division 2 of the California Labor Code
20 and withholds payment to CONTRACTOR, the procedures in California Labor
21 Code §1771.6 shall be followed.

22 **19.4.3.** CONTRACTOR may bring an action in a court of competent jurisdiction to
23 recover from COUNTY the difference between the wages actually paid to an
24 employee and the wages that were required to be paid to an employee pursuant to
25 Chapter 1 of Part 7 of Division 2 of the California Labor Code, any penalties
26 required to be paid pursuant to Chapter 1 of Part 7 of Division 2 of the California
27 Labor Code, and costs and attorney's fees related to the action, if either of the
28 following is true:

1 (a) COUNTY previously affirmatively represented to CONTRACTOR in
2 writing, in the call for bids, or otherwise, that the Work was not a “public
3 work,” as defined in Chapter 1 of Part 7 of Division 2 of the California
4 Labor Code; or

5 (b) COUNTY received actual written notice from the Department of
6 Industrial Relations that the Work is a “public work,” as defined in
7 Chapter 1 of Part 7 of Division 2 of the California Labor Code, and failed
8 to disclose that information to CONTRACTOR before the bid opening or
9 award.

10 **19.5. Prevailing Wage Rates and Payroll Records.**

11 **19.5.1.** CONTRACTOR agrees to comply with §§1775 and 1776 of the California Labor
12 Code relating to the payment of prevailing wage and the maintenance of certified
13 payroll records and to make the certified payroll records available for inspection
14 at all reasonable hours at CONTRACTOR’s principal office. The responsibility
15 for compliance with these provisions is fixed with CONTRACTOR.
16 CONTRACTOR understands and agrees that it shall, as a penalty to COUNTY,
17 forfeit specific monetary fines for each worker paid less than the prevailing wage
18 rates as determined by the Labor Commissioner for the work or craft in which the
19 worker is employed for any Work done pursuant to this Agreement.

20 **19.5.2. *Prevailing Wage Compliance For those Projects subject to DIR Monitoring and***
21 ***Enforcement.*** CONTRACTOR has reviewed and agrees to comply with any
22 applicable provisions for those Projects subject to Department of Industrial
23 Relations (DIR) Monitoring and Enforcement of prevailing wages. COUNTY
24 hereby notifies CONTRACTOR that CONTRACTOR is responsible for
25 complying with the requirements of Senate Bill 854 (SB854) regarding certified
26 payroll record reporting. Further information concerning the requirements of
27 SB854 is available on the DIR website located at: [http://www.dir.ca.gov/Public-](http://www.dir.ca.gov/Public-Works/PublicWorksEnforcement.html)
28 [Works/PublicWorksEnforcement.html](http://www.dir.ca.gov/Public-Works/PublicWorksEnforcement.html).

1 and 107 of the Contract Work Hours and Safety Standards Act, 40 U.S.C. §§3700 et seq.,
2 as supplemented by the Department of Labor regulations, which provide that
3 CONTRACTOR's workers and its subcontractor's workers may not be required or
4 permitted to work more than eight (8) hours in any one (1) calendar day and forty (40)
5 hours in any one (1) calendar week. Further, work performed by employees of
6 CONTRACTOR or its subcontractor in excess of eight (8) hours per day, and forty (40)
7 hours during any one (1) week, shall be compensated for all hours worked in excess of
8 eight (8) hours per day at not less than one and one-half (1½) times the basic rate of pay.
9 The responsibility for compliance with these provisions is fixed with CONTRACTOR.
10 CONTRACTOR understands and agrees that it shall, as a penalty to COUNTY, forfeit
11 specific monetary fines to COUNTY should CONTRACTOR or its subcontractors fail to
12 comply with the provisions contained within this Paragraph.

13 **19.7. Apprenticeship Requirements.**

14 **19.7.1.** CONTRACTOR agrees to comply with §§1777.5, 1777.6 and 1777.7 of the
15 California Labor Code relating to the employment of apprentices and to provide
16 COUNTY with copies of any contract award information and verified statements
17 of the journeyman and apprentice hours performed pursuant to this Agreement as
18 required by §1777.5(e). The responsibility for compliance with these provisions
19 is fixed with CONTRACTOR for all apprenticeable occupations, where
20 journeymen in the craft are employed on the public work, in a ratio of not less
21 than one (1) apprentice for each five (5) journeymen (unless an exemption is
22 granted in accordance with §1777.5) and CONTRACTOR and its subcontractors
23 shall not discriminate among otherwise qualified employees as indentured
24 apprentices on any public work solely on the ground of race, religious creed, color,
25 national origin, ancestry, sex, or age, except as provided in California Labor Code
26 §3077. Only apprentices, as defined in California Labor Code §3077, who are in
27 training under apprenticeship standards and who have signed written apprentice
28 agreements will be employed on public works in apprenticeable occupations.

1 This section shall not be enforced if the not-to-exceed amount of this Agreement
2 set forth and/or incorporated in the "COMPENSATION" Section is less than
3 thirty thousand dollars (\$30,000).

4 **19.7.2.** If the Project falls within the jurisdiction of California Labor Code §1777.5,
5 COUNTY shall, within five (5) days of the award, send a copy of the award to the
6 Division of Apprenticeship Standards. In addition, COUNTY shall notify the
7 Division of Apprenticeship Standards of a finding of any discrepancy regarding
8 the ratio of apprentices to journeymen within five (5) days of the finding.

9 **19.8. Labor Standards Compliance Requirements.**

10 **19.8.1.** It is CONTRACTOR's responsibility to provide all labor compliance
11 documentation from its subcontractors completely and accurately in a timely
12 manner. CONTRACTOR is responsible to review promptly and then forward on
13 all required documentation to COUNTY per the time schedules in the Labor
14 Compliance Handout. Included with the Labor Compliance Handout, COUNTY
15 will provide training, documentation requirements, forms, etc., at the
16 preconstruction conference or at a time designated by COUNTY.

17 **19.8.2.** In the event, during the review process of labor compliance documentation from
18 COUNTY's labor compliance monitor, inaccurate, missing or incomplete
19 information was provided, the labor compliance monitor will request from
20 CONTRACTOR the items, revisions and documentation needed. The cost of this
21 additional labor compliance enforcement shall be borne by CONTRACTOR.

22 **20. INELIGIBILITY.**

23 **20.1.** CONTRACTOR represents and warrants that it and its subcontractors are not ineligible
24 to work for COUNTY due to violations of Labor Code §§1777.1 and 1777.7.

25 **20.2.** If CONTRACTOR is deemed ineligible to perform work on public works projects
26 pursuant to Labor Code Sections 1777.1 or 1777.7, then CONTRACTOR shall be
27 prohibited from bidding on, being awarded an agreement for, or performing work as a
28 subcontractor on this Project, or any other public works project within the state of

California.

21. **SIGNAGE REQUIREMENTS.**

21.1. Project Identity Signage. CONTRACTOR is required to provide and install the required project identity signage as detailed in the Plans and Specifications, in the size and at the location indicated by the Director of Public Works or his/her designee, and to maintain the signage in good condition for the duration of the Project. The signage may not be removed until the Notice of Completion is recorded or by written direction of the Director of Public Works or his/her designee.

21.2. Required Employee Signage and Posters. CONTRACTOR is required to provide and install the Federal and State required employee posters and the required material pertaining to the required labor standards provisions are posted (including, but not limited to, WH-1321, OSHA 3165 and OFCCP-English, EFCCP-Spanish) at the worksite in a prominent and accessible place.

21.3. Section 3 Compliant Signage. If required by COUNTY, CONTRACTOR is directed to provide and install the "Offer for Employment" signage as detailed in the Plans and Specifications in the size and at the location indicated by the Director of Public Works or his/her designee and to maintain the signage in good condition for the duration of the Project. The signage may not be removed until the Notice of Completion is recorded or by written direction of the Director of Public Works or his/her designee.

22. **CONFLICT OF INTEREST AND GRATUITIES.**

22.1. CONTRACTOR agrees that it presently has no interest and shall not acquire any interest, direct or indirect, which could conflict in any manner or degree with the performance of services required to be performed under this Agreement. CONTRACTOR further agrees that in the performance of this Agreement, no person having any such interest shall be employed.

22.2. CONTRACTOR agrees to designate such person or persons who have responsibility for carrying out the services under this Agreement and that such person or persons as may be designated shall take any and all actions necessary to comply with COUNTY's Conflict

1 of Interest Code adopted pursuant to California Government Code §81000 to the extent
2 required thereunder.

3 **22.3.** If it is found, after notice and hearing by COUNTY, that gratuities (in the form of
4 entertainment., gifts, or otherwise) were offered or given by CONTRACTOR, or any
5 agent or representative of CONTRACTOR, to any officer, employee or agent of
6 COUNTY with a view toward securing a contract or securing favorable treatment with
7 respect to the awarding or amending or the making of any determinations with respect to
8 the performance of this Agreement, COUNTY may, by written notice to
9 CONTRACTOR, terminate the right of CONTRACTOR to proceed under this
10 Agreement and/or may pursue such other rights and remedies provided by law or under
11 this Agreement.

12 **22.4.** In the event this Agreement is terminated as provided herein, COUNTY shall be entitled
13 to:

14 **22.4.1.** Pursue the same remedies against CONTRACTOR as it could pursue in the event
15 of a breach of the Agreement by CONTRACTOR; and

16 **22.4.2.** As a penalty in addition to any other damages to which it may be entitled by law,
17 to exemplary damages in an amount (as determined by COUNTY) which shall be
18 not less than three (3) nor more than ten (10) times the costs incurred by
19 CONTRACTOR in providing any such gratuities to any such officer, employee
20 or agent.

21 ~~**23. HOUSING AND URBAN DEVELOPMENT ACT COMPLIANCE.**~~

22 ~~When applicable, CONTRACTOR agrees to comply with Section 3 of the Housing and Urban~~
23 ~~Development Act of 1968 (42 U.S.C. 3601 et seq.) which provides that to the greatest extent feasible,~~
24 ~~CONTRACTOR shall provide job training, employment and contracting opportunities for low- or very-~~
25 ~~low income residents in connection with the Project. The responsibility for compliance with these~~
26 ~~provisions is fixed with CONTRACTOR.~~

27 **24. COPELAND “ANTI-KICKBACK” ACT COMPLIANCE.**

28 When applicable, CONTRACTOR agrees to comply with the Copeland Act

1 (*18 USC §874 and 40 USC §276c; 29 C.F.R. Part 3*) which precludes CONTRACTOR and its
2 subcontractors from in any way inducing an employee to give up any part of the compensation to which
3 he or she is entitled under his or her contract of employment. CONTRACTOR and its subcontractors
4 shall submit a weekly statement of the wages paid to each employee performing on covered work during
5 the preceding payroll period. CONTRACTOR understands and agrees that should CONTRACTOR its
6 subcontractors induce an employee working on a covered contract to give up any part of the
7 compensation to which he or she is entitled, the inducing party may be subject to a five thousand dollar
8 (\$5,000) fine, or imprisonment for up to five (5) years, or both. CONTRACTOR also understands and
9 agrees that willful falsification of the statement of compliance may subject the employer to civil or
10 criminal prosecution and may be cause for contract termination or debarment. The responsibility for
11 compliance with these provisions is fixed with CONTRACTOR.

12 **25. FAIR LABOR STANDARDS ACT COMPLIANCE.**

13 When applicable, CONTRACTOR agrees to comply with the Fair Labor Standards Act of 1938
14 as amended (29 U.S.C. 201 et seq.) which establishes minimum wage, overtime pay, recordkeeping, and
15 youth employment standards affecting full-time and part-time workers on the Project. The responsibility
16 for compliance with these provisions is fixed with CONTRACTOR.

17 **26. CERTIFICATION REGARDING DEBARMENT, SUSPENSION AND OTHER**
18 **RESPONSIBILITY MATTERS.**

19 When applicable, CONTRACTOR agrees to execute a certification regarding debarment,
20 suspension and other responsibility matters. The responsibility for compliance with this provision is
21 fixed with CONTRACTOR.

22 **27. FEDERAL EQUAL EMPLOYMENT OPPORTUNITY CONSTRUCTION CONTRACT**
23 **SPECIFICATIONS.**

24 When applicable, CONTRACTOR agrees to incorporate the notice set forth in paragraph (d) of
25 41 C.F.R. 60-4.2 relating to the “Equal Opportunity Clause” and the “Standard Federal Equal
26 Employment Specifications.” The responsibility for compliance with this provision is fixed with
27 CONTRACTOR.

28 **28. CLEAN AIR ACT AND THE FEDERAL WATER POLLUTION CONTROL ACT.**

1 When applicable, CONTRACTOR agrees to comply with all applicable standards, orders or
2 regulations issued pursuant to the Clean Air Act (42 U.S.C. 7401 et seq.), the Federal Water Pollution
3 Control Act as amended (33 U.S.C. 1251 et seq.), Presidential Executive Order 11738 and
4 Environmental Protection Agency regulations set forth at 40 C.F.R. Part 15. CONTRACTOR
5 understands and agrees that violations shall be reported to the Federal awarding agency and the Regional
6 Office of the Environmental Protection Agency. The responsibility for compliance with these provisions
7 is fixed with CONTRACTOR.

8 **29. PROHIBITION ON THE USE OF FEDERAL FUNDS FOR LOBBYING.**

9 When applicable, CONTRACTOR shall file the required certification. Each tier certifies to the
10 tier above that it will not and has not used Federal appropriated funds to pay any person or organization
11 for influencing or attempting to influence an officer or employee of any agency, a member of Congress,
12 officer or employee of Congress, or an employee of a member of Congress in connection with obtaining
13 any Federal contract, grant or any other award covered by 31 U.S.C. 1352. Each tier shall also disclose
14 any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award.
15 Such disclosures are forwarded from tier to tier up to the recipient. The responsibility for compliance
16 with this provision is fixed with CONTRACTOR.

17 **30. FEDERAL EMPLOYMENT ELIGIBILITY VERIFICATION.**

18 CONTRACTOR shall verify name, date of birth and social security number, along with
19 immigration information for non-citizens in order to verify the identity and employment eligibility of
20 both citizen and non-citizen new hires. The responsibility for compliance with this provision is fixed
21 with CONTRACTOR.

22 **31. THE CIVIL RIGHTS, HCD AND AGE DISCRIMINATION ACT ASSURANCES.**

23 **31.1.** During the performance of this Agreement, CONTRACTOR assures that no otherwise
24 qualified person shall be excluded from participation or employment, denied program
25 benefits or be subjected to discrimination based on race, color, national origin, gender,
26 age or handicap, under any program or activity funded by this Agreement, as required by
27 Title VI of the Civil Rights Act of 1964, Title I of the Housing and Community
28 Development Act of 1974, as amended, and the Age Discrimination Act of 1975, and all

1 implementing regulations. The responsibility for compliance with these provisions is
2 fixed with CONTRACTOR.

3 **31.2.** CONTRACTOR and its subcontractors shall not discriminate on the basis of race, color,
4 national origin, or sex in the performance of this Agreement. CONTRACTOR shall carry
5 out the applicable requirements of 49 C.F.R. Chapter 26 in the award and administration
6 of Department of Transportation assisted contracts. Failure by CONTRACTOR to carry
7 out these requirements is a material breach of this Agreement, which may result in the
8 termination of this Agreement, or such other remedy as COUNTY deems appropriate.
9 CONTRACTOR shall include the nondiscrimination and compliance provisions of this
10 Paragraph in all subcontracts to perform Work under this Agreement.

11 **32. FEDERAL EQUAL EMPLOYMENT OPPORTUNITY REQUIREMENTS.**

12 **32.1.** CONTRACTOR hereby agrees that it will incorporate or cause to be incorporated into
13 any contract for construction work, or modification thereof, as defined in the regulations
14 of the Secretary of Labor at 41 C.F.R. Chapter 60, which is paid for in whole or in part
15 with funds obtained from the Federal Government or borrowed on the credit of the
16 Federal Government pursuant to a grant, contract, loan insurance, or guarantee, or
17 undertaken pursuant to any Federal program involving such grant, contract, loan,
18 insurance, or guarantee, the following equal opportunity clause. For the purposes of this
19 Subsection, the term “contractor” shall refer to CONTRACTOR, and the term “contract”
20 shall refer to this Agreement:

21 *“During the performance of this contract, the Contractor agrees as follows:*

22 *(1) The contractor will not discriminate against any employee or applicant for*
23 *employment because of race, color, religion, sex, or national origin. The*
24 *contractor will take affirmative action to ensure that applicants are*
25 *employed, and that employees are treated during employment, without*
26 *regard to their race, color, religion, sex, or national origin. Such action*
27 *shall include, but not be limited to the following: Employment, upgrading,*
28 *demotion, or transfer, recruitment or recruitment advertising; layoff or*

1 *termination; rates of pay or other forms of compensation; and selection for*
2 *training, including apprenticeship. The contractor agrees to post in*
3 *conspicuous places, available to employees and applicants for employment,*
4 *notices to be provided by the contracting officer setting forth the provisions*
5 *of this nondiscrimination clause.*

6 (2) *The contractor will, in all solicitations or advertisements for employees*
7 *placed by or on behalf of the contractor, state that all qualified applicants*
8 *will receive consideration for employment without regard to race, color,*
9 *religion, sex, or national origin.*

10 (3) *The contractor will send to each labor union or representative of workers*
11 *with which he has a collective bargaining agreement or other contract or*
12 *understanding, a notice to be provided by the agency contracting officer,*
13 *advising the labor union or workers' representative of the contractor's*
14 *commitments under section 202 of Executive Order 11246 of September 24,*
15 *1965, and shall post copies of the notice in conspicuous places available to*
16 *employees and applicants for employment.*

17 (4) *The contractor will comply with all provisions of Executive Order 11246 of*
18 *September 24, 1965, and of the rules, regulations, and relevant orders of*
19 *the Secretary of Labor.*

20 (5) *The contractor will furnish all information and reports required by*
21 *Executive Order 11246 of September 24, 1965, and by the rules,*
22 *regulations, and orders of the Secretary of Labor, or pursuant thereto, and*
23 *will permit access to his books, records, and accounts by the contracting*
24 *agency and the Secretary of Labor for purposes of investigation to ascertain*
25 *compliance with such rules, regulations, and orders.*

26 (6) *In the event of the contractor's non-compliance with the nondiscrimination*
27 *clauses of this contract or with any of such rules, regulations, or orders,*
28 *this contract may be canceled, terminated or suspended in whole or in part*

1 *and the contractor may be declared ineligible for further Government*
2 *contracts in accordance with procedures authorized in Executive Order*
3 *11246 of September 24, 1965, and such other sanctions may be imposed*
4 *and remedies invoked as provided in Executive Order 11246 of September*
5 *24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as*
6 *otherwise provided by law.*

7 (7) *the contractor will include the provisions of paragraphs (1) through (7) in*
8 *every subcontract or purchase order unless exempted by rules, regulations,*
9 *or orders of the Secretary of Labor issued pursuant to section 204 of*
10 *Executive Order 11246 of September 24, 1965, so that such provisions will*
11 *be binding upon each subcontractor or vendor. The contractor will take*
12 *such action with respect to any subcontract or purchase order as may be*
13 *directed by the Secretary of Labor as a means of enforcing such provisions*
14 *including sanctions for noncompliance: Provided, however, that in the*
15 *event the contractor becomes involved in, or is threatened with, litigation*
16 *with a subcontractor or vendor as a result of such direction, the contractor*
17 *may request the United States to enter into such litigation to protect the*
18 *interests of the United States.”*

19 **32.2.** CONTRACTOR further agrees that it will be bound by the above equal opportunity
20 clause with respect to its own employment practices when it participates in federally-
21 assisted construction work; provided that if CONTRACTOR so participating is a State or
22 local government, the above equal opportunity clause is not applicable to any agency,
23 instrumentality, or subdivision of such government which does not participate in work on
24 or under the Agreement.

25 **32.3.** CONTRACTOR agrees that it will assist and cooperate actively with the administering
26 agency and the Secretary of Labor in obtaining the compliance of Contractors and
27 subcontractors with the equal opportunity clause and the rules, regulations, and relevant
28 orders of the Secretary of Labor, that it will furnish the Department and HUD and the

1 Secretary of Labor such information as they may require for the supervision of such
2 compliance, and that it will otherwise assist the administering agency in the discharge of
3 the agency's primary responsibility for securing compliance.

4 **32.4.** CONTRACTOR further agrees that it will refrain from entering into any contract or
5 contract modification subject to Executive Order 11246 of September 24, 1965, with a
6 contractor debarred from, or who has not demonstrated eligibility for, government
7 contracts and federally-assisted construction contracts, pursuant to the Executive Order
8 and will carry out such sanctions and penalties for violation of the equal opportunity
9 clause as may be imposed upon contractors and subcontractors by the administering
10 agency or the Secretary of Labor pursuant to Part II, Subpart D of the Executive Order.
11 In addition, CONTRACTOR agrees that if it fails or refuses to comply with these
12 undertakings, COUNTY may take any or all of the following actions: Cancel, terminate,
13 or suspend in whole or in part this funding commitment (contract, loan, grant, insurance,
14 guarantee); refrain from extending any further assistance to the applicant under the
15 program with respect to which the failure or refund occurred until satisfactory assurance
16 of future compliance has been received from such Contractor; and refer the case to the
17 Department of Justice for appropriate legal proceedings.

18 **33. ASSIGNMENT OF CLAIMS – CLAYTON OR CARTWRIGHT ACTS.**

19 CONTRACTOR shall comply with the following provisions regarding the assignment of claims
20 arising from either the Clayton Act or the Cartwright. For the purposes of this Section, the term
21 "contractor" shall refer to CONTRACTOR, the term "awarding body" shall refer to COUNTY, and the
22 term "public works contract" shall refer to this Agreement:

23 *"In entering into a public works contract or a subcontract to supply goods, services, or*
24 *materials pursuant to a public works contract, the contractor or subcontractor offers and*
25 *agrees to assign to the awarding body all rights, title, and interest in and to all causes of*
26 *action it may have under Section 4 of the Clayton Act (15 U.S.C. Sec. 15) or under the*
27 *Cartwright Act (Chapter 2 (commencing with Section 16700) of Part 2 of Division 7 of the*
28 *Business and Professions Code), arising from purchases of goods, services, or materials*

1 *pursuant to the public works contract or the subcontract. This assignment shall be made*
2 *and become effective at the time the awarding body tenders final payment to the contractor,*
3 *without further acknowledgment by the parties.”*

4 **34. NON-COLLUSION.**

5 CONTRACTOR agrees he/she has executed and submitted with the Bid a Non-Collusion
6 Affidavit that complies with Cal. Public Code §7106, included in **Exhibit “B”** and incorporated herein.

7 **35. NOTICES AND REPORTS.**

8 **35.1.** All notices and reports under this Agreement shall be in writing and may be given by
9 personal delivery or by mailing by certified mail, addressed as follows:

10 COUNTY

11 Imperial County Department of Public Works
12 Attention: Director
13 155 South Eleventh Street
14 El Centro, CA 92243

CONTRACTOR

«Consultant_Business_Name»
«Consultant_Street_Address»
«Consultant_City_State»

15 with copies to:

16 Imperial County Executive Office
17 Attention: County Executive Officer
18 940 West Main Street, Suite 208
19 El Centro, CA 92243

20 and:

21 Imperial County Department of Human
22 Resources and Risk Management
23 Attention: Director
24 940 West Main Street, Suite 101
25 El Centro, CA 92243

26 **35.2.** Notices and reports under this Agreement may be given by personal delivery or by
27 mailing by certified mail at such other address as either Party may designate in a notice
28 to the other Party given in such manner. Any notice given by mail shall be considered
given when deposited in the United States Mail, postage prepaid, addressed as provided
herein.

36. ENTIRE AGREEMENT.

This Agreement contains the entire agreement between COUNTY and CONTRACTOR relating

1 to the transactions contemplated hereby and supersedes all prior or contemporaneous agreements,
2 understandings, provisions, negotiations, representations, or statements, either written or verbal.

3 **37. ASSIGNMENT.**

4 Neither this Agreement nor any duties or obligations hereunder shall be assignable by
5 CONTRACTOR without the prior written consent of COUNTY.

6 **38. MODIFICATION.**

7 No modification, waiver, amendment, discharge, or change of this Agreement shall be valid
8 unless the same is in writing and signed by the Party against whom the enforcement of such modification,
9 waiver, amendment, discharge, or change is or may be sought.

10 **39. CAPTIONS.**

11 Captions in this Agreement are inserted for convenience of reference only and do not define,
12 describe or limit the scope or the intent of this Agreement or any of the terms thereof.

13 **40. PARTIAL INVALIDITY.**

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

17 **41. GENDER AND INTERPRETATION OF TERMS AND PROVISIONS.**

18 Words and expressions in the masculine gender include the feminine and neuter genders. Words
19 and expressions in the singular include the plural and words and expressions in the plural include the
20 singular. CONTRACTOR as used in this Agreement or in any other document referred to in or made a
21 part of this Agreement shall likewise include both singular and the plural, a corporation, a partnership,
22 individual, firm or person acting in any fiduciary capacity as executor, administrator, trustee or in any
23 other representative capacity or any other entity. All covenants herein contained on the part of
24 CONTRACTOR shall be joint and several if more than one person, firm or entity executes the
25 Agreement.

26 **42. WAIVER.**

27 No waiver of any breach or of any of the covenants or conditions of this Agreement shall be
28 construed to be a waiver of any other breach or to be consent to any further or succeeding breach of the

1 same or any other covenant or condition.

2 **43. CHOICE OF LAW.**

3 The laws of the State of California shall govern this Agreement. This Agreement is made and
4 entered into in Imperial County, California. Any action brought by either Party with respect to this
5 Agreement shall be brought in a court of competent jurisdiction within said County.

6 **44. AUTHORITY.**

7 **44.1.** Each individual executing this Agreement on behalf of CONTRACTOR represents and
8 warrants that:

9 **44.1.1.** He/She is duly authorized to execute and deliver this Agreement on behalf of
10 CONTRACTOR;

11 **44.1.2.** Such execution and delivery is in accordance with the terms of the Articles of
12 Incorporation or Partnership, any by-laws or Resolutions of CONTRACTOR and;

13 **44.1.3.** This Agreement is binding upon CONTRACTOR in accordance with its terms.

14 **44.2.** CONTRACTOR shall deliver to COUNTY evidence acceptable to COUNTY of the
15 foregoing within thirty days of execution of this Agreement.

16 **45. COUNTERPARTS.**

17 This Agreement and any subsequent modifications may be executed in any number of
18 counterparts, each of which when executed shall be an original, and all of which together shall constitute
19 one and the same Agreement. No counterparts shall be effective until all Parties have executed a
20 counterpart hereof.

21 **46. TIMING.**

22 The Parties agree that time is of the essence in this Agreement.

23 **47. REVIEW OF AGREEMENT TERMS.**

24 **47.1.** Each Party has had the opportunity to receive independent legal advice from its attorneys
25 with respect to the advisability of making the representations, warranties, covenants and
26 agreements provided for herein, and with respect to the advisability of executing this
27 Agreement.

28 **47.2.** Each Party represents and warrants to and covenants with the other Party that:

1 **47.2.1.** This Agreement in its reduction to final written form is a result of extensive good
2 faith negotiations between the Parties and/or their respective legal counsel; and

3 **47.2.2.** The Parties and/or their legal counsel have carefully reviewed and examined this
4 Agreement for execution by said Parties.

5 **47.3.** Any statute or rule of construction that ambiguities are to be resolved against the drafting
6 party shall not be employed in the interpretation of this Agreement.

7 **48. APPENDIX E OF THE TITLE VI ASSURANCES.**

8 During the performance of this contract, the CONTRACTOR, for itself, its assignees, and
9 successors in interest agrees to comply with the following nondiscrimination statutes and
10 authorities; including but not limited to:

11 48.1. Pertinent Nondiscrimination Authorities:

12 (a) Title VI of the Civil Rights Act of 1964 (42 U.S.C. § 2000d et seq, 78 stat. 252),
13 (prohibits discrimination on the basis of race, color, national origin); and 49 CFR
14 Part 21.

15 (b) The Uniform Relocation Assistance and Real Property Acquisition Policies Act
16 of 1970, (42 U.S.C. § 4601), (prohibits unfair treatment of persons displaced or
17 whose property has been acquired because of Federal or Federal-Aid programs
18 and projects);

19 (c) Federal-Aid Highway Act of 1973, (23 U.S.C. § 324 et seq.), prohibits
20 discrimination on the basis of sex);

21 (d) Section 504 of the Rehabilitation Act of 1973, (29 U.S.C. § 794 et seq.) as
22 amended, (prohibits discrimination on the basis of disability); and 49 CFR Part
23 27;

24 (e) The Age Discrimination Act of 1975, as amended, (42 U.S.C. § 6101 et seq.),
25 (prohibits discrimination on the basis of age);

26 (f) Airport and Airway Improvement Act of 1982, 949 U.S.C. § 4 71, Section 4
27 7123), as amended, (prohibits discrimination based on race, creed, color,
28 national origin, or sex);

- 1 (g) The Civil Rights Restoration Act of 1987, (PL 100-209), (Broadened the scope,
2 coverage and applicability of Title VI of the Civil Rights Act of 1964, The Age
3 Discrimination Act of 1975 and Section 504 of the Rehabilitation Act of 1973, by
4 expanding the definition of the terms “programs or activities” to include all the
5 programs or activities of the Federal-aid recipients, subrecipients and contractors,
6 whether such programs or activities are Federally funded or not);
- 7 (h) Titles II and III of the Americans with Disabilities Act, which prohibit
8 discrimination on the basis of disability in the operation of public entities, public
9 and private transportation systems, places of public accommodation, and certain
10 testing entities (42 U.S.C. §§ 12131-12189) as implemented by Department of
11 Transportation regulations at 49 C.F.R. parts 37 and 38;
- 12 (i) The Federal Aviation Administration’s Nondiscrimination statute (49 U.S.C. §
13 47123) (prohibits discrimination on the basis of race, color, national origin, and
14 sex);
- 15 (j) Executive Order 12898, Federal Actions to Address Environmental Justice in
16 Minority Populations and Low-Income Populations, which ensures
17 discrimination against minority populations by discouraging programs, policies,
18 and activities with disproportionately high and adverse human health or environmental
19 effects on minority and low-income populations;
- 20 (k) Executive Order 13166, Improving Access to Services for persons with Limited
21 English Proficiency, and resulting agency guidance, national origin
22 discrimination includes discrimination because of limited English proficiency
23 (LEP). To ensure compliance with Title VI, you must take reasonable steps to
24 ensure that LEP persons have meaningful access to your programs (70
25 Fed. Reg. at 74087 to 74100);
- 26 (l) Title IX of the Education Amendment of 1972, as amended, which prohibits you
27 from discriminating because of sex in education programs or activities (20 U.S.C.
28 1681 et seq).

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IN WITNESS WHEREOF, the Parties have executed this Agreement on the day and year first above written.

County of Imperial

<<Business Entity Name>>

By: _____
Ryan E. Kelley, Chairman
Imperial County Board of Supervisors

By: _____
«Contractor_Name_for_Signature»

ATTEST:

By: _____
Blanca Acosta,
Clerk of the Board of Supervisors

APPROVED AS TO FORM:

Eric R. Havens,
County Counsel

By: _____
Mistelle Abdelmagied,
Assistant County Counsel

18. NOTICE TO PROCEED

Dated: _____

Project: Gateway County Service Area – Water Treatment Plant Improvements	Owner: County of Imperial	Owner's Contract No.: 6914GTWTP
Contract:		Engineer's Project No.: 542.116

Contractor:

Contractor's Address (send Certified Mail, Return Receipt requested):

You are notified that the Contract Times under the above contract will commence to run on _____. On or before that date, you are to start performing your obligations under the Contract Documents.

Before you may start any Work at the Site, Paragraph 2.01.B of the General Conditions provides that you and the Owner must each deliver to the other (with copies to the Engineer and other identified additional insured's) Certificates of Insurance which each is required to purchase and maintain in accordance with the Contract Documents.

You are required to return an acknowledged copy of this NOTICE TO PROCEED to the OWNER.

	County of Imperial
_____ Contractor	_____ Owner
Given by:	Given by:
_____ Authorized Signature	_____ Authorized Signature
_____ Title	_____ Title
_____ Date	_____ Date

Copy to Engineer

19. PERFORMANCE BOND

Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

CONTRACTOR (Name and Address):

SURETY (Name and Address of Principal Place of Business):

OWNER (Name and Address):

**County of Imperial
940 West Main Street
Suite 208
El Centro, CA 92243**

CONTRACT

Date:

Amount:

Description: **Gateway County Service Area – Water Treatment Plant Improvements**

BOND

Bond Number:

Date (Not earlier than Contract Date):

Amount:

Modifications to this Bond Form:

The Surety and the Contractor, intending to be legally bound hereby, subject to the terms hereof, do each cause this Performance Bond to be duly executed on its behalf by its authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

SURETY

Company:

Signature: _____ (Seal)
Name and Title:

Surety's Name and Corporate Seal

By: _____
Signature and Title
(Attach Power of Attorney)

(Space is provided below for signatures of additional parties, if required.)

Attest: _____
Signature and Title

CONTRACTOR AS PRINCIPAL

SURETY

Company:

Signature: _____ (Seal)
Name and Title:

Surety's Name and Corporate Seal

By: _____
Signature and Title
(Attach Power of Attorney)

Attest: _____
Signature and Title:

1. The Contractor and the Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner for the performance of the Contract, which is incorporated herein by reference.
2. If the Contractor performs the Contract, the Surety and the Contractor have no obligation under this Bond, except to participate in conferences as provided in Paragraph 3.1.
3. If there is no Owner Default, the Surety's obligation under this Bond shall arise after:
 - 3.1 The Owner has notified the Contractor and the Surety, at the addresses described in Paragraph 10 below, that the Owner is considering declaring a Contractor Default and has requested and attempted to arrange a conference with the Contractor and the Surety to be held not later than **fifteen (15) days** after receipt of such notice to discuss methods of performing the Contract. If the Owner, the Contractor and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default; and
 - 3.2 The Owner has declared a Contractor Default and formally terminated the Contractor's right to complete the Contract. Such Contractor Default shall not be declared earlier than **twenty (20) days** after the Contractor and the Surety have received notice as provided in Paragraph 3.1; and
 - 3.3 The Owner has agreed to pay the Balance of the Contract Price to:
 1. The Surety in accordance with the terms of the Contract;
 2. Another contractor selected pursuant to Paragraph 4.3 to perform the Contract.
4. When the Owner has satisfied the conditions of Paragraph 3, the Surety shall promptly and at the Surety's expense take one of the following actions:
 - 4.1 Arrange for the Contractor, with consent of the Owner, to perform and complete the Contract; or
 - 4.2 Undertake to perform and complete the Contract itself, through its agents or through independent contractors; or
 - 4.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Contract, arrange for a contract to be prepared for execution by the Owner and the Contractor selected with the Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Contract, and pay to the Owner the amount of damages as described in Paragraph 6 in excess of the Balance of the Contract Price incurred by the Owner resulting from the Contractor Default; or
 - 4.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor and with reasonable promptness under the circumstances:
 1. After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, tender payment therefore to the Owner; or
 2. Deny liability in whole or in part and notify the Owner citing reasons therefore.
5. If the Surety does not proceed as provided in Paragraph 4 with reasonable promptness, the Surety shall be deemed to be in default on this Bond **fifteen (15) days** after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Paragraph 4.4, and the Owner refuses the payment tendered or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.
6. After the Owner has terminated Contractor's right to complete the Contract, and if the Surety elects to act under Paragraphs 4.1, 4.2, or 4.3 above, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the

Contract. To a limit of the amount of this Bond, but subject to commitment by the Owner of the Balance of the Contract Price to mitigation of costs and damages on the Contract, the Surety is obligated without duplication for:

- 6.1 The responsibilities of the Contractor for correction of defective Work and completion of the Contract;
 - 6.2 Additional Legal, Design Professional, and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Paragraph 4; and
 - 6.3 Liquidated damages, or if no liquidated damages are specified in the Contract, actual damages caused by delayed performance or non-performance of the Contractor.
7. The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, or successors.
 8. The Surety hereby waives notice of any change, including changes of time, to the Contract or to related subcontracts, purchase orders, and other obligations.
 9. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the Work or part of the Work is located and shall be instituted within **two (2) years** after Contractor Default or within **two (2) years** after the Contractor ceased working or within **two (2) years** after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties

as a defense in the jurisdiction of the suit shall be applicable.

10. Notice to the Surety, the Owner, or the Contractor shall be mailed or delivered to the address shown on the signature page.
11. When this Bond has been furnished to comply with a statutory requirement in the location where the Contract was to be performed, any provision in this Bond conflicting with said statutory requirement shall be deemed deleted here from and provisions conforming to such statutory requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

12. Definitions.

- 12.1 Balance of the Contract Price: The total amount payable by the Owner to the Contractor under the Contract after all proper adjustments have been made, including allowance to the Contractor of any amounts received or to be received by the Owner in settlement of insurance or other Claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Contract.
- 12.2 Contract: The agreement between the Owner and the Contractor identified on the signature page, including all the Contract Documents and changes thereto.
- 12.3 Contractor Default: Failure of the Contractor, which has neither been remedied nor waived, to perform or otherwise to comply with the terms of the Contract.
- 12.4 Owner Default: Failure of the Owner, which has neither been remedied nor waived, to pay the Contractor as required by the Contract or to perform and complete or comply with the other terms thereof.

FOR INFORMATION ONLY (Name, Address and Telephone)
SURETY AGENCY OR BROKER: _____ _____
OWNER'S REPRESENTATIVE: _____

20. PAYMENT BOND

Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

CONTRACTOR (Name and Address):

SURETY (Name and Address of Principal Place of Business):

OWNER (Name and Address):

**County of Imperial
940 West Main Street
Suite 208
El Centro, CA 92243**

CONTRACT

Date:

Amount:

Gateway County Service Area – Water Treatment Plant Improvements

BOND

Bond Number:

Date (Not earlier than Contract Date):

Amount:

Modifications to this Bond Form:

The Surety and the Contractor, intending to be legally bound hereby, subject to the terms printed on the reverse side hereof, do each cause this Payment Bond to be duly executed on its behalf by its authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

SURETY

Company:

Signature: _____ (Seal)

Name and Title:

(Seal)

Surety's Name and Corporate Seal

By: _____

Signature and Title

(Attach Power of Attorney)

(Space is provided below for signatures of additional parties, if required.)

Attest: _____

Signature and Title

CONTRACTOR AS PRINCIPAL

SURETY

Company:

Signature: _____ (Seal)

Name and Title:

(Seal)

Surety's Name and Corporate Seal

By: _____

Signature and Title

(Attach Power of Attorney)

Attest: _____

Signature and Title:

1. The Contractor and the Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner to pay for labor, materials, and equipment furnished by Claimants for use in the performance of the Contract, which is incorporated herein by reference.
2. With respect to the Owner, this obligation shall be null and void if the Contractor:
 - 2.1 Promptly makes payment, directly or indirectly, for all sums due Claimants, and
 - 2.2 Defends, indemnifies, and holds harmless the Owner from all claims, demands, liens, or suits alleging non-payment by the Contractor by any person or entity who furnished labor, materials, or equipment for use in the performance of the Contract, provided the Owner has promptly notified the Contractor and the Surety (at the addresses described in Paragraph 12) of any claims, demands, liens, or suits and tendered defense of such claims, demands, liens, or suits to the Contractor and the Surety, and provided there is no Owner Default.
3. With respect to Claimants, this obligation shall be null and void if the Contractor promptly makes payment, directly or indirectly, for all sums due.
4. The Surety shall have no obligation to Claimants under this Bond until:
 - 4.1 Claimants who are employed by or have a direct contract with the Contractor have given notice to the Surety (at the addresses described in Paragraph 12) and sent a copy, or notice thereof, to the Owner, stating that a claim is being made under this Bond and, with substantial accuracy, the amount of the claim.
 - 4.2 Claimants who do not have a direct contract with the Contractor:
 1. Have furnished written notice to the Contractor and sent a copy, or notice thereof, to the Owner, within **ninety (90) days** after having last performed labor or last furnished materials or equipment included in the claim stating, with substantial accuracy, the amount of the claim and the name of the party to whom the materials or equipment were furnished or supplied, or for whom the labor was done or performed; and
2. Have either received a rejection in whole or in part from the Contractor, or not received within **thirty (30) days** of furnishing the above notice any communication from the Contractor by which the Contractor had indicated the claim will be paid directly or indirectly; and
3. Not having been paid within the above **thirty (30) days**, have sent a written notice to the Surety and sent a copy, or notice thereof, to the Owner, stating that a claim is being made under this Bond and enclosing a copy of the previous written notice furnished to the Contractor.
5. If a notice by a Claimant required by Paragraph 4 is provided by the Owner to the Contractor or to the Surety that is sufficient compliance.
6. When a Claimant has satisfied the conditions of Paragraph 4, the Surety shall promptly and at the Surety's expense take the following actions:
 - 6.1 Send an answer to that Claimant, with a copy to the Owner, within **forty-five (45) days** after receipt of the claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed.
 - 6.2 Pay or arrange for payment of any undisputed amounts.
7. The Surety's total obligation shall not exceed the amount of this Bond, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.
8. Amounts owed by the Owner to the Contractor under the Contract shall be used for the performance of the Contract and to satisfy claims, if any, under any performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Contract are dedicated to satisfy obligations of the Contractor and the Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the Work.

9. The Surety shall not be liable to the Owner, Claimants, or others for obligations of the Contractor that are unrelated to the Contract. The Owner shall not be liable for payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligations to make payments to, give notices on behalf of, or otherwise have obligations to Claimants under this Bond.

10. The Surety hereby waives notice of any change, including changes of time, to the Contract or to related Subcontracts, purchase orders and other obligations.

11. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the location in which the Work or part of the Work is located or after the expiration of **one (1) year** from the date (1) on which the Claimant gave the notice required by Paragraph 4.1 or Paragraph 4.2.3, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

12. Notice to the Surety, the Owner, or the Contractor shall be mailed or delivered to the addresses shown on the signature page. Actual receipt of notice by the Surety, the Owner, or the Contractor, however accomplished, shall be sufficient compliance as of the date received at the address shown on the signature page.

13. When this Bond has been furnished to comply with a statutory requirement in the location where the Contract was to be performed, any provision in this Bond conflicting with said statutory requirement shall be deemed deleted herefrom and provisions

conforming to such statutory requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory Bond and not as a common law bond.

14. Upon request of any person or entity appearing to be a potential beneficiary of this Bond, the Contractor shall promptly furnish a copy of this Bond or shall permit a copy to be made.

15. Definitions.

15.1 Claimant: An individual or entity having a direct contract with the Contractor, or with a first-tier subcontractor of the Contractor, to furnish labor, materials, or equipment for use in the performance of the Contract. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Contract, Architectural and Engineering Services required for performance of the Work of the Contractor and the Contractor's Subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials, or equipment were furnished.

15.2 Contract: The agreement between the Owner and the Contractor identified on the signature page, including all Contract Documents and changes thereto.

15.3 Owner Default: Failure of the Owner, which has neither been remedied nor waived, to pay the Contractor as required by the Contract or to perform and complete or comply with the other terms thereof.

FOR INFORMATION ONLY	
(Name, Address and Telephone)	
SURETY AGENCY OR BROKER:	_____

OWNER'S REPRESENTATIVE:	_____

21. CONTRACTOR'S APPLICATION FOR PAYMENT

See attached pages.

APPLICATION AND CERTIFICATION FOR PAYMENT

AIA DOCUMENT G702

PAGE ONE OF TWO PAGES

TO OWNER: PROJECT:

APPLICATION NO:

Distribution to:

OWNER
 CONTRACTOR
 CONSULTANT

FROM PRIME CONTRACTOR: VIA CONSULTANT:

THG PROJECT NO:

CONTRACT DATE:

PRIME CONTRACTOR'S APPLICATION FOR PAYMENT

Application is made for payment, as shown below, in connection with the Contract. Continuation Sheet, AIA Document G703, is attached.

- 1. ORIGINAL CONTRACT SUM \$ _____
- 2. Net change by Change Orders \$ _____
- 3. CONTRACT SUM TO DATE (Line 1 ± 2) \$ _____
- 4. TOTAL COMPLETED & STORED TO DATE (Column G on G703) \$ _____
- 5. RETAINAGE:
 - a. 5 % of Completed Work (Column D + E on G703) \$ _____
 - b. % of Stored Material (Column F on G703) \$ _____ 0
 - Total Retainage (Lines 5a + 5b or Total in Column I of G703) \$ _____
- 6. TOTAL EARNED LESS RETAINAGE (Line 4 Less Line 5 Total) \$ _____
- 7. LESS PREVIOUS CERTIFICATES FOR PAYMENT (Line 6 from prior Certificate) \$ _____
- 8. CURRENT PAYMENT DUE \$ _____
- 9. BALANCE TO FINISH, INCL.RETAINAGE (Line 3 less Line 6) \$ _____

CHANGE ORDER SUMMARY	ADDITIONS	DEDUCTIONS
Total changes approved in previous months by Owner		
Total approved this Month		
TOTALS		
NET CHANGES by Change Order		

GENERAL CONTRACTOR'S CERTIFICATE FOR PAYMENT

In accordance with the Contract Documents, based on on-site observations and the data comprising the application, the General Contractor certifies to the Owner that to the best of the General Contractor's knowledge, information and belief the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and the Prime Contractor is entitled to payment of the AMOUNT CERTIFIED.

AMOUNT CERTIFIED _____

(Attach explanation if amount certified differs from the amount applied. Initial all figures on this Application and on the Continuation Sheet that are changed to conform with the amount certified.)

GENERAL CONTRACTOR:

By: _____ Date: _____

CONSULTANT'S CERTIFICATE FOR PAYMENT

In accordance with the Contract Documents, based on on-site observations and the data comprising the application, the Construction Manager certifies to the Owner that to the best of the Construction Manager's knowledge, information and belief the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and the Prime Contractor is entitled to payment of the AMOUNT CERTIFIED.

AMOUNT CERTIFIED \$ _____

(Attach explanation if amount certified differs from the amount applied. Initial all figures on this Application and on the Continuation Sheet that are changed to conform with the amount certified.)

CONSULTANT:

By: _____ Date: _____

This Certificate is not negotiable. The AMOUNT CERTIFIED is payable only to the Prime Contractor named herein. Issuance, payment and acceptance of payment are without prejudice to any rights of the Owner or Prime Contractor under this Contract.

22. CERTIFICATE OF SUBSTANTIAL COMPLETION

Project: Gateway County Service Area – Water Treatment Plant Improvements	Owner: County of Imperial	Owner's Contract No.: 6914GTWTP
Contract:		Date of Contract:
Contractor:		Engineer's Project No.: 542.116

This [tentative] [definitive] Certificate of Substantial Completion applies to:

- All Work under the Contract Documents: The following specified portions:

Date of Substantial Completion

The Work to which this Certificate applies has been inspected by authorized representatives of the Owner, the Contractor and the Engineer, and found to be substantially complete. The Date of Substantial Completion of the Project or portion thereof designated above is hereby declared and is also the date of commencement of applicable warranties required by the Contract Documents, except as stated below.

A (tentative) (revised tentative) (definitive) list of items to be completed or corrected, is attached hereto. This list may not be all-inclusive, and the failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

The responsibilities between the OWNER and the CONTRACTOR for security, operation, safety, maintenance, heat, utilities, insurance and warranties shall be as provided in the Contract Documents except as amended as follows:

- Amended Responsibilities Not Amended

Owner's Amended Responsibilities:

Contractor's Amended Responsibilities:

The following documents are attached to and made part of this Certificate:

Gateway County Service Area Water Treatment Plant Improvements

This Certificate does not constitute an acceptance of Work not in accordance with the Contract Documents nor is it a release of the Contractor's obligation to complete the Work in accordance with the Contract Documents.

_____ Executed by Engineer	_____ Date
_____ Accepted by Contractor	_____ Date
_____ Accepted by Owner	_____ Date

SECTION 23 - STANDARD GENERAL CONDITIONS

TABLE OF CONTENTS

	Page
Article 1 – Definitions and Terminology	00710-5
1.01 Defined Terms	00710-5
1.02 Terminology	00710-9
Article 2 – Preliminary Matters	00710-10
2.01 Delivery of Bonds and Evidence of Insurance	00710-10
2.02 Copies of Documents	00710-10
2.03 Commencement of Contract Times; Notice to Proceed	00710-10
2.04 Starting the Work	00710-10
2.05 Before Starting Construction	00710-10
2.06 Pre-Construction Conference	00710-11
2.07 Initial Acceptance of Schedules	00710-11
Article 3 – Contract Documents: Intent, Amending, Reuse	00710-11
3.01 Intent	00710-11
3.02 Reference Standards	00710-11
3.03 Reporting and Resolving Discrepancies	00710-12
3.04 Amending and Supplementing Contract Documents	00710-13
3.05 Reuse of Documents	00710-13
3.06 Electronic Data	00710-13
Article 4 – Availability of Lands; Subsurface and Physical Conditions; Hazardous Environmental Conditions; Reference Points	00710-14
4.01 Availability of Lands	00710-14
4.02 Subsurface and Physical Conditions	00710-14
4.03 Differing Subsurface or Physical Conditions	00710-15
4.04 Underground Facilities	00710-16
4.05 Reference Points	00710-17
4.06 Hazardous Environmental Condition at Site	00710-17
Article 5 – Bonds and Insurance	00710-18
5.01 Performance, Payment and Other Bonds	00710-18
5.02 Licensed Sureties and Insurers	00710-19
5.03 Certificates of Insurance	00710-19
5.04 Contractor’s Liability Insurance	00710-19
5.05 Owner’s Liability Insurance	00710-21
5.06 Property Insurance	00710-21
5.07 Waiver of Rights	00710-22
5.08 Receipt and Application of Insurance Proceeds	00710-23
5.09 Acceptance of Bonds and Insurance; Option to Replace	00710-23
5.10 Partial Utilization, Acknowledgment of Property Insurer	00710-23

Gateway County Service Area Water Treatment Plant Improvements

Article 6 – Contractor’s Responsibilities	00710-24
6.01 Supervision and Superintendence	00710-24
6.02 Labor; Working Hours	00710-24
6.03 Services, Materials and Equipment	00710-24
6.04 Progress Schedule	00710-24
6.05 Substitutes and “Or-Equals”	00710-25
6.06 Concerning Subcontractors, Suppliers and Others	00710-27
6.07 Patent Fees and Royalties	00710-28
6.08 Permits	00710-29
6.09 Laws and Regulations	00710-29
6.10 Taxes	00710-29
6.11 Use of Site and Other Areas	00710-29
6.12 Record Documents	00710-30
6.13 Safety and Protection	00710-30
6.14 Safety Representative	00710-31
6.15 Hazard Communication Programs	00710-31
6.16 Emergencies	00710-31
6.17 Shop Drawings and Samples	00710-31
6.18 Continuing the Work	00710-33
6.19 Contractor’s General Warranty and Guarantee	00710-33
6.20 Indemnification	00710-34
6.21 Delegation of Professional Design Services	00710-35
 Article 7 – Other Work at the Site	 00710-35
7.01 Related Work at Site	00710-35
7.02 Coordination	00710-36
7.03 Legal Relationships	00710-36
 Article 8 – Owner’s Responsibilities	 00710-36
8.01 Communication to Contractor	00710-36
8.02 Replacement of Engineer	00710-36
8.03 Furnish Data	00710-37
8.04 Pay When Due	00710-37
8.05 Lands and Easements; Reports and Tests	00710-37
8.06 Insurance	00710-37
8.07 Change Orders	00710-37
8.08 Inspections, Tests and Approvals	00710-37
8.09 Limitations on Owner’s Responsibilities	00710-37
8.10 Undisclosed Hazardous Environmental Condition	00710-37
8.11 Evidence of Financial Arrangements	00710-37
 Article 9 – Engineer’s Status During Construction	 00710-38
9.01 Owner’s Representative	00710-38
9.02 Visits to Site	00710-38
9.03 Project Representative	00710-38
9.04 Authorized Variations in Work	00710-38
9.05 Rejecting Defective Work	00710-39
9.06 Shop Drawings, Change Orders and Payments	00710-39
9.07 Determinations for Unit Price Work	00710-39
9.08 Decisions on Requirements of Contract Documents and Acceptability of Work	00710-39
9.09 Limitations on Engineer’s Authority and Responsibilities	00710-40

Gateway County Service Area Water Treatment Plant Improvements

Article 10 – Changes in the Work; Claims	00710-40
10.01 Authorized Changes in the Work	00710-40
10.02 Unauthorized Changes in the Work	00710-40
10.03 Execution of Change Orders	00710-41
10.04 Notification to Surety	00710-41
10.05 Claims	00710-41
Article 11 – Cost of the Work; Allowances; Unit Price Work	00710-42
11.01 Cost of the Work	00710-42
11.02 Allowances	00710-44
11.03 Unit Price Work	00710-45
Article 12 – Change of Contract Price; Change of Contract Times	00710-46
12.01 Change of Contract Price	00710-46
12.02 Change of Contract Times	00710-47
12.03 Delays	00710-47
Article 13 – Tests and Inspections; Correction, Removal or Acceptance of Defective Work	00710-48
13.01 Notice of Defects	00710-48
13.02 Access to Work	00710-48
13.03 Tests and Inspections	00710-48
13.04 Uncovering Work	00710-49
13.05 Owner May Stop the Work	00710-49
13.06 Correction or Removal of Defective Work	00710-49
13.07 Correction Period	00710-50
13.08 Acceptance of Defective Work	00710-50
13.09 Owner May Correct Defective Work	00710-51
Article 14 – Payments to Contractor and Completion	00710-51
14.01 Schedule of Values	00710-51
14.02 Contractor’s Warranty of Title	00710-54
14.03 Substantial Completion	00710-54
14.04 Partial Utilization	00710-55
14.05 Final Inspection	00710-56
14.06 Final Payment	00710-56
14.07 Final Completion Delayed	00710-57
14.08 Waiver of Claims	00710-57
Article 15 – Suspension of Work and Termination	00710-57
15.01 Owner May Suspend Work	00710-57
15.02 Owner May Terminate Work for Cause	00710-58
15.03 Owner May Terminate for Convenience	00710-59
15.04 Contractor May Stop Work or Terminate	00710-59
Article 16 – Dispute Resolution	00710-60
16.01 Methods and Procedures	00710-60

Gateway County Service Area Water Treatment Plant Improvements

Article 17 – Miscellaneous	00710-60
17.01 Giving Notice	00710-60
17.02 Computation of Times	00710-60
17.03 Cumulative Remedies	00710-60
17.04 Survival of Obligations	00710-61
17.05 Controlling Law	00710-61
17.06 Headings	00710-61
Article 18 – Federal Requirements	00710-61
18.01 Agency Not A Party	00710-61
18.02 Contract Approval	00710-61
18.03 Conflict of Interest	00710-61
18.04 Gratuities	00710-61
18.05 Audit and Access to Records	00710-62
18.06 Small, Minority and Women’s Businesses	00710-62
18.07 Anti-Kickback	00710-62
18.08 Clean Air and Pollution Control Acts	00710-62
18.09 State Energy Policy	00710-63
18.10 Equal Opportunity Requirements	00710-63
18.11 Restrictions on Lobbying	00710-63
18.12 Environmental Requirements	00710-64

GENERAL CONDITIONS

ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

- A. Wherever used in the Bidding Requirements or Contract Documents and printed with initial capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.
1. *Addenda* – Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.
 2. *Agency* – The Federal or state agency named as such in the Agreement.
 3. *Agreement* – The written instrument which is evidence of the agreement between Owner and Contractor covering the Work.
 4. *Application for Payment* – The form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.
 5. *Asbestos* – Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.
 6. *Bid* – The offer or proposal of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
 7. *Bidder* – The individual or entity who submits a Bid directly to Owner.
 8. *Bidding Documents* – The Bidding Requirements and the proposed Contract Documents (including all Addenda).
 9. *Bidding Requirements* – The Advertisement or Invitation to Bid, Instructions to Bidders, bid security of acceptable form, if any, and the Bid Form with any supplements.
 10. *Change Order* – A document recommended by Engineer which is signed by Contractor and Owner and Agency and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.
 11. *Claim* – A demand or assertion by Owner or Contractor seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.
 12. *Contract* – The entire and integrated written agreement between the Owner and Contractor concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.
 13. *Contract Documents* – Those items so designated in the Agreement. Only printed or hard copies of the items listed in the Agreement are Contract Documents. Approved Shop Drawings, other Contractor's submittals, and the reports and drawings of subsurface and physical conditions are not Contract Documents.

Gateway County Service Area Water Treatment Plant Improvements

14. *Contract Price* – The moneys payable by Owner to Contractor for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of Paragraph 11.03 in the case of Unit Price Work).
15. *Contract Times* – The number of days or the dates stated in the Agreement to: (i) achieve Milestones, if any, (ii) achieve Substantial Completion; and (iii) complete the Work so that it is ready for final payment as evidenced by Engineer's written recommendation of final payment.
16. *Contractor* – The individual or entity with whom Owner has entered into the Agreement.
17. *Cost of the Work* – See Paragraph 11.01.A for definition.
18. *Drawings* – That part of the Contract Documents prepared or approved by Engineer which graphically shows the scope, extent, and character of the Work to be performed by Contractor. Shop Drawings and other Contractor submittals are not Drawings as so defined.
19. *Effective Date of the Agreement* – The date indicated in the Agreement on which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.
20. *Engineer* – The individual or entity named as such in the Agreement.
21. *Field Order* – A written order issued by Engineer which requires minor changes in the Work but which does not involve a change in the Contract Price or the Contract Times.
22. *General Requirements* – Sections of Division 1 of the Specifications. The General Requirements pertain to all sections of the Specifications.
23. *Hazardous Environmental Condition* – The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto in connection with the Work.
24. *Hazardous Waste* – The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.
25. *Laws and Regulations; Laws or Regulations* – Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.
26. *Liens* – Charges, security interests, or encumbrances upon Project funds, real property, or personal property.
27. *Milestone* – A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.
28. *Notice of Award* – The written notice by Owner to the Successful Bidder stating that upon timely compliance by the Successful Bidder with the conditions precedent listed therein, Owner will sign and deliver the Agreement.
29. *Notice to Proceed* – A written notice given by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work under the Contract Documents.
30. *Owner* – The individual or entity with whom Contractor has entered into the Agreement and for whom the Work is to be performed.
31. *PCBs* – Polychlorinated biphenyls.

Gateway County Service Area Water Treatment Plant Improvements

32. *Petroleum* – Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.
33. *Progress Schedule* – A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor’s plan to accomplish the Work within the Contract Times.
34. *Project* – The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.
35. *Project Manual* – The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.
36. *Radioactive Material* – Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.
37. *Related Entity* – An officer, director, partner, employee, agent, consultant, or subcontractor.
38. *Resident Project Representative* – The authorized representative of Engineer who may be assigned to the Site or any part thereof.
39. *Samples* – Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.
40. *Schedule of Submittals* – A schedule, prepared and maintained by Contractor, of required submittals and the time requirements to support scheduled performance of related construction activities.
41. *Schedule of Values* – A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor’s Applications for Payment.
42. *Shop Drawings* – All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.
43. *Site* – Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by Owner which are designated for the use of Contractor.
44. *Specifications* – That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable thereto.
45. *Subcontractor* – An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work at the Site.
46. *Substantial Completion* – The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms “substantially complete” and “substantially completed” as applied to all or part of the Work refer to Substantial Completion thereof.
47. *Successful Bidder* – The Bidder submitting a responsive Bid to whom Owner makes an award.

48. *Supplementary Conditions* – That part of the Contract Documents which amends or supplements these General Conditions.
49. *Supplier* – A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or any Subcontractor.
50. *Underground Facilities* – All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.
51. *Unit Price Work* – Work to be paid for on the basis of unit prices.
52. *Work* – The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.
53. *Work Change Directive* – A written statement to Contractor issued on or after the Effective Date of the Agreement and signed by Owner and Agency upon recommendation of the Engineer ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

1.02 *Terminology*

- A. The following words or terms are not defined but, when used in the Bidding Requirements or Contract Documents, have the following meaning.
- B. *Intent of Certain Terms or Adjectives*
 1. The Contract Documents include the terms “as allowed,” “as approved,” “as ordered,” “as directed” or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action or determination will be solely to evaluate, in general, the Work for compliance with the requirements of and information in the Contract Documents and conformance with the design concept of the completed Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 9.09 or any other provision of the Contract Documents.
- C. *Day*
 1. The work “day” means a calendar day of 24 hours measured from midnight to the next midnight.

D. *Defective*

1. The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:
 - a. does not conform to the Contract Documents, or
 - b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents, or
 - c. has been damaged prior to Engineer’s recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 14.04 or 14.05).

E. *Furnish, Install, Perform, Provide*

1. The word “furnish,” when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.
 2. The word “install,” when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.
 3. The words “perform” or “provide,” when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.
 4. When “furnish,” “install,” “perform,” or “provide” is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Contractor, “provide” is implied.
- F. Unless stated otherwise in the Contract Documents, words or phrases which have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2 – PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

- A. When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.
- B. *Evidence of Insurance:* Before any Work at the Site is started, Contractor and Owner shall each deliver to the other, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) which Contractor and Owner respectively are required to purchase and maintain in accordance with Article 5.

2.02 *Copies of Documents*

- A. Owner shall furnish to Contractor up to ten printed or hard copies of the Drawings and Project Manual. Additional copies will be furnished upon request at the cost of reproduction.

2.03 *Commencement of Contract Times; Notice to Proceed*

- A. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Agreement or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Agreement.

2.04 *Starting the Work*

- A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work shall be done at the Site prior to the date on which the Contract Times commence to run.

2.05 *Before Starting Construction*

- A. *Preliminary Schedules:* Within 10 days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), Contractor shall submit to Engineer for timely review:
 - 1. A preliminary Progress Schedule;
 - 2. A preliminary Schedule of Submittals; and
 - 3. A preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.06 *Pre-Construction Conference*

- A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, Agency, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.05.A, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records.

2.07 *Initial Acceptance of Schedules*

- A. At least 10 days before submission of the first Application for Payment a conference attended by Contractor, Engineer, and others as appropriate will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.05.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.
 - 1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work nor interfere with or relieve Contractor from Contractor's full responsibility therefor.
 - 2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.
 - 3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to component parts of the Work.

ARTICLE 3 – CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.01 *Intent*

- A. The Contract Documents are complementary; what is required by one is as binding as if required by all.
- B. It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that may reasonably be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the intended result will be provided whether or not specifically called for at no additional cost to Owner.
- C. Clarifications and interpretations of the Contract Documents shall be issued by Engineer as provided in Article 9.

3.02 *Reference Standards*

- A. *Standards, Specifications, Codes, Laws, and Regulations*
 - 1. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.
 - 2. No provision of any such standard, specification, manual or code, or any instruction of a Supplier shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees from those set forth in the Contract Documents. No such provision or instruction shall be effective to assign to Owner, or Engineer, or any of their Related Entities, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

3.03 *Reporting and Resolving Discrepancies*

- A. Reporting Discrepancies
 - 1. *Contractor's Review of Contract Documents Before Starting Work:* Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy which Contractor may discover and shall obtain a written interpretation or clarification from Engineer before proceeding with any Work affected thereby.
 - 2. *Contractor's Review of Contract Documents During Performance of Work:* If, during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents or between the Contract Documents and any provision of any Law or Regulation applicable to the performance of the Work or of any standard, specification, manual or code, or of any instruction of any Supplier, Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in Paragraph 3.04.
 - 3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor knew or reasonably should have known thereof.
- B. Resolving Discrepancies

Gateway County Service Area Water Treatment Plant Improvements

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:
 - a. the provisions of any standard, specification, manual, code, or instruction (whether or not specifically incorporated by reference in the Contract Documents); or
 - b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Amending and Supplementing Contract Documents*

- A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof by either a Change Order or a Work Change Directive.
- B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the following ways:
 1. A Field Order;
 2. Engineer's approval of a Shop Drawing or Sample; (Subject to the provisions of Paragraph 6.17.D.3) or
 3. Engineer's written interpretation or clarification.

3.05 *Reuse of Documents*

- A. Contractor and any Subcontractor or Supplier shall not:
 1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or Engineer's consultants, including electronic media editions; or
 2. reuse any of such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaption by Engineer.
- B. The prohibition of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

3.06 *Electronic Data*

- A. Copies of data furnished by Owner or Engineer to Contractor or Contractor to Owner or Engineer that may be relied upon are limited to the printed copies (also known as hard copies). Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.
- B. Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data's creator, the party receiving electronic files agrees that it will perform acceptance tests or procedures within 60 days, after which the receiving party shall be deemed to have accepted the data thus transferred. Any errors detected within the 60-day acceptance period will be corrected by the transferring party.

- C. When transferring documents in electronic media format, the transferring party makes no representations as to long term compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by the data's creator.

ARTICLE 4 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS; REFERENCE POINTS

4.01 *Availability of Lands*

- A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work. Owner will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If Contractor and Owner are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, as a result of any delay in Owner's furnishing the Site or a part thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.
- B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which the Work is to be performed and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.
- C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

4.02 *Subsurface and Physical Conditions*

- A. *Reports and Drawings:* The Supplementary Conditions identify:
 - 1. those reports of explorations and tests of subsurface conditions at or contiguous to the Site that Engineer has used in preparing the Contract Documents; and
 - 2. those drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) that Engineer has used in preparing the Contract Documents.
- B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their Related Entities with respect to:
 - 1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or
 - 2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or
 - 3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions, or information.

4.03 *Differing Subsurface or Physical Conditions*

- A. *Notice:* If Contractor believes that any subsurface or physical condition at or contiguous to the Site that is uncovered or revealed either:

Gateway County Service Area Water Treatment Plant Improvements

1. is of such a nature as to establish that any “technical data” on which Contractor is entitled to rely as provided in Paragraph 4.02 is materially inaccurate; or
2. is of such a nature as to require a change in the Contract Documents; or
3. differs materially from that shown or indicated in the Contract Documents; or
4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

B. *Engineer’s Review:* After receipt of written notice as required by Paragraph 4.03.A, Engineer will promptly review the pertinent condition, determine the necessity of Owner’s obtaining additional exploration or tests with respect thereto, and advise Owner in writing (with a copy to Contractor) of Engineer’s findings and conclusions.

C. *Possible Price and Times Adjustments*

1. The Contract Price or the Contract Times, or both, will be equitably adjusted to the extent that the existence of such differing subsurface or physical condition causes an increase or decrease in Contractor’s cost of, or time required for, performance of the Work; subject, however, to the following:
 - a. such condition must meet any one or more of the categories described in Paragraph 4.03.A; and
 - b. with respect to Work that is paid for on a Unit Price Basis, any adjustment in Contract Price will be subject to the provisions of Paragraphs 9.07 and 11.03.
2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times if:
 - a. Contractor knew of the existence of such conditions at the time Contractor made a final commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract; or
 - b. the existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor’s making such final commitment; or
 - c. Contractor failed to give the written notice as required by Paragraph 4.03.A.
3. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefor as provided in Paragraph 10.05. However, Owner and Engineer, and any of their Related Entities shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

4.04 *Underground Facilities*

A. *Shown or Indicated:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the Site is based on information and data furnished to Owner or Engineer

Gateway County Service Area Water Treatment Plant Improvements

by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

1. Owner and Engineer shall not be responsible for the accuracy or completeness of any such information or data; and
2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:
 - a. reviewing and checking all such information and data,
 - b. locating all Underground Facilities shown or indicated in the Contract Documents,
 - c. coordination of the Work with the owners of such Underground Facilities, including Owner, during construction, and
 - d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

B. *Not Shown or Indicated*

1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer. Engineer will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence or location of the Underground Facility. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.
2. If Engineer concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. An equitable adjustment shall be made in the Contract Price or Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated or not shown or indicated with reasonable accuracy in the Contract Documents and that Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment in Contract Price or Contract Times, Owner or Contractor may make a Claim therefor as provided in Paragraph 10.05.

4.05 *Reference Points*

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

4.06 *Hazardous Environmental Condition at Site*

- A. *Reports and Drawings:* Reference is made to the Supplementary Conditions for the identification of those reports and drawings relating to a Hazardous Environmental Condition identified at the Site, if any, that have been utilized by the Engineer in the preparation of the Contract Documents.
- B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the general accuracy of the “technical data” contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such “technical data” is identified in the Supplementary Conditions. Except for such reliance on such “technical data,” Contractor may not rely upon or make any claim against Owner or Engineer, or any of their Related Entities with respect to:
1. the completeness of such reports and drawings for Contractor’s purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto; or
 2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or
 3. any Contractor interpretation of or conclusion drawn from any “technical data” or any such other data, interpretations, opinions or information.
- C. Contractor shall not be responsible for any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work. Contractor shall be responsible for a Hazardous Environmental Condition created with any materials brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible.
- D. If Contractor encounters a Hazardous Environmental Condition or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, Contractor shall immediately: (i) secure or otherwise isolate such condition; (ii) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 6.16.A); and (iii) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any.
- E. Contractor shall not be required to resume Work in connection with such condition or in any affected area until after Owner has obtained any required permits related thereto and delivered to Contractor written notice: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work; or (ii) specifying any special conditions under which such Work may be resumed safely. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, either party may make a Claim therefor as provided in Paragraph 10.05.
- F. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of an adjustment in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a Claim therefor as provided in Paragraph 10.05. Owner may have such deleted portion of the Work performed by Owner’s own forces or others in accordance with Article 7.
- G. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not

limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition: (i) was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be included within the scope of the Work, and (ii) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.G shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

- H. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.H shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- I. The provisions of Paragraphs 4.02, 4.03, and 4.04 do not apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 5 – BONDS AND INSURANCE

5.01 *Performance, Payment, and Other Bonds*

- A. Contractor shall furnish performance and payment bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all of Contractor's obligations under the Contract Documents. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 13.07, whichever is later, except as provided otherwise by Laws or Regulations or by the Contract Documents. Contractor shall also furnish such other bonds as are required by the Contract Documents.
- B. All bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All bonds signed by an agent must be accompanied by a certified copy of the agent's authority to act.
- C. If the surety on any bond furnished by Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of Paragraph 5.01.B, Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the requirements of Paragraphs 5.01.B and 5.02.

5.02 *Licensed Sureties and Insurers*

- A. All bonds and insurance required by the Contract Documents to be purchased and maintained by Owner or Contractor shall be obtained from surety or insurance companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds or insurance policies for the limits and coverages so required. Such surety and insurance companies shall also meet such additional requirements and qualifications as may be provided in the Supplementary Conditions.

5.03 *Certificates of Insurance*

- A. Contractor shall deliver to Owner, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Owner or any other additional insured) which Contractor is required to purchase and maintain.
- B. Owner shall deliver to Contractor, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Contractor or any other additional insured) which Owner is required to purchase and maintain.

5.04 *Contractor's Liability Insurance*

- A. Contractor shall purchase and maintain such liability and other insurance as is appropriate for the Work being performed and as will provide protection from claims set forth below which may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable:
 - 1. claims under workers' compensation, disability benefits, and other similar employee benefit acts;
 - 2. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees;
 - 3. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees;
 - 4. claims for damages insured by reasonably available personal injury liability coverage which are sustained:
 - a. by any person as a result of an offense directly or indirectly related to the employment of such person by Contractor, or
 - b. by any other person for any other reason;
 - 5. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom; and
 - 6. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.
- B. The policies of insurance required by this Paragraph 5.04 shall:
 - 1. with respect to insurance required by Paragraphs 5.04.A.3 through 5.04.A.6 inclusive, include as additional insureds (subject to any customary exclusion regarding professional liability) Owner and Engineer, and any other individuals or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insureds, and include coverage for the respective officers, directors, partners, employees, agents, consultants and subcontractors of each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby;
 - 2. include at least the specific coverages and be written for not less than the limits of liability provided in the Supplementary Conditions or required by Laws or Regulations, whichever is greater;
 - 3. include completed operations insurance;

Gateway County Service Area Water Treatment Plant Improvements

4. include contractual liability insurance covering Contractor's indemnity obligations under Paragraphs 6.11 and 6.20;
5. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the Contractor pursuant to Paragraph 5.03 will so provide);
6. remain in effect at least until final payment and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work in accordance with Paragraph 13.07; and
7. with respect to completed operations insurance, and any insurance coverage written on a claims-made basis, remain in effect for at least two years after final payment.
 - a. Contractor shall furnish Owner and each other additional insured identified in the Supplementary Conditions, to whom a certificate of insurance has been issued, evidence satisfactory to Owner and any such additional insured of continuation of such insurance at final payment and one year thereafter.

5.05 *Owner's Liability Insurance*

- A. In addition to the insurance required to be provided by Contractor under Paragraph 5.04, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.

5.06 *Property Insurance*

- A. Unless otherwise provided in the Supplementary Conditions, Contractor shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof (Contractor shall be responsible for any deductible or self-insured retention.). This insurance shall:
 1. include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, partners, employees, agents, consultants and subcontractors of any of them, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured;
 2. be written on a Builder's Risk "all-risk" or open peril or special causes of loss policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage (other than caused by flood), and such other perils or causes of loss as may be specifically required by the Supplementary Conditions;
 3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);
 4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by Owner prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by Engineer;
 5. allow for partial utilization of the Work by Owner;
 6. include testing and startup; and

7. be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor, and Engineer with 30 days written notice to each other additional insured to whom a certificate of insurance has been issued.
- B. Contractor shall purchase and maintain such boiler and machinery insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured.
- C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with Paragraph 5.06 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with Paragraph 5.07.
- D. Owner shall not be responsible for purchasing and maintaining any property insurance specified in this Paragraph 5.06 to protect the interests of Contractor, Subcontractors, or others in the Work to the extent of any deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount will be borne by Contractor, Subcontractors, or others suffering any such loss, and if any of them wishes property insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.

5.07 *Waiver of Rights*

- A. Owner and Contractor intend that all policies purchased in accordance with Paragraph 5.06 will protect Owner, Contractor, Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them) in such policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or additional insureds thereunder. Owner and Contractor waive all rights against each other and their respective officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them for all losses and damages caused by, arising out of or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insured or additional insured (and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them) under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Contractor as trustee or otherwise payable under any policy so issued.
- B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them for:
 1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and
 2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial utilization pursuant to Paragraph 14.05, after Substantial Completion pursuant to Paragraph 14.04, or after final payment pursuant to Paragraph 14.07.

- C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 5.07.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them.

5.08 *Receipt and Application of Insurance Proceeds*

- A. Any insured loss under the policies of insurance required by Paragraph 5.06 will be adjusted with Contractor and made payable to Contractor as fiduciary for the insureds, as their interests may appear, subject to the requirements of any applicable mortgage clause and of Paragraph 5.08.B. Contractor shall deposit in a separate account any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof.
- B. Contractor as fiduciary shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within 15 days after the occurrence of loss to Contractor's exercise of this power. If such objection be made, Contractor as fiduciary shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, Contractor as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, Contractor as fiduciary shall give bond for the proper performance of such duties.

5.09 *Acceptance of Bonds and Insurance; Option to Replace*

- A. If either Owner or Contractor has any objection to the coverage afforded by or other provisions of the bonds or insurance required to be purchased and maintained by the other party in accordance with Article 5 on the basis of non-conformance with the Contract Documents, the objecting party shall so notify the other party in writing within 10 days after receipt of the certificates (or other evidence requested) required by Paragraph 2.01.B. Owner and Contractor shall each provide to the other such additional information in respect of insurance provided as the other may reasonably request. If either party does not purchase or maintain all of the bonds and insurance required of such party by the Contract Documents, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent bonds or insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.

5.10 *Partial Utilization, Acknowledgment of Property Insurer*

- A. If Owner finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 14.05, no such use or occupancy shall commence before the insurers providing the property insurance pursuant to Paragraph 5.06 have acknowledged notice thereof and in writing effected any changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on the policy or policies, but the property insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy.

ARTICLE 6 – CONTRACTOR'S RESPONSIBILITIES

6.01 *Supervision and Superintendence*

- A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction. Contractor shall not be responsible for the negligence of Owner or Engineer in the design or specification of a specific means, method, technique, sequence, or procedure of construction which is shown or indicated in and expressly required by the Contract Documents.

- B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances. The superintendent will be Contractor's representative at the Site and shall have authority to act on behalf of Contractor. All communications given to or received from the superintendent shall be binding on Contractor.

6.02 *Labor; Working Hours*

- A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the Site.
- B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours. Contractor will not permit the performance of Work on a Saturday, Sunday, or any legal holiday without Owner's written consent (which will not be unreasonably withheld) given after prior written notice to Engineer.

6.03 *Services, Materials, and Equipment*

- A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start-up, and completion of the Work.
- B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.
- C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

6.04 *Progress Schedule*

- A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.07 as it may be adjusted from time to time as provided below.
 - 1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.07) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times. Such adjustments will comply with any provisions of the General Requirements applicable thereto.
 - 2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 12. Adjustments in Contract Times may only be made by a Change Order.

6.05 *Substitutes and "Or-Equals"*

- A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or-equal" item or no substitution is permitted, other items of material or

Gateway County Service Area Water Treatment Plant Improvements

equipment or material or equipment of other Suppliers may be submitted to Engineer for review under the circumstances described below.

1. *“Or-Equal” Items*: If in Engineer’s sole discretion an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by Engineer as an “or-equal” item, in which case review and approval of the proposed item may, in Engineer’s sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this Paragraph 6.05.A.1, a proposed item of material or equipment will be considered functionally equal to an item so named if:
 - a. in the exercise of reasonable judgment Engineer determines that:
 - 1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;
 - 2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole;
 - 3) it has a proven record of performance and availability of responsive service; and
 - b. Contractor certifies that, if approved and incorporated into the Work:
 - 1) there will be no increase in cost to the Owner or increase in Contract Times, and
 - 2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.
2. *Substitute Items*
 - a. If in Engineer’s sole discretion an item of material or equipment proposed by Contractor does not qualify as an “or-equal” item under Paragraph 6.05.A.1, it will be considered a proposed substitute item.
 - b. Contractor shall submit sufficient information as provided below to allow Engineer to determine that the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by Engineer from anyone other than Contractor.
 - c. The procedure requirements for review by Engineer will be as set forth in Paragraph 6.05.A.2.d, as supplemented in the General Requirements and as Engineer may decide is appropriate under the circumstances.
 - d. Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:
 - 1) shall certify that the proposed substitute item will:
 - a) will perform adequately the functions and achieve the results called for by the general design,
 - b) be similar in substance to that specified, and
 - c) be suited to the same use as that specified;
 - 2) will state:

Gateway County Service Area Water Treatment Plant Improvements

- a) the extent, if any, to which the use of the proposed substitute item will prejudice Contractor's achievement of Substantial Completion on time;
 - b) whether or not use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item; and
 - c) whether or not incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty;
- 3) will identify:
- a) all variations of the proposed substitute item from that specified, and
 - b) available engineering, sales, maintenance, repair, and replacement services;
- 4) and shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change.
- B. *Substitute Construction Methods or Procedures:* If a specific means, method, technique, sequence, or procedure of construction is expressly required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by Engineer. Contractor shall submit sufficient information to allow Engineer, in Engineer's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The requirements for review by Engineer will be similar to those provided in Paragraph 6.05.A.2.
- C. *Engineer's Evaluation:* Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraphs 6.05.A and 6.05.B. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No "or equal" or substitute will be ordered, installed or utilized until Engineer's review is complete, which will be evidenced by either a Change Order for a substitute or an approved Shop Drawing for an "or equal." Engineer will advise Contractor in writing of any negative determination.
- D. *Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.
- E. *Engineer's Cost Reimbursement:* Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor pursuant to Paragraphs 6.05.A.2 and 6.05.B. Whether or not Engineer approves a substitute item so proposed or submitted by Contractor, Contractor shall reimburse Owner for the charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.
- F. *Contractor's Expense:* Contractor shall provide all data in support of any proposed substitute or "or-equal" at Contractor's expense.

6.06 Concerning Subcontractors, Suppliers, and Others

- A. Contractor shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to Owner as indicated in Paragraph 6.06.B), whether initially or as a replacement, against whom Owner may have reasonable objection. Contractor shall not be required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom Contractor has reasonable objection.

- B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to Owner in advance for acceptance by Owner by a specified date prior to the Effective Date of the Agreement, and if Contractor has submitted a list thereof in accordance with the Supplementary Conditions, Owner's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of any right of Owner or Engineer to reject defective Work.
- C. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract Documents:
 - 1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier or other individual or entity, nor
 - 2. shall anything in the Contract Documents create any obligation on the part of Owner or Engineer to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.
- D. Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with Contractor.
- E. Contractor shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with Engineer through Contractor.
- F. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.
- G. All Work performed for Contractor by a Subcontractor or Supplier will be pursuant to an appropriate agreement between Contractor and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer. Whenever any such agreement is with a Subcontractor or Supplier who is listed as an additional insured on the property insurance provided in Paragraph 5.06, the agreement between the Contractor and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against Owner, Contractor, and Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them) for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, Contractor will obtain the same.

6.07 *Patent Fees and Royalties*

- A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if to the actual knowledge of Owner or Engineer its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents.

Gateway County Service Area Water Treatment Plant Improvements

- B. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

6.08 *Permits*

- A. Unless otherwise provided in the Supplementary Conditions, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement. Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

6.09 *Laws and Regulations*

- A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work. However, it shall not be Contractor's primary responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.
- C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance of the Work shall be the subject of an adjustment in Contract Price or Contract Times. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

6.10 *Taxes*

- A. Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

6.11 *Use of Site and Other Areas*

- A. *Limitation on Use of Site and Other Areas*
 - 1. Contractor shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and other areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work.
 - 2. Should any claim be made by any such owner or occupant because of the performance of the Work, Contractor shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.

Gateway County Service Area Water Treatment Plant Improvements

3. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused by or based upon Contractor's performance of the Work.
- B. *Removal of Debris During Performance of the Work:* During the progress of the Work Contractor shall keep the Site and other areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.
- C. *Cleaning:* Prior to Substantial Completion of the Work, Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.
- D. *Loading Structures:* Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

6.12 Record Documents

- A. Contractor shall maintain in a safe place at the Site one record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, and written interpretations and clarifications in good order and annotated to show changes made during construction. These record documents together with all approved Samples and a counterpart of all approved Shop Drawings will be available to Engineer for reference. Upon completion of the Work, these record documents, Samples, and Shop Drawings will be delivered to Engineer for Owner.

6.13 Safety and Protection

- A. Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:
 1. all persons on the Site or who may be affected by the Work;
 2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
 3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
- B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property.
- C. All damage, injury, or loss to any property referred to in Paragraph 6.13.A.2 or 6.13.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor (except damage or loss attributable to the fault of Drawings or Specifications or to the acts

Gateway County Service Area Water Treatment Plant Improvements

or omissions of Owner or Engineer or , or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).

- D. Contractor's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

6.14 *Safety Representative*

- A. Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

6.15 *Hazard Communication Programs*

- A. Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.

6.16 *Emergencies*

- A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent threatened damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

6.17 *Shop Drawings and Samples*

- A. Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the acceptable Schedule of Submittals (as required by Paragraph 2.07). Each submittal will be identified as Engineer may require.

1. *Shop Drawings*

- a. Submit number of copies specified in the General Requirements.
- b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by Paragraph 6.17.D.

2. *Samples*

- a. Submit number of Samples specified in the Specifications.
- b. Clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 6.17.D.

B. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.

C. *Submittal Procedures*

1. Before submitting each Shop Drawing or Sample, Contractor shall have determined and verified:
 - a. all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;
 - b. the suitability of all materials with respect to intended use, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work;
 - c. all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto; and
 - d. shall also have reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents.
2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval of that submittal.
3. With each submittal, Contractor shall give Engineer specific written notice of any variations, that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be both a written communication separate from the Shop Drawings or Sample submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to Engineer for review and approval of each such variation.

D. *Engineer's Review*

1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.
3. Engineer's review and approval shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 6.17.C.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer's review and approval shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 6.17.C.1.

E. *Resubmittal Procedures*

Gateway County Service Area Water Treatment Plant Improvements

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.

6.18 *Continuing the Work*

- A. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by Paragraph 15.04 or as Owner and Contractor may otherwise agree in writing.

6.19 *Contractor's General Warranty and Guarantee*

- A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its Related Entities shall be entitled to rely on representation of Contractor's warranty and guarantee.
- B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
 1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
 2. normal wear and tear under normal usage.
- C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:
 1. observations by Engineer;
 2. recommendation by Engineer or payment by Owner of any progress or final payment;
 3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;
 4. use or occupancy of the Work or any part thereof by Owner;
 5. any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by Engineer;
 6. any inspection, test, or approval by others; or
 7. any correction of defective Work by Owner.

6.20 *Indemnification*

- A. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable.

Gateway County Service Area Water Treatment Plant Improvements

- B. In any and all claims against Owner or Engineer or any of their respective consultants, agents, officers, directors, partners, or employees by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 6.20.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.
- C. The indemnification obligations of Contractor under Paragraph 6.20.A shall not extend to the liability of Engineer and Engineer's officers, directors, partners, employees, agents, consultants and subcontractors arising out of:
 - 1. the preparation or approval of, or the failure to prepare or approve, maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or
 - 2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

6.21 *Delegation of Professional Design Services*

- A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable law.
- B. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.
- C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.
- D. Pursuant to this Paragraph 6.21, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 6.17.D.1.
- E. Contractor shall not be responsible for the adequacy of the performance or design criteria required by the Contract Documents.

ARTICLE 7 – OTHER WORK AT THE SITE

7.01 *Related Work at Site*

- A. Owner may perform other work related to the Project at the Site with Owner's employees, or via other direct contracts therefor, or have other work performed by utility owners. If such other work is not noted in the Contract Documents, then:
 - 1. written notice thereof will be given to Contractor prior to starting any such other work; and

Gateway County Service Area Water Treatment Plant Improvements

2. if Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times that should be allowed as a result of such other work, a Claim may be made therefor as provided in Paragraph 10.05.
- B. Contractor shall afford each other contractor who is a party to such a direct contract, each utility owner and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work, and shall properly coordinate the Work with theirs. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering their work and will only cut or alter their work with the written consent of Engineer and the others whose work will be affected. The duties and responsibilities of Contractor under this Paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of Contractor in said direct contracts between Owner and such utility owners and other contractors.
 - C. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 7, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

7.02 *Coordination*

- A. If Owner intends to contract with others for the performance of other work on the Project at the Site, the following will be set forth in Supplementary Conditions:
 1. the individual or entity who will have authority and responsibility for coordination of the activities among the various contractors will be identified;
 2. the specific matters to be covered by such authority and responsibility will be itemized; and
 3. the extent of such authority and responsibilities will be provided.
- B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

7.03 *Legal Relationships*

- A. Paragraphs 7.01.A and 7.02 are not applicable for utilities not under the control of Owner.
- B. Each other direct contract of Owner under Paragraph 7.01.A shall provide that the other contractor is liable to Owner and Contractor for the reasonable direct delay and disruption costs incurred by Contractor as a result of the other contractor's actions or inactions.
- C. Contractor shall be liable to Owner and any other contractor for the reasonable direct delay and disruption costs incurred by such other contractor as a result of Contractor's action or inactions.

ARTICLE 8 – OWNER'S RESPONSIBILITIES

8.01 *Communications to Contractor*

- A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.

8.02 *Replacement of Engineer*

- A. In case of termination of the employment of Engineer, Owner shall appoint an engineer to whom Contractor makes no reasonable objection, whose status under the Contract Documents shall be that of the former Engineer.

8.03 *Furnish Data*

- A. Owner shall promptly furnish the data required of Owner under the Contract Documents.

8.04 *Pay When Due*

- A. Owner shall make payments to Contractor when they are due as provided in Paragraphs 14.02.C and 14.07.C.

8.05 *Lands and Easements; Reports and Tests*

- A. Owner's duties in respect of providing lands and easements and providing engineering surveys to establish reference points are set forth in Paragraphs 4.01 and 4.05. Paragraph 4.02 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of subsurface conditions and drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site that have been utilized by Engineer in preparing the Contract Documents.

8.06 *Insurance*

- A. Owner's responsibilities, if any, in respect to purchasing and maintaining liability and property insurance are set forth in Article 5.

8.07 *Change Orders*

- A. Owner is obligated to execute Change Orders as indicated in Paragraph 10.03.

8.08 *Inspections, Tests, and Approvals*

- A. Owner's responsibility in respect to certain inspections, tests, and approvals is set forth in Paragraph 13.03.B.

8.09 *Limitations on Owner's Responsibilities*

- A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

8.10 *Undisclosed Hazardous Environmental Condition*

- A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 4.06.

8.11 *Evidence of Financial Arrangements*

- A. If and to the extent Owner has agreed to furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents, Owner's responsibility in respect thereof will be as set forth in the Supplementary Conditions.

ARTICLE 9 – ENGINEER’S STATUS DURING CONSTRUCTION

9.01 *Owner’s Representative*

- A. An Owner’s representative will be selected prior to the construction period. The duties and responsibilities and the limitations of the Owner’s representative during construction are set forth in the Contract Documents and will not be changed without written consent of Owner and Owner’s representative.

9.02 *Visits to Site*

- A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor’s executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer’s efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.
- B. Engineer’s visits and observations are subject to all the limitations on Engineer’s authority and responsibility set forth in Paragraph 9.09. Particularly, but without limitation, during or as a result of Engineer’s visits or observations of Contractor’s Work Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor’s means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

9.03 *Project Representative*

- A. If Owner and Engineer agree, Engineer will furnish a Resident Project Representative to assist Engineer in providing more extensive observation of the Work. The authority and responsibilities of any such Resident Project Representative and assistants will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 9.09. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer’s consultant, agent or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

9.04 *Authorized Variations in Work*

- A. Engineer may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. These may be accomplished by a Field Order and will be binding on Owner and also on Contractor, who shall perform the Work involved promptly. If Owner or Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, and the parties are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

9.05 *Rejecting Defective Work*

- A. Engineer will have authority to reject Work which Engineer believes to be defective, or that Engineer believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Engineer will also have authority to require special inspection or testing of the Work as provided in Paragraph 13.04, whether or not the Work is fabricated, installed, or completed.

9.06 *Shop Drawings, Change Orders and Payments*

- A. In connection with Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, see Paragraph 6.17.
- B. In connection with Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, see Paragraph 6.21.
- C. In connection with Engineer's authority as to Change Orders, see Articles 10, 11, and 12.
- D. In connection with Engineer's authority as to Applications for Payment, see Article 14.

9.07 *Determinations for Unit Price Work*

- A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of Paragraph 10.05.

9.08 *Decisions on Requirements of Contract Documents and Acceptability of Work*

- A. Engineer will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. All matters in question and other matters between Owner and Contractor arising prior to the date final payment is due relating to the acceptability of the Work, and the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, will be referred initially to Engineer in writing within 30 days of the event giving rise to the question.
- B. Engineer will, with reasonable promptness, render a written decision on the issue referred. If Owner or Contractor believe that any such decision entitles them to an adjustment in the Contract Price or Contract Times or both, a Claim may be made under Paragraph 10.05. The date of Engineer's decision shall be the date of the event giving rise to the issues referenced for the purposes of Paragraph 10.05.B.
- C. Engineer's written decision on the issue referred will be final and binding on Owner and Contractor, subject to the provisions of Paragraph 10.05.
- D. When functioning as interpreter and judge under this Paragraph 9.08, Engineer will not show partiality to Owner or Contractor and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity.

9.09 *Limitations on Engineer's Authority and Responsibilities*

- A. Neither Engineer's authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.
- B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

- C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.
- D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 14.07.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals that the results certified indicate compliance with the Contract Documents.
- E. The limitations upon authority and responsibility set forth in this Paragraph 9.09 shall also apply to the Resident Project Representative, if any, and assistants, if any.

ARTICLE 10 – CHANGES IN THE WORK; CLAIMS

10.01 *Authorized Changes in the Work*

- A. Without invalidating the Contract and without notice to any surety, Owner may, subject to written approval by Agency at any time or from time to time, order additions, deletions, or revisions in the Work by a Change Order, or a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).
- B. If Owner and Contractor are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a Work Change Directive, a Claim may be made therefor as provided in Paragraph 10.05.

10.02 *Unauthorized Changes in the Work*

- A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents as amended, modified, or supplemented as provided in Paragraph 3.04, except in the case of an emergency as provided in Paragraph 6.16 or in the case of uncovering Work as provided in Paragraph 13.04.B.

10.03 *Execution of Change Orders*

- A. Owner and Contractor shall execute appropriate Change Orders recommended by Engineer covering:
 - 1. changes in the Work which are: (i) ordered by Owner pursuant to Paragraph 10.01.A, (ii) required because of acceptance of defective Work under Paragraph 13.08.A or Owner's correction of defective Work under Paragraph 13.09, or (iii) agreed to by the parties;
 - 2. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive; and
 - 3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by Engineer pursuant to Paragraph 10.05; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, Contractor shall carry on the Work and adhere to the Progress Schedule as provided in Paragraph 6.18.A.

10.04 *Notification to Surety*

- A. If notice of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times) is required by the provisions of any bond to be given

to a surety, the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

10.05 *Claims*

- A. *Engineer's Decision Required:* All Claims, except those waived pursuant to Paragraph 14.09, shall be referred to the Engineer for decision. A decision by Engineer shall be required as a condition precedent to any exercise by Owner or Contractor of any rights or remedies either may otherwise have under the Contract Documents or by Laws and Regulations in respect of such Claims.
- B. *Notice:* Written notice stating the general nature of each Claim shall be delivered by the claimant to Engineer and the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto. The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with supporting data shall be delivered to the Engineer and the other party to the Contract within 60 days after the start of such event (unless Engineer allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of Paragraph 12.01.B. A Claim for an adjustment in Contract Time shall be prepared in accordance with the provisions of Paragraph 12.02.B. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to Engineer and the claimant within 30 days after receipt of the claimant's last submittal (unless Engineer allows additional time).
- C. *Engineer's Action:* Engineer will review each Claim and, within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any, take one of the following actions in writing:
 - 1. deny the Claim in whole or in part,
 - 2. approve the Claim, or
 - 3. notify the parties that the Engineer is unable to resolve the Claim if, in the Engineer's sole discretion, it would be inappropriate for the Engineer to do so. For purposes of further resolution of the Claim, such notice shall be deemed a denial.
- D. In the event that Engineer does not take action on a Claim within said 30 days, the Claim shall be deemed denied.
- E. Engineer's written action under Paragraph 10.05.C or denial pursuant to Paragraphs 10.05.C.3 or 10.05.D will be final and binding upon Owner and Contractor, unless Owner or Contractor invoke the dispute resolution procedure set forth in Article 16 within 30 days of such action or denial.
- F. No Claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Paragraph 10.05.

ARTICLE 11 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

11.01 *Cost of the Work*

- A. *Costs Included:* The term Cost of the Work means the sum of all costs, except those excluded in Paragraph 11.01.B, necessarily incurred and paid by Contractor in the proper performance of the Work. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to Contractor will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Claim. Except as otherwise may be agreed to in writing by Owner, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall include only the following items, and shall not include any of the costs itemized in Paragraph 11.01.B.

Gateway County Service Area Water Treatment Plant Improvements

1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time at the Site. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.
2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.
3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 11.01.
4. Costs of special consultants (including but not limited to Engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.
5. Supplemental costs including the following:
 - a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.
 - b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.
 - c. Rentals of all construction equipment and machinery, and the parts thereof whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.
 - d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, imposed by Laws and Regulations.
 - e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.
 - f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 5.06.D), provided such losses and damages have resulted from causes other than the negligence of

Gateway County Service Area Water Treatment Plant Improvements

Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.

- g. The cost of utilities, fuel, and sanitary facilities at the Site.
 - h. Minor expenses such as telegrams, long distance telephone calls, telephone service at the Site, expressages, and similar petty cash items in connection with the Work.
 - i. The costs of premiums for all bonds and insurance Contractor is required by the Contract Documents to purchase and maintain.
- B. *Costs Excluded:* The term Cost of the Work shall not include any of the following items:
- 1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 11.01.A.1 or specifically covered by Paragraph 11.01.A.4, all of which are to be considered administrative costs covered by the Contractor's fee.
 - 2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
 - 3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
 - 4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.
 - 5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraphs 11.01.A and 11.01.B.
- C. *Contractor's Fee:* When all the Work is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 12.01.C.
- D. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to Paragraphs 11.01.A and 11.01.B, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

11.02 Allowances

- A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.

B. Cash Allowances

Gateway County Service Area Water Treatment Plant Improvements

1. Contractor agrees that:
 - a. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and
 - b. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.

C. *Contingency Allowance*

1. Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.

- D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

11.03 *Unit Price Work*

- A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.
- B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by Engineer subject to the provisions of Paragraph 9.07.
- C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.
- D. Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance with Paragraph 10.05 if:
 1. the Bid price of a particular item of Unit Price Work amounts to more than 5 percent of the Contract Price and the variation in the quantity of that particular item of Unit Price Work performed by Contractor differs by more than 25 percent from the estimated quantity of such item indicated in the Agreement; and
 2. there is no corresponding adjustment with respect to any other item of Work; and
 3. Contractor believes that Contractor is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

ARTICLE 12 – CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES

12.01 *Change of Contract Price*

- A. The Contract Price may only be changed by a Change Order. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.
- B. The value of any Work covered by a Change Order or of any Claim for an adjustment in the Contract Price will be determined as follows:

Gateway County Service Area Water Treatment Plant Improvements

1. where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 11.03); or
 2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 12.01.C.2); or
 3. where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under Paragraph 12.01.B.2, on the basis of the Cost of the Work (determined as provided in Paragraph 11.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 12.01.C).
- C. Contractor's Fee: The Contractor's fee for overhead and profit shall be determined as follows:
1. a mutually acceptable fixed fee; or
 2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
 - a. for costs incurred under Paragraphs 11.01.A.1 and 11.01.A.2, the Contractor's fee shall be 15 percent;
 - b. for costs incurred under Paragraph 11.01.A.3, the Contractor's fee shall be five percent;
 - c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraph 12.01.C.2.a is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of 15 percent of the costs incurred by such Subcontractor under Paragraphs 11.01.A.1 and 11.01.A.2 and that any higher tier Subcontractor and Contractor will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor;
 - d. no fee shall be payable on the basis of costs itemized under Paragraphs 11.01.A.4, 11.01.A.5, and 11.01.B;
 - e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and
 - f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 12.01.C.2.a through 12.01.C.2.e, inclusive.

12.02 *Change of Contract Times*

- A. The Contract Times may only be changed by a Change Order. Any Claim for an adjustment in the Contract Times shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.
- B. Any adjustment of the Contract Times covered by a Change Order or any Claim for an adjustment in the Contract Times will be determined in accordance with the provisions of this Article 12.

12.03 *Delays*

- A. Where Contractor is prevented from completing any part of the Work within the Contract Times due to delay beyond the control of Contractor, the Contract Times will be extended in an amount equal to the time lost due to such delay if a Claim is made therefor as provided in Paragraph 12.02.A. Delays beyond the control of Contractor shall include,

but not be limited to, acts or neglect by Owner, acts or neglect of utility owners or other contractors performing other work as contemplated by Article 7, fires, floods, epidemics, abnormal weather conditions, or acts of God.

- B. If Owner, Engineer, or other contractors or utility owners performing other work for Owner as contemplated by Article 7, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
- C. If Contractor is delayed in the performance or progress of the Work by fire, flood, epidemic, abnormal weather conditions, acts of God, acts or failures to act of utility owners not under the control of Owner, or other causes not the fault of and beyond control of Owner and Contractor, then Contractor shall be entitled to an equitable adjustment in Contract Times, if such adjustment is essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays described in this Paragraph 12.03.B.
 - 1. delays caused by or within the control of Contractor; or
- D. Owner, Engineer and the Related Entities of each of them shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of Engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.
- E. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delays within the control of Contractor. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.

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

13.01 *Notice of Defects*

- A. Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor. All defective Work may be rejected, corrected, or accepted as provided in this Article 13.

13.02 *Access to Work*

- A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and governmental agencies with jurisdictional interests will have access to the Site and the Work at reasonable times for their observation, inspecting, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's Site safety procedures and programs so that they may comply therewith as applicable.

13.03 *Tests and Inspections*

- A. Contractor shall give Engineer timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.
- B. Owner shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents except:
 - 1. for inspections, tests, or approvals covered by Paragraphs 13.03.C and 13.03.D below;

2. that costs incurred in connection with tests or inspections conducted pursuant to Paragraph 13.04.B shall be paid as provided in said Paragraph 13.04.C; and
 3. as otherwise specifically provided in the Contract Documents.
- C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.
 - D. Contractor shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to Owner and Engineer.
 - E. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, it must, if requested by Engineer, be uncovered for observation.
 - F. Uncovering Work as provided in Paragraph 13.03.E shall be at Contractor's expense unless Contractor has given Engineer timely notice of Contractor's intention to cover the same and Engineer has not acted with reasonable promptness in response to such notice.

13.04 *Uncovering Work*

- A. If any Work is covered contrary to the written request of Engineer, it must, if requested by Engineer, be uncovered for Engineer's observation and replaced at Contractor's expense.
- B. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, furnishing all necessary labor, material, and equipment.
- C. If it is found that the uncovered Work is defective, Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05.
- D. If, the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

13.05 *Owner May Stop the Work*

- A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work shall not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

13.06 *Correction or Removal of Defective Work*

- A. Promptly after receipt of notice, Contractor shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by Engineer, remove it from the Project and replace it with Work that is not defective. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or removal (including but not limited to all costs of repair or replacement of work of others).
- B. When correcting defective Work under the terms of this Paragraph 13.06 or Paragraph 13.07, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

13.07 *Correction Period*

- A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents) or by any specific provision of the Contract Documents, any Work is found to be defective, or if the repair of any damages to the land or areas made available for Contractor's use by Owner or permitted by Laws and Regulations as contemplated in Paragraph 6.11.A is found to be defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:
 - 1. repair such defective land or areas; or
 - 2. correct such defective Work; or
 - 3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and
 - 4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting therefrom.
- B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by Contractor.
- C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.
- D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this Paragraph 13.07, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.
- E. Contractor's obligations under this Paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this Paragraph 13.07 shall not be construed as a substitute for or a waiver of the provisions of any applicable statute of limitation or repose.

13.08 *Acceptance of Defective Work*

- A. If, instead of requiring correction or removal and replacement of defective Work, Owner (and, prior to Engineer's recommendation of final payment, Engineer) prefers to accept it, Owner may do so. Contractor shall pay all claims,

costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness) and the diminished value of the Work to the extent not otherwise paid by Contractor pursuant to this sentence. If any such acceptance occurs prior to Engineer's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work, and Owner shall be entitled to an appropriate decrease in the Contract Price, reflecting the diminished value of Work so accepted. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05. If the acceptance occurs after such recommendation, an appropriate amount will be paid by Contractor to Owner.

13.09 *Owner May Correct Defective Work*

- A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work or to remove and replace rejected Work as required by Engineer in accordance with Paragraph 13.06.A, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, Owner may, after seven days written notice to Contractor, correct or remedy any such deficiency.
- B. In exercising the rights and remedies under this Paragraph 13.09, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, take possession of Contractor's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this Paragraph.
- C. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 13.09 will be charged against Contractor, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount of the adjustment, Owner may make a Claim therefor as provided in Paragraph 10.05. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.
- D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 13.09.

ARTICLE 14 – PAYMENTS TO CONTRACTOR AND COMPLETION

14.01 *Schedule of Values*

- A. The Schedule of Values established as provided in Paragraph 2.07.A will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed.

Progress Payments

B. Applications for Payments

1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.
2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.
3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

C. Review of Applications

1. Engineer will, within 10 days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to Owner or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.
2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations on the Site of the executed Work as an experienced and qualified design professional and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:
 - a. the Work has progressed to the point indicated;
 - b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, to the results of any subsequent tests called for in the Contract Documents, to a final determination of quantities and classifications for Unit Price Work under Paragraph 9.07, and to any other qualifications stated in the recommendation); and
 - c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.
3. By recommending any such payment Engineer will not thereby be deemed to have represented that:
 - a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract Documents; or
 - b. that there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.
4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:

Gateway County Service Area Water Treatment Plant Improvements

- a. to supervise, direct, or control the Work, or
 - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or
 - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or
 - d. to make any examination to ascertain how or for what purposes Contractor has used the moneys paid on account of the Contract Price, or
 - e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.
5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 14.02.B.2. Engineer may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in Engineer's opinion to protect Owner from loss because:
- a. the Work is defective, or completed Work has been damaged, requiring correction or replacement;
 - b. the Contract Price has been reduced by Change Orders;
 - c. Owner has been required to correct defective Work or complete Work in accordance with Paragraph 13.09; or
 - d. Engineer has actual knowledge of the occurrence of any of the events enumerated in Paragraph 15.02.A.

D. *Payment Becomes Due*

1. Twenty-four days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended will (subject to the provisions of Paragraph 14.02.D) become due, and when due will be paid by Owner to Contractor.

D. *Reduction in Payment*

1. Owner may refuse to make payment of the full amount recommended by Engineer because:
 - a. claims have been made against Owner on account of Contractor's performance or furnishing of the Work;
 - b. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;
 - c. the Contractor's performance or furnishing of the Work is inconsistent with funding Agency requirements;
 - d. there are other items entitling Owner to an offset against the amount recommended; or
 - e. Owner has actual knowledge of the occurrence of any of the events enumerated in Paragraphs 14.02.B.5.a through 14.02.B.5.c or Paragraph 15.02.A.
2. If Owner refuses to make payment of the full amount recommended by Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, when Contractor corrects to Owner's satisfaction the reasons for such action.
3. If it is subsequently determined that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 14.02.C.1.

14.02 *Contractor's Warranty of Title*

- A. Contractor warrants and guarantees that title to all Work, materials, and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to Owner no later than the time of payment free and clear of all Liens.

14.03 *Substantial Completion*

- A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete (except for items specifically listed by Contractor as incomplete) and request that Engineer issue a certificate of Substantial Completion.
- B. Promptly after Contractor's notification, Owner, Agency, Contractor, and Engineer shall make a prefinal inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.
- C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the tentative certificate during which to make written objection to Engineer as to any provisions of the certificate or attached list. If, after considering such objections, Engineer concludes that the Work is not substantially complete, Engineer will within 14 days after submission of the tentative certificate to Owner notify Contractor in writing, stating the reasons therefor. If, after consideration of Owner's objections, Engineer considers the Work substantially complete, Engineer will within said 14 days execute and deliver to Owner and Contractor a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as Engineer believes justified after consideration of any objections from Owner.

Gateway County Service Area Water Treatment Plant Improvements

- D. At the time of delivery of the tentative certificate of Substantial Completion, Engineer will deliver to Owner and Contractor a written recommendation as to division of responsibilities pending final payment between Owner and Contractor with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless Owner and Contractor agree otherwise in writing and so inform Engineer in writing prior to Engineer's issuing the definitive certificate of Substantial Completion, Engineer's aforesaid recommendation will be binding on Owner and Contractor until final payment.
- E. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to complete or correct items on the tentative list.

14.04 *Partial Utilization*

- A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions.
 - 1. Owner at any time may request Contractor in writing to permit Owner to use or occupy any such part of the Work which Owner believes to be ready for its intended use and substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor will certify to Owner and Engineer that such part of the Work is substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.
 - 2. Contractor at any time may notify Owner and Engineer in writing that Contractor considers any such part of the Work ready for its intended use and substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.
 - 3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 14.04 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.
 - 4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 5.10 regarding property insurance.

14.05 *Final Inspection*

- A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner, Agency, and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

14.06 *Final Payment*

A. *Application for Payment*

- 1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance certificates of inspection, marked-up record documents (as provided in Paragraph 6.12), and other documents, Contractor may make application for final payment following the procedure for progress payments.

2. The final Application for Payment shall be accompanied (except as previously delivered) by:
 - a. all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by Paragraph 5.04.B.7;
 - b. consent of the surety, if any, to final payment;
 - c. a list of all Claims against Owner that Contractor believes are unsettled; and
 - d. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of or Liens filed in connection with the Work.
3. In lieu of the releases or waivers of Liens specified in Paragraph 14.07.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner or Owner's property might in any way be responsible have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien.

B. Engineer's Review of Application and Acceptance

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract Documents have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of payment and present the Application for Payment to Owner for payment. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable subject to the provisions of Paragraph 14.09. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

C. Payment Becomes Due

1. Thirty days after the presentation to Owner of the Application for Payment and accompanying documentation, the amount recommended by Engineer, less any sum Owner is entitled to set off against Engineer's recommendation, including but not limited to liquidated damages, will become due and will be paid by Owner to Contractor.

14.07 Final Completion Delayed

- A. If, through no fault of Contractor, final completion of the Work is significantly delayed, and if Engineer so confirms, Owner shall, upon receipt of Contractor's final Application for Payment (for Work fully completed and accepted) and recommendation of Engineer, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by Owner for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if bonds have been furnished as required in Paragraph 5.01, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by Contractor to Engineer with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of Claims. The remaining balance of any sum included in the final Application for Payment but held by OWNER for Work not fully completed and accepted will become due when the Work is fully completed and accepted.

14.08 *Waiver of Claims*

- A. The making and acceptance of final payment will constitute:
1. a waiver of all Claims by Owner against Contractor, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 14.06, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from Contractor's continuing obligations under the Contract Documents; and
 2. a waiver of all Claims by Contractor against Owner other than those previously made in accordance with the requirements herein and expressly acknowledged by Owner in writing as still unsettled.

ARTICLE 15 – SUSPENSION OF WORK AND TERMINATION

15.01 *Owner May Suspend Work*

- A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by notice in writing to Contractor and Engineer which will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be granted an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if Contractor makes a Claim therefor as provided in Paragraph 10.05.

15.02 *Owner May Terminate for Cause*

- A. The occurrence of any one or more of the following events will justify termination for cause:
1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule established under Paragraph 2.07 as adjusted from time to time pursuant to Paragraph 6.04);
 2. Contractor's disregard of Laws or Regulations of any public body having jurisdiction;
 3. Contractor's disregard of the authority of Engineer; or
 4. Contractor's violation in any substantial way of any provisions of the Contract Documents.
- B. If one or more of the events identified in Paragraph 15.02.A occur, Owner may, after giving Contractor (and surety) seven days written notice of its intent to terminate the services of Contractor:
1. exclude Contractor from the Site, and take possession of the Work and of all Contractor's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion),
 2. incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and
 3. complete the Work as Owner may deem expedient.
- C. If Owner proceeds as provided in Paragraph 15.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Owner arising out of or relating to completing the Work, such excess will be paid to Contractor. If such claims, costs, losses, and damages exceed such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this Paragraph Owner shall not be required to obtain the lowest price for the Work performed.
- D. Notwithstanding Paragraphs 15.02.B and 15.02.C, Contractor's services will not be terminated if Contractor begins within seven days of receipt of notice of intent to terminate to correct its failure to perform and proceeds diligently to cure such failure within no more than 30 days of receipt of said notice.
- E. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue. Any retention or payment of moneys due Contractor by Owner will not release Contractor from liability.
- F. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 5.01.A, the termination procedures of that bond shall supersede the provisions of Paragraphs 15.02.B, and 15.02.C.

15.03 *Owner May Terminate For Convenience*

- A. Upon seven (7) days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):

Gateway County Service Area Water Treatment Plant Improvements

1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;
 2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses;
 3. all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and
 4. reasonable expenses directly attributable to termination.
- B. Contractor shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

15.04 *Contractor May Stop Work or Terminate*

- A. If, through no act or fault of Contractor, (i) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (ii) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (iii) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the Contract and recover from Owner payment on the same terms as provided in Paragraph 15.03.
- B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this Paragraph 15.04 are not intended to preclude Contractor from making a Claim under Paragraph 10.05 for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this Paragraph.

ARTICLE 16 – DISPUTE RESOLUTION

16.01 *Methods and Procedures*

- A. Owner and Contractor may mutually request mediation of any Claim submitted to Engineer for a decision under Paragraph 10.05 before such decision becomes final and binding. The mediation will be governed by the Construction Industry Mediation Rules of the American Arbitration Association in effect as of the Effective Date of the Agreement. The request for mediation shall be submitted in writing to the American Arbitration Association. Timely submission of the request shall stay the effect of Paragraph 10.05.E.
- B. Owner and Contractor shall participate in the mediation process in good faith. The process shall be concluded within 60 days of filing of the request. The date of termination of the mediation shall be determined by application of the mediation rules referenced above.
- C. If the claim is not resolved by mediation, Engineer's action under Paragraph 10.05.C or a denial pursuant to Paragraphs 10.05.C.3 or 10.05.D shall become final and binding 30 days after termination of the mediation unless, within that time period, Owner or Contractor:
1. elects in writing to invoke any dispute resolution process provided for in the Supplementary Conditions, or
 2. agrees with the other party to submit the Claim to another dispute resolution process, or

3. gives written notice to the other party of their intent to submit the Claim to a court of competent jurisdiction.

ARTICLE 17 – MISCELLANEOUS

17.01 Giving Notice

- A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:
 1. 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
 2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

17.02 Computation of Times

- A. When any period of time is referred to in the Contract Documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

17.03 Cumulative Remedies

- A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto 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. 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.

17.04 Survival of Obligations

- A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion, and acceptance of the Work or termination or completion of the Contract or termination of the services of Contractor.

17.05 Controlling Law

- A. This Contract is to be governed by the law of the state in which the Project is located.

17.06 Headings

- A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

ARTICLE 18 – FEDERAL REQUIREMENTS

18.01 Agency Not a Party

- A. This Contract is expected to be funded in part with funds provided by Agency. Neither Agency, nor any of its departments, entities, or employees is a party to this Contract.

18.02 *Contract Approval*

- A. Owner and Contractor will furnish Owner's attorney such evidence as required so that Owner's attorney can complete and execute the "Certificate of Owner's Attorney" (Exhibit GC-A on Page 00620-1) before Owner submits the executed Contract Documents to Agency for approval.
- B. Concurrence by Agency in the award of the Contract is required before the Contract is effective.

18.03 *Conflict of Interest*

- A. Contractor may not knowingly contract with a supplier or manufacturer if the individual or entity who prepared the plans and specifications has a corporate or financial affiliation with the supplier or manufacturer.
- B. Owner's officers, employees, or agents shall not engage in the award or administration of this Contract if a conflict of interest, real or apparent, would be involved. Such a conflict would arise when: (i) the employee, officer or agent; (ii) any member of their immediate family; (iii) their partner or (iv) an organization that employs, or is about to employ, any of the above, has a financial interest in the Contract. Owner's officers, employees, or agents shall neither solicit nor accept gratuities, favors or anything of monetary value from Contractor or subcontractors.

18.04 *Gratuities*

- A. If Owner finds after a notice and hearing that Contractor, or any of Contractor's agents or representatives, offered or gave gratuities (in the form of entertainment, gifts, or otherwise) to any official, employee, or agent of Owner or Agency in an attempt to secure this Contract or favorable treatment in awarding, amending, or making any determinations related to the performance of this Contract, Owner may, by written notice to Contractor, terminate this Contract. Owner may also pursue other rights and remedies that the law or this Contract provides. However, the existence of the facts on which Owner bases such findings shall be an issue and may be reviewed in proceedings under the dispute resolution provisions of this Contract.
- B. In the event this Contract is terminated as provided in paragraph 18.04.A, Owner may pursue the same remedies against Contractor as it could pursue in the event of a breach of this Contract by Contractor. As a penalty, in addition to any other damages to which it may be entitled by law, Owner may pursue exemplary damages in an amount (as determined by Owner) which shall not be less than three nor more than ten times the costs Contractor incurs in providing any such gratuities to any such officer or employee.

18.05 *Audit and Access to Records*

- A. For all negotiated contracts and negotiated modifications (except those of \$10,000 or less), Owner, Agency, the Comptroller General, or any of their duly authorized representatives, shall have access to any books, documents, papers, and records of the Contractor, which are pertinent to the Contract, for the purpose of making audits, examinations, excerpts and transcriptions. Contractor shall maintain all required records for three years after final payment is made and all other pending matters are closed.

18.06 *Small, Minority and Women's Businesses*

- A. If Contractor intends to let any subcontracts for a portion of the work, Contractor shall take affirmative steps to assure that small, minority and women's businesses are used when possible as sources of supplies, equipment, construction, and services. Affirmative steps shall consist of: (1) including qualified small, minority and women's businesses on solicitation lists; (2) assuring that small, minority and women's businesses are solicited whenever they are potential sources; (3) dividing total requirements when economically feasible, into small tasks or quantities to permit maximum participation of small, minority, and women's businesses; (4) establishing delivery schedules, where the requirements of the work permit, which will encourage participation by small, minority and women's businesses; (5) using the services and assistance of the Small Business Administration and the Minority Business Development Agency of the U.S. Department of Commerce; (6) requiring each party to a subcontract to take the

Gateway County Service Area Water Treatment Plant Improvements

affirmative steps of this section; and (7) Contractor is encouraged to procure goods and services from labor surplus area firms.

18.07 *Anti-Kickback*

- A. Contractor shall comply with the Copeland Anti-Kickback Act (18 USC 874 and 40 USC 276c) as supplemented by Department of Labor regulations (29 CFR Part 3, “Contractors and Subcontractors on Public Buildings or Public Works Financed in Whole or in Part by Loans or Grants of the United States”). The Act provides that Contractor or subcontractor shall be prohibited from inducing, by any means, any person employed in the construction, completion, or repair of public facilities, to give up any part of the compensation to which they are otherwise entitled. Owner shall report all suspected or reported violations to Agency.

18.08 *Clean Air and Pollution Control Acts*

- A. If this Contract exceeds \$100,000, Contractor shall comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act (42 USC 7401 *et seq.*) and the Federal Water Pollution Control Act as amended (33 USC 1251 *et seq.*). Contractor will report violations to the Agency and the Regional Office of the EPA.

18.09 *State Energy Policy*

- A. Contractor shall comply with the Energy Policy and Conservation Act (P.L. 94-163). Mandatory standards and policies relating to energy efficiency, contained in any applicable State Energy Conservation Plan, shall be utilized.

18.10 *Equal Opportunity Requirements*

- A. If this Contract exceeds \$10,000, Contractor shall comply with Executive Order 11246, “Equal Employment Opportunity,” as amended by Executive Order 11375, “Amending Executive Order 11246 Relating to Equal Employment Opportunity,” and as supplemented by regulations at 41 CFR Part 60, “Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor.”
- B. Contractor’s compliance with Executive Order 11246 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative active obligations required by the Standard Federal Equal Employment Opportunity Construction Contract Specifications, as set forth in 41 CFR Part 60-4 and its efforts to meet the goals established for the geographical area where the Contract is to be performed. The hours of minority and female employment and training must be substantially uniform throughout the length of the Contract, and in each trade, and Contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting Contractor’s goals shall be a violation of the Contract, the Executive Order, and the regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.
- C. Contractor shall provide written notification to the Director of the Office of Federal Contract Compliance Programs within 10 working days of award of any construction subcontract in excess of \$10,000 at any tier for construction work under the Contract resulting from this solicitation. The notification shall list the name, address, and telephone number of the subcontractor; employer identification number; estimated dollar amount of subcontract; estimated starting and completion dates of the subcontract; and the geographical area in which the Contract is to be performed.

18.11 *Restrictions on Lobbying*

- A. Contractor and each subcontractor shall comply with Restrictions on Lobbying (Public Law 101-121, Section 319) as supplemented by applicable Agency regulations. This Law applies to the recipients of contracts and subcontracts that exceed \$100,000 at any tier under a Federal loan that exceeds \$150,000 or a Federal grant that exceeds \$100,000. If applicable, Contractor must complete a certification form on lobbying activities related to a specific Federal loan or grant that is a funding source for this Contract. Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or

Gateway County Service Area Water Treatment Plant Improvements

employee of any agency, a member of Congress, or an employee of a member of Congress in connection with obtaining any Federal contract, grant, or any other award covered by 31 USC 1352. Each tier shall disclose any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award. Certifications and disclosures are forwarded from tier to tier up to the Owner. Necessary certification and disclosure forms shall be provided by Owner.

18.12 *Environmental Requirements*

- A. When constructing a project involving trenching and/or other related earth excavations, Contractor shall comply with the following environmental constraints:
1. Wetlands – When disposing of excess, spoil, or other construction materials on public or private property, Contractor shall not fill in or otherwise convert wetlands.
 2. Floodplains – When disposing of excess, spoil, or other construction materials on public or private property, Contractor shall not fill in or otherwise convert 100 year floodplain areas delineated on the latest Federal Emergency Management Agency Floodplain Maps, or other appropriate maps, i.e., alluvial soils on NRCS Soil Survey Maps.
 3. Historic Preservation – Any excavation by Contractor that uncovers an historical or archaeological artifact shall be immediately reported to Owner and a representative of Agency. Construction shall be temporarily halted pending the notification process and further directions issued by Agency after consultation with the State Historic Preservation Officer (SHPO).
 4. Endangered Species – Contractor shall comply with the Endangered Species Act, which provides for the protection of endangered and/or threatened species and critical habitat. Should any evidence of the presence of endangered and/or threatened species or their critical habitat be brought to the attention of Contractor, Contractor will immediately report this evidence to Owner and a representative of Agency. Construction shall be temporarily halted pending the notification process and further directions issued by Agency after consultation with the U.S. Fish and Wildlife Service.

TABLE OF CONTENTS

	PAGE
SC-1.01.A.20. Defined Terms	00800-2
SC-1.01.A.30. Defined Terms	00800-2
SC-1.01.A.35. Defined Terms.....	00800-2
SC-1.02.E.3. Terminology	00800-2
SC-2.02.A. Copies of Documents	00800-2
SC-2.03.A. Commencement of Contract Times; Notice to Proceed	00800-3
SC-2.05.A.4. Before Starting Construction	00800-3
SC-2.06.A. Pre-Construction Conference	00800-3
SC-4.06. Hazardous Environmental Condition at Site	00800-3
SC-5.02.B. Licensed Sureties and Insurers	00800-3
SC-5.03.A. Certificates of Insurance	00800-3
SC-5.03.C. Certificates of Insurance	00800-3
SC-5.04.C. Contractor’s Liability Insurance	00800-4
SC-6.06.H. Concerning Subcontractors, Suppliers, and Others	00800-4
SC-6.11.A.1. Use of Site and Other Areas	00800-4
SC-6.13. Safety and Protection	00800-5
SC-6.13.E. Safety and Protection	00800-5
SC-6.13.F. Safety and Protection	00800-5
SC-6.17. Shop Drawings and Samples.....	00800-5
SC-6.20. Indemnification	00800-5
SC-8.08A. Owners Responsibility Testing.....	00800-6
SC-9.03.B.1 Project Representative	00800-6
SC-13.03.D. Tests and Inspections	00800-9
SC-13.03.G Geotechnical Testing.....	00800-9
SC-14.01.B.3 Retention	00800-9
SC-14.01.D.1Progress Payment	00800-9
SC-14.04.A.2 Partial Utilization	00800-9
SC-14.06.C.1 Notice of Completion	00800-9
SC-18.08.A Contracts Exceeding \$100,000	00800-9
SC-19. Additional State Requirements	00800-9

Note: The page column notes where the Special Condition Section item starts.

SECTION 24- SUPPLEMENTARY CONDITIONS

These Supplementary Conditions amend or supplement the Standard General Conditions and other provisions of the Contract Documents as indicated below. All provisions which are not so amended or supplemented remain in full force and effect. The terms used in these Supplementary Conditions will have the meanings indicated in the General Conditions. Additional terms used in these Supplementary Conditions have the meanings indicated below, which are applicable to both the singular and plural thereof.

SC-1.01.A.20 Add the following sentences and statement to the end of Paragraph 1.01.A.20:

The Engineer for this project as listed in the Agreement is: The Holt Group, Inc.

SC-1.01.A.30 Add the following sentences to the end of Paragraph 1.01.A.30:

The Owner for this Project is the County of Imperial. The words “County of Imperial” are used within this document interchangeably with the word “Owner” and have the same meaning.

SC-1.01.A.35 Delete the second sentence and replace the second sentence of SGC-1.01.A.35 with the following sentence.

The Project Manual includes the following listed items 1 through 26:

1. “Invitation for Proposals” also referred to as “Advertisement for Bids”
2. Instruction to Bidders
3. Wage Requirements
4. Bid Form for Construction Contract
5. Non-Collusion Affidavit
6. Bid Bond
7. Certification of Non-Segregated Facilities
8. Certification regarding Debarment
9. Federal and State Contract Language Inclusion
10. Iran Contracting Act Certification
11. Certification for Contracts, Grants and Loans
12. Contractors Certification Regarding Worker’s Compensation Insurance
13. Tabulation of Subcontractors
14. Bidder Qualification Statement
15. Tabulation of Major Material Suppliers
16. Notice of Award and Acceptance of Notice
17. Agreement for Construction Services
18. Notice to Proceed
19. Performance Bond
20. Payment Bond
21. Contractors Application for Payment
22. Certificate of Substantial Completion
23. Standard General Conditions (SGC)
24. Supplementary Conditions (SC)
25. Special Conditions
26. Technical Specifications

SC-1.02.E.3 Add the following sentence to the end of Paragraph SGC-1.02.E.3:

The word “construct” shall be used within this document interchangeably with the words “perform” and “provide” and have the same meaning.

SC-2.02.A Delete the first sentence of SGC-2.02.A and replace with the following sentence:

- A. Owner shall furnish to Contractor up to two (2) printed or hard copies of the Project Manual, and five (5) copies of the Drawings.

SC-2.03.A Delete SGC Paragraph 2.03.A in its entirety and insert the following paragraph in its place:

- A. The Contract Times will commence to run on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within thirty (30) calendar days after the Effective Date of the Agreement.

SC-2.05.A.4 Add the following new statement to SGC-2.05:

- 1. The Contractor shall submit an injury and illness prevention program and a Project Specific Safety Plan.
- 2. Specific Operating Safety Procedures.

SC-2.06.A Add the following sentence to SGC-2.06.A:

An item shall be placed on the Pre-Construction Agenda to review safety requirements and the implementation of all health and safety provisions related to this Project.

SC-4.06 Delete Paragraphs 4.06.A and 4.06.B in their entirety and insert the following:

- A. No reports or explorations or tests of subsurface conditions relative to hazardous environmental conditions at or contiguous to the Site are known to the Owner or Engineer.

SC-5.02.B Add Item "B" to Section 5.02 as follows:

- B. The Contractor shall take out and maintain insurance at his/her sole cost and expense with insurance carriers possessing the following credentials:
 - a. Rated no less than A-, Class VIII or better by the A.M. Best Company;
 - b. Licensed by the State of California to conduct business in this state.

All deductibles shall be the sole responsibility of the Contractor.

SC-5.03.A Add the following to SGC-5.03.A:

- E. The following persons or entities are to be included as an additional insured on the policies:
 - 1. County of Imperial.
 - 2. Engineer.

SC-5.03 Add Section SGC-5.03.C as follows:

- C. Failure of the Owner to demand such certificates or other evidence of full compliance with these insurance requirements or failure of the Owner to identify a deficiency from evidence provided shall not be construed as a waiver of Contractor's obligation to maintain such insurance.

SC-5.04 Add Section SGC-5.04.C as follows:

C. The limits of liability for insurance required by Paragraph 5.04 of the Standard General Conditions shall provide coverage for not less than the following amounts or greater where required by Laws and Regulations:

- 1. Workers' Compensation and related coverage's under Paragraphs 5.04.A.1 and A.2 of the Standard General Conditions. Worker's Compensation is required by Section 3700 of the Labor Code of the State of California. Such policy shall contain an endorsement which waives all right of subrogation against those persons and entities designated in the policy. Contractor shall require its subcontractors similarly to provide such Workers' Compensation insurance. Please note: State Compensation Insurance Fund of California is an acceptable insurance carrier.

- a. State: Statutory
- b. Employer's Liability \$1,000,000

- 2. Contractor's General Liability which shall include completed operations and product liability coverages, personal and advertising injury and an excess (or umbrella) liability.

- a. General Aggregate \$6,000,000
- b. Products – Completed Operations Aggregate \$3,000,000
- c. Personal and Advertising Injury \$3,000,000
- d. Each Occurrence (Bodily Injury and Property Damage) \$4,000,000
- e. Excess or Umbrella Liability \$4,000,000

- 3. Automobile Liability under Paragraph 5.04.6 of the General Conditions:

- a. Combined Single Limit \$1,000,000

- 4. Contractual Liability coverage required by paragraph 5.04.B.4 of the Standard General Conditions shall be provided as part of the General Liability coverage.

SC-6.06.H Add Section SGC-6.06.H as follows:

- H. The Contractor shall not award work valued at more than sixty-five percent (65%) of the Contract Price to Subcontractor(s), without prior written approval of the Owner.

SC-6.11.A.1 Add Section SGC-6.11.A.1 as follows:

- A. The area within the Gateway of the Americas Water Treatment Plant is limited and is to be reserved for the operation and maintenance of the water treatment plant until immediately prior to physical construction activities of a particular item. The contractor shall obtain a staging area outside of the Gateway of the Americas Water

Treatment Plant for the delivery, storage and preassembling of material items and equipment. The contractor shall be responsible for the security of the materials and equipment. The contractor shall include the costs of the staging area within project mobilization bid item.

SC-6.11.A.4 Add Item 4 to SGC Section 6.11 as follows:

Contractor shall cooperate with the County of Imperial Public Works Department, Water Treatment Plant Operators, Imperial County Building Division, Imperial County Health Department - Environmental Health, Imperial Irrigation District Energy Division and all other jurisdictional agencies. The County of Imperial will maintain a Resident Engineer on site to observe and verify compliance with Contract Documents. Contractor shall perform work in a manner so as not to interfere with operation of existing Water Treatment Plant, Imperial County Public Works Department facilities, or operate any existing Water Treatment facilities. Contractor shall notify the County of Imperial Public Works Department and Construction Manager a minimum of two (2) weeks prior to commencing physical construction in the vicinity of its facilities.

SC-6.13. Add the following language to the end of SGC Paragraph 6.13.B:

For all excavations in excess of five feet (5'), the Contractor shall, pursuant to Labor Code Section 6705, submit in advance of any excavation hereunder a detailed plan showing the design of shoring, bracing, sloping, or other provisions to be made for worker protection from caving ground. The excavation plan shall be prepared and stamped by a Registered Civil Engineer or Geotechnical Engineer in the State of California. The Contractor shall include the costs of the excavation plan in his/her bid. Excavation work shall not occur until the plan is submitted by Contractor and approved by the Engineer.

SC-6.13.E Add Section SGC-6.13.E as follows:

The Owner reserves the right to suspend the work wholly or in part, for any time period as the Owner representative deems necessary, due to unresolved safety disputes.

No additional compensation or contract time will be allowed for the period the work is wholly or in part suspended.

Should the Contractor continue with the disputed work after having received a written notice of suspension, any work performed by the Contractor during the suspension shall be considered as having been done by the Contractor at the Contractor's own risk as a volunteer, and shall not entitle the Contractor to compensation or any other rights under the contract.

SC-6.13.F Add Section SGC-6.13.F as follows:

The Contractor shall conform to all applicable occupational safety and health standards, rules, regulations and orders established by local agencies, State of California, and California Division of Occupational Safety and Health Construction Safety Regulations (Cal Osha), including obtaining permits required by California Code of Regulations, Title 8, Sections 341 and 341(a).

SC-6.17. Delete Section SC-6.17. in its entirety:

For Clarification Purpose: Shop Drawings and Samples refer to Technical Condition Section 01300, Contractor Submittals, for Submittal and Shop Drawing requirements.

SC-6.20. Delete SGC Paragraph 6.20.C.2 in its entirety:

SC-8.08A Delete first sentence of SGC 8.08A and replace with the following:

- A. Owner's responsibility in respect to certain inspections, tests and approvals is set forth in Article Subsection 13.03.

SC-9.03.B Add Item 9.03.B to SGC Section 9.03:

Resident Engineering Services shall include the following work tasks:

1. Review the contract documents including the improvement plans, specifications, addendum(a), Traffic Control Plan, SWPPP, Encroachment Permits, Erosion Control Plan, Environmental Documents and Geotechnical Report, as applicable.
2. Coordinate and chair the Pre-Construction Conference. A Pre-Construction Conference Agenda will be prepared and reviewed with the District and funding agency staffs prior to issuance to all pertinent parties. A Pre-Construction Conference Memorandum will be prepared after the meeting and distributed to the County of Imperial Public Works Department, Contractor, Subcontractors, Material Suppliers, Funding Agency representatives, and District Representatives and all other pertinent entities within 48 hours of the Pre-Construction Conference. Noticing regarding said Pre-Construction Conference shall be provided 10 days in advance of meeting date.
3. Complete the review of various project submittals. The submittal shall be either rejected, conditionally approved as submitted or approved. A submittal status spreadsheet will be maintained indicating the current status of submittals that have been reviewed and approved, rejected or returned with a request for additional information. The submittal status list will indicate the date the submittal was submitted for review and the date the submittal was returned, rejected or approved. Comments regarding the submittals will also be maintained on the submittal status list. The Resident Engineer will review the submittal review list with the Contractor, District and Funding Agency on a weekly basis. The Resident Engineer will also review any pertinent issues pertaining to individual submittals with the Contractor as required.
4. Assist with the response to Request for Information (RFI's) forwarded by the Contractor. Coordinate with the District and Funding Agency prior to the issuance of standard responses as required.
5. Complete full-time inspection of the project. The Resident Engineer will be present during the time the Contractor or Subcontractors are present at the project site. The Daily Construction Period is expected to range between 8 to 10 hours per day. The Resident Engineer will enforce the provisions of the improvement plans, specifications, and addendum(a) requirements throughout the construction of the project.
6. The Resident Engineer will prepare Daily Inspection Reports each day of the project. The Resident Engineer will monitor the work completed in the field per the contract documents, improvement plans, specifications, addendum(a) and encroachment permits. Pictures of the work performed each day shall be included with the Daily Inspection Report. The Daily Reports will include such information as the material at the site, construction personnel and construction work times. The times the construction personnel start work and the time the construction personnel stop work shall be listed on the Daily Inspection Reports. The Daily Inspection Reports shall be forwarded to the District, Contractor and Funding Agency at the conclusion of each work day. In addition, a weekly inspection report shall be included summarizing the major items completed for a particular week.

7. The Resident Engineer will schedule and participate in weekly construction meetings with the County of Imperial Public Works Department, Contractor, Water Treatment Plant Operators, IID Energy Representatives and other Parties. The Resident Engineer shall be responsible for preparing a meeting agenda, a written summary including the construction progress of the project, weekly plan and pending issues and preparing a meeting memorandum and distributing the meeting memorandum to all pertinent parties.
8. The Resident Engineer will review and observe the construction surveying and staking work, and Geotechnical Testing to be completed by the Contractor or Contractor's sub-contractors and sub-consultants.
9. Assist in coordinating and scheduling the relocation of any utilities; i.e., power poles, underground fiber optic lines, underground telephone lines, etc. The coordinating and scheduling of utility infrastructure shall be conducted in a manner to cause minimal or no delay with regards to the construction schedule.
10. Collect supplier/vendor slips of cement slurry backfill, Class 2 Base, A.C. pavement, P.C.C. concrete and other major materials delivered to the project site. The major materials delivered to the project site shall be listed on the Daily Inspection Report. For Unit Price Projects, spreadsheets shall be prepared and updated. The spreadsheets shall be updated on a daily basis. The amount the project is over or under budget shall be logged on a daily basis. All material documentation shall be reviewed and delivered to the District and Funding Agency on a weekly basis during the weekly construction meetings.
11. Assist with the completion of the Contractor's Monthly Payment Request prior to issuance to the County of Imperial Public Works Department. The Resident Engineer shall be the primary contact with regard to the Contractor, Utility Providers and any other project-related parties. The Resident Engineer shall forward the Contractor's Monthly Payment Request to the County of Imperial Public Works Department for review and payment. The Resident Engineer shall keep an accurate record of Contractor payment request costs and change orders.
12. Assist with the review of change orders submitted by the Contractor and meet with the County of Imperial Public Works Department Representatives prior to issuing a response to the change order request. If the change order is approved, the Resident Engineer is to assist in processing the change order and ensuring the change order is reflected in the payment request.
13. Monitor geotechnical and material testing. Ensure that the contract document requirements are satisfactorily completed and adhered to. Ensure the required geotechnical testing is completed for specific items prior to the commencement of subsequent items.
14. The Resident Engineer shall note as-built conditions at the project site and verify the As-Built Drawings maintained by the Contractor are accurate and complete. The as-built information shall be detailed and include the date the as-built information was obtained. The redlined as-built plans shall be dated and forwarded to the County of Imperial Public Works Department.
15. Maintain at the site orderly files for correspondence, reports of job conferences, reproductions of original contract documents, including all change orders, field orders, work change directives, addenda, additional drawings issued subsequent to the execution of the contract, Engineer's clarifications and interpretations of the contract documents,

progress reports, shop drawings, submittals and other project-related documents. All project records shall be forwarded to the County of Imperial Public Works Department at the conclusion of the project.

16. Upon completion of work, furnish original set of all Resident Engineers project documentation to the County of Imperial Public Works Department. Documentation shall be compiled in three-ring binders with the project name labeled on the binders. An electronic copy of the documentation in PDF format shall be provided in addition to the three-ring binders.
17. The Resident Engineer shall complete the following with regards to project completion:
 - a. Participate in a substantial completion (pre-final) inspection, and assist in the determination of substantial completion and the preparation of lists of items to be completed or corrected.
 - b. Participate in a final inspection in the company of the County of Imperial Public Works Department Representatives, Water Treatment Plant Operators, and Contractor. Prepare a final list of items to be completed and deficiencies to be remedied.
 - c. Observe whether all items on the final list have been completed or corrected and make recommendations to the County of Imperial Public Works Department concerning acceptance and issuance of the Notice of Completion.
 - d. Assist in arranging inspections by other agencies as required by contract provisions, encroachment permits, etc.
 - e. Prepare final closeout documentation as required by the County of Imperial Public Works Department and project specifications.
18. Provide Labor Compliance and Monitoring Services. The Labor Compliance Officer shall conduct reviews of applicable Contractor payroll records and complete bilingual interviews at the project site, in addition to all required labor compliance service requirements. The Labor Compliance Officer will prepare a monthly report illustrating all labor compliance information. The Resident Engineer shall monitor and assist in coordinating the Labor Compliance Officer's activities.
19. The Resident Engineer shall not:
 - a. Authorize any deviation from the contract documents or substitution of materials or equipment (including "or equal" items).
 - b. Exceed limitations of Owner authority as set forth in the Agreement or the contract documents.
 - c. Undertake any of the responsibilities of Contractor, Subcontractor, Suppliers or Contractor's Superintendent.
 - d. Advise on, issue directions relative to, or assume control over any aspect of the means, methods, techniques, sequences or procedures of Contractor's work unless such advice or directions are specifically required by the contract documents.
 - e. Advise on, issue directions regarding, or assume control over safety practices, precautions and programs in connection with the activities or operations of the Owner or Contractor.
 - f. Participate in specialized field or laboratory tests or inspections conducted off-site by others except as specifically authorized the County of Imperial Public Works Department.
 - g. Accept shop drawings or sample submittals from anyone other than the Contractor.

SC – 13.03.D Add the following sentence to SGC Section 13.03.D

The Contractor shall engage the services of a Geotechnical Consultant and pay for those services regarding the Acceptance Testing for Materials during the submittal process.

SC – 13.03.G Add Section SGC - 13.03G as follows:

The Contractor shall provide the services of a qualified Geotechnical Consultant to perform the required geotechnical testing specified within the contents of the plans and specifications. The cost for the geotechnical testing shall be borne by the contractor. Refer to Technical Specification 02200, Earthwork for the required geotechnical testing to be completed for the project.

SC – 14.01.B.3 Delete Section SGC – 14.01.B.3 and replace with the following:

The amount of retainage with respect to progress payments is five (5) percent.

SC – 14.01.D.1 Delete Section SGC – 14.01.D.1 and replace with the following:

Forty-five (45) calendar days after presentation of Application for Payment to the Owner with the Engineer's recommendation, the amount recommended will (subject to the provisions of paragraphs 14.01B and 14.01C) become due, and when due will be paid by the Owner to the Contractor.

SC – 14.04.A.2 Delete SGC – 14.04.A.2 in its entirety.

SC – 14.06.C.1 Delete SGC Paragraph 14.06.C.1 in its entirety and replace with the following paragraph:

1. **Thirty-five (35) calendar days** after the filing of a Notice of Completion with the County Recorder and after presentation to Owner of the Application for Payment and accompanying documentation, the amount recommended by the Engineer, less any sum the Owner is entitled to offset against the Engineer's recommendation, including but not limited to liquidated damages, will become due and will be paid by the Owner to the Contractor.

SC – 18.08.A Delete SGC Paragraph 18.08A in its entirety and replace with the following paragraph:

1. If this Contract exceeds **\$100,000**, the Contractor shall comply with all applicable standards, orders, or requirements issued under Section 306 of the Clean Air Act (42 USC – 1857(h)), Section 508 of the Clean Air Act (33 USC - 1368), Executive Order 11738, and Environmental Protection Agency regulations (40 CFR Part 15).

SC-19 Add the following new paragraphs:

ARTICLE 19 - ADDITIONAL STATE REQUIREMENTS

19.01 In entering into a public works contract or a subcontract to supply goods, services, or materials pursuant to a public works contract, the Contractor or Subcontractor offers and agrees to assign to the awarding body all rights, title, and interest in and to all causes of action it may have under Section 4 of the Clayton Act (15 U.S.C. Section 15) or under the Cartwright Act (Chapter 2 (commencing with Section 16700) of Part 2 of Division 7 of the Business and Professions Code), arising from purchases of goods, services, or materials pursuant to the public works contract or the subcontract. This assignment shall be made and become effective at the time the awarding body tenders final payment to the Contractor, without further acknowledgment by the parties.



**GATEWAY COUNTY SERVICE AREA
WATER TREATMENT PLANT
IMPROVEMENTS**

**COUNTY OF IMPERIAL
PROJECT NUMBER 6914GTWTP**

**PROJECT MANUAL
VOLUME 2 OF 3
CIVIL, MECHANICAL, AND
ELECTRICAL TECHNICAL SPECIFICATIONS**

JULY 12, 2024

**THG PROJECT NO.
542.116E**

TABLE OF CONTENTS
TECHNICAL SPECIFICATIONS

DIVISION 1 - GENERAL REQUIREMENTS

01010	PROJECT DESCRIPTION
01070	ABBREVIATIONS
01090	REFERENCE STANDARDS
01300	CONTRACTOR SUBMITTALS
01312	PROJECT MEETINGS
01505	MOBILIZATION
01520	TEMPORARY FACILITIES
01530	PROTECTION OF EXISTING FACILITIES
01550	SITE ACCESS AND STORAGE
01660	MECHANICAL EQUIPMENT - INSTALLATION AND START-UP
01700	PROJECT CLOSEOUT
01730	OPERATION AND MAINTENANCE MANUALS
01783	AS-BUILTS

DIVISION 2 - SITEWORK

02050	DEMOLITION AND SALVAGE
02200	EARTHWORK
02630	DUCTILE IRON PIPE
02640	PVC PIPE
02650	PIPE FITTINGS, TRANSITION COUPLINGS, MECHANICAL RESTRAINED JOINT FITTINGS, FLANGED COUPLINGS ADAPTERS AND HARDWARE
02666	PRESSURE PIPELINE WATER TESTING
02670	DISINFECTION OF POTABLE WATER PIPELINES

DIVISION 3 - CONCRETE

03100	CONCRETE FORMWORK
03200	REINFORCEMENT STEEL
03290	JOINTS IN CONCRETE STRUCTURES
03300	CAST-IN-PLACE CONCRETE
03315	GROUT

DIVISION 15 - MECHANICAL

15380	VERTICAL MULTISTAGE BOOSTER PUMP STATION
15400	MAGNETIC FLOWMETER
15450	PRESSURE GAUGES

DIVISION 26 - ELECTRICAL

26 05 00	BASIC ELECTRICAL REQUIREMENTS
26 05 03	EQUIPMENT WIRING CONNECTIONS
26 05 19	LOW VOLTAGE ELECTRICAL POWER CONDUCTERS & CABLES
26 05 26	GROUNDING & BONDING FOR ELECTRICAL SYSTEMS
26 05 29	HANGERS & SUPPORTS FOR ELECTRICAL SYSTEMS
26 05 33	RACEWAYS & BOXES FOR ELECTRICAL SYSTEMS
26 05 53	IDENTIFICATION FOR ELECTRICAL SYSTEMS
26 22 00	LOW-VOLTAGE TRANSFORMERS
26 24 13	SWITCHBOARDS
26 24 16	PANELBOARDS
26 28 13	FUSES
26 28 19	ENCLOSED SWITCHES
26 32 13	ENGINE GENERATORS

DIVISION 33 - UTILITIES

33 71 73	ELECTRICAL UTILITY SERVICES
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SECTION 01010 – PROJECT DESCRIPTION

The Gateway of the Americas Water Treatment Plant is located at 1499 Highway 98, Calexico, California 92231. The Gateway of the Americas water system owner is the County of Imperial. The Gateway of the Americas is classified as a “Community Water System”. The Imperial County Public Health Department -Division of Environmental Health is the Local Primacy Agency. The Agency issued a Domestic Water Supply Permit for the Gateway of the Americas water system and is responsible for the oversight and enforcement of the permit requirements. The Gateway of the Americas Water System Local Primacy Agency identification number is 1300018.

The Improvement Plans contained herein are for the improvements to the Gateway of the Americas *Water Treatment Plant*. These plans do not include improvements to the Gateway of the Americas water distribution system or improvements to the Calexico East Land Port of Entry (LPOE) water system.

The previous backup diesel fire pump failed while operating approximately 4 years ago and was not salvageable. The previous backup diesel fire pump is no longer operable. The original 2001 booster pumping system which conveyed water to the water distribution pipeline system was replaced with an interim booster pumping system in March of 2023. The interim booster pumping system consists of three (3) of the prior existing pumps and one (1) new pump. The interim booster pumps consist of one (1) 100 GPM – 10HP; one (1) 250 GPM – 20 HP and two (2) 750 GPM – 50 HP pumps. The four pumps can deliver 1,850 GPM at 70 psi to the distribution system. The interim electrical control panel and pumps currently maintain the downstream pipeline distribution operating pressure in a range between 68 and 78 psi. The interim pumping system does not possess an automatically activated emergency electrical power supply and therefore does not provide adequate fire flow protection to the Gateway of the Americas Service Area.

The improvements to the Gateway of the Americas water treatment plant include the replacement of the interim booster pumping system which conveys potable water to the water distribution pipeline system, improvements to the electrical system and installation of an emergency standby diesel generator set. The standby diesel generator set will provide an emergency power supply for the new booster pumps to insure adequate fire protection. The new variable frequency booster pumping system will be capable of providing 2,800 GPM at 78 psi flow to the water distribution pipeline system. This higher capacity fire flow will adequately provide the required fire flow to the Gateway of the Americas industrial and commercial establishments.

The Gateway of the Americas water treatment plant improvements do not include expanding the capacity of the water treatment plant, improvements to the raw water storage or conveyance system, filtering systems, water storage tanks, disinfection system, installation of a SCADA system or other major water treatment plant components. The improvements also do not include improvements to the Gateway of the Americas water distribution system for the installation of the distribution system pipeline sections required

PROJECT DESCRIPTION

01010-1

for the supply of 2,800 GPM @ 20 PSI residual pressure to all areas of the Gateway of the Americas Service Area and LPOE.

The major Gateway of the Americas Water Treatment Plant improvement are as follows:

1. Install a bypass pumping system to convey treated water from the tanks to the distribution system during the demolition and construction of the existing and new distribution pumps, piping and electrical system. **SEE SPECIAL CONDITION SECTION 00840-1 ENTITLED, "SEQUENCE OF CONSTRUCTION FOR MAINTAINING THE WATER TREATMENT PLANT OPERATIONAL DURING THE CONSTRUCTION PERIOD AND LISTING OF MAJOR PROJECT ITEMS."**
2. Complete the demolition of the distribution pumps, piping, a portion of the existing electrical system and existing parking area. The new electrical system will occupy the location of the existing parking area.
3. Install new variable frequency drive booster pumping system, piping, valves, flowmeter and electrical VFD and control panel. The variable frequency drive booster pumping system shall be capable of providing 2,800 gallons per minute at 78 psi pressure to the pipeline distribution system.
4. The pressure relief valve upstream of the existing 500,000 gallon ground storage reservoir is to be replaced.
5. The Imperial Irrigation District is to install a new electrical transformer, new secondary conductors from the transformer to the new service entrance section (SES) and install a new meter in the SES.
6. Install a new pcc parking area to replace the demolished parking area to accommodate the new electrical panels.
7. Install new electrical concrete pad in the location of the new electrical panels. Place a shade structure over the electrical panels.
8. Install a new electrical system including the 277/480 Volt, 3 phase, 4 wire, 800 amp SES Panel, Automatic Transfer Switch and 3 phase and 1 phase load centers. Existing electrical panels and transformers to remain operable are to be connected to the new electrical system. Connect existing circuitry to the new electrical system. Install new circuitry to the VFD electrical and control panels. Install alarm, monitoring and signal circuitry. Install flowmeter converter and circuitry, new generator set circuitry and generator set annunciator panel circuitry. Complete relocation of existing electrical circuitry. Complete other miscellaneous electrical work.

PROJECT DESCRIPTION

01010-2

9. Install a new standby diesel emergency 350 Kw generator set on prepared pcc support pad. Extend conduits and conductors from the standby emergency generator to the new automatic transfer switch.
10. Complete minor grading work before and after the installation of the electrical pcc pad, new pcc parking lot and new standby diesel emergency generator set pcc pad.
11. Complete a satisfactory start-up of the electrical, new variable frequency drive pumping system and all other system components. Place the new variable frequency drive pumping system in operation.

END OF SECTION 01010

PROJECT DESCRIPTION

01010-3

SECTION 01070 - ABBREVIATIONS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Wherever in these Contract Documents the following abbreviations or acronyms are used, they shall have the meanings indicated as follows in this specification.

1.02 ABBREVIATIONS AND ACRONYMS

AA	Aluminum Association
AAMA	Architectural Aluminum Manufacturer's Association
AASHTO	American Association of the State Highway and Transportation Officials
A2LA	American Association of Laboratory Accreditation
A.C.	Asphalt Concrete
ACI	American Concrete Institute
ADWR	California Division of Water Resources
AGC	Associated General Contractors
AGMA	American Gear Manufacturer's Association
AI	The Asphalt Institute
AIA	American Institute of Architects
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
AMCA	Air Moving and Conditioning Association
ANSI	American National Standards Institute, Inc.
AOS	Apparent Opening Size
APA	American Plywood Association
API	American Petroleum Institute
APN	Assessor's Parcel Number
APWA	American Public Works Association
ASA	Acoustical Society of America
ASAE	American Society of Agriculture Engineers
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASLE	American Society of Lubricating Engineers
ASME	American Society of Mechanical Engineers
ASQC	American Society for Quality Control
ASSE	American Society of Sanitary Engineers
ASTM	American Society for Testing and Materials
AWPA	American Society for Preservers Association

ABBREVIATIONS
01070-1

AWPI	American Wood Preservers Institute
AWS	American Welding Society
AWWA	American Water Works Association
BHMA	Builders Hardware Manufacturer's Association
CBC	California Building Code
CBR	California Bearing Ratio
CDX	Apa Rated Plywood Sheathing Exposure
CGA	Compressed Gas Association
CLFMI	Chain Link Fence Manufacturer's Institute
CMA	Concrete Masonry Association
CRSI	Concrete Reinforcing Steel Institute
ETL	Electrical Test Laboratories
ETL	Extract, Transform Load
EPDM	Ethylene Propylene Diene M-Class
FHWA	Federal Highway Administration
GAI	Geosynthetic Accreditation Institute
GCP	Construction General Permit
GPM	Gallons per Minute
GRI	Geosynthetic Research Institute
HDPE	High Density Polyethylene
HPC	Heterotrophic Plate Count
ICBO	International Conference of Building Officials
ICDPW	Imperial County Department of Public Works
IEEE	Institute of Electrical and Electronics Engineers
IES	Illuminating Engineering Society
IID	Imperial Irrigation District
IPC	Institute of Printed Circuits
IPCEA	Insulated Power Cable Engineers Association
IPS	Iron Pipe Size
ISA	Instrument Society of America
LAP	Laboratory Accreditation Program
LLDPE	Linear Low Density Polyethylene
MARV	Minimum Average Roll Value
MD	Machine Direction
MGD	Million Gallons per Day
MPA	Mega Pascal
MBMA	Metal Building Manufacturer's Association
NACE	National Association of Corrosion Engineers
NBS	National Bureau of Standards
NEC	National Electrical Code
NEMA	National Electrical Manufacturer's Association
NFPA	National Fire Protection Association
NFPA	National Forest Products Association
NGLI	National Lubricating Grease Institute
No.	Number

ABBREVIATIONS
01070-2

NOI	Notice of Intent
NOT	Notice of Termination
NSF	National Sanitation Foundation
NTPEP	National Transportation Product Evaluation Program
OD	Outside Diameter
OEM	Original Equipment Manufacturer
OIT	Oxidative Induction Time
OS&Y	Outside Stem and York
OSHA	Occupational Safety and Health Administration
PCA	Portland Cement Association
PCC	Portland Concrete Cement
PSI	Pounds per Square Inch
PVC	Polyvinyl Chloride
SBR	Styrene Butadiene Rubber
SCH	Schedule
SDR	Standard Dimension Ratio
SMA	Screen Manufacturer's Association
SMACCNA	Sheet Metal and Air Conditioning Contractors National Association
SPDT	Single Pole-Double Throw
SSPC	Steel Structures Painting Council
SSPWC	Standard Specifications for Public Works Construction
SWPPP	Storm Water Pollution Prevention Plan
TRS	Trihalomethane Removal System
UBC	Uniform Building Code
UL	Underwriters Laboratories, Inc.
USEPA	United States Environmental Protection Agency
UV	Ultra-Violet Disinfection
WCRSI	Western Concrete Reinforcing Steel Institute
WRI	Wire Reinforcement Institute, Inc.
WWPA	Western Wood Products Association
XMD	Cross Machine Direction

1.03 PLAN SHEET ABBREVIATIONS

%	Percent
AASHTO	American Association of State Highway and Transportation Officials
A.C.	Asphalt Concrete
A.C.P.	Asbestos Cement Pipe
AC-FT	Acre Feet
Agg.	Aggregate
AOS	Apparent Opening Size
APP	Approximate
ASTM	American Society for Testing and Materials

ABBREVIATIONS
01070-3

AVE	Average
AWWA	American Water Works Association
BC	Beginning of Curve
BLDG.	Building
BTM	Bottom
B.V.	Butterfly Valve
C2B	Class 2 Base
CC	Cubic Centimeter
C.I.	Cast Iron
CIRC	Circumferential
CL	Centerline
CLR	Clear
C.M.C.	Cement Mortar Coated
C.M.L.	Cement Mortar Lined
CPVC	Chlorinated Polyvinyl Chloride
D.I.	Ductile Iron
DIA	Diameter
DWG	Drawing
D/W	Driveway
Δ	Delta
EC	End of Curve
EF	Each Face
EL.	Elevation
E.P.	Edge of Pavement
EPDM	Ethylene Propylene Diene M-Class
EW	Each Way
FF	Finish Floor Elevation
FG	Finished Grade
FL	Flowline
FL.	Flanged
F.M.	Flow Meter
FM	Force Main
FS	Finish Surface
GALV	Galvanized
GPH	Gallons per Hour
GPM	Gallons per Minute
GW	Ground Water
H.B.	Hose Bib
HDPE	High Density Polyethylene
HP	Horsepower
HW	High Water
I.D.	Inside Diameter
INV. EL.	Invert Elevation
INV.	Invert
IPS	Iron Pipe Size

ABBREVIATIONS
01070-4

L.	Length
LBS	Pounds
MAX.	Maximum
MG	Million Gallon
MGD	Million Gallons per Day
M.H.	Manhole
MIN.	Minimum
MISC.	Miscellaneous
M.J.	Mechanical Joint
MPH	Miles per Hour
N. RIM	North Rim
N.S.	Native Surface
N.T.S.	Not To Scale
O.C.	On Center
O.D.	Outside Diameter
OHC	Overhead Cable
OHE	Overhead Electric Line
OHT	Overhead Telephone Line
OS&Y	Outside Stem & York
P.C.C.	Portland Concrete Cement
P.E.	Plain End
PL	Property Line
P.P.	Power Pole
PP#	Power Pole Number
PPM	Parts per Million
PSI	Pounds per Square Inch
PT	Pressure Transmitter
PVC	Polyvinyl Chloride
P/S	Prestressing
R.C.	Reinforced Concrete
ROW	Right-of-Way
S.	Slope
SCH	Schedule
SCHED	Schedule
SD	Storm Drain
SDFM	Storm Drain Force Main
SDR	Standard Dimension Ratio
SM	Static Mixer
SQ	Square
SS	Sanitary Sewer or Stainless Steel
STA	Station
S/W	Sidewalk
SWPPP	Storm Water Pollution Prevention Plan
TBD	To Be Determined
TBM	Temporary Benchmark

ABBREVIATIONS
01070-5

T.C.	Top of Curb or Top of Concrete
TDH	Total Dynamic Head
TF	Top of Footing
TMH	Top of Manhole
TOE	Top of Slope
TOF	Top of Floor
TOW	Top of Wall
T.P.	Top of Pavement
TRS	Trihalomethane Removal System
TV	Television
TYP.	Typical
UE	Underground Electricity
UNO	Unless Noted Otherwise
UT	Underground Telephone
VERT	Vertical

END OF SECTION 01070

ABBREVIATIONS
01070-6

SECTION 01090 - REFERENCE STANDARDS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. All work and materials shall be in accordance with applicable codes, ordinances and regulations of the County of Imperial, the State of California, American Water Works Association, and all other public authorities having jurisdiction. Codes governing this work include, but are not limited to, the latest approved edition of the following: Standard Specifications for Public Works Construction (Greenbook) latest edition; American Water Works Association (AWWA) Standard Specifications latest edition; American Concrete Institute (ACI) Standard Specifications latest edition; Occupational Safety and Health Act (OSHA); and the County of Imperial ordinances and regulations including the County of Imperial Standard Details and Specifications.
- B. Whenever in these Specifications references are made to published specifications, codes, standards or other requirements, it shall be understood that when no date is specified, only the latest published specifications, standards or requirements of the respective issuing agencies, as of the date that the Work is advertised for bids, shall apply; except to the extent that said standards or requirements may be in conflict with applicable laws, ordinances, or governing codes. No requirements set forth herein or shown on the drawings shall be waived because of any provision of, or omission from, said standards or requirements.

1.02 REFERENCE SPECIFICATIONS, CODE AND STANDARDS

- A. All work specified herein shall conform to or exceed the requirements of the referenced specifications, codes and standards to the extent that the provisions of such documents are not in conflict with the requirements of these Specifications.
- B. References herein to “Building Code” or UBC shall mean the Uniform Building Code of the International Conference of Building Officials (ICBO). The latest edition of the code, as of the date of award, as approved and adopted by the agency having jurisdiction, including all addenda, modifications, amendments or other lawful changes thereto, shall apply to the Work.
- C. References herein to American Water Works Association or AWWA shall comply with the latest edition of the code, as of the date of award.

REFERENCE STANDARDS

01090-1

- D. In case of conflict between codes, reference standards, drawings and other Contract Documents, the most stringent requirements shall govern. All conflicts shall be brought to the attention of the Engineer for clarification and directions prior to ordering or providing any materials or labor. The contractor shall bid the most stringent requirements.
- E. Applicable Standard Specifications: The Contractor shall construct the Work specified herein in accordance with the requirements of the Contract Documents and the referenced portions of those referenced codes, standards and specifications listed herein; except, that wherever references to “Standard Specifications” are made, the provisions therein for measurement and payment shall not apply.
- F. References herein to “OSHA Regulations for Construction” shall mean Title 29, Part 1926, Construction Safety and Health Regulations, Code of Federal Regulations (OSHA), including all changes and amendments thereto.
- G. References herein to “OSHA Standards” shall mean Title 29, Part 1910, Occupational Safety and Health Standards, Code of Federal Regulations (OSHA), including all changes and amendments thereto.
- H. All materials and equipment appurtenances that can contact potable water or water that will be treated to become potable shall be listed in NSF / ANSI Standard 61.
- I. References in the Contract Documents to “Standard Specifications” shall mean the Greenbook, formally known as the “Standard Specifications for Public Works Construction” as published by the American Public Works Association, including all current supplements, addenda and revisions thereof, latest edition.

END OF SECTION 01090

REFERENCE STANDARDS
01090-2

SECTION 01300 - CONTRACTOR SUBMITTALS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. All submittals by the Contractor shall be forwarded to the Engineer for review.
- B. Within five (5) calendar days after the date of Notice to Proceed, the Contractor shall submit the following items to the Engineer:
 - 1. A Construction Schedule providing the starting and completion dates of the various stages of the Work. The Contractor shall be prepared to discuss its construction schedule at the pre-construction conference.
 - 2. Schedule of Values or lump sum price breakdown for progress payment purposes.
 - 3. Letter designating the Contractor's Project Superintendent.

1.02 SUBMITTAL REQUIREMENTS AND PROCESS

- A. Wherever called for in the Contract Documents or when requested by the Engineer the Contractor shall furnish to the Engineer for review, six (6) copies of each submittal. The Engineer shall allow electronic copies of submittals to be forwarded by the contractor in lieu of hard copy submittals. The Engineer shall establish the requirements for the forwarding of electronic submittals at the Pre-Construction Conference.
- B. *The construction schedule, schedule of values and project superintendent submittals are to be forwarded to the Engineer for review within five (5) calendar days after the date of the Notice to Proceed. All other submittals are to be forwarded to the Engineer for review within fifteen (15) calendar days after the issuance of the Notice to Proceed except for the new booster pump station, electrical and emergency power generator set submittals. The booster pump station, electrical and emergency power generator set submittals shall be forwarded to the Engineer for review within twenty five (25) days after the issuance of the Notice to Proceed. All rejected and revise and resubmit submittals shall be forwarded to the Engineer for review within 7 days after the submittals are reviewed and forwarded to the Contractor by the Engineer. **The contractor's payment requests will***

CONTRACTOR SUBMITTALS

01300-1

not be processed if the preparation, forwarding and resubmission of submittals is not accomplished according to the above stipulated schedule.

- C. All submittals shall be accompanied by a submittal transmittal form. This form may be obtained from the Engineer. A separate transmittal form shall be used for each specific item for which a submittal is required. Each submittal should be referenced to the specification section requiring the submittal. All Contractor submittals shall be carefully reviewed by an authorized representative of the Contractor, prior to submission to the Engineer. Each submittal shall be dated, signed and certified by the Contractor as being correct and in strict conformance with the Contract Documents. In the case of shop drawings, each sheet shall be so dated, signed and certified. No consideration for review by the Engineer of any Contractor submittals will be made for any items which have not been so certified by the Contractor. All non-certified submittals will be returned to the Contractor without action taken by the Engineer and any delays caused thereby shall be the sole responsibility of the Contractor.
- C. Multiple-page submittals shall be collated into sets with each set stapled or bound.
- D. The Engineer will return copies of each submittal to the Contractor with review comments within fifteen (15) calendar days following their receipt by the Engineer. There will be three (3) copies of a submittal returned to the Contractor when marked either “NO EXCEPTIONS TAKEN” or “APPROVED AS NOTED”, and no formal revision and re-submission of said submittal will be required. However, if one or more copies of the submittal are returned to the Contractor marked ‘REVISE AND RESUBMIT” or ‘REJECTED”, the Contractor shall revise said submittal and shall resubmit the required number of copies of said revised submittal to the Engineer.
- E. Fabrication of an item shall commence only after the Engineer has reviewed the submittal and returned copies to the Contractor marked either “NO EXCEPTIONS TAKEN” or “APPROVED AS NOTED”. Corrections indicated on submittals shall be considered as changes necessary to meet the requirements of the Contract Documents and shall not be taken as the basis of claims for extra work.
- F. The Engineer’s review of Contractor’s submittals shall not relieve the Contractor of the entire responsibility for the correctness of details and dimensions. The Contractor shall assume all responsibility and risk for any problems due to any errors in the Contractor submittals. The

CONTRACTOR SUBMITTALS

01300-2

Contractor shall be responsible for the dimensions and the design of adequate connections and details.

1.03 CONTRACTOR’S SCHEDULE SUBMITTAL

- A. The Contractor shall submit to the Engineer a construction schedule for the Work showing a general plan for orderly progression of the Work including mobilization of plant and equipment and timing of procurement of major materials and equipment.
- B. The Engineer may request that the Contractor provide a revised or updated Construction Schedule if, at any time, the Engineer considers the project completion date to be in jeopardy because of any portion of the Work falling behind schedule or the sequence of operations becomes different from the previous schedule.

1.04 PROPOSED SUBSTITUTES OR “OR EQUAL” ITEM SUBMITTAL

- A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular supplier, the specification or description is intended to establish the type, function, appearance and quality required. Other items of material or equipment, or material or equipment of other suppliers may be submitted to the Engineer for review under the circumstances described below:
 - 1. The Contractor shall be responsible for resultant changes and all additional costs or credit to the Owner which the accepted substitution requires in the Contractor’s work, the work of its subcontractors and of other contractors and shall effect such changes without cost to the Owner.
- B. The procedure for review by the Engineer will include the following:
 - 1. If proposed substitute material or equipment has been judged to be unacceptable by the Engineer, the Contractor shall provide the material or equipment named in the Contract Documents or required by the contract specifications.

1.05 SAMPLES SUBMITTAL

- A. The Contractor shall submit not less than two (2) samples, unless noted otherwise in a material or equipment specification, to the Engineer for review and possible acceptance at no additional cost to the Owner.

CONTRACTOR SUBMITTALS
01300-3

Samples shall be submitted for acceptance a minimum of ten (10) days prior to ordering such material for delivery to the job site. If accepted by the Engineer, one (1) set of samples will be returned to the Contractor and one (1) set of samples shall remain at the job site until completion of the Work.

1.06 OPERATION, MAINTENANCE AND TECHNICAL MANUAL SUBMITTAL

- A. The Contractor shall furnish operation, maintenance and technical manuals in accordance with Section 01730 – Operation and Maintenance Manuals.
- B. All technical manuals shall be submitted to the Engineer not later than the seventy-five percent (75%) of construction completion date or fourteen (14) days prior to start-up of equipment if started before seventy-five percent (75%) completion of project. All discrepancies found in the technical manuals shall be corrected by the Contractor within thirty (30) days from the date of written notification by the Engineer.

1.07 AS-BUILT SUBMITTAL

- A. The Contractor shall maintain, during the progress of the Work, one (1) set of As-Built Drawings and shall neatly mark on them all project changes from the details shown on the original Contract Drawings. Special attention shall be given to recording on the drawings the horizontal and vertical location of all buried utilities that differ from the locations indicated or which were observed during the construction.
- B. As-Built drawings shall be accessible to the Engineer at all times during the construction period and shall be delivered to the Engineer upon completion of the Work.
- C. Upon substantial completion of the Work and prior to final project acceptance the Contractor shall deliver a complete set of As-Built drawings to the Engineer.

1.08 SUPERINTENDENT SUBMITTAL

- A. A letter designating the Project Superintendent shall be forwarded to the Engineer for his review and approval. The letter shall also include emergency contact information for the Project Superintendent and other Contractor Representatives.

CONTRACTOR SUBMITTALS
01300-4

1.09 SUBMITTAL LIST

A. At a minimum, the following material and equipment list shall be submitted for review and approval.

1. General Requirements

1.1 Construction Schedule

1.2 Schedule of Values

1.3 Letter Designating Project Superintendent

1.4 Emergency Contact Number

1.5 Operation and Maintenance Manuals

1.6 Project Sign (if required)

1.7 Site Specific Safety Plan

2. Sitework

2.1 Class 2 Base - Gradation, Maximum Density and Sand Equivalent

2.2 Granular Sand - Gradation, Maximum Density and Sand Equivalent

2.3 PCC Wheel Stops

2.4 Steel Bollards

2.5 Thermoplastic Marking Paint

2.6 Riser and Cover for Sanitary Sewer Cleanout

2.7 2" x 6" Treated Header Boards

2.8 Ductile Iron Pipeline and Spools

2.9 Ductile Iron Fittings

2.10 Ductile Iron Reducers including Eccentric Reducers

CONTRACTOR SUBMITTALS

01300-5

- 2.11 Hardware for Fittings, Valves, Piping, etc.
 - 2.12 OS & Y Gate Valves
 - 2.13 Non-Rising Stem Gate Valves
 - 2.14 Transition Couplings and Hardware
 - 2.15 Ductile Iron Blind Flanges
 - 2.16 Pipe Supports per Details F and G on the plans and pipe supports to be placed under the vertical multi-stage pump station suction and discharge pipelines
 - 2.17 AWWA C-900 PVC Pipe
 - 2.18 Ductile Iron Pipe Fittings
 - 2.19 Magnetic Detector Tape
 - 2.20 Schedule 40 PVC piping and fittings
 - 2.21 Schedule 80 PVC piping and fittings
 - 2.22 SDR 35 PVC fittings – Elbow and Wye
 - 2.23 Calder Couplings
 - 2.24 Restrained Flange Adapters
 - 2.25 Ductile iron joint restraints for AWWA C-900 pvc pipe
 - 2.26 Galvanized steel pipe brackets for Sch. 40 pvc pipe
3. Concrete
- 3.1 Reinforcement Steel
 - 3.2 Cast-in-Place Concrete
 - 3.3 Grout

CONTRACTOR SUBMITTALS
01300-6

- 4. Metals
 - 4.1 Pipe stanchion, existing and new pump skid anchor bolts
 - 4.2 Pre-engineered metal shade structure for electrical panels
 - 4.2.1 Structural steel members
 - 4.2.2 Steel roofing panels
 - 4.2.3 Hardware and anchor bolts
 - 4.2.4 Structural calculations prepared by a Licensed California Registered Civil or Structural Engineer
 - 4.3 Temporary shade structure placed over long term duration temporary existing pump station skid and electrical control panel
- 9. Finishes
 - 9.1 Protective Coatings
- 10. Equipment
 - 10.1 Electromagnetic Flowmeter and Converter
 - 10.2 Pressure Gauges with isolation ball valves
 - 10.3 Pressure Relief Valve
 - 10.4 Generator Set
 - 10.4.1 PCC Pad plan dimensions (width and length) as governed by the generator set manufacturers shroud dimensions.
 - 10.4.2 PCC concrete for generator pad will be per Submittal Item 3.2
 - 10.4.3 Reinforcement steel for generator pad will be per Submittal Item 3.1
 - 10.4.4 Generator mechanical, electrical, control and monitoring including remote annunciator per the Electrical Technical Specification submittal section.
 - 10.4.5 Anchor bolts for generator set and shroud enclosure

CONTRACTOR SUBMITTALS
01300-7

- 11. Special Construction
 - 11.1 Fiberglass grates over pipe chase
- 12. Mechanical
 - 12.1 Variable Frequency Drive Vertical Multi-Stage Booster Pump Station and Control Panel – *See Technical Specification Section 15380, subsection 1.04 on pages 015380-3 through 015380-6 for the listing of submittal documents to be prepared and forwarded for review.*
 - 12.2 Short duration temporary bypass end suction centrifugal pump
- 13. Electrical
 - 13.1 Electrical Submittal requirements are as contained in the Submittal Section of each Electrical Specification Section.
 - 13.2 Temporary portable trailer mounted generator sets for the long term duration temporary bypass booster pump station

END OF SECTION 01300

CONTRACTOR SUBMITTALS
01300-8

SECTION 01312 - PROJECT MEETINGS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work Included:

1. Required to enable orderly review during pre-design phase and design phase and progress of the Work, and to provide for systematic discussion of installation problems and other construction problems arisen, the Resident Engineer will conduct project meetings throughout the construction period.

1.02 RELATED WORK SPECIFIED ELSEWHERE

1. Documents affecting the work of this Section include, but are not necessarily limited to, General Conditions, Division 1 – General Requirements.
2. The Contractor's relations with his subcontractors and materials suppliers, and discussions relative thereto, are the Contractor's responsibility and normally are not part of project meetings content.

1.03 SUBMITTALS

A. Conform to provisions of Section 01300 – Contractor Submittals.

B. Agenda Items:

1. To the maximum extent practicable, advise the Resident Engineer at least forty-eight (48) hours in advance of project meetings regarding items to be added to the agenda or requesting the cancellation of any Meeting.

C. Minutes:

1. The Resident Engineer will compile minutes of each project meeting and will furnish one copy to the Contractor, Resident Project Representative, and all other involved parties.
2. Recipients of copies may make and distribute such other copies as they wish.

PROJECT MEETINGS

01312-1

1.04 QUALITY ASSURANCE

- A. For those persons designated by the Contractor to attend and participate in project meetings, provide required authority to commit the Contractor to solutions agreed upon in the project meetings.

PART TWO - PRODUCTS (NOT APPLICABLE)

PART THREE - EXECUTION

3.01 MEETING SCHEDULE

- A. Except as noted below for Preconstruction Meeting, progress meetings are to be held every once every two weeks or as otherwise directed by the Resident Engineer.
- B. Coordinate as necessary to establish mutually acceptable schedule for additional meetings.

3.02 MEETING LOCATION

- A. The Resident Engineer will establish the meeting location. To the maximum extent practicable, meetings will be held at the project site.

3.03 PRE- CONSTRUCTION AND CONSTRUCTION MEETINGS

- A. A Pre-Construction and Construction Meetings will be scheduled to be held within five (5) working days after the Notice to Proceed has been issued.
 - 1. Provide attendance by authorized representatives of the Contractor, major subcontractors, utilities and major suppliers.
 - 2. The Resident Engineer will advise other interested parties.
- B. Minimum Agenda: Data will be distributed and discussed on at least the following items.
 - 1. Organizational arrangement of Contractor's forces and personnel, and those of the subcontractors, and materials suppliers.
 - 2. Organizational arrangement of the Owner's forces and personnel and other authorized representatives.

PROJECT MEETINGS
01312-2

3. Channels and procedures for communication.
4. Construction Schedule, including sequence of events and critical work.
5. Contract Documents, including distribution of required copies of original Documents and revisions.
6. Processing of Shop Drawings and other data submitted to the Owner and/or Representative for review.
7. Processing of bulletin, addenda, field decisions, Requests for Information and Change Orders.
8. Rules and regulations governing performance of the Work.
9. Procedures for site security, project quality control, housekeeping, and related matters.
10. It is the responsibility of the Contractor for Site Safety & First Aid; however, it shall be on the agenda.
11. Review submission and review of contractor's monthly payment requests.
12. Emergency Information: The name, addresses, telephone and fax numbers of the Contractor, and Subcontractors, or their representatives, shall be filed with the Owner and/or Representative prior to start of the Work.

3.04 PROJECT MEETINGS

A. Attendance:

1. To the maximum extent practicable, the Project Superintendent and other representatives who have full knowledge of the project and full authority to act for the Contractor shall represent the Contractor at Project Meetings throughout the progress of the Work.
2. Subcontractors, materials suppliers, and others may be invited to attend these Project Meetings in which their aspect of the Work is involved.

PROJECT MEETINGS

01312-3

3. The Contractor may not cancel or be absent from any meeting without advanced approval from the Owner and/or Representative. The Contractor must submit a written request with reason to the Owner and/or Representative twenty-four (24) hours before the scheduled meeting. If approved, the Contractor shall notify all parties of the cancellation.

B. Minimum Agenda:

1. Review progress of the Work since last meeting. Review actual starts and finish dates of activities. Review progress of construction.
2. Review status (total complete and outstanding) of submittal for approval, Request for Information and Change Orders.
3. Identify old and new problems, which impede planned progress, identify responsible party for the follow-up actions. Mutually agree to a common solution and date of correction.
4. Develop corrective measures and procedures to regain lost time on the planned schedule.
5. Review the following weeks work activities.
6. Any project site health and/or accident or safety issues.

3.05 SPECIFIC SITE MEETINGS

- A. Required when necessary to enable orderly review and discussion of site conditions and problems requiring solution during the progress of the contracted work. Notify the Resident Engineer of the need for additional site meetings as early as possible to resolve the problem without any impact to the Project Schedule.
- B. Provide necessary labor, tools, and equipment such as shoring, scaffolding, ladder, etc. to gain access to the specific sites.
- C. The Contractor and it's authorized representative shall be present at all times.

All discussion and follow-up actions shall be recorded by the Resident Engineer, and the minutes shall be distributed at the next meeting or at earliest time

PROJECT MEETINGS
01312-4

END OF SECTION 01312

PROJECT MEETINGS
01312-5

**Gateway County Service Area Water Treatment Plant Improvements
County Project No. 6914GTWTP – THG Project No. 542.116**

SECTION 01505 - MOBILIZATION

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Mobilization shall include preparatory work and operations including, but not limited to the movement of personnel, equipment, supplies and incidentals to the Project site for all other work and operations that are to be performed for the project. Mobilization includes costs incurred before beginning work on various project site items. Mobilization also includes other miscellaneous items which are required to complete the project. Given that physical construction work will not commence until all material, equipment, electrical panels, the generator set, piping and valves and the booster pump station and all other construction components have been delivered to the Contractor's staging area at the end of the construction schedule; several mobilization items will not be eligible for payment until the mobilization items are accomplished near the end of construction. Mobilization shall include the following items:
1. Moving Contractor's and subcontractor's equipment and materials to the Contractor's staging area or from the Contractor's staging area to the project site.
 2. Providing temporary utilities and payment of all associated fees per Technical Specification Section 01520. Technical Specification Section 01520 includes but is not limited to contractor providing temporary power and lighting, construction water, drinking water, fire protection, sanitation facilities including toilets, material disposal containers, communication, contractor parking and similar items.
 3. Arranging and establishing the Contractor's staging area. The Contractor shall establish a separate staging area apart from the Gateway of the Americas Water Treatment Plant. The Contractor shall not be allowed to establish the staging area at the Gateway of the Americas Water Treatment Plant Site. The Contractor shall pay for all staging area costs. Complete all Site Access and Storage requirements in conformance with Technical Condition Section 01550.
 4. Obtaining and paying for permits as required by the Special Conditions. Include all inspection fees by utilities, districts and agencies associated with the permits.

MOBILIZATION
01505-1

5. Posting all OSHA required notices and establishment of safety programs. Preparation and implementation of a Health and Safety Plan.
6. Have Contractor's superintendent at the project site full time when physical construction activities are occurring or during the start-up of water treatment plant facilities.
7. Construct, install and maintain all project signs including the Contractor's identity sign, employee notices and poster sign and the project sign.
8. Costs of Insurance, Payment Bond, Performance Bond, Taxes, Freight and similar expenses.
9. Providing copies of permits and material vendor slips. Providing copies of geotechnical testing reports.
10. Preparation and processing of documents including but not limited to the contract documents, labor compliance documents, payment requests, quantity estimates, request for information forms (RFI's), change orders, construction correspondence and e-mails and similar project documents.
11. Attending project meetings including the Pre-Construction Conference meeting in conformance with Technical Specification Section 01312.
12. Maintaining the project site. Removing and disposing of construction debris and discarded construction materials. Includes cleaning up and demobilizing at the conclusion of the project. Protection of existing facilities in conformance with Technical Specification Section 01530. Complete final project cleanup and Project Closeout items in conformance with Technical Specification Section 01700.
13. Preparation and submission of a construction notification form and dust control plan to the County of Imperial Air Pollution Control District. Compliance with Air Pollution Control District requirements during project construction.
14. Preparation of As-Built Drawings. Providing equipment operation and maintenance manuals. Completion of project close-out documentation.

MOBILIZATION
01505-2

1.02 PAYMENT FOR MOBILIZATION

- A. The Schedule of Values prepared and submitted to the Engineer for review and approval shall assign a value (dollar amount) for each of the fourteen (14) paragraph section 1.01A items. The sum of the fourteen (14) items shall equal the total Mobilization compensation amount listed on the Bid Form. Payment for Mobilization shall be paid to the contractor per the monthly payment request form based on the completion percentage of each of the fourteen (14) items listed in paragraph 1.01A of this Technical Condition Section.

END OF SECTION 01505

MOBILIZATION
01505-3

SECTION 01520 - TEMPORARY FACILITIES

PART 1 - GENERAL

1.01 DESCRIPTION

The Owner shall bear no costs of temporary facilities, unless noted otherwise.

It shall be the Contractor's responsibility to provide equipment that is adequate for the performance of the Work under this Contract within the time specified. All equipment shall be kept in satisfactory operating condition, shall be capable of safely and efficiently performing the required Work and shall be subject to inspection and approval by the Owner's representative at any time within the duration of the Contract. All work hereunder shall conform to the applicable requirements of the OSHA Standards for Construction.

1.02 POWER AND LIGHTING

The Gateway Water Treatment Plant Facility shall provide electric power, as necessary, for the execution of the work, including that required by all subcontractors; except that, the trailer mounted generators required for the long duration temporary bypass pumping system and any required night lighting facilities shall be provided by the Contractor. ~~Contractor shall make the necessary arrangements with utility purveyor to include all permits, applications and fees, and shall bear all costs for these temporary services and shall furnish and install all necessary transformers, metering facilities and distribution centers from branch circuits as may be required.~~

The Contractor shall provide lighting and outlets in temporary structures throughout the Project as may be required for safety, proper performance and inspection of the Work. If operations are performed during hours of darkness, or if natural lighting is deemed insufficient by the Owner, the Contractor shall provide adequate floodlights, clusters and spot illumination. The use of permanently installed lighting fixtures, lamps and tubes for work shall not be permitted except by special permission of the Owner. The Contractor shall make arrangements with Subcontractors for electrical services and lighting as may be necessary in the performance of their work.

1.03 WATER SUPPLY

- A. General: The Contractor shall provide an adequate supply of water of a quality suitable for all domestic and construction purposes. ***Potable construction water shall be furnished by the County of Imperial without charge; however the contractor shall supply all connections, backflow preventors, temporary piping, pumps and all other items necessary to***

TEMPORARY FACILITIES

01520-1

access and convey the water. The Contractor shall comply with all requirements established by the Gateway of the Americas Water Treatment Plant Chief Operator with regard to obtaining water from the Gateway of the Americas Water Treatment Plant. The potable water supply shall be used for the hydrostatic and disinfection pipeline testing, site work and other construction activities.

- B. Drinking Water: All drinking water on the site during construction shall be furnished by the Contractor and shall be bottled water as supplied by Yosemite, Sparkletts or a similar water purveyor (not the Gateway of the Americas Water Treatment Plant). ~~Notices shall be posted conspicuously throughout the site warning the Contractor's personnel that piped water for construction purposes may be contaminated and is not for human consumption.~~
- C. Water Connections: ~~The Contractor shall not make connection to, or draw water from, any fire hydrant or pipeline without first obtaining permission, in writing, of the authority having jurisdiction over the use of said fire hydrant or pipeline and from the agency owning the water system. For each such connection made the Contractor shall first attach to the fire hydrant or pipeline a valve, backflow preventer and a meter, if required by the said authority, of a size and type acceptable to said authority and agency.~~
- D. Removal of Water Connections: Before final acceptance of the Work all temporary water connections and piping installed by the Contractor shall be entirely removed, and all affected improvements shall be restored to their original condition, or better, to the satisfaction of the Owner and to the agency owning the affected utility.
- E. Fire Protection: The Contractor shall provide fire extinguishers and other fire protection equipment to adequately protect new and existing facilities and temporary facilities against damage by fire. Hose connections and hose, water casks, chemical equipment or other sufficient means shall be provided for fighting fires in the new, existing and temporary structures and other portions of the Work and responsible persons shall be designated and instructed in the operation of such fire apparatus so as to prevent or minimize the hazard of fire. The Contractor's fire protection program shall conform to the requirements of the OSHA Standards for Construction. The Contractor shall employ every reasonable means to prevent the hazard of fire.

TEMPORARY FACILITIES

01520-2

1.04 SANITATION

- A. Toilet Facilities: Portable chemical toilet facilities shall be provided wherever needed for the use of employees. Toilets at Site(s) shall conform to the requirements of Subpart “D”, Section 1926.51 of the OSHA Standards for Construction. ***The Owner’s toilet facilities shall not be used by the Contractor or subcontractors. Two (2) toilet facilities shall be positioned at the project site. One (1) toilet facility shall be for men. The other toilet facility shall be for women. The location of the Toilet Facilities shall be determined by the Engineer.*** Toilet facilities shall be relocated as required and be maintained close to daily work activities. The toilet facilities shall be cleaned and serviced on a weekly basis.
- B. ~~Sanitary and Other Organic Wastes: The Contractor shall establish adequate and regular collection of all sanitary and organic wastes. All wastes and refuse from sanitary facilities provided by the Contractor or organic material wastes from any other source related to the Contractor’s operations shall be disposed of in a manner satisfactory to the Owner and in accordance with all laws and regulations pertaining thereto. Contractor may install temporary piping for toilet facilities to discharge into the incoming sewer.~~

1.05 COMMUNICATIONS

- A. Telephone Services: The Contractor shall provide and maintain a phone a phone service at the project site. A cell phone service is acceptable.

1.06 FENCE AND BARRICADES

The Contractor shall provide such protective fences and barricades as deemed necessary for public safety and to protect storage areas and the Work in place. The location and appearance of all fences shall be subject to the approval of the Owner.

1.07 CONTRACTOR PARKING

The Contractor shall not park his equipment, nor allow his personnel to park, in any area except those specifically designated by the Owner.

TEMPORARY FACILITIES

01520-3

1.08 TEMPORARY LIVING QUARTERS

Temporary living quarters shall not be allowed on the Site or on publicly owned properties. In addition, all local zoning codes for the area in question shall be strictly adhered to.

1.09 REMOVAL OF TEMPORARY CONSTRUCTION

The Contractor shall remove temporary office facilities, toilets, storage sheds and other temporary construction materials and equipment from the site as soon as, in Owner's opinion, the progress of Work permits. Contractor shall recondition and restore those portions of the site occupied by the same to a condition equal to or better than it was prior to construction.

END OF SECTION 01520

TEMPORARY FACILITIES
01520-4

SECTION 01530 - PROTECTION OF EXISTING FACILITIES

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The Contractor shall protect all existing utilities, piping and improvements not designated for removal and shall restore damaged or temporarily relocated utilities, piping and improvements to a condition equal to or better than they were prior to such damage or temporary relocation.
- B. The Contractor shall verify the exact locations and depths of all underground piping and utilities shown and not shown and shall make exploratory excavations of all piping and utilities that may interfere with the Work. It shall be the Contractor's responsibility to ascertain the actual location of all existing utilities, piping and other improvements that will be encountered during construction operations and verify that such utilities or other improvements are adequately protected from damage due to such operations.
- C. Maintaining in Service: All pipelines, electrical, power, telephone communication cables, fiber optic cables, gas and water mains shall remain continuously in service during all the operations under the Contract, unless other arrangements satisfactory to the Engineer are made with the Owner or other provisions have been included in the project work to discontinue service during project construction. Where the proper completion of the Work requires the temporary or permanent removal and/or relocation of an existing utility or other improvement the Contractor, after necessary scheduling and approval, shall remove and, without unnecessary delay, temporarily replace or relocate such utility or improvement in a manner satisfactory to the Engineer and the Owner of the facility. In all cases of such temporary removal or relocation, the Work shall be accomplished by the Contractor in a manner that will restore or replace the utility or improvement to a new condition meeting the specification requirements.
- D. All repairs to a damaged utility or improvement are subject to inspection and approval by a Resident Engineer before being concealed by backfill or other work.

PROTECTION OF EXISTING FACILITIES

01530-1

1.02 RIGHTS-OF-WAY

- A. The Contractor shall refrain from commencing work or entering upon the rights-of-way of any oil, gas, sewer or water pipeline; any telephone or electric transmission line; any fence; or any other structure, until notified that the Owner has secured authority to do so. After authority has been obtained, the Contractor shall give the governing utility proper advanced notice of its intention to begin work.

1.03 RESTORATION OF PAVEMENT AND SIDEWALKS

- A. All paved areas and sidewalks not designated for replacement, cut or damaged during construction shall be replaced with similar materials and of equal thickness to match the existing adjacent undisturbed areas unless otherwise noted. All sidewalks, curbs and gutters and pavements which are subject to partial removal shall be neatly saw-cut in straight lines. The sidewalk, curb and gutter and pavement shall be constructed in accordance with the details illustrated on the improvement plans; or, if details are not illustrated on the improvement plans the Standard Details and Plans of the governing agency.

1.04 UNDERGROUND UTILITIES NOT SHOWN OR INDICATED

- A. If the Contractor damages existing utilities, piping or improvements that are not illustrated or the location of which was not made known to the Contractor prior to excavation and the damage was not due to failure of the Contractor to exercise reasonable care the Contractor shall immediately notify the Owner or resident engineer. If directed by the Owner or resident engineer repairs shall be made by the Contractor.

1.05 NOTIFICATION BY THE CONTRACTOR

- A. Prior to any excavation in the vicinity of any existing underground facilities, including water, sewer, storm drain, gas, petroleum products, or other pipelines; all buried electric power, communications, telecommunication and fiber optic cables; all traffic signal and street lighting facilities; and all roadway and state highway rights-of-way, the Contractor shall notify the respective utility purveyors or agencies or owners responsible for such facilities not less than three (3) working days prior to excavation so that a representative is afforded the opportunity to be present during the excavation work.

END OF SECTION 01530

PROTECTION OF EXISTING FACILITIES

01530-2

SECTION 01550 - SITE ACCESS AND STORAGE

PART 1 - GENERAL

1.01 HIGHWAY AND STREET LIMITATIONS TO PROJECT SITE

- A. The Contractor shall make its own investigation of the condition of available public and private roads and of clearances, restrictions, bridge load limits and other limitations affecting transportation and ingress and egress to the Site. It shall be the Contractor's responsibility to construct and maintain any haul roads required for its construction operations or define any alternate routes to the Site due to roadway or bridge restrictions.
- B. Nothing herein shall be construed to entitle the Contractor to the exclusive use of any public street, utility right-of-way or the Site during the performance of the Work hereunder. The Contractor shall conduct its operations so as not to interfere unnecessarily with the authorized work of utility companies, other agencies, or the Owner's plant personnel. No street or access shall be closed without first obtaining permission of the Owner or proper governmental authority. Where excavation is being performed in primary streets or highways one (1) lane in each direction shall be kept open to traffic at all times unless otherwise provided or shown by the Contract Documents. Fire hydrants on or adjacent to the Work shall be kept accessible to fire-fighting equipment at all times. Temporary provisions shall be made by the Contractor to assure the use of sidewalks, access routes and the proper functioning of all gutters, sewer inlets and other drainage facilities.
- C. Traffic Control: For the protection of traffic in public streets and plant operating personnel at the Site, the Contractor shall provide, place and maintain all necessary barricades, traffic cones, warning signs, lights and other approved safety devices. All barricades, traffic cones, warning signs, lights and other approved safety devices shall be placed according to the agency requirements maintaining jurisdiction, as applicable. The Contractor shall take all necessary precautions for the protection of the Work and the safety of the Owner's personnel and the public. All barricades and obstructions shall be illuminated at night.

SITE ACCESS AND STORAGE

01550-1

1.02 CONTRACTOR'S WORK AND STAGING AREA

- A. There is not sufficient area within the Gateway of the Americas water treatment plant site to provide a staging area for the Contractor. The Contractor shall secure a staging area for equipment and material storage at a location separate from the water treatment plant site. The Contractor shall pay for all staging area costs. The mobilization item of the bid form shall include compensation to the Contractor for the staging area. The Contractor shall be solely responsible for the security of its material, tools, supplies, vehicles, equipment, electrical panels, power generator set, new booster pump station, piping, pipe fittings, valves, water meters and similar items at the staging area. If the County of Imperial compensates the Contractor for the cost of items at the staging area and items are stolen or damaged, then the contractor shall be responsible to replace any stolen items or repair any damaged items to the satisfaction of the Owner at the Contractor's expense. The Contractor's general liability insurance policy shall include provisions to replace stolen or damaged equipment.

END OF SECTION 01550

SITE ACCESS AND STORAGE

01550-2

**SECTION 01660 - MECHANICAL EQUIPMENT -
INSTALLATION AND START-UP**

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This section contains general information required for the installation of mechanical equipment as specified within the various individual specifications. The plans and/or performance specifications describe equipment and general layout based on certain commercially available equipment. It shall be the responsibility of the Contractor to ascertain the compatibility of all equipment and utilization of available space based on the Contractor's approved design and/or shop drawings and intent of these Contract Documents.
- B.. Included shall be all supervision, labor, materials, tools, equipment and services as required for the furnishing, installation, testing and operation of equipment including the services of manufacturer service engineers, receiving, unloading, storage, protection, installation and complete erection of all mechanical equipment required in these Contract Documents.
- C. Installation shall include, but not be limited to placing, core drilling, shimming, anchoring, grouting, cleaning, painting, lubricating, assembling, testing and adjusting of all mechanical equipment. Installation shall also include providing all required miscellaneous parts and appurtenances.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 15380 – Variable Frequency Drive Pumping System
- B. Section 263213 – Emergency Power Generator Set

1.03 DESCRIPTION

A. General:

- 1. The Contractor shall be liable for all damage to the equipment which is to be furnished and installed under this Contract, as well as for any damage to the building structures, existing equipment or other property, real or personal, resulting from the movement of

**MECHANICAL EQUIPMENT -
INSTALLATION AND START-UP**

01660-1

equipment or installation work. This liability shall continue until the installed equipment is accepted by the Owner.

2. The Contractor shall cause the equipment to be furnished under this division to be the product of firms regularly engaged in the design and manufacture of the type of item specified, possessing the required technical competence, skill, resources and ability to complete the work specified herein with the requisite degree of quality and in a timely and efficient manner. The Contractor shall be prepared to adequately document the qualification of the manufacturers nominated to provide equipment specified under this division. All documentation shall be submitted to the Owner or representative for review and acceptance prior to design, fabrication and shipment of any component specified herein. Nothing contained within these provisions shall be construed as relieving the Contractor of his responsibility for any portion of the work covered by this division.

B. Arrangement:

1. This arrangement of equipment as described by the specifications is based upon the best information available to the Owner at the time of the preparation of the concept drawings and specifications and is not intended to show exact dimensions peculiar to any specific manufacturer unless otherwise shown or specified. The Conceptual Drawings are, in part, diagrammatic, and, therefore, it is to be expected that the illustrated equipment, if any, be installed be per the Contractor's design and conform adequately to actual equipment installation requirements. The Owner or representative will review all equipment shop drawings, and installations to assure compliance with these requirements. It is to be anticipated that structural supports, equipment pads, foundations, connected piping and valves shown, in part or in whole, may have to be altered in order to accommodate the equipment furnished. ***Equipment pads shall be increased or reduced in size to properly suit the actual equipment. No additional payment will be made for such changes.*** All necessary calculations and drawings shall be submitted to the Owner or representative prior to beginning of the construction phase.

**MECHANICAL EQUIPMENT -
INSTALLATION AND START-UP**
01660-2

1.04 QUALITY ASSURANCE

- A. Equipment and appurtenances shall be designed in conformity with the conceptual documents and performance specifications. Equipment shall be constructed of materials for the conditions of exposure and of such strength to withstand all stress which may occur during testing, installation, all conditions of operation, including start-up, shut-down and power failure.
- B. All equipment shall be installed true and level and to the locations shown on the Plans. All work shall be performed to the satisfaction of the Owner. Precision gauges and levels shall be used in setting all equipment.
- C. The Contractor shall be responsible for installation of the equipment in a manner consistent with the requirements of performance warranties and equipment workmanship of the manufacturer.
- D. Machinery parts shall conform exactly to the dimensions shown on the Shop Drawings. The corresponding parts of identical machines shall be made interchangeable. Clearance shall be provided for repairs, inspection and adjustment.
- E. Exposed surfaces shall be finished in appearance. All exposed welds shall be ground smooth at the corners for personnel protection.
- F. All machinery and equipment shall comply in all respects with the provisions of the Occupational Safety and Health Act of 1970, and other applicable Federal, State and local laws and regulations.
- G. Conformance to Design Criteria and Performance Guarantee.
 - 1. In submitting a bid, the Contractor shall formally acknowledge receipt of and understanding of the design criteria presented in the Conceptual Drawings and Performance Specifications and guarantees that the equipment to be supplied shall be designed and performs in compliance with the design criteria.
 - 2. Contractor shall guarantee all equipment provided under this Contract in accordance with the Contract Documents.

**MECHANICAL EQUIPMENT -
INSTALLATION AND START-UP**
01660-3

1.05 SUBMITTALS AND MISCELLANEOUS REQUIREMENTS

A. General:

1. All mechanical equipment provided under this division shall be submitted for review by the Owner or Representative. The submittal package for each individual equipment or groups of related equipment shall be complete and in accordance with Section 01300, Contractor Submittals.

PART 2 - PRODUCTS

2.01 ANCHORS AND SUPPORTS

- A. The Contractor shall furnish, install and protect all guides, bearing plates, anchor and attachment bolts, and all other appurtenances required for the installation of equipment. Anchors and supports shall be of ample size and strength for the purpose intended and shall be approved by the Owner or Representative.
- B. Anchor bolts shall be furnished and set in concrete foundations where required. All anchor bolts, studs and fasteners shall be Class 316 stainless steel.
- C. Anchor bolts, flange bolts, and other fasteners using nuts and threaded bolts shall have no more than 1 ½ to 2 threads extending beyond the nut when fully tightened.
- D. The Contractor shall obtain and use shop drawings and suitable templates when required for installation of equipment.

2.02 LUBRICATION

- A. The Contractor shall thoroughly lubricate all equipment in accordance with the equipment manufacturer's instructions. Lubricating oils and greases shall be of the type and viscosity recommended by the equipment manufacturer.
- B. All lubricants shall be furnished with flushing oils as recommended by the manufacturer. This includes, but is not limited to, all gearing and bearings, regardless of whether they have been shipped with or without oil soluble protective coatings.

**MECHANICAL EQUIPMENT -
INSTALLATION AND START-UP**
01660-4

- C. Following flushing, oil lubricating systems shall be filled with “run-in” oil as recommended by the equipment manufacturer. The equipment shall be “run-in” at the no load condition for a minimum of two (2) hours. Following “run-in” and inspection, the equipment is to be drained and flushed again with flushing oil and refilled with lubricant as recommended by the manufacturer.
- D. The grease fittings on all mechanical equipment shall be such that they can be serviced with a single type of grease gun. Grease fittings shall be standard zirt type.
- E. Where locally mounted grease fittings would be difficult to service, the fitting shall be extended by adequately sized 316 stainless steel tubing to a point that shall provide accessibility for normal maintenance. Such points shall be located and installed as per the Owner or Representative’s directive.

2.03 PROTECTIVE COATING AND PAINTING

- A. All equipment and materials shall be shop painted. Particular attention shall be directed to wetted surfaces and other areas exposed to corrosive, extreme temperature or other hazardous environments.
- B. Painting shall be in strict accordance with Section 09800 unless otherwise indicated in the detailed equipment specifications. If there is no Section 09800, coating shall be as follows:
 - 1. Ferrous Metals: Exterior Exposure (Non-submerged and non-buried)
 - a. Surface preparation: SSPC-SP 6.
 - b. Product: Devoe:
 - (1) Primer: Bar Rust 231 - 2 coats (3-5 mils DFT)
 - (2) Intermediate: Devran 224 HS (4-5 mils DFT)
 - (3) Finish: Devthane 378H - 1 coat (3-5 mils DFT) or approved equal.
 - c. Color to be selected by the Owner.

**MECHANICAL EQUIPMENT -
INSTALLATION AND START-UP**
01660-5

2. All Piping and Valves that have a factory epoxy coating shall receive a final coating in the field with a product compatible with the existing coating.
 - a. Color to be selected by the Owner.
- C. All machined surfaces and shafting shall be cleaned and protected from corrosion by the proper type and amount of coating necessary to assure a minimum protection for two (2) years after shipment.
- D. Oil lubricated gearing, bearings, and other lubricated components shall be shipped with an oil soluble protective coating as recommended by the manufacturer. The coating shall be selected to provide protection for two (2) years.
- E. Motors, reducers and electric controls shall have the standard factory finish prior to delivery except where specific exception is noted in the individual equipment specifications.
- F. Provide two (2) gallons of paint compatible with the equipment finish coat for field touch-up and provide blend numbers for primer coat and finish coat paints.

2.04 COUPLINGS

- A. Unless otherwise specified, mechanical equipment with a driver greater than $\frac{1}{2}$ horsepower, and where the input shaft of a driven unit is directly connected to the output shaft of the drive, shall have its two shafts connected by a flexible coupling which can accommodate angular misalignment, parallel misalignment and end float, and which cushions shock loads and dampens torsional vibrations. The flexible member shall consist of a tire with synthetic tension members bonded together in rubber. The flexible member shall be attached to flanges by means of clamping rings and cap screws, and the flanges shall be attached to the sub shaft by means of taperlock bushings which shall give the equivalent of a shrunk-on fit. There shall be no metal-to-metal contact between the driver and the driven unit.
- B. Coupling sizes shall be as recommended by the manufacturer for the specific application, considering horsepower, speed of rotation, and type of service, and shall be installed as recommended by the manufacturer.

**MECHANICAL EQUIPMENT -
INSTALLATION AND START-UP**
01660-6

2.05 GUARDS

- A. All exposed moving parts shall be provided with guards in accordance with the requirements of CAL/OSHA. Guards shall be fabricated of 14 gage steel, ½-13-15 expanded metal screen to provide visual inspection of moving parts without removal of the guard. Guards shall be galvanized after fabrication and shall be designed to be readily removable to facilitate maintenance of moving parts. Reinforced holes shall be provided.

2.06 NAMEPLATES

- A. A nameplate shall be provided on all items of equipment and shall contain approved equipment name or abbreviation and equipment number. Equipment nameplates shall be engraved or stamped on stainless steel and fastened to the equipment in an accessible location with No. 4 or larger oval head stainless steel screws or drive pins. Nameplates for motor-driven equipment shall include capacity, head, horsepower, bearing data, model number and serial number of pump, blower, compressor and motor. The main sewage pump nameplates shall also include the impeller diameter.

2.07 TOOLS AND ACCESSORIES

- A. The Contractor shall supply one (1) complete set of any special wrenches or other special tools necessary for the assembly, adjustment, and dismantling of the equipment. Special tools shall include any type of tool that has been specifically made for use on an item of equipment for assembly, disassembly, repair, and maintenance or is not available in current Snap-On Catalogue or Proto Professional Tools Full-Line Catalogue. When special tools are provided, they shall be marked or tagged, and a list of such tools shall be included with the maintenance and operation manuals describing the use of each marked tool. All wrenches and spanners shall be of best quality, hardened steel forgings with bright, finished heads and with work faces dressed to fit nuts. Each set of tools shall be neatly mounted in a toolbox of suitable design provided with a hinged cover.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. The Contractor shall cause each item of equipment provided as a part of the Contract Documents to be installed, aligned and tested by skilled

**MECHANICAL EQUIPMENT -
INSTALLATION AND START-UP**

01660-7

workmen to the tolerances recommended by the equipment manufacturer. In addition, the equipment shall be installed, aligned and tested under the direction of installation engineers who have been factory trained by the equipment manufacturer. Upon completion of the Work and as a condition precedent to final acceptance, the Contractor shall furnish written certification from each equipment manufacturer that each item has been installed, aligned and tested correctly and that the installation meets all the manufacturer's requirements for efficient, trouble-free operation. This provision, however, shall not be construed as relieving the Contractor of his overall responsibility for the Work.

3.02 NOISE REQUIREMENTS

- A. All equipment specified shall be tested for noise generation after installation. When tested, equipment shall include the complete driver and driven equipment. Three (3) certified copies of the test shall be submitted to the Owner for approval prior to final acceptance.

3.03 SHOP INSPECTION AND SHOP TESTING

- A. The Owner shall be granted reasonable access to the production and shop test areas of the equipment manufacturer's facility during manufacturing and testing.
- B. The Contractor shall notify the Owner in writing, at least ten (10) working days prior to commencement of shop tests, of the time and place of all shop tests.
- C. Inspection by the Owner will not relieve the Contractor of his responsibility for workmanship, materials and Conceptual Drawings and Specification requirements.
- D. Manufacturer's standard test procedures shall be required and the manufacturer shall demonstrate that equipment meets all the requirements of these Conceptual Drawings and Specifications.

3.04 SHIPPING AND IDENTIFICATION

- A. All shipments shall be "tagged" by the Contractor with "wired-on" metal or plastic tag clearly stenciled or lettered with paint or waterproof ink. The information on the tags and cartons shall include Contractor's order number, purchase order number, manufacturer's number, and equipment

**MECHANICAL EQUIPMENT -
INSTALLATION AND START-UP**

01660-8

number. Any expense incurred by the Owner due to the Contractor's failure to do so will be backcharged or deducted from his Contract.

- B. Each piece of equipment shall be provided with a substantial stainless steel nameplate, securely fastened in a conspicuous location and clearly inscribed with the manufacturer's name, year of manufacturer, serial number, principal rating data and equipment item number.
- C. The equipment covered in these Specifications shall be fabricated in the minimum number of sub-assemblies necessary for transportation. Small components or assemblies shall be adequately boxed or crated to prevent damage during shipment.
- D. Each assembly or package shall be identified with a durable shipping tag securely attached and plainly marked with the Contractor's order number, manufacturer's purchase order number and equipment number.
- E. All openings shall be covered with plywood, plastic or wood plugs or shields to prevent debris from entering the assemblies. Each assembly or sub-assembly shall have lifting lugs to facilitate erection and subsequent removal when necessary.

3.05 OPERATION AND MAINTENANCE MANUALS

- A. Operation and Maintenance manuals shall be furnished in accordance with Section 01730.

3.06 OPERATION AND MAINTENANCE INSTRUCTION

- A. The Contractor shall provide instruction time in accordance with the detailed equipment specifications, after the equipment has been accepted by the Owner. The time shall be used to instruct the Owner's personnel in the proper operation and maintenance of the equipment. The manufacturer shall provide technical personnel familiar with the operation and maintenance of the equipment in making this presentation.
- B. Training shall consist of on-site operation training, classroom training, operational, safety and emergency drills.

3.07 INSTALLATION OF EQUIPMENT

- A. The Contractor's work procedure shall conform to the manufacturer's installation instructions unless expressly directed otherwise by the Owner.

**MECHANICAL EQUIPMENT -
INSTALLATION AND START-UP**
01660-9

- B. Equipment shall be erected level and plumb on the existing foundations and supports at the locations and elevations shown on the Plans, unless otherwise directed, in writing, by the Owner and Resident Engineer during installation. Any additional pads, plates and other appurtenances necessary for the installation shall be provided by the Contractor.
- C. The equipment shall be brought to proper level with leveling nuts. After the machine has been leveled and aligned, the nuts on the anchor bolts shall be tightened to anchor the machine firmly into place against the leveling nuts.
- D. Equipment secured to existing concrete pads or floors shall be shimmed, if necessary, to attain a level installation. Grout shall be placed beneath the machine base plates or skids in the areas of the shims beneath the full area of the base plate or skid for stability purposes to insure the equipment maintains a level position in accordance with Technical Specification Section 03315.
- E. The grout shall be installed in accordance with Technical Specification Section 03315.
- F. All equipment shall be installed in such a manner as to provide access for routine maintenance and lubrication as specified in Section 2.02 of this specification.
- G. Equipment of a portable nature which requires no installation shall be delivered to a location designated by the Owner.

3.08 MECHANICAL START-UP

- A. Once the equipment has been installed, complete with all auxiliary and support systems, and is ready for operation, the Contractor shall mechanically check out the equipment to verify that the equipment functions correctly under “non-process” conditions. The equipment shall be fine-tuned, adjusted, water tested, where applicable, and completely checked out before the equipment and support systems are considered ready for process start-up.
- B. The Contractor will be responsible for coordinating this effort and providing all support services and facilities necessary for this work effort.
- C. The equipment will not be considered ready for process start-up until the Resident Engineer is satisfied that the equipment has been satisfactorily checked out and successfully passed leakage and non-process test runs and

**MECHANICAL EQUIPMENT -
INSTALLATION AND START-UP**

01660-10

appropriate training has been completed per the detailed equipment specifications.

3.09 FIELD SERVICE

It is understood that the Contractor and manufacturer share a joint responsibility in this Work. The Contractor shall provide the Manufacturer's qualified field representative and supporting personnel as required for the equipment furnished and installed under this Contract to perform the following:

- A. Assistance during equipment installation shall be provided to align the equipment or check the alignment of pre-aligned equipment prior to making connections to or anchoring of the equipment.
- B. Inspection during equipment installation work shall be provided to determine compliance with equipment erection methods and procedures recommended by the manufacturer.
- C. Conduct the process start-up necessary to operate, adjust, calibrate and tune the equipment and systems into operating service in accordance with the design criteria described in each detailed equipment specification.
- D. Conduct performance tests to demonstrate compliance with design criteria and performance guarantee set forth in the Specifications.

3.10 PROCESS START-UP

- A. Once the equipment has been considered ready for process start-up and the support system can deliver the process material, the Contractor shall start up the equipment under process conditions and conduct performance tests to verify compliance with the Specifications. The Contractor shall give the Resident Engineer forty-eight (48) hours written notice of his intent to start up equipment under process conditions and conduct performance testing.
- B. The Contractor shall provide the necessary supervision and technical personnel and services required to perform the work. The Resident Engineer shall coordinate this phase of the work with the Contractor and provide all necessary support services and facilities to assist the Contractor in performing the work.

**MECHANICAL EQUIPMENT -
INSTALLATION AND START-UP**

01660-11

- C. The equipment shall be considered ready for a performance test only after the Contractor has demonstrated to the Resident Engineer that the equipment can operate continuously, without mechanical interruption under the process flow conditions for up to three (3) days, or such time as may be mutually agreeable to the Resident Engineer and Contractor.
- D. After it has been determined that the equipment will operate satisfactorily under process conditions, the performance test shall be made by the Contractor to verify that the equipment can meet the requirements outlined in the Specifications. The performance test shall be based on maintaining the design requirements for a time period mutually agreeable to the Resident Engineer and the Contractor, or such period as is stipulated in the General Provisions.

3.11 OWNER FURNISHED EQUIPMENT

- A. The Contractor shall notify the Resident Engineer when Owner furnished equipment is completely installed in accordance with the Owner furnished manufacturer's instruction and requirements of the Contract Documents and ready for operation testing. The Resident Engineer will schedule the manufacturer's representative to visit the site of the Work and inspect, check or adjust if necessary and approve the equipment installation. If the manufacturer's representative cannot complete the testing and startup services due to the Contractor's negligence in installing the equipment, the Contractor shall be responsible for the costs of the service representatives' revisit to the site of the Work.

3.12 PERFORMANCE TESTS

- A. Performance test procedures shall be prepared by the Contractor and approved (in writing) by the Resident Engineer a minimum of fourteen (14) days before performance tests are conducted.
- B. Costs of all inspections, field service, mechanical start-up, run-in work, process start-up and performance tests shall be borne by the Contractor and shall be included in the total price bid for the Work.
- C. The Contractor shall also agree to repay the Owner installation costs for any rejected equipment. The installation costs will be derived by the Resident Engineer based on actual costs charged for the installation of the equipment.

**MECHANICAL EQUIPMENT -
INSTALLATION AND START-UP**
01660-12

3.13 ACCEPTANCE OF EQUIPMENT BY THE OWNER

After all the conditions of the Performance Specifications have been satisfied, the Resident Engineer will designate in writing that the equipment is accepted, and at such time the Owner will be responsible for all further maintenance and operation of same. The warranty period for all equipment shall start on the date of final acceptance by the Resident Engineer and the Owner.

END OF SECTION 01660

**MECHANICAL EQUIPMENT -
INSTALLATION AND START-UP**
01660-13

SECTION 01700 - PROJECT CLOSEOUT

PART 1 - GENERAL

1.01 FINAL CLEANUP

- A. The Contractor shall promptly remove from the vicinity of the completed work, all rubbish, unused materials, concrete forms, construction equipment and temporary structures and facilities used during construction. Final acceptance of the Work by the Owner will be withheld until the Contractor has satisfactorily complied with the requirements for final cleanup of the site.

1.02 FINAL SUBMITTALS

- A. The Contractor, prior to requesting final payment shall obtain and submit the following items to the Owner's representative for transmittal to the Owner:
1. Written guarantees, where required.
 2. Operating manuals, technical manuals and instructions. The Contractor's attention is directed to the condition that one percent (1%) of the contract price will be deducted from any monies due the Contractor as progress payments if at the seventy-five percent (75%) construction completion point the approved technical manuals have not been submitted in accordance with Section 01300 – Contractor Submittals. The aforementioned amount will be retained by the Owner as the agreed estimated value of the approved technical manuals. Any such retention of money for failure to submit the approved technical manuals on or before the seventy-five percent (75%) construction completion point shall be in addition to the retention of any payments due to the Contractor.
 3. Manufacturers representatives' installation, testing and startup report.
 4. Keying.
 5. Maintenance stock items, spare parts and special tools.
 6. Completed As-Builts, as approved by the Resident Engineer.

PROJECT CLOSEOUT
01700-1

7. Certificates of inspection and acceptance by local governing agencies having jurisdiction.
8. Releases from all parties who are entitled to claims against the subject project, property or improvement pursuant to the provisions of law.
9. Extension of Performance Bond in accordance with the Standard General Conditions, if applicable.

1.05 MAINTENANCE AND GUARANTEE

- A. The Contractor shall provide a bond to comply with the General Conditions guarantee requirements, if applicable.
- B. The Contractor shall make all repairs and replacements promptly upon receipt of written order from the Owner. If the Contractor fails to make such repairs or replacements promptly the Owner reserves the right to do the Work and the Contractor and his surety shall be liable to the Owner for the cost thereof. Replacement of native material or aggregate fill, backfill or resurfacing where it has settled below the required finish elevations shall be considered as part of such required repair work.

END OF SECTION 01700

PROJECT CLOSEOUT
01700-2

SECTION 01730 - OPERATION AND MAINTENANCE MANUALS

PART 1 - GENERAL

1.01 DESCRIPTION

The Contractor shall furnish to the Owner's representative four (4) identical sets of operation, maintenance and technical manuals. Also to be provided are four (4) electronic pdf thumb drives containing the operation, maintenance and technical manuals. The operation, maintenance and technical manuals shall be forwarded to the Resident Engineer for distribution. The Contractor shall include in the manuals for each item of mechanical, electrical and instrumentation equipment the following:

1. Complete operating instructions, including recommended troubleshooting and start-up procedures; tabulation of proper settings for all pressure relief valves, pressure switches and other related equipment protection devices; detailed test procedures to determine performance efficiency of equipment; list of all electrical relay settings including alarm and contact settings.
2. Preventive maintenance procedures and schedules, including required lubricants, filters, adjustments and special tools.
3. Parts lists, by generic title and identification number, complete with exploded views of each assembly. Spare parts information shall be included for each mechanical, electrical and instrumentation equipment. The spare parts list shall include the current list price of each spare part. The spare parts list shall be limited to those spare parts which each manufacturer recommends be maintained by the Owner in inventory at the plant site. Each manufacturer or supplier shall indicate the name, address and telephone number of its nearest outlet for spare parts to facilitate the Owner in ordering.
4. Disassembly and reassembly instructions, including required special tools.
5. Record drawings including diagrams and schematics as required under the electrical and instrumentation portions of these specifications.

OPERATION AND MAINTENANCE MANUALS

01730-1

1.02 OPERATIONS AND MAINTENANCE MANUALS

A. General:

1. The “Operating and Maintenance Manual” is a bound compilation of drawings and data required for each project. These manuals, complete with drawings and data, shall be furnished to the Owner.
2. The Contractor has overall responsibility to obtain the necessary data from and compile the data as set forth in this specification, including items or equipment purchased by the Owner and delivered to the Contractor for installation.
3. The number of binders (or “volumes”) required for each individual project will depend on the amount of information to be catalogued.
4. All information included shall be legible and sufficiently marked to indicate the exact size, model, type, etc., of equipment furnished and installed.

B. Purpose: The Operating and Maintenance Manual is prepared to provide a ready reference to all important mechanical, electrical and instrumental equipment components installed at the project. It is also to provide the necessary operating and maintenance data for use by service personnel. It is also to provide information required for checking equipment performance or for planning plant expansion or redesign.

C. Quantity and Preparation (Submit through Resident Engineer):

1. Operation and Maintenance Manual hard and electronic copy sets shall be distributed as follows:
 - A. One (1) set forwarded to the Water Treatment Plant Operators. O & M manuals to be kept at the Gateway of the Americas Water Treatment Plant.
 - B. One (1) set forwarded to the Water Treatment Plant Operator Consultant home office.
 - C. One (1) set forwarded to the Owner (County of Imperial Department of Public Works).
 - D. One (1) set forwarded to the Design Engineer (The Holt Group, Inc.).

OPERATION AND MAINTENANCE MANUALS

01730-2

2. The quantities of drawings, manufacturer's literature, or other data required for these manuals are in addition to those otherwise required for normal distribution for approval during the construction period.

PART 2 - MATERIALS AND METHODS

2.01 PAGE SIZE

- A. All pages shall be standard 8-½ x 11 inches size or approximate multiples (preferably 11 x 17 inches) folded to 8-½ x 11-inch manila pockets, which shall have standard three-ring side punching for insertion in the binders. The equipment name, drawing description and number shall be written on the face of each manila pocket.

2.02 DRAWINGS

- A. All drawings larger than 8-½ x 11" shall be folded and inserted in individual 8-½" x 11" manila pockets, which shall have standard three-ring side punching for insertion in the binders. The equipment name, drawing description and number shall be written on the face of each manila pocket.

2.03 BINDERS

- A. Binders shall be Buckram binders with block lettering for sheet size 8-½ x 11 inches with 2" to 3-½" expandable metal capacity as required for the project. The number of binders, however, shall be based on not filling them beyond 4".
- B. The following information shall appear on the front cover and backbone:
 1. "Operation and Maintenance Manual"
 2. Project Name (Gateway to the Americas Water Treatment Plant Improvement Project) and volume number if more than one volume
 3. Owner's name; Imperial County Department of Public Works (ICDPW).
 4. Owner's Design Engineer; The Holt Group, Inc.
 5. General Contractor's name (need not be printed on the backbone)

OPERATION AND MAINTENANCE MANUALS

01730-3

2.04 CONTENTS AND INDEXING

- A. Manuals shall contain descriptions of the plant systems in sufficient detail to adequately indicate the type of systems installed and the basic details of their operation.
- B. All purchased equipment data shall be used to designate the sections. Within each section additional indexing of component parts may be required.
- C. Operation and Maintenance Manuals shall contain to the fullest extent all possible information pertinent to the equipment. The arrangement and type of information to be filed shall be as follows:
 - 1. Copy of purchase order change (if any).
 - 2. Outline drawings, special construction details, “as built” electrical wiring and control diagrams for all major and supplementary systems.
 - 3. Manufacturer’s test or calculated performance data and certified test curves.
 - 4. Installation, operating and maintenance instructions, including a complete parts list and sectional drawing with parts identification numbers. Mark with model, size and plan number.
 - 5. Manufacturer’s brochure marked to indicate exact equipment purchased. Brochures on component parts supplied by a manufacturer with his equipment, but not manufactured directly by him, shall also be included.
 - 6. The serial numbers of each item of equipment installed are to be listed with the model numbers and plan symbols.
 - 7. Written warranties.
 - 8. Include a Table of Contents. The contents shall be divided with tabbed index dividers into the following suggested parts:

Part I Treatment Plant and System Descriptions

Part II Purchased Equipment Data

Part III Test Reports and Valve Charts

OPERATION AND MAINTENANCE MANUALS

01730-4

Part IV Start-Up and Operation

Part V Preventative Maintenance Recommendations

9. A copy of the approved submittals for each piece of equipment.
10. A copy of all testing, adjusting and balancing reports.
11. Wiring diagrams marked with model and size and plan symbol.
12. Operating and Maintenance Manuals data for Part I shall be obtained directly from the mechanical and electrical consultants.
13. The index shall contain the name and address of the manufacturer and, if different, where replacement and repair parts may be obtained.

2.05 EQUIPMENT SUMMARY DATA FORMS INFORMATION SHEET

Equipment Summary Data Forms are intended to provide the Maintenance Department with sufficient information to catalogue newly purchased equipment items installed at the project site. This information is used for inventory purposes as well as for equipment performance tracking purposes. Each item of equipment installed at the facility must be documented on Equipment Summary Data Form. Examples of the form are herein. Additional requirements regarding submittal format, quantities, etc, are found elsewhere in this Specification.

1. Equipment item (included industry-accepted nomenclature).
2. Manufacturer address, phone/fax numbers
3. Supplier address (if different than above), phone/fax numbers
4. Equipment serial and model numbers
5. Size
6. Capacity
7. Rated output
8. Drive motor data (as appropriate).

OPERATION AND MAINTENANCE MANUALS

01730-5

In addition, information specific to the item described shall be provided as indicated on the following form.

OPERATION AND MAINTENANCE MANUALS

01730-6

**Gateway County Service Area Water Treatment Plant Improvements
County Project No. 6914GTWTP – THG Project No. 542.116**

**EQUIPMENT SUMMARY
DATA FORM**

EQUIPMENT ITEM: _____

EQUIPMENT COST: _____

EQUIPMENT SUPPLIER: _____

COMPONENT INFORMATION:	
NAMEPLATE DATE:	MANUFACTURER:
EQUIPMENT MODEL NO.:	EQUIPMENT SERIAL NO.:
EQUIPMENT MODEL DESIGNATION:	TYPE:
SIZE:	RATED OUTPUT:
CAPACITY:	SERVICE:
COMPONENT INFORMATION: DRIVE MOTOR DATA	
MANUFACTURER:	
SERIAL NO.:	HORSEPOWER:
MODEL:	FRAME:
TYPE:	VOLTAGE:
ENCLOSURE:	AMPERAGE:
PHASE: HERTZ:	SERVICE FACTOR:
LUBRICATION REQUIREMENTS: MOTOR	
COMMENTS:	

2.06 INFORMATION SHEET FOR EQUIPMENT MAINTENANCE SUMMARY FORMS

Equipment Maintenance Summary forms are intended to provide the Maintenance Division with information sufficient to properly diagnose (troubleshoot, repair, check-out, and return an item of equipment to service. Standard information contained in each Form shall be as follows:

In addition, Maintenance information required to troubleshoot, repair, and return electrical/electronic equipment to service (including set point, derivatives, etc.) shall be included as required. The Maintenance Summary Form attached is intended to serve as a (minimum) guide to the information required per item of equipment. Additional requirements regarding submittal format, quantities, etc. are found elsewhere in this Specification.

1. Equipment item (include industry-accepted nomenclature)
2. Manufacturer address, phone/fax numbers
3. Equipment serial number(s)
4. Weight of individual components (over 100 pounds)
5. Nameplate data (including voltage, horsepower, lubrication requirements, speed, etc.)
6. Manufacturer's local representative address, phone/fax numbers
7. Maintenance operation(s) required. Listing shall include (1) Maintenance Operation to be performed. (2) Frequency of said Maintenance Operation based on actual service conditions of installed equipment (i.e., type of duty, environmental factors). Reference shall be made to the appropriate section of the manufacturer's technical literature.
8. Lubricant list. List shall include a primary and two secondary manufacturer-approved lubricants.
9. Spare parts required for a minimum of one (1) year of equipment operation based on anticipated actual service conditions. Also the name, address, and phone number of the recommended source of spare parts shall be included if different than manufacturer's representative.

TYPICAL MAINTENANCE SUMMARY FORM

OPERATION AND MAINTENANCE MANUALS

01730-8

NOTE: SUPPLEMENTARY INFORMATION SHALL BE INCLUDED AS APPROPRIATE

1. EQUIPMENT ITEM: _____
2. MANUFACTURER: _____
 ADDRESS: _____
 TELEPHONE NO.: _____ FAX NO.: _____
3. EQUIPMENT SERIAL/IDENTIFICATION NUMBERS: _____
4. WEIGHT OF INDIVIDUAL COMPONENTS (OVER 100 POUNDS): _____
5. NAMEPLATE DATA: _____
6. MANUFACTURER'S LOCAL REPRESENTATIVE: _____
 ADDRESS: _____
 TELEPHONE NO.: _____
 FAX NO.: _____
7. MAINTENANCE OPERATION(S) REQUIRED: (attach separate sheet if required).

<u>OPERATION</u>	<u>FREQUENCY</u>	<u>COMMENTS</u>

8. LUBRICANT LIST. Provide Reference symbol used in items recommended.

SHELL	STANDARD OIL	GULF	ARCO	EQUAL

OPERATION AND MAINTENANCE MANUALS

01730-9

9. RECOMMENDED SPARE PARTS LISTS FOR MINIMUM OF ONE (1) YEAR UNINTERRUPTED SERVICE. (Attach separate sheet if required).

ITEM	PART NO.	QUANTITY REQUIRED (per unit)	UNIT COST	COMMENTS

END OF SECTION 01730

SECTION 01783 - AS-BUILTS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. As-Builts are full size drawings (Plans) and Record Project Manual which are marked up during construction to delineate the actual in-place constructed conditions. As-Builts shall be provided by the Contractor for this Project. Requirements for As-Builts, as specified elsewhere, shall supplement the requirements specified herein.
- B. As-Builts shall include all changes in the Plans including those issued as Change Orders, Plan Clarifications, Addenda, Notice to Bidders, responses to Requests for Information, Project Site Memos, and any additional details needed for the construction of the Project but not shown on the Plans. Any substructures encountered while excavating that are left in place shall be located by survey, to the satisfaction of the Owner, shown, and identified on the As-Builts. All substructures including, but not limited to, concrete structures, electrical conduit and duct banks, drains and sanitary sewer pipelines, process piping, water lines, etc, whose installed location differs from that shown on the original Plans shall be precisely located by survey to the satisfaction of the Owner and recorded on the As-Builts before backfilling.
- C. As-Builts shall be marked with red ink or chemical fluid on one (1) set of full size prints to produce a record of the complete installation. Any additional drawings that may be required to indicate record conditions shall be prepared on 24" x 36" paper. All additions to the plans shall employ and use drafting standards which are consistent with the drafting standards used in the Contract.
- D. The As-Builts, including those of all Subcontractors, shall be kept by the Contractor in the Contractor's project site office, shall be updated during construction, and shall be available for the Owner's inspection and copying. The Resident Engineer will review the As-Builts prior to submittal of all Monthly Payment Requests. If, in the opinion of the Resident Engineer, the As-Builts are not current, approval of the Monthly Payment may be withheld until the drawings are made current. In addition, the Contractor shall submit a signed certification with each Monthly Payment Request stating that all As-Builts are complete and accurate as of the date of the payment request.

AS-BUILTS
01783-1

- E. Where the Plans are diagrammatic or lacking precise details, the Contractor shall produce dimensioned full size sheets as the As-Builts. For installations outside of structures, the locations shall be given by coordinates and elevations. Where substructures are encased in concrete, the outside dimensions of the encasement shall also be given.
- F. In the case of those Drawings which depict the detail requirements for equipment to be assembled and wired in the factory, the As-Builts shall be updated by indicating those portions which are superseded by final Shop Drawings and by including appropriate reference information describing the Shop Drawings by manufacturer, drawing and revision numbers.
- G. At the Completion of the Work and after Final Inspection, the Contractor shall copy As-Built data, using red ink, onto a new set of Plans provided by the Engineer. The Contractor shall certify to the completeness and accuracy of the "as installed" information indicated on the new set of Plans with its signature. The Contractor shall then deliver as a submittal to the Engineer, for review and approval, both the field developed As-Built Plans and the final signed As-Built Plans as a condition precedent to the Owner's release of any retained funds.

END OF SECTION 01783

AS-BUILTS
01783-2

SECTION 02050 - DEMOLITION AND SALVAGE

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The Contractor shall provide demolition and removal of existing items such as structural materials, piping, fencing, electrical panels, electrical circuitry, electrical gear, pumps, concrete, equipment, structures and similar items in accordance with the requirements of the Contract Documents. The Contractor shall conduct demolition operations so that existing facilities to remain and new work to be completed will not be damaged or disturbed. *The contractor shall include all costs for the removal and disposal of demolition items in the contractors demolition costs and the proposal submitted for this project.*
- B. It is vital that the existing treatment plant system remain in operation at all times. Any proposed shut-down of any one of the systems facilities shall be coordinated and approved by the Resident Engineer and Water Treatment Plant Chief Operator.
- C. If during demolition operations the Contractor becomes aware of any asbestos, hazardous waste or toxic material at the Site to which the Contractor or any subcontractor, supplier or Owner's personnel may be exposed, the Contractor shall follow procedures as required by California State Law and as required by the Division of Occupational Safety and Health. *P.C.C. concrete to be demolished is to be tested for asbestos content by a laboratory approved by the National Voluntary Laboratory Accreditation Program. The contractor shall bear the expense of the laboratory testing. Concrete which is free of asbestos shall be allowed to be demolished. Concrete which contains asbestos shall be demolished by a Division of Occupational Safety and Health Certified Asbestos Demolition Contractor. Concrete which is asbestos free shall be removed and disposed of by the contractor. Concrete which contains asbestos shall be removed and disposed of by a Division of Occupational Safety and Health Certified Demolition Contractor.*
- D. The Contractor shall repair or replace, without cost to the Owner and to the satisfaction of the Resident Engineer, existing facilities disturbed or damaged during demolition and removal operations.
- E. Upon removal of demolition items, the Contractor shall legally dispose of demolished items not to be salvaged. The Contractor shall be responsible to pay for all costs relative to the disposal of demolition items. Demolished items not to be salvaged shall be removed from the Site

DEMOLITION AND SALVAGE

02050-1

within two (2) calendar days of demolition activity completion. The plans indicate what demolition items are to be removed and disposed of by the contractor and what items are to remain the property of the owner (ICDPW). Demolition items to remain the property of the owner (ICDPW) are to be relocated to an owner designated location by the contractor. The cost of removal and relocation of owners retained items shall be included in the contractors proposal. No demolished items shall be sold while on the Owner's property.

- F. ***The Contractor shall patch and seal openings and holes left as a result of removal and demolition work to match the existing surrounding structure in accordance with the improvement plans and this specification.*** Openings in concrete shall be patched with a non-shrink grout and if necessary grouted openings in floors shall be supported in a manner approved by the Resident Engineer. Large openings shall be supported by ¾-inch minimum treated plywood bolted to the structure underneath the opening prior to the placement of the non-shrink grout. ***Openings in the building metal siding for pipeline removal and installation shall be repaired by placing new metal siding over the removed pipe openings on both the interior and exterior walls. If a new pipeline or replacement pipeline is placed through the building metal siding wall then segments of metal siding shall be placed around the pipe and caulking shall be placed between the metal siding segments and pipe to create a seal tight condition around the pipe circumference.***

The masonry walls through which existing pipelines are removed and new pipelines are installed shall be repaired by placing formwork over the exterior and interior walls and installing concrete within the complete interior volume of the formwork. The pipelines shall be installed through the formwork in a seal-tight manner prior to the installation of the concrete. Link seal shall be placed around the circumference of the pipeline prior to concrete installation.

- G. Existing concrete structures exhibiting spalls or holes not related to previously installed mechanical equipment shall be patched with a non-shrink grout.

END OF SECTION 02050

DEMOLITION AND SALVAGE
02050-2

SECTION 02200 - EARTHWORK

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The Work of this Section includes all earthwork required for construction of the Work. Earthwork shall include, but not be limited to the loosening, removing, loading, transporting, depositing and compacting in its final location of all materials wet and dry, as required for the purposes of completing the work specified in the Contract Documents which shall include, but not be limited to: P.C.C. concrete and underlying material to a subbase design grade, the installation of subbase material to a subbase grade beneath concrete infrastructure, the excavation of pipeline trenches, the installation of backfill material within pipeline trenches, excavations for above-grade and below-grade structures, backfill requirements for material to be placed beneath above-grade and below-grade structures, backfill requirements for the areas surrounding above-grade and below-grade structures, backfilling of depressed areas resultant from demolition, the disposal of excess excavated materials, borrow of materials to make up deficiencies for fills; scarifying and compacting native subbase material, and all other incidental earthwork, all in accordance with the requirements of the Contract Documents.

Principal project work items included in this section are:

1. Scarification and compaction of native subbase material beneath parking lot, electrical panels/facilities and long duration temporary bypass pumping system pcc slabs/pad areas and the emergency power generator set foundation and emergency power generator set pads.
2. Establishment of subbase grade, subgrade or finish grade for parking lot, electrical panels/facilities, and long duration temporary bypass pumping system pcc slabs/pads and the emergency power generator set foundation and pads. Involves cutting or filling native areas to subbase design grade and installing granular sand or class 2 base to subgrade design grade. Involves compacting granular sand and class 2 base.
3. Placement of native backing/transition material from generator set pcc foundation, pcc parking and electrical panel/ facility slabs, and the long duration temporary bypass pumping system slab. Install class 2 base transitions or support shoulders from the pcc slab edges to existing native earth grade.

EARTHWORK
02200-1

4. Construction, excavation and backfilling of native earth temporary percolation pond. Backfill the temporary percolation pond with compacted native earth lifts after pipeline demolition and installation bypass pumping activities are complete. After placing compacted native earth backfill, grade the backfilled surface level with the surrounding earth grade.
5. Final site grading including watering, compacting and blading off the native earth project site disturbed by construction activities, including roadways at the conclusion of the project.
6. ***This Technical Specifications is comprehensive and covers a full range of earthwork considerations and requirements. The technical sections most applicable to this project are Sections 1.04A, 1.05A, 1.11, 2.01.A.1, 2.01A.4, 3.08, 3.09 and 3.10.***

1.02 REFERENCE STANDARDS

ASTM C 131	Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM D 75	Practice for Sampling Aggregates
ASTM D 422	Method for Particle-Size Analysis of Soils
ASTM D 698	Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5-lb (2.49-kg) Rammer and 12-in (304.8-mm) Drop
ASTM D 1556	Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D 1557	Test Method for Moisture-Density Relations of Soils Using Rammer and Drop
ASTM D 2419	Test method for Sand Equivalent Values of Soil and Fine Aggregate
ASTM D 2487	Classification of Soils for Engineering Purposes
ASTM D 2922	Test Method for Density of Soil in Places by Nuclear Methods (Shallow Depth)

EARTHWORK
02200-2

ASTM D 3017	Test method for Water Content of Soil and Rock in Place by Nuclear Methods
ASTM D 4253	Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Plate
ASTM D 4254	Test Methods for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density
CAL-OSHA	Title 8 General Industry Safety Orders

1.03 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 02150 - Sheeting, Shoring and Bracing
- B. Section 02221 - Trenching, Backfilling and Compacting
- C. Section 02630 - Ductile Iron Pipe
- D. Section 02640 - PVC Pipe

1.04 DEFINITIONS

- A. Site: The site property is owned by the County of Imperial. The site includes the Gateway to the Americas Water Treatment Plant.
- B. Controlled Fill: Compacted suitable fill material in all areas of the site requiring filling to grade as shown on the Plans.
- C. Structural Fill: Compacted suitable fill material which will support a structure or some part of a structure. This includes support material for P.C.C. structures and pads
- D. Structural Backfill: Compacted suitable material placed between the wall of a structure and construction excavation slope up to finished grade.
- E. Suitable Material: As specified herein shall be any material imported or excavated from the cut areas that is, in the opinion of the Resident Engineer, suitable for use in constructing fills.
- F. Waste Excavation: Also Surplus Material. Material from project excavations which is not suitable for use in backfill or compacted fills or is in excess of that required to be used for backfill or to construct fills.
- G. Pipe Zone Backfill: Material suitable for placement below or surrounding the pipe to a given vertical distance above the pipe as required by the pipe section.

EARTHWORK
02200-3

- H. Pipe Trench Backfill: Material suitable for placement from the pipe zone to finish grade or to pavement subbase material.

1.05 SITE INVESTIGATION

- A. Soil Investigation Report: A Geotechnical Report prepared by Landmark Geotechnical (LCI Report No. LE21020) dated February 2021 is contained within the Special Conditions section of the specifications. The native earthwork, subbase and subgrade requirements for the pcc parking lot/delivery/electrical slab and the emergency generator set foundation and pad; as illustrated on the plans, are in conformance with the recommendations of the geotechnical report.
- B. Contractor's Responsibility: The Contractor shall carefully examine the site and make all inspections necessary in order to determine the full extent of the work required to make the completed Work conform to the Drawings and Specifications. The Contractor shall satisfy himself/herself as to the nature and location of the Work, the conditions of the existing ground surface, and the character of equipment and facilities needed prior to and during prosecution of the Work. The Contractor shall satisfy himself/herself as to the character, quality and quantity of surface and subsurface materials or obstacles to be encountered. Any inaccuracies or discrepancies between the actual field conditions and the Plans, or between the Plans and Specifications must be brought to the attention of the Engineer in order to clarify the exact nature of the Work to be performed.
- C. Existing Elevations: All *existing* elevations illustrated on the Plans are approximate. The Contractor shall recognize and acknowledge the condition that the bid lump sum price shall include all earthwork activities irrespective of the possible localized difference in contour elevations and actual ground; and that there will be no additional compensation from the Owner for earthwork changes, engineering, or field staking in this regard.

1.06 SAFETY

The Contractor shall familiarize himself/herself with, and shall at all times conform to, the regulations of the “OSHA General Industry Occupational Safety and Health Standards”, and “OSHA Safety and Health Regulations for Construction Safety Orders” and “Trench Construction Safety Orders” of the State of California, Department of Industrial Relations, Division of Occupational Health and Safety. A copy of these documents shall be kept on the job site.

EARTHWORK
02200-4

1.07 ENVIRONMENTAL SAFEGUARDS AND REGULATIONS

The Contractor shall comply with regulations in force at all times to prevent pollution of air and water. The Contractor shall be responsible for the construction of Project Environmental Control facilities as appropriate.

1.08 GEOTECHNICAL TESTING

The Contractor shall provide the services of a qualified Geotechnical Consultant to perform the required earthwork geotechnical testing specified within the contents of the Plans and Specifications. The Geotechnical Consultant shall have a California Registered Civil Engineer or Geotechnical Engineer on staff experienced in performing the required geotechnical testing to direct and supervise the geotechnical testing and construction related inspections for this project. The cost for the Geotechnical Testing shall be borne by the Contractor. A copy of all tests shall be forwarded to the Resident Engineer within two (2) days after the testing is complete. Geotechnical Earthwork Testing shall include in-situ native soil compaction testing, moisture testing, compaction testing, gradation testing, sand equivalent testing and similar testing. The Contractor shall bear the cost of retest and re-inspection of re-worked material due to faulty work.

1.09 STANDARDS FOR SOIL CLASSIFICATION, PROPERTIES AND TESTS

A. Backfill for Trench:

1. Classification - ASTM D 2487-17e1.
2. Compaction - Modified Proctor ASTM D 1557-12e1.
3. Field Density Test - ASTM D1556/ D1556M-15e1; D
2937-17e2 (as approved by Geotechnical Engineer).

B. Structural Fill and Backfill:

1. Classification - ASTM D 2487-17e1.
2. Atterberg Limits – Plastic Owner Index and Liquid Limit ASTM D 4318-17e1.
3. Compaction - Modified Proctor ASTM D 1557-12e1.
4. Physical Properties - ASTM D 854-14, D 2216-19.
5. Field Density Test - ASTM D 1556/ D1556M-15e1, D
2937-17e2 (as approved by Geotechnical Engineer).

EARTHWORK
02200-5

C. Controlled Fills:

1. Classification - ASTM D 2487-17e1.
2. Physical Properties - ASTM D 854-14, D 2216-19.
3. Compaction - Modified Proctor ASTM D 1557-12e1.
4. CBR - ASTM D 1883-16
(R-Value - ASTM 2844/ D 2844M-18).
5. Field Density Test - ASTM D 1556/ D1556M-15e1, D 2937-17e (as approved by Geotechnical Engineer).

D. Borrow:

1. Classification - ASTM D 2487-17e1.
2. Other properties - as determined by requirements at point of use.

E. Pipe Trenches:

1. Classification - ASTM D 2487-17e1.
2. Physical Properties - ASTM D 854-14, D 2216-19.
3. Compaction - Modified Proctor ASTM D 1557-12e1.
4. CBR - ASTM D 1883-16.
5. Field Density Test - ASTM D 1556/ D1556M-15e1, D 2937-17e (as approved by Geotechnical Engineer).

1.10 COMPACTION

The maximum dry density, optimum moisture content and field density of each soil type used in the controlled compacted fill shall be determined as stated in Section 1.09 above.

1.11 INSPECTION

Observation and compaction tests shall be obtained by the Geotechnical Consultant engaged by the Contractor during the filling and compacting operations.

EARTHWORK
02200-6

The Geotechnical Consultant shall be required to be present at the site on a full-time or part-time basis during the work activities. The following chart indicates the earthwork items which will require full time or intermittent geotechnical testing.

<u>NO.</u>	<u>ITEM</u>	<u>GEOTECHNICAL TESTING</u>
1.	Scarification and compaction of native material	Intermittent Testing
2.	Installation of Class 2 Base and Granular Sand Fill material beneath the pcc slabs and generator set foundation.	Intermittent Testing
3.	Installation of Class 2 Base and native earth backing/transition material around the perimeter edges of the parking lot, electrical panels/facilities and long duration temporary bypass pumping system pcc slabs and Generator Set foundation and access roads.	Intermittent Testing
4.	Backfill for Electrical Conduit Trenches, if applicable. The specification requires that the backfill be compacted in lifts. Additional lifts shall not be allowed to be placed until previous lifts have been satisfactorily tested for compaction. This requirement shall be strictly enforced, and the Contractor shall be required to remove all backfill from the electrical conduit trench if this specification is violation.	Intermittent Testing
5.	Native earth backfill for the temporary percolation pond	Intermittent Testing

1.12 GUARANTEE

Work required by this Section shall be subject to the guarantee requirements stated in the Conditions of the Contract and included in the Performance/Maintenance Bond.

EARTHWORK
02200-7

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Structural Fill Material: Materials shall consist of crushed rocks, Class 2 Base, granular sand, decomposed granite (crusher fines) or fine gravel either imported or manufactured from excavated onsite rocky material.

The crushed aggregate, granular sand, decomposed granite (crusher fines) or fine gravel shall be uniformly graded. The following gradations shall apply:

1. Granular Sand:

Clean granular sand free of clay, shale and deleterious material. Sand shall be compacted to 95 percent of maximum density at optimum water content per ASTM D 1557 unless otherwise noted on the Plans.

The material shall conform to a sand equivalent of 30 or greater.

The maximum amount of material passing the Number 200 sieve shall be 5 percent.

The sand shall conform to the following gradation percentages:

<u>SIEVE SIZE</u>	<u>GRANULAR SAND</u> <u>% PASSING</u>
3/8"	100
No. 4	98-90
No. 8	90-75
No. 10	75-60
No. 16	60-50
No. 30	50-38
No. 40	38-29
No. 50	29-19
No. 100	19-7
No. 200	5-0

The Contractor shall supply a 5-gallon sample of sand material to the material testing laboratory within five (5) days after the Notice to Proceed is issued. The gradation, sand equivalent and maximum density of the sand material shall be determined. The test results shall be forwarded to the Engineer. The cost of testing shall be

EARTHWORK
02200-8

incurred by the Contractor. The gradation of the granular sand shall be determined and the test results forwarded to the Engineer prior to the delivery of the granular sand material to the Site. Prior to the placement of sand the native subbase grade shall be checked and approved by the Engineer.

Crusher fines shall be allowed to be utilized in lieu of sand if approved by the Engineer.

2. Crusher Fines:

Crusher fines shall consist of decomposed granite indigenous to the Imperial Valley. Crusher fines utilized for this project shall conform to the following gradation requirements:

<u>SIEVE SIZE</u>	<u>PERCENT PASSING</u>
5/8"	100
No. 4	80-100
No. 8	50-85
No. 30	30-50
No. 200	4-15

The sand equivalent shall be 20 or greater.

The Contractor shall supply a five-gallon sample of crusher fines material to the material testing laboratory within five (5) days after the Notice to Proceed is issued. The Gradation and Maximum Density of the crusher fines material shall be determined. The test results shall be forwarded to the Engineer for approval prior to the delivery of the material to the Site. The cost of the testing shall be incurred by the Contractor.

3. Fine Gravel:

Clean fine gravel free of clay, shale and deleterious material. Fine gravel shall be compacted with a plate compactor with one pass in maximum 1 foot lifts. Additional lifts shall not be added until previous lifts shall have been passed over by the plate compactor.

The maximum amount of material passing the 1/4" Sieve shall be 2 percent.

The fine gravel shall conform to the following gradation percentages:

EARTHWORK
02200-9

<u>SIEVE SIZE</u>	<u>PERCENT PASSING</u>
3/8"	100
1/4"	0-2

The Contractor shall supply a five-gallon sample of fine gravel material to the material testing laboratory within five (5) days after the Notice to Proceed is issued. The Gradation and Maximum Density of the fine gravel material shall be determined. The test results shall be forwarded to the Engineer for approval prior to the delivery of the material to the Site. The cost of the testing shall be incurred by the Contractor.

4. Class 2 Base:

The Class 2 Base material shall conform to Caltrans Section 26, Latest Edition, for 25mm maximum base material.

The gradation requirements are as follows:

<u>SIEVE SIZE</u>	<u>CLASS 2 BASE % PASSING</u>
1"	100
3/4"	87-100
No. 4	30-65
No. 30	5-35
No. 200	0-12

The sand equivalent shall be 25 or greater. An angular aggregate is to be used. Class 2 Base material shall be compacted to 95 percent of maximum density according to ASTM D 1557, unless otherwise noted on the Plans or Details. The tolerance for the Class 2 Base between design subgrade elevation and actual subgrade elevation as constructed in the field shall be plus or minus 0.02 feet as referenced from the design subgrade. Prior to the placement of Class 2 Base, the native subbase grade shall be checked and approved by the Engineer. The native subbase grade shall be within plus or minus 0.05 feet of native subbase design grade prior to the placement of Class 2 Base.

The Contractor shall supply a 5-gallon sample of the Class 2 Base to the material testing laboratory within four (4) days of the Notice to Proceed. The material shall be delivered to the testing laboratory

EARTHWORK
02200-10

to determine the maximum density, gradation, R-value, sand equivalent and durability index of the Class 2 Base. A copy of the test results shall be forwarded to the Engineer by the Geotechnical Consultant for review. The gradation of the Class 2 Base shall be determined and the test results forwarded to the Engineer for approval prior to the delivery of the Class 2 Base material to the Site. *Class 2 Base utilizing recycled materials shall not be allowed.*

- C. Structural Backfill Material: Structural Backfill Material shall consist of the same material listed with the Structural Fill Material item above.
- D. Special Crushed Rock Bedding and Structure Foundation: When groundwater is encountered in the excavation and/or where indicated on the Plans, the material in the bottom of the trench or excavation shall be removed to a depth directed by the Geotechnical Engineer and replaced with 3/4-inch maximum crushed rock bedding or 1” round rock bedding. The rock beddings shall be installed and compacted per these Specifications. The 3/4-inch maximum crushed rock and 1” round rock materials shall be approved by the Geotechnical Engineer before use.

The bottom and sidewalls of the trench shall be covered with a geotextile. The geotextile fabric shall extend to the top of the pipe zone material on both sides of the trench excavation, and cover the top of the crushed rock and or 1-inch round rock.

1. 3/4-Inch Maximum Crushed Rock

Crushed rock shall be the product of crushing rock or gravel. Fifty percent (50%) of the particles by weight retained on a 3/8-inch sieve shall have their entire surface area composed of faces resulting from fracture due to mechanical crushing. Not over 5% shall be particles that show no faces resulting from crushing.

Less than 10% of the particles that pass the 3/8-inch sieve and are retained on the No. 4 sieve shall be waterworn particles. Gravel shall not be added to the crushed rock.

Crushed rock (3/4”) shall have the following gradation:

<u>SIEVE SIZES</u>	<u>3/4-INCH MAX. CRUSHED ROCK % PASSING</u>
1”	100
3/4”	90-100

EARTHWORK
02200-11

1/2"	30-60
3/8"	0-20
No. 4	0-5
No. 8	-

The 3/4-inch maximum crushed rock shall be compacted with a plate compactor in one pass in maximum 1 foot lifts. Additional lifts shall not be added until previous lifts shall have been passed over by the plate compactor.

The Contractor shall supply a five-gallon sample of the 3/4-inch maximum crushed rock material to the material testing laboratory within four (4) days of the Notice to Proceed. The Gradation and Sand Equivalent of the crushed rock shall be determined. The tests results shall be forwarded to the Engineer for approval prior to the delivery of the material to the Site. The cost of the testing shall be incurred by the Contractor.

2. 1" Round Rock

The 1-inch round rock material shall conform to the following gradation requirements:

<u>SIEVE SIZES</u>	<u>1-INCH ROUND ROCK % PASSING</u>
1-1/2"	100
1"	96
3/4"	79
1/2"	25
3/8"	1

The 1-inch round rock shall be compacted with a plate compactor in one pass in maximum 1 foot lifts. Additional lifts shall not be added until previous lifts shall have been passed over by the plate compactor.

The Contractor shall supply a five-gallon sample of the 1-inch round rock material to the material testing laboratory within four (4) days of the Notice to Proceed. The Gradation of the round rock shall be determined. The tests results shall be forwarded to the Engineer for approval prior to the delivery of the material to the Site. The cost of the testing shall be incurred by the Contractor.

EARTHWORK
02200-12

PART 3 - EXECUTION

3.01 GENERAL

The Work performed under this Specification shall be constructed to the lines, grades, elevations, slopes and cross-sections indicated on the Plans, specified herein, and/or directed by the Engineer. Slopes, graded surfaces, and drainage features shall present a neat uniform appearance upon completion of the Work.

It shall be the Contractor's responsibility (1) to maintain adequate safety measures and working conditions; and (2) to take all measures necessary during the performance of the Work to protect the entire project area and adjacent properties which would be affected by this Work from storm damage, flood hazard, caving of trenches and embankments, and sloughing of material, until final acceptance by the Engineer. It shall be the Contractor's responsibility to maintain completed areas until the entire project area is in satisfactory compliance with the job specification.

Utility lines and structures indicated on the Plans which are to remain in service shall be protected by the Contractor from any damage as a result of his/her operation. Where utility lines or structures not shown on the Plans are encountered, the Contractor shall report them to the Engineer before proceeding with the Work. The Contractor shall bear the cost of repair or replacement of any utility lines or structures which are broken or damaged by his/her operations.

3.02 REMOVALS, CLEARING AND GRUBBING

- A. Clearing: Clearing consists of the complete removal of objectionable materials and obstructions above and below the ground surface including tree stumps, brush, grass, vegetative matter and other objectionable materials within the project limits. All brush and organic material shall be removed before placing any earth fills. It shall be the Contractor's responsibility to save and protect all trees that lie outside the construction area.
- B. Grubbing: Grubbing consists of the complete removal of stumps, including tap roots or lateral roots 1-1/2 inches or more in diameter, and the removal of brush, grass or weeds to depths below the natural ground as specified herein. Stumps shall be grubbed to a depth of 3 feet and grass or weeds shall be grubbed to a depth of 6 inches below the natural ground surface, or to the depths as determined in the field by the Engineer at the time of construction.

EARTHWORK
02200-13

- C. Protection: Existing items not designated to be demolished or removed shall be protected from damage. Any such item damaged by the Contractor shall be restored or replaced immediately at the Contractor's expense.
- D. Debris and Waste Material: All debris and waste material resulting from demolition, clearing and grubbing shall be removed from the site and disposed of by the Contractor.

3.03 DUST CONTROL

The Contractor shall take all steps possible to prevent and reduce dust arising from the construction activity. The contractor shall follow all required County of Imperial Air Pollution Control District requirements for this project.

3.04 CARE OF DRAINAGE WATER

Contractor shall take care of drainage water from the construction operations, and of stormwater and/or wastewater reaching the construction area from any source, so that damage is not incurred to the excavation, pipe or structures. The Contractor shall be responsible for any damages to persons or property on or off the Site due to such drainage water or to the interruption or diversion of such stormwater or wastewater on account of his/her operation.

Such grading shall be accomplished as may be necessary to prevent surface water from flowing into excavations, and any water accumulating therein shall be removed by pumping or by other reviewed methods.

Protection of the site during construction shall be the responsibility of the Contractor. Completion of a portion of the project shall not preclude that portion or adjacent areas from the requirements for site protection until such time as the entire project is complete.

3.05 EXCAVATION

- A. General: The Contractor shall perform all excavation necessary or required as illustrated on the Plans. The excavation shall include the removal and disposal of all earth materials of whatever nature encountered, which shall include both rock excavation and common excavation when both are present, and shall include the furnishing, placing and maintaining of shoring and bracing necessary to safely support the sides of the excavations. The Work shall also include all pumping, ditching and other required methods for the removal or exclusion of water.

EARTHWORK
02200-14

- B. Excavation for Structures: Structure excavation shall include the removal of all materials of whatever nature encountered, including all obstructions of any nature that would interfere with the proper execution and completion of the Work. The removal of such materials shall conform to the lines and grades shown on the Plans and/or herein specified. Temporary structure excavations shall at all times conform to the Requirements of the State of California, Division of Occupational Health and Safety, and pertinent requirements contained in referenced Geotechnical Investigation Report and Specification Section 02150 - Sheeting, Shoring and Bracing.

Continuous wall and isolated footings shall be underlain by a minimum compacted controlled fill thickness to a minimum 1.5 times the footing width or greater if indicated in the referenced Geotechnical Investigation Report or as required by the Plans. This zone of over-excavation, scarification and recompaction shall extend a minimum of five feet (5') beyond the footing lines unless otherwise illustrated on the Plans. Exposed native surface shall be scarified, and brought to optimum moisture content and compacted to a minimum of 90 percent relative compaction if required by the Geotechnical Investigation Report or the Plans.

All surfaces to receive concrete slabs-on-grade shall be underlain by a minimum compacted controlled fill thickness of 18 inches or greater if indicated in the referenced Geotechnical Investigation Report or as required by the Plans. This shall be accomplished by combination of over-excavation and recompaction of native material to 90% of relative compaction or as required by the Geotechnical Investigation Report or as required by the Plans.

Contingent upon locations, all surfaces to receive compacted fill shall be scarified, brought to near optimum moisture content and compacted to required percentage of relative compaction as specified herein unless otherwise indicated on the Plans.

Rough grade excavations for structures and footings will be inspected by the Geotechnical Engineer to verify that the excavations extend into satisfactory soils and are free of loose and disturbed materials.

Foundation for tanks, pump vaults or subsurface chambers shall have structural fill material extending 12 inches, minimum, below the structural base slab to native material, which has been scarified and compacted to 90% relative compaction unless otherwise indicated on the Plans.

EARTHWORK
02200-15

3.06 STRUCTURE FILL AND STRUCTURE BACKFILL MATERIAL

- A. Placement of Structure Backfill: Before beginning backfilling, all foreign material, including water, shall be removed from the space to be backfilled and the area to be backfilled shall be inspected and approved by the Geotechnical Engineer. Sloping sides of the excavated space shall be stepped to prevent wedging action of the backfill against the structure. No backfill shall be placed around or upon any structure until it is proven that the concrete has attained satisfactory strength in accordance with the Division 3 of Technical Specifications and that the structure as a whole is adequate to receive backfill. The compressive strength shall be determined by tests on representative cylinders cured under conditions similar to those prevailing at the site.
- B. General: Structure fill and structure backfill shall consist of granular sand, Class 2 Base, crusher fines or other material as indicated on the Plans. *The subbase grade shall be excavated to within plus or minus 0.05 feet of design grade prior to the placement of structure fill and structure backfill. The design subbase grade shall be field verified and approved by the Resident Engineer prior to the placement of the structure fill or structure backfill material. The Resident Engineer shall determine the number and location of points to check for the subbase grade elevation compliance. Prior to the Resident Engineer's inspection of the subbase grade the Contractor shall establish bluetop stakes on a 10-foot by 10-foot grid across the area which structure backfill is to be placed.*

Granular sand, Class 2 Base and crusher fine structure fill and structure backfill material shall be placed in maximum 8-inch lifts and compacted to 95 percent of maximum density at optimum water content per ASTM D 1557 unless otherwise noted on the improvement plans. Additional granular sand, Class 2 Base or crusher fine lifts shall not be placed until previous lifts have attained the specified compaction requirement and are approved by both the on-site geotechnical representative and the Owner's Representative.

- C. Placing, Spreading and Compacting Fill Material: The structural fill and structural backfill material shall be placed by the Contractor in thin layers that when compacted shall not exceed 8 inches unless otherwise noted on the improvement plans. Each layer shall be spread evenly and shall be thoroughly mixed during the spreading to obtain uniformity of material in each layer.

EARTHWORK
02200-16

When the moisture content of the fill material is below that required by the Geotechnical Engineer, water shall be added by the Contractor until the moisture content is as required for the specified compaction.

When the moisture content of the fill material is above that required by the Geotechnical Engineer, the fill material shall be aerated by the Contractor by blading, mixing, or other satisfactory methods until the moisture content is as required for the specified compaction.

After each layer has been placed, mixed and spread evenly, it shall be thoroughly compacted by the Contractor to the specified density. Compaction shall be accomplished by sheepsfoot rollers, vibratory rollers, multiple-wheel pneumatic-tired rollers or other types of acceptable compacting equipment. Equipment shall be of such design that it shall be able to compact the fill to the specified density. Compaction shall be continuous over the entire area and the equipment shall make sufficient passes over the material to ensure that the desired density has been obtained.

Compacted fill slopes shall be overbuilt and cut back to grade, exposing the firm, compacted inner core. The slopes shall be overbuilt a minimum of one foot (1'). If the desired compaction is not achieved, the existing slope shall be over excavated and reconstructed. The amount of overbuilding shall be increased until the desired compaction is achieved on the slope. The Contractor shall provide thorough mechanical compaction to the outer edge of the overbuilt slope surface. There shall be no excessive loose soil on the slopes.

The Contractor shall provide and maintain adequate erosion control facilities during the construction of the fill areas. The erosion control facilities shall be maintained in optimum condition until the permanent drainage system and vegetation is complete. The facilities shall be inspected following significant rainfall, repairs made and excess sediment removed. It shall be the Contractor's responsibility to prevent the discharge of sediment off-site or to adjacent watercourses.

3.07 SUITABLE MATERIAL AND WASTE (SURPLUS) EXCAVATION INCLUDING ABANDONED UTILITY BACKFILLING

- A. General: *Suitable material or waste excavation consists of native material.* The subbase grade shall be excavated to within plus or minus 0.05 feet of design grade prior to the placement of suitable material or waste excavation material. The design subbase grade shall be field verified and approved by the Engineer prior to the placement of the suitable material or waste excavation material. The Engineer shall determine the number and location of points to check for the subbase grade elevation compliance. Prior to the

EARTHWORK
02200-17

Engineer's inspection of the subbase grade the Contractor shall establish bluetop stakes on a 20-foot by 20-foot grid across the area suitable material or waste excavation material is to be placed.

Abandoned utilities shall be excavated, removed and disposed of by the contractor or left in place as required by the plans and specifications or as determined by the Engineer. Abandoned utility excavations shall be backfilled in accordance with the following paragraph.

The suitable material or waste excavation material shall be placed in maximum 1-foot lifts and compacted to 90 percent of maximum density at optimum water content per ASTM D 1557. ***Suitable native backfill material is to be placed in the Temporary Percolation Pond illustrated on plan sheet 13.*** Additional suitable material or waste excavation material lifts shall not be placed until previous lifts have attained the specified compaction requirement and are approved by both the on-site geotechnical representative and the Resident Engineer.

- B. Placing, Spreading and Compacting Suitable Material and Waste Excavation Material: ***The suitable material and waste excavation material shall be placed by the Contractor in 1-foot lifts. Each layer shall be spread evenly and shall be thoroughly mixed during the spreading to obtain uniformity of material in each layer.***

When the moisture content of the fill material is below that required by the Geotechnical Engineer, water shall be added by the Contractor until the moisture content is as required for the specified compaction.

When the moisture content of the fill material is above that required by the Geotechnical Engineer, the fill material shall be aerated by the Contractor by blading, mixing, or other satisfactory methods until the moisture content is as required for the specified compaction.

After each layer has been placed, mixed and spread evenly, it shall be thoroughly compacted by the Contractor to the specified density. Compaction shall be accomplished by sheepsfoot rollers, vibratory rollers, multiple-wheel pneumatic-tired rollers or other types of acceptable compacting equipment. Equipment shall be of such design that it shall be able to compact the fill to the specified density. Compaction shall be continuous over the entire area and the equipment shall make sufficient passes over the material to ensure that the desired density has been obtained.

Compacted fill slopes shall be overbuilt and cut back to grade, exposing the firm, compacted inner core. The slopes shall be overbuilt a minimum of one foot (1'). If the desired compaction is not achieved, the existing slope

EARTHWORK
02200-18

shall be over excavated and reconstructed. The amount of overbuilding shall be increased until the desired compaction is achieved on the slope. The Contractor shall provide thorough mechanical compaction to the outer edge of the overbuilt slope surface. There shall be no excessive loose soil on the slopes.

The Contractor shall provide and maintain adequate erosion control facilities during the construction of the fill areas. The erosion control facilities shall be maintained in optimum condition until the permanent drainage system and vegetation is complete. The facilities shall be inspected following significant rainfall, repairs made and excess sediment removed. It shall be the Contractor's responsibility to prevent the discharge of sediment off-site or to adjacent watercourses.

3.08 ESTABLISHMENT OF SUBBASE GRADE, SUBGRADE OR FINISH GRADE

Finish Grade is defined as the finish surface grade. For instance, the top of an A.C. or P.C.C. paved surface or slab is referred to as finish grade.

Subgrade is defined as the grade of the material beneath the finish surface. For instance, the top of Class 2 Base grade beneath an A.C. or P.C.C. paved surface or slab is referred to as subgrade.

Subbase is defined as the grade of the material beneath the base material. For instance, the top of native material beneath the Class 2 Base subgrade material of an A.C. or P.C.C. paved surface or slab is the subbase grade.

Finish grade surfaces are to be graded to within plus or minus 0.02 feet from design grade as illustrated on the Grading Plans. The Contractor shall place bluetop stakes on a 10-foot x 10-foot grid across the top of the finish grade surface during final grading. A bluetop stake is defined as a stake placed at the finish grade elevation within the tolerance of plus or minus 0.02 feet of finish grade. The Engineer shall obtain elevations across finish grade surfaces at locations determined by the Engineer prior to accepting and approving the finish grade surfaces. The Contractor shall rework areas not conforming to the finish surface grade tolerance as required. Work items to occur after the establishment of finish grade shall not occur until the Engineer has approved the finish grade.

Subgrade surfaces are to be graded to within plus or minus 0.02 feet from design grade as illustrated on the Grading Plans. Bluetop stakes shall be placed on a 10-foot x 10-foot grid pattern across rectangular or square facilities such as parking lots and access roads. The Engineer shall obtain elevations across the

EARTHWORK
02200-19

subgrade surfaces at locations determined by the Engineer prior to accepting and approving the subgrade surfaces. The Contractor shall rework areas not conforming to the subgrade tolerance as required. Work items to occur after the establishment of subgrade shall not occur until the Engineer has approved the finish subgrade.

Subbase surfaces are to be graded to within plus or minus 0.05 feet of subbase design grade as illustrated on the Grading Plans. Bluetop stakes shall be placed on a 10-foot x 10-foot grid pattern across rectangular or square facilities such as parking lots, access roads, sludge beds, structures, building pads, etc. The Engineer shall obtain elevations across the subbase surfaces at locations determined by the Engineer prior to accepting and approving the subbase surfaces. The Contractor shall rework areas not conforming to the subbase design grade tolerance as required. Work items to occur after the establishment of subbase grade shall not occur until the Engineer has approved the subbase grade.

3.09 GEOTECHNICAL TESTING REQUIRED DURING THE PROJECT CONSTRUCTION

The contractor shall provide the geotechnical testing for this project. Following are a list of the geotechnical tests to be performed for this project:

- 1. Prepare proctor curve to determine the maximum density and optimum water content for the native material at the site and the other water content values at 90, 87 and 85 percent maximum density.*
- 2. Prepare proctor curve to determine the maximum density and optimum water content for the granular sand material. Recently completed proctor curves for the sand material proposed to be used for the project shall be acceptable if approved by the Engineer.*
- 3. Prepare proctor curve to determine the maximum density and optimum water content for the class 2 base material. Recently completed proctor curves for the class 2 base material proposed to be used for the project shall be acceptable if approved by the Engineer.*
- 4. One compaction test shall be completed for every 250 square feet of pcc parking lot/delivery/electrical slab and sidewalk surface for the native subbase material to be scarified and compacted.*
- 5. One compaction test shall be completed for every 250 square feet of the parking lot/delivery/electrical slab for the class 2 base – subgrade material.*
- 6. A total of one (1) compaction test shall be obtained for the granular sand subgrade material beneath the pcc sidewalk.*
- 7. A total of one (1) compaction test shall be obtained for the class 2 base subgrade material beneath the raised Electrical Panel pcc slab.*

EARTHWORK
02200-20

8. *A total of five (5) equally spaced compaction tests shall be obtained along the class 2 base transition area between the pcc parking lot/delivery/electrical slab and the existing native grade.*
9. *A total of one (1) compaction test shall be obtained for the scarified and compacted native material beneath the pcc generator foundation.*
10. *A total of two (2) compaction tests shall be obtained for the scarified and compacted native material beneath the Class 2 Base generator pad areas (one compaction test for each generator pad area).*
11. *A total of two (2) compaction tests shall be obtained for the finished surface Class 2 Base generator pad areas (one compaction test for each generator pad area).*
12. *A total of one (1) compaction test for each 1 foot depth of class 2 base installed beneath the pcc generator foundation shall be obtained.*
13. *A total of eight (8) compaction tests shall be obtained for the native material backfill/transition area surrounding outside perimeter edge of the generator pcc slab and the Class 2 Base generator pad areas.*
14. *A total of one (1) compaction test for each one (1) foot lift of electrical trench backfill material in native areas shall be obtained.*
15. *A total of one (1) compaction test for each one (1) foot lift of electrical trench backfill material underneath pcc slab areas shall be obtained.*
16. *A total of one (1) compaction test for the native subbase material to be scarified and compacted beneath the “Long Term Duration Temporary Bypass Booster Pump Station” shall be obtained.*
17. *A total of one (1) compaction test for each 9 inch lift of class 2 base installed beneath the “Long Term Duration Temporary Bypass Booster Pump Station” slab shall be obtained.*
18. *A total of one (1) compaction test shall be obtained for each one (1) foot lift of native earth backfill placed in the “Temporary Percolation Pond”.*

3.10 CLEAN-UP

Upon completion of Work in this Section, all rubbish and debris shall be removed from the site. All construction equipment and implements of service shall be removed from the water treatment plant area. Water shall be applied to the construction related disturbed native areas and the areas shall be compacted prior to final grading to stabilize the native surface material. The native earth areas disturbed during the project construction and the native earth roadway areas shall be graded smooth with a blade or motor patrol. The finish native earth surface shall be firm, unyielding and smooth after finish grading is completed.

3.11 STAKING

The Contractor shall be responsible for all staking and the associated staking costs for this project. The staking required for this project is as follows:

EARTHWORK
02200-21

- 1. Complete subbase bluetop staking for the pcc parking lot/delivery/electrical slab in accordance with Section 3.08 of this special condition specification.*
- 2. Complete subgrade bluetop staking for the pcc parking lot/delivery/electrical slab in accordance with Section 3.08 of this special condition specification.*
- 3. Place two (2) offset stakes at each corner of the pcc parking lot/delivery/electrical slab in-line with the edges of the slab. Cut and fill vertical distances from the offset stakes to the finish grade surface of the slab shall be placed on off-set lath.*
- 4. Place two (2) offset stakes at each corner of the emergency power generator set pcc pad in-line with the edges of the pad. Cut and fill vertical distances from the offset stakes to the finish grade surface for the pcc pad shall be placed on off-set lath.*
- 5. Place two (2) offset stakes at each corner of the emergency power generator set – pcc generator class 2 base service pad in line with the service pad edges. Cut and fill vertical distances from the offset stakes to the finish grade surface of the class 2 base service pad shall be placed on off-set lath.*
- 6. Place 5 foot x 5 foot diagonal stakes from the Long Duration Temporary Bypass Pumping System class 2 base pad toe of slope boundary corners to define the rectangular native earth scarification area and class 2 base toe of slope boundary. Provide slope staking information to the class 2 base top of slope pad elevation.*
- 7. Place two (2) offset stakes at each corner of the Long Duration Temporary Bypass Pumping System pcc slab in-line with the edges of the pcc slab. Cut and fill vertical distances from the offset stakes to the finish grade surface of the pcc slab shall be placed on the off-set lath.*
- 8. Place 5 foot x 5 foot diagonal offset stakes at each corner of the Temporary Percolation Basin exterior toe of slope boundary. Provide slope staking information to the top of slope design grade.*
- 9. Place 10 foot x 10 foot bluetop stakes to the finish design grade Temporary Percolation Basin bottom.*

END OF SECTION 02200

EARTHWORK
02200-22

SECTION 02630 - DUCTILE IRON PIPE

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The Contractor shall furnish and install all ductile iron pipe, fittings, transitions, connections and appurtenant work, complete and in accordance with the requirements of the Contract Documents.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 02200 - Earthwork
- B. ~~Section 02221 - Trenching, Backfilling and Compacting~~
- C. Section 02650 - Pipe Fittings
- D. Section 02666 - Pressure Pipeline Water Testing
- E. Section 02670 - Disinfection of Potable Water Pipelines
- F. ~~Section 09800 - Protective Coatings~~

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Commercial Standards:

ANSI/AWWA C 104/A 21.4	Cement-mortar lining for Ductile Iron and Gray Iron Pipe and Fittings for Water.
ANSI/AWWA C 105/A 21.5	Polyethylene Encasement for Gray and Ductile Cast Iron Piping for Water and Other Liquids.
ANSI/AWWA C 110/A 21.10	Fittings, 3-inch through 48-inch for Water and Other Liquids, Gray Iron and Ductile Iron.
ANSI/AWWA C 111/A 21.11	Rubber Gasket Joints for Ductile Iron and Gray Iron Pressure Pipe and Fittings

DUCTILE IRON PIPE
02630-1

ANSI/AWWA C 115/A 21.15	Flanged Ductile Iron and Gray Iron Pipe with Threaded Flanges.
ANSI/AWWA C 150/A 21.50	Thickness Design of Ductile Iron Pipe.
ANSI/AWWA C 151/A 21.51	Ductile Iron Pipe, Centrifugally Cast, in Metal Molds or Sand-Lined Molds for Water and Other Liquids.
ANSI/AWWA C 209	Cold Applied Coatings for the Exterior of Special Sections, Connections and Fittings for Steel Water Pipelines.
ANSI/AWWA C 214	Tape Coating Systems for the Exterior of Steel Water Pipelines.
ANSI/AWWA C 600	Water Mains and Appurtenances, Installation of Ductile Iron.
ANSI/ASTM D 1248	Polyethylene Lining Material for Ductile Iron Pipe and Fittings.
ASTM C 150	Specification for Portland Cement.
ASTM A 746	Installation of Ductile Iron Pipe for Gravity Sewers.

1.04 CONTRACTOR SUBMITTALS

- A. The Contractor shall furnish a certified affidavit of compliance for all pipe and other products or materials furnished under this Section of the Specifications and as specified in the referenced standards. Certification shall include physical and chemical properties of pipe materials and hydrostatic test reports.
- B. All expenses incurred in sampling and testing for certifications shall be borne by the Contractor.

DUCTILE IRON PIPE
02630-2

1.05 QUALITY ASSURANCE

- A. Ductile iron pipe shall be manufactured with the material, have the dimensions, be within the tolerances and meet the testing requirements set forth in ASTM A 746 and ANSI A 21.51. Ductile iron pipe shall be manufactured in nominal 18 foot or 20 foot laying lengths and shall have the lining called for in the Contract Documents.
- B. All pipe shall be subject to inspection at the place of manufacture in accordance with the provisions of the referenced standards, as supplemented by the requirements herein.
- C. In addition to those tests specifically required, the Owner's Representative may request additional samples of any material including lining and coating samples for testing by the Owner. The additional samples shall be furnished at no additional cost to the Owner.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Mortar lined and polyethylene encased ductile iron pipe shall conform to ANSI/AWWA C 151, C 104, C 105, C 214 and D 1248, subject to the following supplemental requirements. *The pipe for this project shall be 150 pound flanged, class 53, mortar lined and of the diameter shown on the plans.* The pipe shall be furnished complete with rubber gaskets, if applicable, as indicated in the Contract Documents and all specials and fittings shall be provided as required under the Contract Documents. Any ductile iron pipes used as air lines and connected after the blowers shall have EPDM gaskets.
- B. The pipe shall be handled by use of wide slings, padded cradles or other devices acceptable to the Owner's Representative, designed and constructed to prevent damage to the pipe lining and/or coating. The use of chains, hooks or other equipment which might injure the pipe lining and coating will not be permitted. Stockpiled pipe shall be safely and properly supported to prevent accidental rolling. The Contractor shall be fully liable for the cost of replacement or repair of pipe which is damaged.
- C. Maximum pipe laying lengths shall be 20 foot with shorter lengths provided as required by the Design.
- D. The pipe shall have a smooth dense interior surface and shall be free from fractures, defects and roughness.

DUCTILE IRON PIPE
02630-3

2.02 MATERIALS

- A. Ductile iron pipe materials shall conform to the requirements of ANSI/AWWA C 151/A 21.51.
- B. Fittings for ductile iron pipe shall conform to the requirements of ANSI/AWWA C 110/A 21.10 for diameters 3 inch through 48 inch. Ductile iron fittings larger than 48 inch shall conform to the above-referenced standard with the necessary modifications for the larger size.
- C. Cement for mortar lining shall conform to the requirements of ANSI/AWWA C 104/A 21.4; provided, that cement for mortar lining shall be Type V. A fly ash or pozzolan shall not be used as a cement replacement.
- D. Material for the polyethylene encasement shall conform to the requirements of ANSI/AWWA C 105/A 21.5.
- E. All elastomer gaskets used for ductile iron pipe shall be of neoprene material.
- F. All buried bolts and nuts used in the assembly of ductile iron pipe and fittings shall be 316 stainless steel bolts.
- G. *All bolts and nuts used in the assembly of ductile iron pipe and fittings **in the pipe chase** shall be composed of ductile iron or 316 stainless steel.*
- H. *All bolts and nuts used in the assembly of ductile iron pipe, fittings and valves **above the level of the pipe chase** shall be composed of A-36 steel.*

2.03 DESIGN OF PIPE

- A. Ductile iron pipe shall be designed in accordance with the requirements of ANSI/AWWA C 150/A 21.50, as applicable and as modified in this Section. The pipe furnished shall be cement-mortar lined. Buried ductile iron pipe shall be polyethylene encased.
- B. The pipe shall be designed, manufactured, tested, inspected and marked according to applicable requirements previously stated and except as hereinafter modified, shall conform to ANSI/AWWA C 151.
- C. The pipe and fittings shall be of the diameter shown and shall be of pressure Class 350 for pipe sizes twelve inches and below and pressure Class 250 for pipe fourteen inches to twenty inches and pressure Class 200 for twenty-four inch pipe and pressure Class 150 for thirty inch and above, except that

DUCTILE IRON PIPE
02630-4

where mechanical couplings are used and the pipe is grooved, the ductile iron pipe shall be of special thickness Class 53.

- D. Ductile iron pipe and fittings shall be furnished with mechanical joints, push-on joints, flanged joints and restrained joints as required.
 - 1. Mechanical and push-on joints shall conform to ANSI/AWWA C 111/A 21.11.
 - 2. Flanged joints shall conform to ANSI/AWWA C 115/A 21.15.
 - 3. Restrained joints shall be “Lok-Ring” Restrained Joint by American Ductile Iron Pipe, “TR FLEX” Restrained Joint by U.S. Pipe, “Mechanical/Lock Joint” by Pacific States Cast Iron Pipe Company, or equal.

- E. For bell-and-spigot ends with rubber gaskets, the clearance between the bells and spigots shall be such that when combined with the gasket groove configuration and the gasket itself will provide watertight joints under all operating conditions when properly installed. The Contractor shall require the pipe manufacturer to submit details complete with significant dimensions and tolerances and also to submit performance data indicating that the proposed joint has performed satisfactorily under similar conditions. In the absence of a history of field performance, the results of a test program shall be submitted.

2.04 CEMENT-MORTAR LINING

- A. Except as otherwise provided herein, interior surfaces of ductile iron pipe, fittings and specials to be furnished with cement-mortar lining shall be cleaned and lined in the shop with cement-mortar lining applied centrifugally in conformity with ANSI/AWWA C 104. If lining is damaged or found faulty at delivery site, the damaged or unsatisfactory portions shall be replaced with lining conforming to these Specifications.

- B. The minimum lining thickness shall be as follows:

Nominal Pipe Diameter (inches)	Minimum Lining Thickness (inches)
3-12	1/8
14-24	3/16
30-54	1/4

DUCTILE IRON PIPE
02630-5

- C. For all pipe and fittings with plant-applied cement-mortar linings, the Contractor shall provide a polyethylene or other suitable bulkhead on the ends of the pipe and on all special openings. All bulkheads shall be substantial enough to remain intact during shipping and storage until the pipe is installed.

2.06 EXTERIOR COATING OF PIPE

- A. *The exterior surfaces of ductile iron pipe which will be exposed to the atmosphere inside structures **above the level of the pipe chase as illustrated on the plans** shall be thoroughly cleaned and then given a shop coat of ethyl silicate inorganic zinc-rich primer which is compatible with a polyamide epoxy coating 2nd coat material. The exterior surface of the ductile iron piping **within the pipe chase** shall be coated with a bituminous coating by the pipe manufacturer prior to delivery.*
- B. Buried ductile iron pipe shall be coated with a bituminous coating by the pipe manufacturer and polyethylene encased in accordance with the requirements of ANSI/AWWA C 105/A 21.5.

PART 3 - EXECUTION

3.01 INSTALLATION OF PIPE

- A. All pipe, fittings, etc. shall be carefully handled and protected against damage, impact shocks and free fall. All pipe handling equipment shall be acceptable to the Owner's Representative. Pipe shall not be placed directly on rough ground, but shall be supported in a manner which will protect the pipe against damage whenever stored at the trench site in accordance with Paragraph 2.01, herein. All pipe damaged prior to Substantial Completion shall be repaired or replaced by the Contractor.
- B. The Contractor shall inspect each pipe and fitting prior to installation to ensure that there are no damaged portions of the pipe. No pipe shall be installed where the lining or coating exhibit defects that may be harmful as determined by the Owner's Representative. Such damaged lining or coating shall be repaired, or a new undamaged pipe shall be furnished and installed.
- C. The pipe shall be installed in accordance with ANSI/AWWA C 600. Before placement of the pipe in the trench, each pipe or fitting shall be thoroughly cleaned of any foreign substance which may have collected thereon and shall be kept clean at all times thereafter. For this purpose, the openings of

DUCTILE IRON PIPE
02630-6

all pipes and fittings in the trench shall be closed during any interruption to the Work. As pipe laying progresses, the Contractor shall keep the pipe interior free of all debris. The Contractor shall completely clean the interior of the pipe of all sand, dirt, rocks and any other debris following completion of pipe laying prior to testing and disinfecting the completed pipeline.

- D. Pipe shall be laid directly on the imported bedding material. No blocking will be permitted and the bedding shall be such that it forms a continuous, solid bearing for the full length of the pipe. Excavations shall be made as needed to facilitate removal of handling devices after the pipe is laid. Bell holes shall be formed at the ends of the pipe to prevent joint loading at the bells or couplings. Excavation shall be made as needed outside the normal trench section at field joints to permit adequate access to the joints for field connection operations and for application of coating on field joints.
- E. Where necessary to raise or lower the pipe due to unforeseen obstructions or other cause, the Owner's Representative may change the alignment and/or the grades. Such change shall be made by the deflection of joints, by the use of bevel adapters or by the use of additional fittings. However, in no case shall the deflection in the joint exceed the maximum deflection recommended by the pipe manufacturer.
- F. No pipe shall be installed upon a foundation into which frost has penetrated or at any time that there is a danger of the formation of ice or penetration of frost at the bottom of the excavation. No pipe shall be laid unless it can be established that the trench will be backfilled before the formation of ice and frost occurs.
- G. The openings of all pipe and specials where the pipe and specials have been cement-mortar lined in the shop shall be protected with suitable bulkheads to prevent unauthorized access by persons, animals, water or any undesirable substance. At all times, means shall be provided to prevent the pipe from floating.
- H. Immediately before jointing pipe, the bell end of the pipe shall be thoroughly cleaned and a clean rubber gasket lubricated with an approved vegetable-based lubricant shall be placed in the bell groove. The spigot end of the pipe shall be carefully cleaned and lubricated with a vegetable-based lubricant. The spigot end of the pipe section shall then be inserted into the bell of previously laid joint and telescoped into its proper position. Tilting of the pipe to insert the spigot into the bell will not be permitted.

END OF SECTION 02630

DUCTILE IRON PIPE
02630-7

SECTION 02640 - PVC PIPE

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The Contractor shall furnish and install all Polyvinyl Chloride (PVC) plastic pipe, fittings, transitions, connections and appurtenant work, complete and in accordance with the requirements of the Contract Documents.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 02200 - Earthwork
- B. ~~Section 02221 - Trenching, Backfilling and Compacting~~
- C. Section 02666 - Pressure Pipeline Water Testing
- D. Section 02670 - Disinfect Potable Water Pipelines

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Commercial Standards:

ASTM D 1784 and ASTM D 1785	Specifications for Polyvinyl Chloride (PVC) Plastic Pressure Pipe
ASTM D 3034	Specifications for Polyvinyl Chloride (PVC) Plastic Gravity Sewer Pipe
AWWA C 900	Specifications for Polyvinyl Chloride (PVC) Plastic Water Pressure Pipe
ASTM D 2321	Standard Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe

1.04 CONTRACTOR SUBMITTALS

- A. Contractor shall submit copies of the manufacturer's product specifications according to the requirements of Section 01300 - Contractor Submittals.

PVC PIPE
02640-1

PART 2 - PRODUCTS

2.01 PVC (POLYVINYL CHLORIDE) PRESSURE PIPE, 4 INCHES AND SMALLER SOLVENT-WELDED

- A. All PVC pressure pipe 4 inches and smaller shall be made from all new rigid unplasticized polyvinyl chloride and shall be Normal Impact Class 12454-B, Schedule 40 or 80 as illustrated on the plans, to conform to ASTM D 1785, unless otherwise shown. Elbows and tees shall be of the same material and schedule as the pipe. Unless otherwise shown, joint design shall be for solvent-welded construction.

2.02 AWWA C 900 AND AWWA C 905 WATER PIPELINE WITH BELL AND SPIGOT JOINTS

This Specification designates general requirements for unplasticized polyvinyl chloride (PVC) plastic class water pipe with integral bell and spigot joints for the conveyance of water. Pipe shall meet the requirements of AWWA C 900 or AWWA C 905 "Polyvinyl Chloride (PVC) Water Distribution".

All pipe shall be suitable for use as pressure conduit, provisions must be made for expansion and contraction at each joint with an elastomeric ring. The bell shall consist of an integral wall section with a factory installed, solid cross-section elastomeric ring which meets the requirements of ASTM F 477. The bell section shall be designed to be at least as hydrostatically strong as the pipe wall and meet the requirements of AWWA C 900. Sizes and dimensions shall be as shown in this Specification. Joint design shall meet qualification requirements of ASTM F 3139. Each pipe shall be tested to four times the pressure class of the pipe for a maximum of 5 seconds. The integral bell shall be tested with the pipe. Standard laying lengths shall be 20 feet ($\pm 1'$) for all sizes.

The pipe stiffness using $F/\Delta Y$ for PVC class water pipe is contained in the table below:

<u>CLASS</u>	<u>DR</u>	<u>FΔy (PSI)</u>
100	25	129
150	18	364
200	14	815

PVC PIPE
02640-2

Pipe shall withstand, without failure at 73°F, an impact of a falling missile, TUP C, at the following levels (per ASTM D 2444):

<u>Pipe Size (IN.)</u>	<u>Impact (FT./LBS.)</u>
4	100
6	100
8	100
10	120
12	120

There shall be no visible evidence of shattering or splitting when the energy is imposed.

Randomly selected samples tested in accordance with ASTM D 1599 shall withstand, without failure, pressures listed below when applied in 60-70 seconds.

<u>Class</u>	<u>Minimum Burst Pressure At 73°F (PSI)</u>
100	535
150	755
200	985

Pipe for this Project shall conform with the specifications for AWWA C 900, DR 18 PVC pipe material for diameter sizes 4-inches through 12 inches and AWWA C 905, DR 25 PVC pipe material for diameter sizes 14 inches through 36-inches unless otherwise indicated on the Plans.

2.03 PVC (POLYVINYL CHLORIDE) GRAVITY PIPE

- A. Pipe shall conform to the requirements of ASTM D 3034 for SDR 26 or SDR 35 gravity pipe, unless otherwise indicated on the Plans.
- B. All pipe joints shall be of the bell and spigot type with electrometric seals and conform to the requirements of ASTM D 3212. Gaskets shall be factory installed and chemically bonded to the bell end of the pipe. Gasket material shall conform to the requirements of ASTM F 477.
- C. All fittings shall be fabricated from pipe meeting the requirements of these standards. Fabricated miter joints shall be reinforced by fusion heat welding. All fittings shall be approved for use by the pipe manufacturer and shall be capable of accepting bell and spigot connections.

PVC PIPE
02640-3

1. There shall be no sign of flaking or disintegration when immersed in anhydrous acetone for 20 minutes as described in ASTM D 2152.
- D. All pipe shall be from quality PVC resin, compounded to provide physical and mechanical properties that equal or exceed cell class 12454 as defined in ASTM 1784.
- E. Minimum pipe stiffness at 5 percent deflection shall be 46 PSI for all sizes when tested in accordance with ASTM D 2412, External Loading Properties of Plastic Pipe by Parallel-Plate Loading”.
- F. Each pipe shall be identified with the name of manufacturer, nominal size, cell classification, ASTM designation F 1803, the pipe stiffness designation “PS-46” and manufacturer’s date code.

PART 3 - EXECUTION

3.01 INSTALLATION OF PIPE

- A. All pipe, fittings, etc., shall be carefully handling and protected against damage, impact shocks and free fall. All pipe handling equipment shall be acceptable to the Owner’s Representative. Pipe shall not be placed directly on rough ground, but shall be supported in a manner which will protect the pipe against injury whenever stored at the Site. All pipe damaged prior to Substantial Completion shall be repaired or replaced by the Contractor.
- B. The Contractor shall inspect each pipe and fitting prior to installation to ensure that there are no damaged portions of the pipe. Damaged pipe shall be replaced with new undamaged sections of pipe.
- C. Before placement of the pipe in the trench, each pipe or fitting shall be thoroughly cleaned of any foreign substance which may have collected thereon and shall be kept clean at all times thereafter. For this purpose, the openings of all pipes and fittings in the trench shall be closed during any interruption to the Work. As pipe laying progresses, the Contractor shall keep the pipe interior free of all debris. The Contractor shall completely clean the interior of the pipe of all sand, dirt, rocks and any other debris following completion of pipe laying prior to testing, disinfecting and placing the completed pipeline in service.
- D. Pipe shall be laid directly on the imported bedding material. No blocking will be permitted and the bedding shall be such that it forms a continuous,

PVC PIPE
02640-4

solid bearing for the full length of the pipe. Bell holes shall be formed at the ends of the pipe to prevent joint loading at the bells or couplings.

- E. Where necessary to raise or lower the pipe grade due to unforeseen obstructions or other causes, the Owner's Representative may change the alignment and/or the grades. Such change shall be made by the deflection of joints or by the use of additional fittings. However, in no case shall the deflection in the joint exceed the maximum deflection recommended by the pipe manufacturer.
- F. No pipe shall be installed upon a foundation into which frost has penetrated or any time that there is a danger of the formation of ice or penetration of frost at the bottom of the excavation. No pipe shall be laid unless it can be established that the trench will be backfilled before the formation of ice and frost occurs.
- G. Immediately before jointing bell and spigot pipe, both the bell and spigot end of the pipe shall be thoroughly cleaned and lubricated with an approved vegetable-based lubricant. The spigot end of the pipe section shall then be inserted into the bell of the previously laid joint and telescoped into its proper alignment. Tilting of the pipe to insert the spigot into the bell will not be permitted.
- H. Solvent-welded and heat-fused joints shall be carefully and thoroughly cleaned immediately before jointing the pipe. Particular care shall be taken in making solvent-welded joints to ensure a uniform, homogeneous and complete bond.
- I. ~~Pipe installation shall conform with Technical Specification Section 02221 –Trenching, Backfilling and Compacting. If this installation of pipe section and Section 02221 conflict, the most stringent specification shall apply.~~

END OF SECTION 02640

PVC PIPE
02640-5

**SECTION 02650 - PIPE FITTINGS, TRANSITION COUPLINGS,
MECHANICAL RESTRAINED JOINT FITTINGS, FLANGED
COUPLING ADAPTERS AND HARDWARE**

PART 1 - GENERAL

1.01 DESCRIPTION

The Contractor shall provide and install pipe fittings, transition couplings, restrained joint fittings, flanged coupling adapters and hardware for the connection of PVC, ductile iron and other pipeline material. Other connecting items may also be required. This section includes the specifications and requirements for the prior listed pipe connection items. The hardware for this specification section shall include the hardware for pipe or any other fittings or items located along a pipeline. Material shall be new and free from defects.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 02630 - Ductile Iron Pipe
- B. Section 02640 - PVC Pipe

1.03 REFERENCE DOCUMENTS

Unless otherwise indicated, the current editions of the following reference standards and specifications apply to the Work described herein, and are considered part of this Specification.

C 104/A 21.4-03	American National Standard for Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water
C 105/A 21.5-99	American National Standard for Polyethylene Encasement for Ductile-Iron Pipe Systems
C 110/A 21.10-03	American National Standard for Ductile-Iron and Gray-Iron Fittings, 3-In. through 48-In. (76 mm through 1,219 mm), for Water
C 111/A 21.11-00	American National Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings

**PIPE FITTINGS, TRANSITION COUPLINGS,
MECHANICAL RESTRAINED JOINT FITTINGS,
FLANGED COUPLING ADAPTERS AND HARDWARE**

02650-1

C 115/A 21.15-99	American National Standard for Flanged Ductile Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges
C 116/A 21.16-03	American National Standard for Protective Fusion-Bonded Epoxy Coatings for the Interior and Exterior Surfaces of Ductile-Iron and Gray-Iron Fittings for Water Supply Service
C 153/A 21.53-00	American National Standard for Ductile-Iron Compact Fittings, 3-In. (76 mm) through 64-In. (1,600 mm), for Water Service
ASTM A 536	American Standards for Testing and Materials - High Strength Ductile Iron for Sleeve and Flanges of Transition Coupling and Flanged Coupling Adapter
NSF 61	National Sanitation Foundation - Nitrile (Buna-N) Gasket for Transition Coupling and Flanged Coupling Adapter
ASTM A 536-80, Grade 65-45-12	American Standard Testing and Material - Ductile Iron Mechanical Joint Restraint Fitting
UNI-B-13-92	As listed Underwriters Laboratories - Restraining Glands for Mechanical Restrained Joint Fittings
ASTM B 117	American Standard Testing Materials - Salt Spray Testing for Bolts

1.04 CONTRACTOR SUBMITTALS

- A. The Contractor shall furnish a certified affidavit of compliance for all pipe and other products or materials furnished under this Section of the Specifications and as specified in the referenced standards. Certification shall include physical and chemical properties of pipe materials and hydrostatic test reports.
- B. All expenses incurred in sampling and testing for certifications shall be borne by the Contractor.

**PIPE FITTINGS, TRANSITION COUPLINGS,
MECHANICAL RESTRAINED JOINT FITTINGS,
FLANGED COUPLING ADAPTERS AND HARDWARE**

02650-2

1.05 QUALITY ASSURANCE

- A. Ductile iron fittings shall be manufactured with the material, have the dimensions, be within the tolerances and meet the testing requirements set forth in ANSI A 21.53-00 and ANSI A 21.10-03.
- B. All fittings shall be subject to inspection at the place of manufacture in accordance with the provisions of the referenced standards, as supplemented by the requirements herein.
- C. In addition to those tests specifically required, the Owner's Representative may request additional samples of any material including lining and coating samples for testing by the Owner. The additional samples shall be furnished at no additional cost to the Owner.

PART 2 - PRODUCTS

The Technical Requirements for Ductile Iron Fittings, Transition Couplings, Mechanical Restrained Joint Fittings, Flanged Coupling Adapters and Hardware follow:

2.01 DUCTILE IRON FITTINGS

Fittings and reducers for the water mains shall be composed of ductile iron. The ductile iron fittings shall conform to ASTM A 536. Mechanical joint fittings shall conform with AWWA C 153 C 350 PSI. Flanged fittings shall conform with AWWA C 110 C 250 PSI. Flange fittings shall have standard wall thickness not compact thickness. The fittings shall be cement-mortar lined in accordance with ANSI/AWWA C 104/A 21.4, Standard for Cement-Mortar Lining for Ductile Iron and Gray Iron Pipe Fittings for Water, latest revision. Asphaltic seal coating shall be applied to the interior and exterior of the below-grade fittings in accordance with ANSI/AWWA C 104/A 21.4, asphaltic seal coating shall be applied to the interior of the above-grade fittings. *The exterior surfaces of ductile iron fittings which will be exposed to the atmosphere inside structures above the level of the pipe chase as illustrated on the plans shall be thoroughly cleaned and then given a shop coat of ethyl silicate inorganic zinc-rich primer which is compatible with a polyamide epoxy coating 2nd coat material. The exterior surface of the ductile iron piping within the pipe chase shall be coated with a bituminous coating by the pipe manufacturer prior to delivery.*

**PIPE FITTINGS, TRANSITION COUPLINGS,
MECHANICAL RESTRAINED JOINT FITTINGS,
FLANGED COUPLING ADAPTERS AND HARDWARE**

02650-3

2.02 FLANGED COUPLING ADAPTERS

Flanged coupling adapters shall be used to join plain end pipe with flanged ductile iron fittings and valves. Adapters shall conform to AWWA Specification C 153. Bodies shall be composed of ductile iron and conform with ASTM A 536. The flanged coupling adapter shall be cement lined in accordance with AWWA C 104 (ANSI A 21.4). The flanged coupling adapter shall withstand a working pressure of 350 PSI.

2.03 TRANSITION COUPLING

The transition couplings shall be installed as required. *The center rings shall be constructed of ductile iron conforming to ASTM A 536-80, Grade 65-45-12.* The end rings shall be constructed of ductile iron conforming to ASTM A 536, Grade 65-45-12. Gaskets shall be composed of virgin styrene butadiene rubber (SBR) compounded for water and sewer service in accordance with ASTM D 2000 MBA 810. *The coating for the ductile iron transition coupling shall be fusion bonded epoxy.* The transition coupling shall be capable of sustaining a working pressure of 250 PSI.

2.04 RESTRAINED FLANGE ADAPTER

Restrained Flange Adapters adapt to and restrain plain end ductile iron, PVC, carbon steel and HDPE pipe to flanged pipe or fittings, where the flange conforms to ANSI/AWWA C111/A21.11 with flange surface facing in accordance with ANSI/AWWA C207, latest edition.

Restrained Flange Adapters shall be installed as required by the plans in lieu of threaded or welded flanged spool connections. Flanged adapters shall be made of ductile iron conforming to ASTM A536 and have flange bolt circles that are compatible with ANSI/AWWA C110/A21.10 (125# / Class 150 Bolt Pattern).

Restraint for flange adapter shall consist of a plurality of individual actuated gripping wedges to maximize restraint capability. Torque limiting actuating screws shall be used to insure proper initial set of gripping wedges.

The flange adapters shall be capable of deflection during assembly or permit lengths of pipe to be field cut to allow a minimum 0.6 inch gap between the end of the pipe and the mating flange without affecting the integrity of the seal.

All internal surfaces of the gasket ring (wetted parts) shall be lined with a minimum of 15 mils of fusion bonded epoxy conforming to the applicable requirements of ANSI/AWWA C213. The coating shall meet ANSI/NSF-61. Exterior surfaces of

**PIPE FITTINGS, TRANSITION COUPLINGS,
MECHANICAL RESTRAINED JOINT FITTINGS,
FLANGED COUPLING ADAPTERS AND HARDWARE**

02650-4

the gasket ring shall be coated with a minimum of 6 mils of fusion bonded epoxy conforming to the applicable requirements of ANSI/AWWA C116/A21.16.

The restraint ring shall be coated with a Mega-Bond restraint coating system.

Pressure ratings for the restrained flange adapters shall be 350 psi.

2.05 RESTRAINED JOINT FITTINGS

Mechanical joint restraint shall be incorporated into the design for the follower gland. The gripping or restraining mechanism shall transmit uniform restraining pressure around the circumference of the pipe, thus avoiding point loading or pipe distortion. This restraining process shall be kept separate from the mechanical joint sealing process and *not* a part of the sealing function. All components shall be manufactured of ductile iron conforming to ASTM A 536-80, Grade 65-45-12.

The restrained twist-off nut bolt system shall have a torque limiting feature designed to break off at 75 to 90 FT-LBS of torque to insure proper actuating of restraining devices. Both the twist-off nut and the removal nut shall be the same size as tee-bolt nut. Hardware shall be composed of 316 stainless steel.

The gland shall be such that it can replace the standardized mechanical joint gland and can be used with the standardized mechanical joint bell conforming to ANSI/AWWA C 111/A 21.11, C 110/A 21.10 and C 153/A 21.53 of the latest revision.

The device shall restrain all classes of ductile iron, C 900 PVC, C 905 PVC and high density polyethylene (HDPE) with the use of a standard mechanical joint gasket. The same device without any field modification shall additionally restrain IPS PVC, IPS steel and IPS HDPE with the use of a transition gasket.

The restraining glands shall have a pressure rating equal to twice (2:1) that of the pipe on which it is used. The restraining glands shall have been tested to UNI-B-13-92, be listed by Underwriters Laboratories and be approved by factory mutual. The mechanical joint restraint device shall be UNI-Bell, EBBA Series 2000, Sigma One-Lock or equal.

Restrained joint fittings shall be placed at all termination points, tees, bends, and angle points. Restrained joint fittings shall be placed for connection points of existing to new pipelines, unless noted in the plans. New pipeline-to-pipeline connections shall not be required to have restrained harness assemblies unless noted in the Plans.

**PIPE FITTINGS, TRANSITION COUPLINGS,
MECHANICAL RESTRAINED JOINT FITTINGS,
FLANGED COUPLING ADAPTERS AND HARDWARE**

02650-5

2.06 HARDWARE

Hardware for ductile iron fittings shall conform with ANSI/AWWA C 111/A 21.11-07, Appendix “C”, Section C.1 entitled “Bolts and Nuts”. The size, length and number of bolts are illustrated in Tables 2 and 3 of ANSI/AWWA C 115/A 21.15.

Hardware for transition couplings and mechanical restrained joint fittings shall comply with the manufacturer’s recommendation for steel or ductile iron bolts and nuts.

~~For above ground and underground, all steel or ductile iron nuts and bolts shall be coated with a flouropolymer using Xylan/014 as a primary coating. The coating shall be electrostatically applied to the hardware after all surfaces are chemically cleaned, abrasive blasted and primed with a nickel phosphate primer. Multiple coats of the Xylan/014 shall be applied to the steel or ductile iron hardware and baked at 425°F for one (1) hour. Hardware protected with this coating system shall exhibit no signs of corrosion after salt spray testing up to 3,000 hours. The coating system shall be a Tripac 2000 Blue or an approved equal.~~

All bolts and nuts used in the assembly of ductile iron fittings, transition couplings and valves **in the pipe chase** shall be composed of ductile iron or 316 stainless steel. All bolts and nuts used in the assembly of ductile iron fittings, transition couplings, valves, flowmeters, etc. **above the level of the pipe chase** shall be composed of A-36 steel.

2.07 POLYETHYLENE ENCASEMENT

All below grade ductile iron or gray iron fittings, transition couplings, mechanical restrained joint fittings and coupling adapters shall be polyethylene encased at the time of installation. Polyethylene encasement and installation shall be in accordance with ANSI/AWWA C 105.

**PIPE FITTINGS, TRANSITION COUPLINGS,
MECHANICAL RESTRAINED JOINT FITTINGS,
FLANGED COUPLING ADAPTERS AND HARDWARE**

02650-6

PART 3 - EXECUTION

3.01 INSTALLATION OF FITTINGS, TRANSITION COUPLINGS, MECHANICAL RESTRAINED JOINT FITTINGS, FLANGED COUPLING ADAPTERS AND HARDWARE

- A. All fittings, etc. shall be carefully handled and protected against damage, impact shocks and free fall. All fittings, etc. handling equipment shall be acceptable to the Owner's Representative. Fittings, etc. shall not be placed directly on rough ground, but shall be supported in a manner which will protect the fittings, etc. against damage whenever stored at the trench site. All fittings, etc. damaged prior to Substantial Completion shall be repaired or replaced by the Contractor.

- B. If during the course of fastening and securing the hardware (nuts and bolts) for the fittings, etc., the flouropolymer coated is scratched, chipped or otherwise removed from the hardware surface, then a coating system supplied by the manufacturer shall be applied to the damaged hardware surface. The repair coating system shall be applied prior to the backfilling or covering of the fittings, etc. hardware.

END OF SECTION 02650

**PIPE FITTINGS, TRANSITION COUPLINGS,
MECHANICAL RESTRAINED JOINT FITTINGS,
FLANGED COUPLING ADAPTERS AND HARDWARE**

02650-7

SECTION 02666 – PRESSURE PIPELINE WATER TESTING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The Contractor shall perform flushing and testing of all pipelines and appurtenant piping complete, including conveyance of test water from Engineer-designated source to point of use and disposal thereof after testing, in accordance with the requirements of the Contract Documents. The disposal method of the water shall be reviewed and approved by the Engineer and Chief Water Treatment Plant Operator prior to the commencement of the test.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. ~~Section 02221 – Trenching, Backfilling and Compaction~~
- B. Section 02630 - Ductile Iron Pipeline
- C. Section 02640 - PVC Pipe

PART 2 – PRODUCTS

2.01 MATERIAL REQUIREMENTS

- A. All test equipment, fuel, electrical connections, temporary valves, bulkheads, compressors, water pumps, water gauges and other water control equipment support systems and required materials for hydrostatic or pneumatic air testing shall be furnished by the Contractor subject to the Engineers review.

PART 3 – EXECUTION

3.01 GENERAL

- A. The Contractor shall notify the Engineer and Chief Water Treatment Plant Operator at least ten (10) calendar days in advance of any planned testing and shall review the testing procedures with the Engineer and Chief Water Treatment Plant Operator. The source of testing water and disposal of the testing water shall be reviewed.

PRESSURE PIPELINE WATER TESTING

02666-1

- B. Unless otherwise provided herein, water for testing pipelines shall be furnished by the County of Imperial; however, the Contractor shall make all necessary provisions for conveying the water from the Gateway to the Americas Water Treatment Plant designated source to the points of use. The Contractor shall provide inlet hoses, fittings, piping, pressure gauges pumping equipment, meters, backflow preventers and other required items.
- C. The Contractor shall provide a double bronze service saddle, brass corporation stop, inlet pipeline and outlet pipeline at the beginning and end of the pipeline section to be tested to allow water to be directed into the pipeline and air to be purged from the pipeline while the pipeline is filling with water. The fittings and pipe shall be used during the chlorination and disinfection of the pipeline. After the hydrostatic pipe testing and disinfection of the pipeline are satisfactorily completed remove the corporation stop from the brass service saddle. Place a brass plug in the service saddle inlet.
- D. All pipelines shall be tested. All testing operations shall be performed in the presence of the Engineer and Chief Water Treatment Plant Operator.
- E. The disposal or release of test water from pipelines, after testing, shall be acceptable to the Engineer and Chief Water Treatment Plant Operator. The conveyance items to dispose of the testing water shall be provided by the Contractor.

3.02 HYDROSTATIC TESTING OF PIPELINES

- A. Prior to hydrostatic testing, all pipelines shall be thoroughly flushed of all sand, dirt and material to the satisfaction of the Engineer and Chief Water Treatment Plant Operator. The Contractor shall test all pipelines either in sections or as a unit. The Contractor shall be responsible to insure all test bulkheads and test plates are suitably restrained to resist the thrust of the test pressure without damage to, or movement of, adjacent pipe or structures. Care shall be exercised to insure that all air vents are open during filling.
- B. The pipeline shall be filled at a rate which will not result in surges or exceed the rate at which the air can be released through the air valves at a reasonable velocity and all the air within the pipeline shall be properly purged. After the pipeline or section thereof has been filled it shall be allowed to stand under a slight pressure for at least 24 hours to allow the concrete or mortar lining, if applicable, to absorb water and allow the escape of air from the pipeline. During this period, bulkheads, test plates, valves and connections shall be examined for leaks. If leaks are found, corrective measures shall

PRESSURE PIPELINE WATER TESTING

02666-2

be initiated and completed to the satisfaction of the Engineer and Chief Water Treatment Plant Operator.

- C. The hydrostatic test shall consist of holding the test pressure within the pipeline for a period of 4 hours. The test pressure for pipelines shall be 200 PSI. All leaks shall be repaired. The hydrostatic pressure shall be relieved from the pipeline prior to initiating leak repair.
- D. Pipe leaks, as evidenced by water loss from the basin from which water is pumped into the pipeline, shall not be allowed after the test begins. Test pressures shall be held for at least two (2) hours after the test commences without additional pumping and observed for not less than four (4) hours. Approved gauges shall be provided by the Contractor. Gauge range shall not exceed 50 PSI above test pressure. In the event leaks occur after the hydrostatic test commences, the Contractor shall determine the cause of the leakage and take corrective measures necessary to repair the leaks. After the leaks are satisfactorily repaired the pipeline shall be re-tested.

END OF SECTION 02666

PRESSURE PIPELINE WATER TESTING

02666-3

SECTION 02670 - DISINFECTION OF POTABLE WATER PIPELINES

PART 1 - GENERAL

1.01 DESCRIPTION

Potable pipelines within the water distribution system, Water Treatment Plant, and other areas are to be disinfected prior to being connected to other existing active pipelines and placed in service. The new pipelines are to be isolated from the existing active pipelines (usually by means of a closed valve) until the pipeline has been satisfactorily hydrostatically tested, leak tested (if required) and disinfected. The pipelines shall be hydrostatically and leak tested (if required) as a separate procedure from the pipeline disinfection.

1.02 PURPOSE

The purpose of this standard is to define the minimum requirements for the disinfection of water mains, including the preparation of water mains, application of chlorine, and sampling and testing for the presence of coliform bacteria.

1.03 REFERENCE SECTIONS

Reference sections pertaining to the disinfection testing are as follows:

Section 02630	Ductile Iron Pipe
Section 02640	PVC Pipe
Section 02666	Pressure Pipeline Water Testing
ANSI/AWWA C 651-05	American National Standards Institute/ American Water Works Association
ANSI/AWWA B 300	Hypochlorites
ANSI/AWWA B 301	Liquid Chlorine
AWWA Manual M 12	<i>Simplified Procedures for Water Examination,</i> AWWA: Denver, Colorado

SECTION 2 - PRODUCTS

2.01 GENERAL

DISINFECTION OF POTABLE WATER PIPELINES

02670-1

A. Construction of Pipeline, Associated Fittings, Valves and Components:

The Contractor shall train pipe crews to be aware of the need to maintain clean pipes, fittings, etc and avoid contamination. While bacteriological testing is used to verify the absence of coliform organisms and is generally accepted as verification that disinfection of the pipeline has been accomplished, following sanitary practices for handling and installation of pipe, valves, fittings, and accessories, coupled with adequate flushing of the line before disinfection, is necessary to ensure that the disinfected pipeline will be ready for connection to the water system. Failure to pass the bacteriological test shall require that the flushing or disinfection process be repeated. The final water quality test is not the primary means for certifying the sanitary condition of a main. The sanitary handling of materials, the practices during construction, and the continual inspection of the work are the primary means for ensuring the sanitary condition of the water main.

B. Methods of Disinfecting Newly Constructed Water Pipelines and the Acceptable Method of Disinfecting Pipelines:

The three methods of disinfecting newly constructed water mains are the tablet method, the continuous-feed method and the slug method. Factors considered when selecting a method include the length and diameter of the main, type of joints present, availability of materials, equipment required for disinfection, training of the personnel who will perform the disinfection, and safety concerns. This Project shall allow chlorination of pipelines by the continuous feed method. The tablet method and slug method shall not be allowed.

The tablet method shall not be used unless the main can be kept clean and dry. It shall not be used in large-diameter mains if it is necessary for a worker to enter the main to grout joints or perform inspection, because the tablets may release toxic fumes after exposure to moist air. When using the tablet method, the chlorine concentration is not uniform throughout the main, because the hypochlorite solution is dense and tends to concentrate at the bottom of the pipe. The use of the tablet method precludes preliminary flushing. The tablet method is convenient to use in mains having diameters up to 24 inches, and it requires no special equipment.

The continuous-feed method is suitable for general application. Preliminary flushing removes light particulates from the main but not from the pipe-joint spaces. The chlorine concentration is uniform throughout the main.

The slug method is suitable for use in large-diameter mains where the volume of water makes the continuous-feed method impractical and

DISINFECTION OF POTABLE WATER PIPELINES

02670-2

difficult to achieve for short attachments. The slug method results in appreciable savings of chemicals used to disinfect long, large-diameter mains. Also, this method reduces the volume of heavily chlorinated water to be flushed to waste.

C. Forms of Chlorine for Disinfection:

The forms of chlorine that may be used in the disinfection operations are liquid chlorine, sodium hypochlorite solution, and calcium hypochlorite granules or tablets. For this Project, liquid chlorine shall be used unless otherwise approved by the Owner's Representative.

1. **LIQUID CHLORINE:** Liquid chlorine conforming to ANSI/AWWA B301 contains 100 percent available chlorine and is packaged in steel containers usually of 100-lb., 150-lb., or 1-ton net chlorine weight. Liquid chlorine shall be used only (1) in combination with appropriate gas-flow chlorinators and ejectors to provide a controlled high-concentration solution feed to the water to be chlorinated; (2) under the direct supervision of personnel familiar with the biological, chemical and physical properties of liquid chlorine and who are trained and equipped to handle any emergency that may arise; and (3) when appropriate safety practices are observed to protect working personnel and the public.
2. **SODIUM HYPOCHLORITE:** Sodium hypochlorite conforming to ANSI/AWWA B300 is available in liquid form in glass, rubber-lined, or plastic containers typically ranging in size from 1 quart to 5 gallons. Containers of 30 gallons or larger may be available in some areas. Sodium hypochlorite contains approximately 5 percent to 15 percent available chlorine, and the storage conditions and time must be controlled to minimize its deterioration. (Available chlorine is expressed as a percent of weight when the concentration is 5 percent or less, and usually as a percent of volume for higher concentrations. Percent x 10 = grams of available chlorine per liter of hypochlorite.)
3. **CALCIUM HYPOCHLORITE:** Calcium hypochlorite conforming to ANSI/AWWA B300 is available in granular form or in 5-g tablets, and must contain approximately 65 percent available chlorine by weight. The material should be stored in a cool, dry, and dark environment to minimize its deterioration.

CAUTION: Tablets dissolve in approximately 7 hours and must be given adequate contact time. Do not use calcium hypochlorite intended for swimming pool disinfection, as this material has been

DISINFECTION OF POTABLE WATER PIPELINES

02670-3

sequestered and is extremely difficult to eliminate from the pipe after the desired contact time has been achieved.

D. Preventative and Corrective Measures to be Implemented during the Construction of Pipelines:

Heavy particulates (dirt, soil, rocks, etc.) generally contain bacteria and prevent even very high chlorine concentrations from contacting and killing organisms. Therefore, the procedures of this Section shall be stringently implemented by the Contractor and enforced by the Owner's Representative to ensure that water pipelines, fittings, etc., have been thoroughly cleaned before flushing the pipeline for the final disinfection by chlorination. Also, any connection of a new water main to the active distribution system prior to the receipt of satisfactory bacteriological samples constitute a cross-connection in violation of the California Health Department requirements. The new main shall be isolated until bacteriological tests described later in this Section are satisfactorily completed. The Contractor shall complete the following tasks or observe the following precautionary measures during the installation of the water pipeline:

1. The interiors of pipes, fittings and valves shall be protected from contamination by dirt, debris, rocks, concrete residue, water and similar items.
2. Openings in the pipeline shall be closed with watertight plugs when pipe laying is stopped at the close of the day's work or for other reasons, such as rest breaks or meal periods. Rodent-proof plugs may be used when watertight plugs are not practicable and when thorough cleaning will be performed by flushing or other means.
3. Delay in placement of delivered pipe invites contamination. Pipe delivered to the site shall be covered with tarps. The tarps shall be placed over the pipes and end of the pipes to minimize the entrance of dirt, dust and construction debris.
4. Sealing Materials: No contaminated material or any material capable of supporting growth of microorganisms shall be used for sealing joints. Sealing material or gaskets shall be handled in a manner that avoids contamination. The lubricant used in the installation of sealing gaskets shall be suitable for use in potable water and shall not contribute odors. It shall be delivered to the job in closed containers and shall be kept clean and applied with dedicated, clean applicator brushes.

DISINFECTION OF POTABLE WATER PIPELINES

02670-4

5. If dirt or other contaminants enter a pipeline, fitting, transition coupling, valve or any other pipeline, it shall be swept from the interior of the pipeline, fitting, etc. The contaminated area shall be wiped clean with an ammonia solution disinfectant. After each pipe section is installed the end of the pipe shall be inspected for the entrance of dirt and other contaminants. If dirt or contaminants are identified the dirt and contaminants shall be removed prior to the installation of the next pipe length. Correspondingly, the pipe end to be “stabbed” into the previously installed pipe segment shall be checked for dirt contamination and cleaned and disinfected accordingly.
6. Flooding by Storm or Accident during Construction: If the pipeline is flooded during construction, it shall be cleared of the floodwater by draining and flushing with potable water until the main is clean. The section exposed to the floodwater shall then be filled with a chlorinated potable water that, at the end of a 24 hour holding period, shall have a free chlorine residual of not less than 25 mg/L. The chlorinated water shall then be drained or flushed from the main. After construction is completed, the main shall be disinfected for a second time using the continuous-feed method.

PART 3 - EXECUTION

3.01 GENERAL

The water pipeline shall be thoroughly flushed with potable water prior to the chlorination of the pipeline. Prior to the flushing of the water pipeline it may be necessary to construct temporary flushing and testing connections at the upstream and downstream ends of the pipelines to be tested. If new pipelines are to be connected to existing in-service pipelines with new valves installed at the connection fittings between the new and existing pipelines which reliably isolate the new pipeline from the existing in-service pipeline, then blowoffs and properly positioned fire hydrants allow for the adequate flushing of the pipeline and allow for the dispersion of chlorine by the continuous-feed method. This method is particularly applicable to new commercial or residential developments which occur within an existing pipe distribution system.

If new pipelines are to be connected to existing in-service pipelines, concrete structures and reservoirs with no reliable valve at the connection point of the new pipeline to isolate the new pipeline from the existing in-service pipelines, concrete structures and reservoirs, then temporary caps or plugs (blind flanges), supply hoses, control valves, backflow devices, discharge/flushing lines and sampling faucets shall be constructed. This pipeline condition often occurs within water treatment plants. The pipelines within water treatment plants in the condition

DISINFECTION OF POTABLE WATER PIPELINES

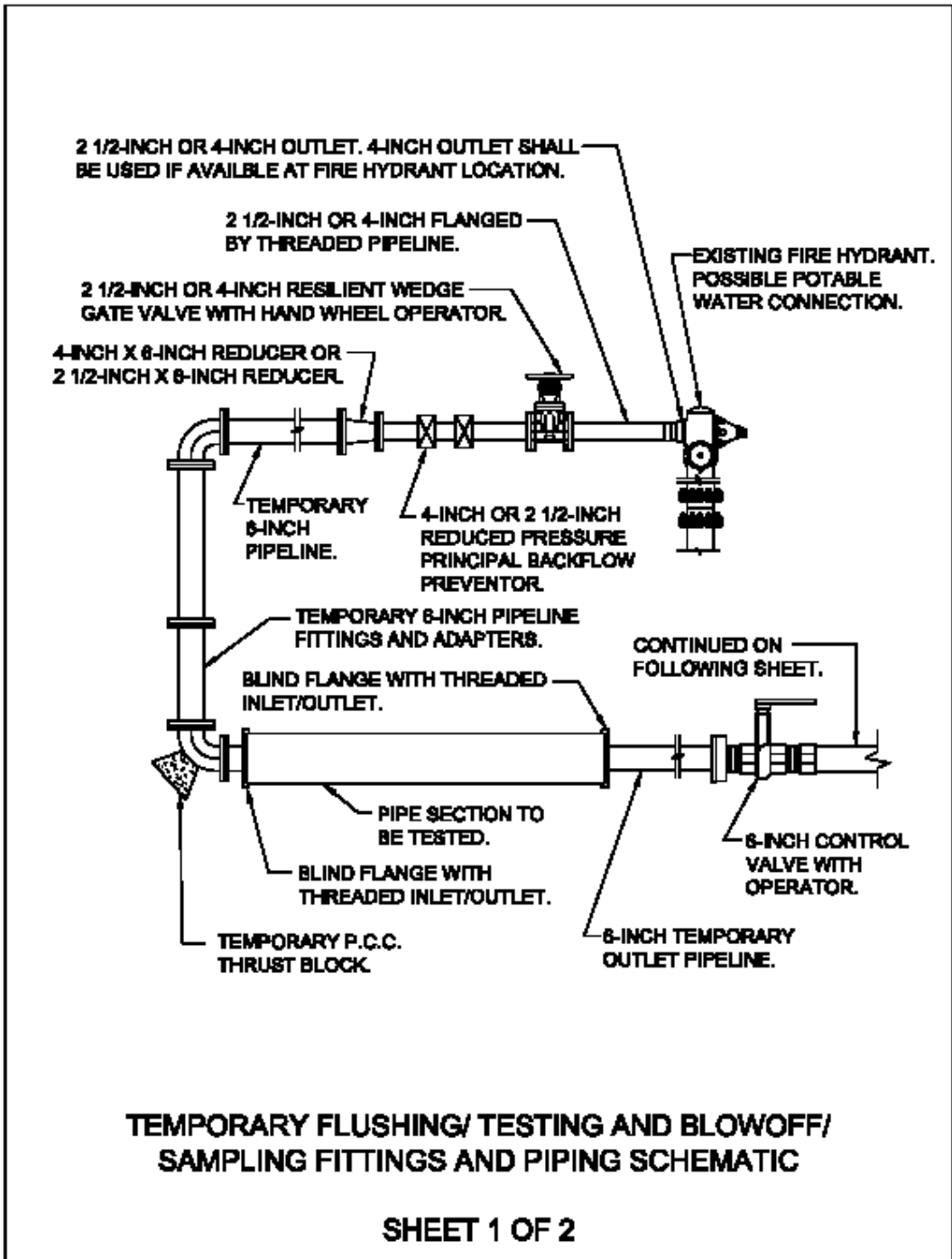
02670-5

described within this paragraph shall be flushed, chlorinated and tested while physically separated from existing in-service pipelines, reservoirs and concrete structures. The physically separated pipeline section shall be hydrostatically tested prior to the flushing, chlorination and testing of the pipeline section. Potable water from an outside source shall be required to be conveyed to the new pipeline for flushing and disinfecting via a temporary connection supplied and installed by the Contractor. The temporary connection shall be disconnected (physically separated) from the new pipeline during the hydrostatic pressure test. The temporary connection shall include a reducer fitting from the fire hydrant, 4 inch control valve, 4 inch backflow preventer based upon a reduced pressure principal, 4 inch supply hose or pipeline, temporary testing block, blind flange with 4 inch threaded outlet, 4 inch discharge piping, 4 inch discharge control valve and smooth, unthreaded sampling faucet. It shall be necessary for the Contractor to provide all other necessary fittings, adapters, hardware and other components. The discharge pipeline shall extend to a discharge point acceptable to the Engineer and Chief Water Treatment Plant Operator. If the discharge pipeline extends through on-site roadways or into the public right of way then the Contractor shall place the temporary discharge pipeline below grade. The Contractor shall perform all cutting, demolition and replacement of P.C.C. infrastructure as required by Division 1 of the Technical Specifications. The Contractor shall core the side of manholes, install the discharge pipeline to the interior wall face of the manhole and grout the annular space between the exterior circular core and the exterior of the pipeline for the full thickness of the manhole shaft with a non-shrink grout. At the conclusion of the pipeline disinfection all upstream and downstream pipelines, supply hoses, valves, check valves, fittings, blind flanges and components shall be removed from the Project Site. The interior of any discharge pipeline extending into manholes shall be plugged for the full width of the manhole shaft wall width with a non-shrink grout.

A schematic of the temporary flushing/testing connection and schematic of the discharge blowoff/sampling tap pipeline follows. The schematic drawings are intended to illustrate the concept and major components required for the disinfection of the pipeline. The schematics do not illustrate each fitting, adapter and component required for the flushing/testing connection pipeline or the discharge blowoff/sampling tap pipeline nor do the schematics illustrate the lengths of pipelines required, number of fittings, number of valves, etc. The schematics do not illustrate where the source of water is to be obtained or the discharge point the blowoff pipeline is to extend to. It is the responsibility of the Contractor to determine the source of the potable water, length of the connection pipeline, exact number and type of fittings, valves and adapters, length of the blowoff pipeline, exact number and type of fittings, valves and adapters, paving and concrete demolition and replacement requirements and similar logistical placement, pipe mechanic and civil infrastructure issues. Following are the Temporary Flushing/Testing Connection Schematic and Blowoff Sampling Point Discharge Pipeline Schematic Drawings:

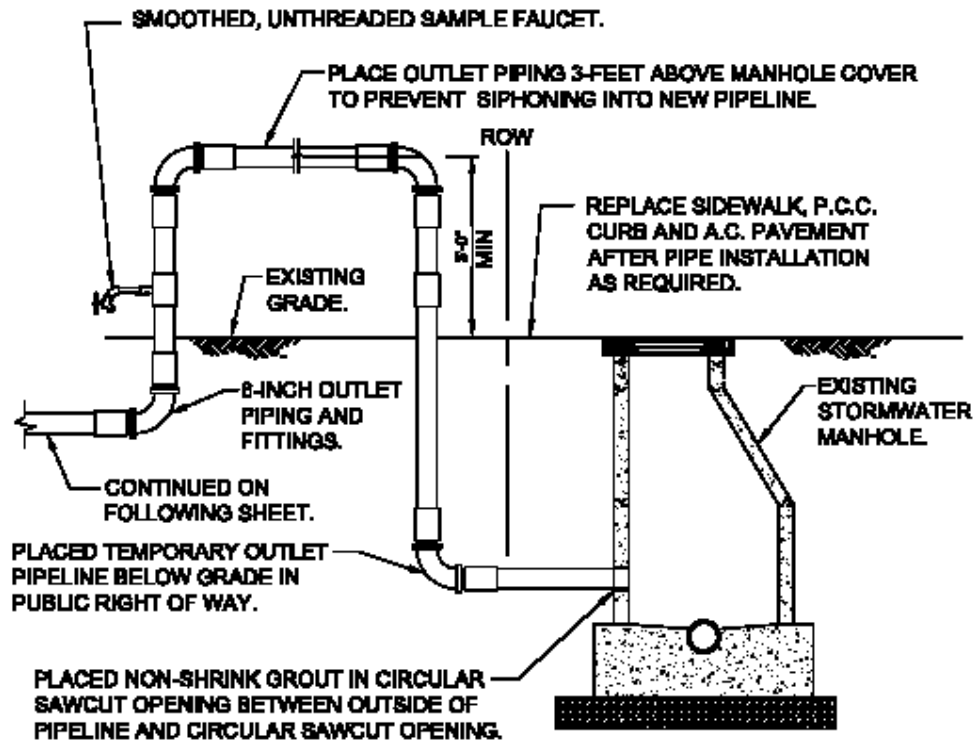
DISINFECTION OF POTABLE WATER PIPELINES

02670-6



DISINFECTION OF POTABLE WATER PIPELINES

02670-7



**TEMPORARY FLUSHING/ TESTING AND BLOWOFF/
SAMPLING FITTINGS AND PIPING SCHEMATIC**

SHEET 2 OF 2

DISINFECTION OF POTABLE WATER PIPELINES

02670-8

3.02 CHLORINATION PROCEDURE

- A. Pipeline shall be thoroughly flushed prior to the commencement of the introduction of chlorine disinfectant.

Pipelines within a distribution system or a network of pipelines shall be flushed at each hydrant, blowoff, or service pipeline. It shall be necessary to install sampling/blowoff assemblies at the termination ends of pipe segments to allow the extremities of the pipeline to be flushed and for chlorinated water to be dispersed throughout the new water pipeline section in the event blowoffs or fire hydrants are not placed at the extremities of the pipeline to be tested. At least one (1) blowoff/sampling point assembly shall be placed at the extremities of the pipe section to be tested for sampling purposes. Sampling shall not be allowed through fire hydrants or water fittings with threaded ends. The Contractor shall install at least one (1) blowoff/sampling assembly at the end of each pipeline section to be tested; even if the blowoff/sampling assembly is not illustrated on the Plans. The Contractor shall be required to install the blowoff/sampling assembly as a requirement of this pipeline disinfection specification section. The Contractor shall not be compensated for the costs of the blowoff/sampling assembly. The cost of the installation of the blowoff/sampling assembly shall be incidental to the costs of disinfecting the pipeline.

Pipelines physically separated from existing in-service pipelines, reservoirs and concrete structures (as is often the case at Water Treatment Plants), shall be flushed with temporary pipeline connections upstream and downstream of the pipeline section to be disinfected as described in Section 3.01 of this specification.

Flushing of pipelines within a distribution system shall occur through fire hydrants, blowoffs, water services and blowoff/sampling points for a minimum of 10 minutes with the potable water source placed at maximum flow and maximum pressure. Flushing shall continue until no evidence of dirt is evident from the discharge water. Flushing shall be accomplished through fire hydrants or blowoffs if possible. Flushing of the water pipeline shall occur through a blowoff/sampling point assembly as a last resort. The pipeline contractor shall take necessary precautions to avoid damage to existing structures and utilities.

Flushing of physically separated pipelines shall be accomplished for a minimum of 10 minutes with the potable water source placed at maximum flow and maximum pressure. Flushing of the pipeline shall continue until no evidence of dirt is visible from the discharge water entering the downstream deposition point. The pipeline contractor shall take necessary precautions to avoid damage to existing structures and utilities.

DISINFECTION OF POTABLE WATER PIPELINES

02670-9

- B. After flushing of the water pipelines is satisfactorily accomplished and approved by the Engineer and Chief Water Treatment Plant Operator, chlorinated water shall be introduced to the pipeline. The pipelines shall be chlorinated in accordance with AWWA C 651.

The continuous-feed method of chlorine application shall be employed. The use of chlorine tablets or granules shall not be allowed.

Direct-feed chlorinators, which operate solely from gas pressure in the chlorine cylinder, shall not be used for the application of liquid chlorine. (The danger of using direct-feed chlorinators is that water pressure in the main can exceed gas pressure in the chlorine cylinder. This allows a backflow of water into the cylinder, resulting in severe cylinder corrosion and the escape of chlorine gas.) The preferred equipment for applying liquid chlorine is a solution-feed, vacuum-operated chlorinator and a booster pump. The vacuum-operated chlorinator mixes the chlorine gas in solution water; the booster pump injects the chlorine-gas solution into the main to be disinfected. Hypochlorite solutions may be applied to the water main with a fuel or electrically powered chemical-feed pump designed for feeding chlorine solutions. Feed lines shall be made of material capable of withstanding the corrosion caused by the concentrated chlorine solutions and the maximum pressures that may be created by the pumps. All connections shall be checked for tightness before the solution is applied to the pipeline.

Chlorine shall be dispersed through the pipeline at 100 ppm. Chlorine shall be flushed through all fire hydrants, blowoffs, water services and blowoff/sampling assemblies. Chlorine shall continue to be flushed through the above listed items until the chlorine concentration is measured at 100 ppm or greater.

The chlorinated water shall remain in the pipeline for a minimum 24-hour period and not longer than 48 hours. The chlorine residual shall be a minimum of 50 ppm after the 24 hour period; or prior to flushing the heavily chlorinated water from the pipeline. The heavily chlorinated water shall not remain in the pipeline over 48 hours as prolonged exposure to the heavily chlorinated water may damage (corrode) pipelines, fittings, valves and other piping components. The heavily chlorinated water shall be flushed from the pipeline, pipeline fittings, water services, fire hydrants, blowoffs, blowoff/sampling assemblies and all other pipe connections. The heavily chlorinated water shall be flushed until chlorine samples of the flushed water confirm that the chlorine concentration is no higher than the water in the in-service distribution system or the water source used for the disinfection process.

DISINFECTION OF POTABLE WATER PIPELINES

02670-10

The environment to which the heavily chlorinated water is to be discharged shall be inspected. In the opinion of the Engineer and Chief Water Treatment Plant Operator, if there is a possibility that the chlorinated water will result in damage to the environment, then the Engineer and Chief Water Treatment Plant Operator shall require a neutralizing chemical be applied to the water to be wasted (prior to discharge) by means of a neutralizing chemical. Neutralizing chemicals may be sulfur dioxide, sodium bisulfite, sodium sulfite, sodium thiosulfate or ascorbic acid. Appendix "C" of ANSI/AWWA C 651-05 lists the neutralizing chemicals and the suggested neutralizing chemical concentrations per 100,000 gallons of water.

The Contractor shall be responsible for the discharging of the heavily chlorinated water. The Contractor shall provide all piping, fittings, etc. to convey the heavily chlorinated water from the disinfected pipeline per Item 3.01 of this Specification.

- C. After final flushing and before the disinfected water pipeline is connected to the distribution system or in-service pipeline system, two (2) consecutive sets of acceptable samples, obtained a minimum of 24 hours apart, shall be collected from the disinfected pipeline.

One (1) set of samples shall be collected from every 1,200 feet of new water pipeline and one (1) set shall be obtained from the end point(s) of the disinfected water pipeline(s). If disinfected water pipelines terminate (dead-end) at cul-de-sacs, a sample shall be obtained from the termination point of the pipelines. As was noted by the previous sections, The Contractor shall install blowoff/sampling point assemblies at pipeline termination points as required.

Samples shall be tested for bacteriological (chemical and physical) quality in accordance with *Standard Methods for the Examination of Water and Wastewater* and shall show the absence of coliform organisms; and chlorine residual. Turbidity, pH, and a standard heterotrophic plate count (HPC) test shall be required. New pipeline does not typically contain coliforms but does typically contain HPC bacteria.

Samples for bacteriological analysis shall be collected in sterile bottles treated with sodium thiosulfate, as required by *Standard Methods for the Examination of Water and Wastewater*. No hose, fire hydrant or threaded fitting outlet shall be used in the collection of samples. There should be no water in the trench up to the connection for sampling. The sampling pipe must be dedicated and clean and disinfected and flushed prior to sampling.

DISINFECTION OF POTABLE WATER PIPELINES

02670-11

If sample results from the lab indicate a measured HPC greater than 500 colony-forming units (cfu) per ml, flushing should be resumed and another coliform and HPC set of samples shall be obtained until no coliforms are present and the HPC is less than 500 cfu/ml.

The record of disinfection compliance shall be the bacteriological test results certifying that the water sampled from the disinfected water main is free of coliform bacteria contamination and is equal to or better than the bacteriologic water quality in the distribution system.

If the initial disinfection fails to produce satisfactory bacteriological results or if other water quality is affected, the disinfected pipeline may be reflushed and shall be resampled. If succeeding samples also fail to produce acceptable results, the disinfected pipeline shall be rechlorinated by the continuous-feed method until satisfactory results are obtained, satisfactory results being derived from two (2) consecutive sets of acceptable samples taken 24 hours apart.

The Contractor shall be responsible for all expenses relative to the chlorination and disinfection of the pipelines. The costs of re-testing shall also be borne by the Contractor. The City, County or District Water Department within which the disinfected pipeline is located shall coordinate obtaining the tests and select the testing laboratory to perform the tests. The Contractor shall be responsible for all expenses relative to the laboratory testing.

The disinfected pipeline shall not be placed in service until evidence that the bacteriological tests have proved negative and successfully met the testing requirements and are presented to the Engineer and Chief Water Treatment Plant Operator. The Engineer and Chief Water Treatment Plant Operator shall allow the disinfected pipeline(s) to be connected to the in-service pipeline after the evidence is presented to him/her by the Contractor. The evidence shall consist of the original laboratory report document certifying the laboratory test results comply with the disinfection requirements of this document.

3.03 FINAL CONNECTION PIPE SEGMENT DISINFECTION REQUIREMENTS

If approved by the Engineer and Chief Water Treatment Plant Operator, final connection pipe segments (measuring 18.5 feet or less) located between the existing in-service pipeline and the valve or temporary termination point of a successfully disinfected pipe section may be spray disinfected or swabbed with a minimum 1-5 percent solution of chlorine prior to final installation. The installation of the final connection pipe segment shall be witnessed by the Engineer and Chief Water Treatment Plant Operator. If dirt, debris or any contaminating substances enter the

DISINFECTION OF POTABLE WATER PIPELINES

02670-12

pipe section between the disinfection process and installation process the pipe section shall be removed and re-disinfected. The Contractor shall immediately remove the pipe section from the pipe trench and re-disinfect the pipe section if required by the Engineer and Chief Water Treatment Plant Operator. The disinfection of the pipeline shall require that all dirt, construction residue, dust and contaminants be thoroughly pressure washed from the interior of the pipeline, valve, fitting, transition coupling and other pipe component interior surfaces. The interior surfaces shall be dried clean with a cloth or paper towels. The interior surfaces shall then be disinfected with the minimum 1-5 percent solution of chlorine. The pipe section shall not be allowed to be set in place for connection to the existing in-service pipeline until the Engineer and Chief Water Treatment Plant Operator approves the witnessed disinfection of the pipeline section.

END OF SECTION 02670

DISINFECTION OF POTABLE WATER PIPELINES

02670-13

SECTION 03100 - CONCRETE FORMWORK

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The Contractor shall provide concrete formwork, bracing, shoring, supports, and false work, in accordance with the Contract Documents.
- B. Work included in this Section: Principal items are:
 - 1. Furnishing, erection, and removal of forms.
 - 2. Shoring and bracing of formwork.
 - 3. Setting of embedded items and pipe sleeves for mechanical and electrical work under direction of respective trade.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. The Work of the following Sections apply to the Work of this Section. Other Sections, not referenced below, shall also apply to the extent required for proper performance of the Work.
 - 1. Section 03200 - Reinforcement Steel
 - 2. Section 03300 - Cast-in-Place Concrete

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. Except as otherwise indicated in this Section of the Specifications, the Contractor shall comply with the latest adopted edition of the Standard Specifications for Public Works Construction (SSPWC), together with the latest adopted editions of the Regional Amendments.
- B. The current edition of the Uniform Building Code (UBC) of International Conference of Building Officials (ICBO).
- C. Except as otherwise indicated, the current editions of the following apply to the Work of this Section:
 - 1. PS 1 U.S. Product Standard for Concrete Forms, Class 1
 - 2. PS 20 American Softwood Lumber Standard

CONCRETE FORMWORK

03100-1

3. ACI 117 Standard Tolerances for Concrete Construction and Materials
4. ACI 347 Recommended Practice for Concrete Formwork

1.04 CONTRACTOR SUBMITTALS

- A. The Contractor shall, in accordance with the requirements in the Specification Section 01300 – Concrete Submittals, forward detailed drawings of the false work proposed to be used. Such drawings shall be in sufficient detail to indicate the general layout, sizes of members, anticipated stresses, grade of materials to be used in the false work, means of protecting existing construction which supports false work, and typical soil conditions.
- B. The Contractor shall, in accordance with the requirements in the Specification Section 01300 – Contractor Submittals, forward the following:
 1. Form ties and all related accessories, including taper tie plugs, if taper ties are used.
 2. Form gaskets.
- C. The Contractor shall submit shop drawings showing the proposed location and type of required construction for any joints not shown on the Plans, and the sequence of forming and concrete placing operations.
- D. Forms and false work to support the roof and floor slabs shall be designed for the total dead load, plus a live load of 50 PSF (minimum). The minimum design load for combined dead and live loads shall be 100 PSF.
- E. The Contractor shall design formwork prior to fabrication, placing the order, or use on the jobs.
- F. The Contractor shall design joints in forms to remain mortar-tight and withstand placing pressures without bulging outward or creating surface patterns.
- G. Calculations shall be signed and sealed by a Professional Civil or Structural Engineer registered in the State of California for both the forming system and the stresses induced on the form system.
- H. Suitable and effective means shall be provided for holding adjacent edges and end panels and sections tightly together and in accurate alignment so as to prevent the formation of ridges, fins, offsets or similar surface defects in

CONCRETE FORMWORK

03100-2

the finished concrete. The forms shall be tight so as to prevent the loss of water, cement, and fines during placing and vibrating of the concrete.

1.05 QUALITY ASSURANCE

- A. The Contractor shall comply with the requirements of the California Division of Occupational Health and Safety Construction Safety Orders Section 1717 and OSHA Part 1926, Section 1926.701 that apply to the Work of this Section. The Contractor shall prepare and maintain at least one copy of the required Plans at the site. The design of the structures shown on the Plans does not include any allowance or consideration for imposed construction loads. The Contractor shall provide forms, shoring and false work adequate for imposed live and dead loads, including equipment, height of concrete drop, concrete and foundation pressures, stresses, lateral stability, and other safety factors during construction.
- B. Tolerances: The Contractor shall employ formwork complying with ACI 347 Guide to Formwork for Concrete, except as exceeded by the requirements of regulatory agencies, or as otherwise indicated or specified. The Contractor shall design and construct formwork to produce finished concrete conforming to P tolerances given in ACI 117.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Except as otherwise accepted by the Owner's Representative, all lumber brought on the Site for use as forms, shoring, or bracing shall be new material. All forms shall be smooth surface forms and shall be of the following materials:
 - Walls: Steel or plywood panel
 - Columns: Steel, plywood or fiberglass
 - Roof and Floor: Plywood
 - All Other Work: Steel panels, plywood or tongue and groove lumber
- B. Form materials which may remain or leave residues on or in the concrete shall be classified as acceptable for potable water use by the Environmental Protection Agency within 30 days of application or use.

2.02 FORM AND FALSE WORK MATERIALS

- A. Materials for concrete forms, formwork, and false work shall conform to the following requirements:

CONCRETE FORMWORK
03100-3

1. Lumber shall be Douglas Fir or Southern Yellow Pine, construction grade or better, in conformance with U.S. Product Standard PS 20.
2. Plywood for concrete formwork shall be new, waterproof, synthetic resin bonded; exterior type Douglas Fir or Southern Yellow Pine plywood manufactured especially for concrete formwork and shall conform to the requirements of PS 1 for Concrete Forms, Class I, and shall be edge sealed.
3. Form materials shall be metal, wood, plywood, or other approved material that will not adversely affect the concrete and will facilitate placement of concrete to the shape, form, line, and grade shown. Metal forms shall be an approved type that will accomplish such results. Wood forms for surfaces to be painted shall be Medium Density Overlaid plywood, MDO Ext. Grade.

2.03 FORM TIES

- A. Form ties with integral waterstops shall be provided with a plastic cone or other suitable means for forming a conical hole to ensure that the form tie may be broken off back of the face of the concrete. The maximum diameter of removable cones for rod ties, or of other removable form-tie fasteners having a circular cross-section, shall not exceed 1-1/2 inches; and all such fasteners shall be such as to leave holes of regular shape for reaming. Form ties shall be Burke Penta-Tie System by The Burke Company; Richmond Snap-Tys by the Richmond Screw Anchor Company; or equal.
- B. Form ties for water-retaining structures shall have integral waterstops. Removable taper ties may be used when approved by the Owner's Representative or Resident Project Representative. A preformed neoprene or polyurethane tapered plug sized to seat at the center of the wall shall be inserted in the hole left by the removal of the taper tie. Use Burke Taper-Tie System by The Burke Company; Taper-Ty by the Richmond Screw Anchor Company; or equal.

2.04 FORM COATING

- A. Non-grainrising and nonstaining resin or polymer type that will not leave residual matter on surface of concrete or adversely effect bonding to concrete of paint, plaster, mortar, protective coatings, waterproofing or other applied materials. Coatings containing mineral oils, paraffins, waxes or other nondrying ingredients, are not permitted. For concrete surfaces contacting potable stored water, use only coatings and form-release agents that are completely nontoxic.

CONCRETE FORMWORK

03100-4

2.05 FORM JOINT SEALERS

- A. For joints between form panels, use resilient foam rubber strips, non-hardening plastic-type caulking compound free of oil, or waterproof pressure-sensitive plastic tape of minimum 8 mil thickness and 2 inches width. For form tie holes, use rubber plugs, plastic caulking compound, or equal.

PART 3 - EXECUTION

3.01 GENERAL

- A. Forms to confine the concrete and shape it to the required lines shall be used wherever necessary. The Contractor shall assume full responsibility for the adequate design of all forms, and any forms which are unsafe or inadequate in any respect shall promptly be removed from the Work and replaced at no increased cost to the Owner. The Contractor shall provide worker protection from protruding reinforcement bars in accordance with applicable safety codes. A sufficient number of forms of each kind shall be provided to permit the required rate of progress to be maintained. The design and inspection of concrete forms, false work, and shoring shall comply with applicable local, state and Federal regulations. Plumb and string lines shall be installed before concrete placement and shall be maintained during placement. Such lines shall be used by Contractor's personnel and by the or Resident Project Representative and shall be in sufficient number and properly installed. During concrete placement, the Contractor shall continually monitor plumb and string line form positions and immediately correct deficiencies.
- B. Concrete forms shall conform to the shape, lines, and dimensions of members as called for on the Drawings, and shall be substantial, free from surface defects, and sufficiently tight to prevent leakage. Forms shall be properly braced or tied together to maintain their position and shape under a load of freshly placed concrete. If adequate foundation for shores cannot be secured, trussed support shall be provided.
- C. Unless otherwise indicated, exterior corners in concrete members shall be provided with ¾ inch chamfers. Re-entrant corners in concrete members shall not have fillets unless otherwise indicated.
- D. The Contractor shall notify the Owner's Representative or Resident Project Representative at least 48 hours prior to concrete placement so the completed formwork can be inspected.

CONCRETE FORMWORK

03100-5

- E. Final inspection will be made only after all formwork, embeds, blowouts, screeds, ties, final adjustments, and related work have been completed by the Contractor.
- F. The Contractor shall correct defective work identified by the Owner's Representative or Resident Project Representative, prior to delivery of the concrete.
- G. Neither the review of the Contractor's drawings nor inspection of forms by the Owner's Representative or Resident Project Representative shall relieve the Contractor of responsibility for the adequacy of the forms nor from the necessity for remedying all defects which may develop or become apparent with use. The Owner's Representative or Resident Project Representative may at any time condemn any section or sections of the forms found deficient. The Contractor shall promptly remove the condemned forms from the Work and replace them.

3.02 FORM DESIGN

- A. All forms shall be true in every respect to the required shape and size, shall conform to the established alignment and grade, and shall be of sufficient strength and rigidity to maintain their position and shape under the loads and operations incident to placing and vibrating the concrete. Suitable and effective means shall be provided on all forms for holding adjacent edges and ends of panels and sections tightly together and in accurate alignment so as to prevent the formation of ridges, fins, offsets, or similar surface defects in the finished concrete. Plywood, 5/8 inch and greater in thickness, may be fastened directly to studding if the studs are spaced close enough to prevent visible deflection marks in the concrete. The forms shall be tight so as to prevent the loss of water, cement and fines during placing and vibrating of the concrete. Specifically, the bottom of wall forms that rest on concrete footings or slabs shall be provided with a gasket to prevent loss of fines and paste during placement and vibration of concrete. Such gasket may be a 1- to 1-1/2 inch diameter polyethylene rod held in position to the underside of the wall form. Adequate clean-out holes shall be provided at the bottom of each lift of forms. The size, number, and location of such clean-outs shall be as acceptable to the Owner's Representative or Resident Project Representative. Whenever concrete cannot be placed from the top of a wall form in a manner that meets the requirements of the Contract Documents, form windows shall be provided in the size and spacing needed to allow placement of concrete to the requirements of Section 03300 - Cast-in-Place Concrete. The size, number, and location of such form windows shall be as acceptable to the Owner's Representative.

CONCRETE FORMWORK
03100-6

B. Wall Forms:

1. All walls shall be formed by methods acceptable to the Owner's Representative or Resident Project Representative and to the correct elevations and location illustrated on the Plans.

2. Pouring Openings:

a) The minimum pouring opening size shall be 18" x 18".

b) The bottom of the lower openings shall be no more than 48 inches from the top of the wall-footing.

c) The horizontal centerline distance between such openings shall not exceed 96 inches nor shall the distance between the nearest opening and the bulkhead for the vertical joint exceed 36 inches.

d) The vertical centerline distance between horizontal rows of openings shall not exceed 96 inches.

e) Under no circumstances shall forming be such that the drop of concrete in the forms will exceed 4 feet in any one place.

3.03 CONSTRUCTION

A. Vertical Surfaces: All vertical surfaces of concrete members shall be formed, except where placement of the concrete against the ground is shown. Not less than 1 inch of concrete shall be added to the thickness of the concrete member as shown where concrete is permitted to be placed against trimmed ground in lieu of forms. Such permission will be granted only for members of comparatively limited height and where the character of the ground is such that it can be trimmed to the required lines and will stand securely without caving or sloughing until the concrete has been placed.

B. Construction Joints: Concrete construction joints will not be permitted at locations other than those shown or specified, except as may be acceptable to the Owner's Representative or Resident Project Representative. When a second lift is placed on hardened concrete, special precautions shall be taken in the way of the number, location, and tightening of ties at the top of the old lift and bottom of the new to prevent any unsatisfactory effect whatsoever on the concrete. Pipe stubs and anchor bolts shall be set in the forms where required.

CONCRETE FORMWORK

03100-7

C. Form Ties:

1. Embedded Ties: Holes left by the removal of form tie cones shall be reamed with suitable toothed reamers so as to leave the surface of the holes clean and rough before being filled with non-shrink grout as specified for "Finish of Concrete Surfaces" in Section 03315 - Grout. Wire ties for holding forms will not be permitted. No form-tying device or part thereof, other than metal, shall be left embedded in the concrete. Ties shall not be removed in such manner as to leave a hole extending through the interior of the concrete members. The use of snap-ties which cause spalling of the concrete upon form stripping or tie removal will not be permitted. If steel panel forms are used, rubber grommets shall be provided where the ties pass through the form in order to prevent loss of cement paste. Where metal rods extending through the concrete are used to support or to strengthen forms, the rods shall remain embedded and shall terminate not less than 1 inch back from the formed face or faces of the concrete.
2. Removable Ties: Where taper ties are approved for use, the larger end of the taper tie shall be on the wet side of walls in water retaining structures. After the taper tie is removed, the hole shall be thoroughly cleaned and roughened for bond. A precast neoprene or polyurethane tapered plug shall be located at the wall centerline. The hole shall be completely filled with non-shrink grout for water bearing and below-grade walls. The hole shall be filled with non-shrink or regular cement grout for above-grade walls which are dry on both sides. Exposed faces of walls shall have the outer 2 inches of the exposed face filled with a cement grout which shall match the color and texture of the surrounding wall surface.

D. Embedded Items:

1. Before the placement of concrete within the forms, each trade having embedded items, including waterstops within the forms and affected by the pour, shall certify that all items are properly located and braced. This certification shall be provided by the Contractor to the Owner's Representative or Resident Project Representative at least 48 hours in advance of placement.

3.04 EMBEDDED PIPING AND ROUGH HARDWARE

- A. The Contractor shall consult with all trades which require openings for the passage of pipes, conduits and other inserts, and properly and accurately install the necessary pipe sleeves, anchors, or other required inserts, and

CONCRETE FORMWORK

03100-8

properly size the equipment pads. The Contractor shall reinforce openings as indicated and required. The Contractor shall locate conduits or pipes so as not to reduce the strength of the construction, and in no case, place pipes, other than conduits in a slab 4-1/2 inches or less in thickness. The Contractor shall not embed conduit having an outside diameter greater than 1/3 of the thickness of the slab in a concrete slab, nor place conduit below bottom reinforcing steel or over top reinforcing steel. Conduits may be embedded in walls, provided they are not larger in outside diameter than 1/3 the thickness of the wall, are not spaced closer than three diameters on center, and do not impair the strength of the structure. The Contractor shall support embedded pipes and conduits independently from reinforcing steel in a manner to prevent metallic contact, and thereby, prevent electrolytic deterioration. The Contractor shall place embedded pipes and conduits as nearly as possible to the centerline of the concrete section. The Contractor shall submit all conduit, piping and other wall penetrations, reinforcements and anchor bolt sizing and locations for review and approval.

3.05 REMOVAL OF FORMS

- A. Careful procedures for the removal of forms shall be strictly followed, and this Work shall be accomplished with care so as to avoid injury to the concrete. No heavy loading on green, insufficiently cured concrete will be permitted. In the case of roof slabs and above-ground floor slabs, forms for supported slab, but not shoring, shall remain in place until test cylinders for the roof concrete attain a minimum compressive strength of 75 percent of the 28 day strength specified in Section 03300 - Cast-in-Place Concrete; provided, that no forms shall be disturbed or removed under an individual panel or until before the concrete in the adjacent panel or unit has attained 75 percent of the specified 28 day strength and has been in place for a minimum of 7 days. The time required to establish said strength shall be as determined by the Owner's Representative from several test cylinders obtained by the Contractor for this purpose from concrete used in the first group of roof panels placed. If the time so determined is more than the 7-day minimum, then that time shall be used as the minimum length of time. Forms for all vertical walls and columns shall remain in place at least 2 days after the concrete has been placed. Forms for all parts of the Work not specifically mentioned herein shall remain in place for periods of time as determined by the Owner's Representative.
- B. The Contractor shall not backfill against walls until the top slab is in place and all concrete has obtained compressive strength equal to the specified 28-day compressive strength.
- C. Immediately upon removal of the forms, the concrete surfaces shall be thoroughly wetted and shall be kept wet until the curing compound is

CONCRETE FORMWORK

03100-9

applied, or other curing procedure made effective, in accordance with the specification requirements.

- D. The Contractor shall assume responsibility for damage resulting from improper and premature removal of forms.

3.06 REUSE OF FORMS

- A. Forms may be reused only if in good condition and only if acceptable to the Owner's Representative or Resident Project Representative. Light sanding between uses will be required wherever necessary to obtain uniform surface texture on all exposed concrete surfaces. Exposed concrete surfaces are defined as surfaces which are permanently exposed to view. In the case of forms for the inside wall surfaces of hydraulic/water retaining structures, unused tie rod holes in forms shall be filled with non-shrink grout.

3.07 MAINTENANCE OF FORMS

- A. Forms shall be maintained at all times in good condition, particularly as to size, shape, strength, rigidity, tightness, and smoothness of surface. Forms, when in place, shall conform to the established alignment and grades. Before concrete is placed, the forms shall be thoroughly cleaned. The form surfaces shall be treated with a non-staining mineral oil or other lubricant acceptable to the Owner's Representative or Resident Project Representative. Any excess lubricant shall be satisfactorily removed before placing the concrete. Where field oiling of forms is required, the Contractor shall perform the oiling at least 2 weeks in advance of their use. Care shall be exercised to keep oil off the surfaces of steel reinforcement and other metal items to be embedded in concrete.

3.08 FALSE WORK

- A. The Contractor shall be responsible for the design, engineering, construction, maintenance, and safety of all false work, including staging, walkways, forms, ladders, and similar appurtenances, which shall equal or exceed the applicable requirements of the provisions of the OSHA Safety and Health Standards for Construction, and the requirements of the California Division of Industrial Safety.

3.09 REMOVAL OF SHORING AND FALSE WORK

- A. The Contractor shall not remove shoring and false work until 21 days after concrete placement, or concrete has attained at least 90 percent of the 28-day design compressive strength as demonstrated by control test cylinders,

CONCRETE FORMWORK
03100-10

but not sooner than 14 days. If testing is completed to review the 90 percent compressive strength, the Contractor shall incur the cost.

3.10 LOAD RESTRICTION

- A. The Contractor shall not impose construction, equipment or permanent loads on columns, supported slabs, or supported beams until concrete has attained the 28-day design compressive strength.

END OF SECTION 03100

CONCRETE FORMWORK
03100-11

SECTION 03200 - REINFORCEMENT STEEL

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The Contractor shall provide concrete reinforcement steel, welded wire fabric, couplers, concrete inserts, wires, clips, supports, chairs, spacers, and other accessories, complete, all in accordance with the Contract Documents.
- B. Work Included in this Section: Principal items are:
 - 1. Furnishing and placing bar and mesh reinforcing for cast-in-place concrete.
 - 2. Furnishing reinforcing steel bars for masonry, including delivery to the site.
 - 3. Submittals.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. The Work of the following Sections apply to the Work of this Section. Other Sections, not referenced below, shall also apply to the extent required for proper performance of this Work.
 - 1. Section 03100 - Concrete Formwork
 - 2. Section 03300 - Cast-in-Place Concrete

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. Except as otherwise indicated in this Section of the Specifications, the Contractor shall comply with the latest adopted edition of the Standard Specifications for Public Works Construction (SSPWC), together with the latest adopted editions of the Regional Amendments.
- B. The current edition of the Uniform Building Code (UBC) of International Conference of Building Officials (ICBO).
- C. Commercial Standards (Current Edition):
 - 1. ACI 315 Details and Detailing of Concrete Reinforcement

REINFORCEMENT STEEL
03200-1

2. ACI 318 Building Code Requirements for Structural Concrete
3. CRSI MSP Concrete Reinforcing Steel Institute Manual of Standard Practice
4. CRSI PRB Concrete Reinforcing Steel Institute Placing Reinforcing Bars
5. WRI Manual of Standard Practice for Welded Wire Fabric
6. AWS D 1.4 Structural Welding Code - Reinforcing Steel
7. ACI 117 Standard Tolerance for Concrete Construction Materials

D. ASTM Standards in Building Codes (Current Edition):

1. ASTM A 82: Specification for Steel Wire, Plain, for Concrete Reinforcement
2. ASTM A 185: Specification for Welded Steel Wire Fabric, Plain, for Concrete Reinforcement
3. ASTM A 615: Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
4. ASTM A 706: Specification for Low-Alloy Steel Deformed Bars for Concrete Reinforcement
5. ASTM A 775: Specification for Epoxy-Coated Reinforcing Steel Bars

E. National Sanitation Foundation

1. NSF / ANSI 61: Drinking Water System Components – Health Effects

1.04 CONTRACTOR SUBMITTALS

- A. The Contractor shall furnish shop bending diagrams, placing lists, and drawings of all reinforcement steel before fabrication in accordance with

REINFORCEMENT STEEL
03200-2

the requirements of the Specification Section 01300 – Contractor Submittals.

- B. Details of the concrete reinforcement steel and concrete inserts shall be submitted at the earliest possible date after receipt of the Notice to Proceed. Details of reinforcement steel for fabrication and erection shall conform to ACI 315 and the requirements indicated. The shop bending diagrams shall show the actual lengths of bars, to the nearest inch, measured to the intersection of the extensions (tangents for bars of circular cross-section) of the outside surface. The shop drawings shall include bar placement diagrams which clearly indicate the dimensions of each bar splice.
- C. Where mechanical couplers are required or permitted to be used to splice reinforcement steel, the Contractor shall submit manufacturer's literature including instructions and recommendations for installation for each type of coupler used; certified test reports which verify the load capacity of each type and size of coupler used; and shop drawings which show the location of each coupler with details of how they are to be installed in the formwork.
- D. If reinforcement steel is spliced by welding at any location, the Contractor shall submit mill test reports which shall include the information necessary for the determination of the carbon equivalent as specified in AWS D 1.4. The Contractor shall submit a written welding procedure for each type of weld for each size of bar which is to be spliced by welding; a mere statement that AWS procedures will be followed will not be acceptable.

1.05 QUALITY ASSURANCE

- A. If requested by the Resident Engineer, the Contractor shall furnish samples from each heat of reinforcement steel delivered in a quantity adequate for testing. Costs of initial tests will be paid by the Contractor. Costs of additional tests due to material failing initial tests shall also be paid by the Contractor.
- B. If reinforcement steel is spliced by welding at any location, the Contractor shall submit certifications of procedure qualifications for each welding procedure used and certification of welder qualifications, for each welding procedure, and for each welder performing the Work. Such qualifications shall be as specified in AWS D 1.4.
- C. If requested by the Resident Engineer, the Contractor shall furnish samples of each type of welded splice used in the Work in a quantity and of dimensions adequate for testing. At the discretion of the Resident Engineer, radiographic testing of direct butt welded splices will be performed. The Contractor shall provide assistance necessary to facilitate testing. The

REINFORCEMENT STEEL

03200-3

Contractor shall repair any weld which fails to meet the requirements of AWS D 1.4. The costs of testing will be paid by the Contractor. The costs of all tests which fail to meet specified requirements shall also be paid by the Contractor.

PART 2 - PRODUCTS

2.01 MATERIAL REQUIREMENTS

- A. Materials which may remain or leave residues on or within the concrete shall be classified as acceptable for potable water use by the Environmental Protection Agency within 30 days of application or use.

2.02 REINFORCEMENT STEEL

- A. Reinforcement steel for all cast-in-place reinforced concrete construction shall conform to the following requirements:
1. Bar reinforcement shall conform to the requirements of ASTM A 615 for Grade 60 Billet Steel Reinforcement or as otherwise indicated.
 2. All welded reinforcement, specifically detailed or otherwise indicated, shall be low-alloy Grade 60 deformed bars conforming to the requirements of ASTM A 706.
 3. Welded wire fabric reinforcement shall conform to the requirements of ASTM A 185 and the details indicated; provided, that welded wire fabric with longitudinal wire of W4 size wire and smaller shall be either provided in flat sheets or in rolls with a core diameter of not less than 10 inches; and provided further, that welded wire fabric with longitudinal wires larger than W4 size shall be provided in flat sheets only.
 4. Spiral reinforcement shall be cold-drawn steel wire conforming to the requirements of ASTM A 82.
 5. Tie wire shall be Annealed Steel, 14 gauge minimum.
- B. Accessories:
1. Accessories shall include all necessary chairs, slab bolsters, concrete blocks, tie wires, dips, supports, spacers, and other devices to position reinforcement during concrete placement. All bar supports

REINFORCEMENT STEEL

03200-4

shall meet the requirements of the CRSI Manual of Standard Practice, Chapter 3, including special requirements for supporting epoxy-coated reinforcing bars. Wire bar supports shall be CRSI Class 1 for maximum protection with a 1/8 inch minimum thickness of plastic coating which extends at least ½ inch from the concrete surface. Plastic shall be gray in color.

2. Concrete blocks (dobies), used to support and position reinforcement steel, shall have the same or higher compressive strength as specified for the concrete in which it is located. Wire ties shall be embedded in concrete block bar supports.
- C. Epoxy coating for reinforcing and accessories, where indicated, shall conform to ASTM A 775.

2.03 MECHANICAL COUPLERS

- A. Mechanical couplers shall be provided where indicated and where approved by the Resident Engineer. The couplers shall develop a tensile strength which exceeds 125 percent of the yield strength of the reinforcement bars being spliced at each splice.
- B. Where the type of coupler used is composed of more than one component, all components required for a complete splice shall be supplied. This shall apply to all mechanical splices, including those splices intended for future connections.
- C. The reinforcement steel and coupler used shall be compatible for obtaining the required strength of the connection. Straight threaded type couplers shall require the use of the next larger size reinforcing bar or shall be used with reinforcing bars with specially forged ends which provide upset threads which do not decrease the basic cross-section of the bar.

2.04 WELDED SPLICES

- A. Welded splices shall be provided where indicated and where approved by the Resident Engineer. All welded splices of reinforcement steel shall develop a tensile strength which exceeds 125 percent of the yield strength of the reinforcement bars which are connected.
- B. Provided materials shall be capable of conforming to the Weld Splice requirements of AWS D 1.4.

REINFORCEMENT STEEL
03200-5

2.05 EPOXY GROUT

- A. Epoxy for grouting reinforcing bars shall be specifically formulated for such application, for the moisture condition, application temperature, and orientation of the hole to be filled. Epoxy grout shall be in conformance with Section 03315 - Grout.

2.06 MANUFACTURERS

- A. Couplers/welded splices shall be manufactured by one of the following or equal:
 - 1. Lenton Form Saver by Erico Products
 - 2. Dowel Bar Splicer System by Richmond Screw Anchor Company

2.07 NSF / ANSI STANDARD 61

- A. All cementitious material, admixtures, curing compounds, and other industrial produced materials used in concrete, or for curing or repairing of concrete, that can contact potable water or water that will be treated to become potable shall be listed in NSF / ANSI Standard 61.

PART 3 - EXECUTION

3.01 GENERAL

- A. All reinforcement steel, welded wire fabric, couplers, and other appurtenances shall be fabricated, and placed in accordance with the requirements of the Uniform Building Code and the supplementary requirements indicated herein.

3.02 FABRICATION AND DELIVERY

- A. The Contractor shall conform to CRSI MSP, Chapters 6 and 7, except as otherwise indicated or specified. The Contractor shall bundle reinforcement and tag with suitable identification to facilitate sorting and placing, and transport and storage at the site so as not to damage material. The Contractor shall keep a sufficient supply of tested, approved, and proper reinforcement at the site to avoid delays.
- B. Bending and Forming: The Contractor shall bend bars of indicated size and accurately form in accordance with the requirements of ACI 315 and ACI 318 to shapes and lengths indicated on the Plans and required by methods not injurious to materials. The Contractor shall not heat

REINFORCEMENT STEEL

03200-6

reinforcement for bending. Bars with kinks or bends not conforming with approved shop drawings will be rejected.

- C. Fabricating Tolerance: All fabrication of reinforcing bars shall meet the requirements of ACI 117.
- D. Reinforcing Bars for Masonry: The Contractor shall detail and fabricate bars at the shop, ready for installation by masons.

3.03 PLACING

- A. Reinforcement steel shall be accurately positioned and shall be supported and wired together to prevent displacement, using annealed iron wire ties or suitable clips at intersections. All reinforcement steel shall be supported by concrete, plastic or metal supports, spacers or metal hangars which are strong and rigid enough to prevent any displacement of the reinforcement steel. Where concrete is to be placed on the ground, supporting concrete blocks (or dobies) shall be used, in sufficient numbers to support the bars without settlement, but in no case shall such support be continuous. All concrete blocks used to support reinforcement steel shall be tied to the steel with wire ties which are embedded in the blocks. For concrete over formwork, the Contractor shall furnish concrete, metal, plastic, or other acceptable bar chairs and spacers.
- B. Limitations on the use of bar support materials shall be as follows:
 - 1. Concrete Dobbies: Permitted at all locations except where architectural finish is required.
 - 2. Wire Bar Supports: Permitted only at slabs over dry areas, interior dry wall surfaces, and exterior wall surfaces.
 - 3. Plastic Bar Supports: Permitted at all locations except on grade.
- C. Tie wires shall be bent away from the forms in order to provide the specified concrete coverage.
- D. Bars additional to those shown which may be found necessary or desirable by the Contractor for the purpose of securing reinforcement in position shall be provided by the Contractor at no additional cost to the Owner.
- E. Unless otherwise specified, reinforcement placing tolerances shall be within the limits specified in Section 7.5 of ACI 318 except where in conflict with the requirements of the UBC.

REINFORCEMENT STEEL
03200-7

- F. Bars may be moved as necessary to avoid interference with other reinforcement steel, conduits, or embedded items. If bars are moved more than one bar diameter, or enough to exceed the above tolerances, the resulting arrangement of bars shall be subject to the approval of the Resident Engineer .
- G. Welded wire fabric reinforcement placed over horizontal forms shall be supported on slab bolsters. Slab bolsters shall be spaced not more than 30 inches on center, shall extend continuously across the entire width of the reinforcement mat, and shall support the reinforcement mat in the plane indicated.
- H. Welded wire fabric placed over the ground shall be supported on wired concrete blocks (dobies) spaced not more than 3 feet on center in any direction. The construction practice of placing welded wire fabric on the ground and hooking into place in the freshly placed concrete shall not be allowed.
- I. Epoxy-coated reinforcing bars shall be stored, transported, and placed in such a manner as to avoid chipping of the epoxy coating. Non-abrasive slings made of nylon and similar materials shall be used. Specially coated bar supports shall be used. All chips or cracks in the epoxy coating shall be repaired with a compatible epoxy repair material prior to placing concrete.
- J. Accessories supporting reinforcing bars shall be spaced such that there is no deflection of the accessory from the weight of the supported bars. When used to space the reinforcing bars from wall forms, the forms and bars shall be located so that there is no deflection of the accessory when the forms are tightened into position.

3.04 SPLICES

- A. Splicing shall be in accordance with ACI 318, unless otherwise noted on the Plans.
- B. Vertical Bars: Except as specifically detailed or otherwise indicated, splicing of vertical bars in concrete is not permitted, except at the indicated or approved horizontal construction joints or as otherwise specifically detailed.
- C. Horizontal Bars: Except as specifically detailed or otherwise indicated, splicing of horizontal bars in concrete is not permitted.

REINFORCEMENT STEEL
03200-8

- D. Mechanical Couplers: Unless otherwise indicated or approved by the Owner's Representative or Resident Project Representative, use of mechanical couplers is not permitted.
- E. Welding: Except as specifically detailed or otherwise indicated, welding of reinforcing bars is not permitted.

3.05 ADDITIONAL REINFORCING

- A. The Contractor shall provide additional reinforcing bars at sleeves and openings as indicated on the Plans.

3.06 WELDED WIRE MESH

- A. The Contractor shall install necessary supports and chairs to hold the wire mesh in place during concrete pours. The Contractor shall straighten mesh to lay in a flat plane and bend mesh as shown or required to fit work. The Contractor shall provide laps of no less than one complete mesh, unless otherwise detailed, and shall tie every other wire at laps. Roll mesh is not acceptable.

3.07 EMBEDMENT OF DRILLED REINFORCING STEEL DOWELS

- A. Hole Preparation:
 - 1. The hole diameter shall be as recommended by the epoxy manufacturer but shall be no larger than 0.25 inch greater than the diameter of the outer surface of the reinforcing bar deformations.
 - 2. The depth of the hole shall be as recommended by the epoxy manufacturer to fully develop the bar but shall not be less than 12 bar diameters, unless noted otherwise.
 - 3. The hole shall be drilled by methods which do not interfere with the proper bonding of epoxy.
 - 4. Existing reinforcing steel in the vicinity of proposed holes shall be located prior to drilling. The location of holes to be drilled shall be adjusted to avoid drilling through or nicking any existing reinforcing bars.
 - 5. The hole shall be blown clean with clean, dry compressed air to remove all dust and loose particles.

REINFORCEMENT STEEL
03200-9

6. Epoxy shall be injected into the hole through a tube placed to the bottom of the hole. The tube shall be withdrawn as epoxy is placed but kept immersed to prevent formation of air pockets. The hole shall be filled to a depth that ensures that excess material will be expelled from the hole during dowel placement.
7. Dowels shall be twisted during insertion into the partially filled hole so as to guarantee full wetting of the bar surface with epoxy. The bar shall be inserted slowly enough to avoid developing air pockets.

3.08 CLEANING AND PROTECTION

- A. Reinforcing steel delivered to the jobsite shall be suitably stored off the ground and protected from oils, mud, concrete splatter and all conditions conducive to corrosion until embedded in concrete.
- B. The surfaces of all reinforcement steel and other metalwork to be in contact with concrete shall be thoroughly cleaned of all dirt, grease, loose scale and rust, grout, mortar and other foreign substances immediately before the concrete is placed. Where there is delay in depositing concrete, reinforcement shall be re-inspected and, if necessary, re-cleaned.

END OF SECTION 03200

REINFORCEMENT STEEL
03200-10

SECTION 03290 - JOINTS IN CONCRETE STRUCTURES

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The Contractor shall provide joints in concrete at the locations indicated, complete, in accordance with the Contract Documents.
- B. Waterstops shall be provided in all construction and expansion joints of hydraulic or below grade structures unless specifically noted otherwise in the Contract Documents.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. The Work of the following Sections apply to the Work of this Section. Other Sections, not referenced below, shall also apply to the extent required for proper performance of the Work.
 - 1. Section 03100 - Concrete Formwork
 - 2. Section 03200 - Reinforcement Steel
 - 3. Section 03300 - Cast-in-Place Concrete
 - 4. Section 03315 – Grout

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. Except as otherwise indicated in this Section, the Contractor shall comply with the latest adopted edition of the Standard Specifications for Public Works Construction (SSPWC), together with the latest adopted editions of the Regional Amendments; and the latest American Concrete Institute ACI 318 Code requirements and ACI Standard Design Codes and Construction Specifications.
- B. The current edition of the Uniform Building Code (UBC) of International Conference of Building Officials (ICBO).
- C. National Sanitation Foundation
 - 1. NSF / ANSI 61: Drinking Water System Components – Health Effects

JOINTS IN CONCRETE STRUCTURES

03290-1

D. Federal Specifications (Current Edition):

1. TT-S-0227E(3): Sealing Compound, Elastomeric Type, Multi-Component for Caulking, Sealing, and Glazing Buildings and Other Structures.
2. SS-S-210A: Sealing Compound for Expansion Joints.

E. U.S. Army Corps of Construction Managers Specifications:

1. CRD-C572: PVC Waterstop.

F. ASTM Standards in Building Codes (Current Edition):

1. ASTM A 775: Specification for Epoxy-Coated Reinforcing Steel Bars
2. ASTM C 920: Specification for Elastomeric Joint Sealants
3. ASTM D 412: Test Methods for Rubber Properties in Tension
4. ASTM D 624: Test Method for Rubber Property - Tear Resistance
5. ASTM D 638: Test Method for Tensile Properties of Plastics
6. ASTM D 746: Test Method for Brittleness Temperature of Plastics and Elastomers by Impact
7. ASTM D 747: Test Method for Apparent Bending Modulus of Plastics by Means of a Cantilever Beam
8. ASTM A 775: Specification for Epoxy-Coated Reinforcing Steel Bar
9. ASTM D 1056: Specification for Flexible Cellular Materials - Sponge or Expanded Rubber
10. ASTM D 1752: Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
11. ASTM D 2000: Standard Classification System for Rubber Product in Automotive Applications

JOINTS IN CONCRETE STRUCTURES

03290-2

12. ASTM D 2240: Test Method for Rubber Property - Durometer Hardness
13. ASTM D 2241: Specification for Poly Vinyl Chloride (PVC) Pressure-Related Pipe (SDR-series)

1.04 TYPES OF JOINTS

- A. Construction Joints: When fresh concrete is placed against a hardened concrete surface, the joint between the two pours is called a construction joint. Unless otherwise indicated, all joints in water bearing members shall be provided with a waterstop and/or sealant groove of the shape indicated. The surface of the first pour may also be required to receive a coating of bond breaker as indicated.
- B. Contraction Joints: Contraction joints are similar to construction joints except that the fresh concrete shall not bond to the hardened surface of the first pour, which shall be coated with a bond breaker. The slab reinforcement shall be stopped 4-1/2 inches from the joint; which is provided with a sleeve-type dowel, to allow shrinkage of the concrete of the second pour. Waterstop and/or sealant groove shall also be provided unless otherwise indicated on the Plans.
- C. Expansion Joints: To allow the concrete to expand freely, a space is provided between the two pours; the joint shall be formed as indicated. This space is obtained by placing a filler joint material against the first pour, which acts as a form for the second pour. Unless otherwise indicated, all expansion joints in water bearing members shall be provided with a center-bulb type waterstop.
- D. Control Joints: The function of the control joint is to provide a weaker plane in the concrete, where shrinkage cracks will likely occur. A groove, of the shape and dimensions indicated, is formed or saw-cut in the concrete. This groove is filled afterward with a joint sealant material as specified.

1.05 CONTRACTOR SUBMITTALS

- A. The Contractor shall submit the following in compliance with Section 01300 – Contractor Submittals:
 1. Waterstops: Before production of the required materials, qualification samples shall be submitted. Such samples shall consist of extruded or molded sections of each size or shape to be used, and

JOINTS IN CONCRETE STRUCTURES

03290-3

shall be accomplished so that the material and workmanship represents in all respects the material to be provided under this Contract. The balance of the material to be used under this Contract shall not be produced until after the Construction Manager has reviewed the qualification samples.

2. Joint Sealant: Before ordering the sealant material, the Contractor shall submit sufficient data to show general compliance with the requirements of the Contract Documents.
3. Before the sealant is used on the job, the Contractor shall submit certified test reports from the sealant manufacturer on the actual batch of material being supplied indicating compliance with the above requirements.
4. Shipping Certification: The Contractor shall furnish written certification from the manufacturer as an integral part of the shipping form, to show that all of the material shipped to this project meet or exceed the physical property requirements of the Contract Documents. Supplier certificates are not acceptable.
5. Joint Location: The Contractor shall submit placement shop drawings illustrating the location and type of all joints for each structure.

1.06 QUALITY ASSURANCE

- A. Waterstop Inspection: All waterstop field joints shall be subject to rigid inspection, and no such work shall be scheduled or started without the Contractor having made prior arrangements with the Construction Manager to provide for the required inspections. Not less than 48 hours' notice shall be given to the Construction Manager for scheduling such inspections.
- B. All field joints in waterstops shall be subject to rigid inspection for misalignment, bubbles, inadequate bond, porosity, cracks, offsets, and other defects which would reduce the potential resistance of the material to water pressure at any point. All defective joints shall be replaced with material which shall pass said inspection, and all faulty material shall be removed from the site and disposed of by the Contractor at no increase in cost to the Owner.
- C. The following waterstop defects represent a partial list of defects which shall be grounds for rejection:

JOINTS IN CONCRETE STRUCTURES

03290-4

1. Offsets at joints greater than 1/16 inch or 15 percent of material thickness, at any point, whichever is less.
 2. Exterior crack at joint, due to incomplete bond, which is deeper than 1/16 inch or 15 percent of material thickness, at any point, whichever is less.
 3. Any combination of offset or exterior crack which will result in a net reduction in the cross-section of the waterstop in excess of 1/16 inch or 15 percent of material thickness, at any point, whichever is less.
 4. Misalignment of joint which result in misalignment of the waterstop in excess of 1/2-inch in 10 feet.
 5. Porosity in the welded joint as evidenced by visual inspection.
 6. Bubbles or inadequate bonding which can be detected with a penknife test. If, while prodding the entire joint with the point of a penknife, the knife breaks through the outer portion of the weld into a bubble, the joint shall be considered defective.
- D. Waterstop Samples: Before use of the waterstop material in the field, a sample of a fabricated mitered cross and a tee constructed of each size or shape of material to be used shall be submitted to the Construction Manager for review. These samples shall be fabricated so that the material and workmanship represent in all respects the fittings to be provided under this Contract. Field samples of fabricated fittings will be selected at random by the Construction Manager for testing by a laboratory at the Contractor's expense. When tested, PVC waterstops shall have a tensile strength across the joints equal to at least 600 PSI.
- E. Construction Joint Sealant: The Contractor shall prepare adhesion and cohesion test specimens as indicated, at intervals of 5 working days while sealants are being installed.
- F. The sealant material shall show no signs of adhesive or cohesive failure when tested in accordance with the following procedure in laboratory and field tests:
1. Sealant specimens shall be prepared between two concrete blocks (1 inch to 2 inches by 3 inches). Spacing between the blocks shall be 1 inch. Coated spacers (2 inches by 1 ½ inch by ½ inch) shall be

JOINTS IN CONCRETE STRUCTURES

03290-5

used to ensure sealant cross-sections of ½ inch by 2 inches with a width of 1 inch.

2. Sealant shall be cast and cured according to manufacturer's recommendations except that the curing period shall be not less than 24 hours.
3. Following curing period, the gap between blocks shall be widened to 1-1/2 inch. Spacers shall be used to maintain this gap for 24 hours before inspection for failure.

1.07 WARRANTY

- A. The Contractor shall furnish a 5 year written warranty of the entire sealant installation against faulty and/or incompatible materials and workmanship, along with a statement that it agrees to repair or replace, to the satisfaction of the Owner and at no additional cost to the Owner, any defects that appear during the warranty period.

PART 2 - PRODUCTS

2.01 GENERAL

- A. All joint materials specified herein shall be classified by the Environmental Protection Agency as acceptable for potable water use.

2.02 PVC WATERSTOPS

- A. General: Waterstops shall be extruded from an elastomeric polyvinyl chloride compound containing the plasticizers, resins, stabilizers, and other materials necessary to meet the requirements of these Specifications. No reclaimed or scrap material shall be used. The Contractor shall obtain from the waterstop manufacturer and submit to the Construction Manager current test reports and a written certification that the material to be shipped meets the physical requirements outlined in the U.S. Army Corps of Construction Managers Specification CRD-C572 and those listed herein.
- B. Flatstrip and Center-Bulb Waterstops: At no place shall the thickness of flatstrip waterstops, including the center-bulb type, be less than 3/8 inch. Flatstrip and center-bulb waterstops shall be manufactured by Kirckhill Rubber Co., Brea, California; Water Seals, Inc., Chicago, Illinois; Progress Unlimited, Inc., New York, New York; Greenstreak Plastic Products Co., St. Louis, Missouri; or equal.

JOINTS IN CONCRETE STRUCTURES

03290-6

- C. Multi-Rib Waterstops: Multi-rib waterstops, where required, shall be manufactured by Water Seals, Inc., Chicago, Illinois; Progress Unlimited, Inc., New York, New York; Greenstreak Plastic Products Co., St. Louis, Missouri; or equal. Prefabricated joint fittings shall be used at all intersections of the ribbed-type waterstops.
- D. Other Types of Waterstops: When other types of waterstops not listed above are required and indicated, they shall be subjected to the same requirements as those listed herein.
- E. Waterstop Testing Requirements: When tested in accordance with the standards, the waterstop material shall meet or exceed the following requirements:

<u>Physical Property, Sheet Material</u>	<u>Value</u>	<u>ASTM Std.</u>
Tensile Strength-min (PSI)	1,750	D 638, Type IV
Ultimate Elongation-min (%)	350	D 638, Type IV
Low Temp Brittleness-max (degrees <i>F</i>)	-35	D 746
Stiffness in Flexure-min (PSI)	400	D 747
Accelerated Extraction (CRD-C572)		
Tensile Strength-min (PSI)	1,500	D 638, Type IV
Ultimate Elongation-min (%)	300	D 638, Type IV
Effect of Alkalies (CRD-C572)		
Change in Weight (%)	+0.25/-0.10	-----
Change in Durometer, Shore A	+5	D 2240
Finish Waterstop		
Tensile Strength-min (PSI)	1,400	D 638, Type IV
Ultimate Elongation-min (%)	280	D 638, Type IV

2.03 JOINT SEALANT

- A. Joint sealant shall be polyurethane polymer designed for bonding to concrete which is continuously submerged in water. No material will be

JOINTS IN CONCRETE STRUCTURES

03290-7

acceptable which has an unsatisfactory history as to bond or durability when used in the joints of water retaining structures.

- B. Joint sealant material shall meet the following requirements (73°F and 50% relative humidity):

Work Life	45 - 180 minutes
Time to Reach 20 Shore “A” Hardness (at 77°F, 200 gr quantity)	24 hours, maximum
Ultimate Hardness (ASTM D 2240)	20 - 45 Shore “A”
Tensile Strength (ASTM D 412)	200 PSI, minimum
Ultimate Elongation (ASTM D 412)	400%, minimum
Tear Resistance (Die C ASTM D 624)	75 pounds per inch of thickness, minimum
Color	Light Gray

- C. All polyurethane sealants for waterstop joints in concrete shall conform to the following requirements:

1. Sealant shall be two-part polyurethane with the physical properties of the cured sealant conforming to or exceeding the requirements of ANSI/ASTM C 920 or Federal Specification TT-S-0227 E(3) for two-part material, as applicable.
2. For vertical joints and overhead horizontal joints, only “nonsag” compounds shall be used; all such compounds shall conform to the requirements of ANSI/ASTM C 920 Class 25, Grade NS, or Federal Specification TT-S-0227 E(3), Type II, Class A.
3. For plane horizontal joints, the self-leveling compounds which meet the requirements of ANSI/ASTM C 920 Class 25, Grade P, or Federal Specification TT-S-0227 E(3), Type I shall be used. For joints subject to either pedestrian or vehicular traffic, a compound providing nontracking characteristics, and having a Shore “A” hardness range of 35 to 45, shall be used.

JOINTS IN CONCRETE STRUCTURES

03290-8

4. Primer materials, if recommended by the sealant manufacturer, shall conform to the printed recommendations of the sealant manufacturer.
- D. All sealants, wherever shown, or required hereunder shall be PSI-270 as manufactured by Polymeric Systems Inc.; Elastothane 227R as manufactured by Pacific Polymers; Sikaflex 2C, as manufactured by Sika Corporation, or equal.
- E. Sealants for nonwaterstop joints in concrete shall conform to the requirements of Section 07900 – Sealants and Caulking.

2.04 JOINTS MATERIALS

- A. Bearing Pad: Bearing pad to be neoprene conforming to ASTM D 2000 BC 420, 40 durometer hardness unless otherwise indicated.
- B. Neoprene Sponge: Sponge to be neoprene, closed-cell, expanded, conforming to ASTM D 1056, Type 2C3-E1.
- C. Joint Filler:
 1. Joint filler for expansion joints in water holding structures shall be neoprene conforming to ASTM D 1056, Type 2C5-E1.
 2. Joint filler material in other locations shall be of the preformed nonextruding type joint filler constructed of cellular neoprene sponge rubber or polyurethane of firm texture. Bituminous fiber type will not be permitted. All nonextruding and resilient-type preformed expansion joint fillers shall conform to the requirements and tests set forth in ASTM D 1752 for Type I, except as otherwise indicated.

2.05 BACKING ROD

- A. Backing rod shall be an extruded closed-cell, polyethylene foam rod. The material shall be compatible with the joint sealant used and shall have a tensile strength of not less than 40 PSI and a compression deflection of approximately 25% at 8 PSI. The rod shall be 1/8 inch larger in diameter than the joint width except that a 1 inch diameter rod shall be used for a 3/4 inch wide joint.

JOINTS IN CONCRETE STRUCTURES

03290-9

2.06 BOND BREAKER

- A. Bond breaker shall be Super Bond Breaker as manufactured by Burke Company, San Mateo, California; Select Cure CRB as manufactured by Select Products Co., Upland, California, or equal. It shall contain a fugitive dye so that areas of application will be readily distinguishable.

2.07 SLIP DOWELS

- A. Slip dowels in joints shall be A 36 smooth epoxy-coated bars, as indicated on the Plans, and conforming to ASTM A 775.

2.08 PVC TUBING

- A. PVC tubing in joints shall be Schedule SDR 13.5, conforming to ASTM D 2241.

2.09 NSF / ANSI STANDARD 61

- A. All cementitious material, admixtures, curing compounds, and other industrial produced materials used in concrete, or for curing or repairing of concrete, that can contact potable water or water that will be treated to become potable shall be listed in NSF / ANSI Standard 61.

PART 3 - EXECUTION

3.01 GENERAL

- A. Waterstops of the type indicated shall be embedded in the concrete across joints as indicated. All waterstops shall be fully continuous for the extent of the joint. Splices necessary to provide such continuity shall be accomplished in conformance to printed instructions of manufacturer of the waterstops. The Contractor shall take suitable precautions and means to support and protect the waterstops during the progress of the Work and repair or replace at its own expense any waterstops damaged during the progress of the Work. All waterstops shall be stored so as to permit free circulation of air around the waterstop material.
- B. When any waterstop is installed in the concrete on one side of a joint, while the other half or portion of the waterstop remains exposed to the atmosphere for more than 2 days, suitable precautions shall be taken to shade and protect the exposed waterstop from direct rays of the sun during the entire exposure and until the exposed portion of the waterstop is embedded in concrete.

JOINTS IN CONCRETE STRUCTURES

03290-10

3.02 SPLICES IN WATERSTOPS

- A. Splices in waterstops shall be performed by heat sealing the adjacent waterstop sections in accordance with the manufacturer's printed recommendations. It is essential that:
 - 1. The material not be damaged by heat sealing.
 - 2. The splices have a tensile strength of not less than 60% of the unspliced material's tensile strength.
 - 3. The continuity of the waterstop ribs and of its tubular center axis be maintained.
- B. Butt joints of the ends of two identical waterstop sections may be made while the material is in the forms.
- C. All joints with waterstops involving more than two ends to be joined together, and all joints which involve an angle cut, alignment change, or the joining of two dissimilar waterstop sections shall be prefabricated before placement in the forms, allowing not less than 24 inch long strips of waterstop material beyond the joint. Upon being inspected and approved, such prefabricated waterstop joint assemblies shall be installed in the forms and the ends of the 24 inch strips shall be butt welded to the straight run portions of waterstop in place in the forms.
- D. Where a centerbulb waterstop intersects and is joined with a noncenterbulb waterstop, care shall be taken to seal the end of the centerbulb, using additional PVC material if needed.

3.03 JOINT CONSTRUCTION

- A. Setting Waterstops: To eliminate faulty installation that may result in joint leakage, particular care shall be taken of the correct positioning of the waterstops during installation. Adequate provisions shall be made to support and anchor the waterstops during the progress of the Work and to ensure the proper embedment in the concrete. The symmetrical halves of the waterstops shall be equally divided between the concrete pours at the joints. The center axis of the waterstops shall be coincident with the joint openings. Maximum density and imperviousness of the concrete shall be ensured by thoroughly working it in the vicinity of all joints.

JOINTS IN CONCRETE STRUCTURES

03290-11

- B. In placing flat-strip waterstops in the forms, a means shall be provided to prevent them from being folded over by the concrete as it is placed. Unless otherwise indicated, all waterstops shall be held in place with light wire ties on 12 inch centers which shall be passed through the edge of the waterstop and tied to the curtain of reinforcing steel. Horizontal waterstops, with their flat face in a vertical plane, shall be held in place with continuous supports to which the top edge of the waterstop shall be tacked. In placing concrete around horizontal waterstops, with their flat face in a horizontal plane, concrete shall be worked under the waterstops by hand so as to avoid the formation of air and rock pockets.
- C. In placing centerbulb waterstops in expansion joints, the centerbulb shall be centered on the joint filler material.
- D. Waterstop in vertical wall joints shall stop 6 inches from the top of the wall where such waterstop does not connect with any other waterstop and is not to be connected to a future concrete placement.
- E. Joint Location: Construction joints, and other types of joints, shall be provided where indicated. When not indicated, construction joints shall be provided at 25 foot maximum spacing for all concrete construction, unless noted otherwise. The location of all joints, of any type, shall be submitted for acceptance by the Construction Manager.
- F. Joint Preparation: Special care shall be used in preparing concrete surfaces at joints where bonding between two sections of concrete is required. Unless otherwise indicated, such bonding will be required at all horizontal joints in walls. Surfaces shall be prepared in accordance with the requirements of Section 03300 - Cast-in-Place Concrete.
- G. Premolded expansion joint material shall be installed with the edge at the indicated distance below or back from finished concrete surface, and shall have a slightly tapered, dressed, and oiled wood strip secured to or placed at the edge thereof during concrete placement, which shall later be removed to form space for sealing material.
- H. The space so formed shall be filled with a joint sealant material as specified. In order to keep the two wall or slab elements in line the joint shall also be provided with a sleeve-type dowel, unless otherwise indicated on Plans.
- I. Construction Joint Sealant: Construction joints in water-bearing floor slabs, and elsewhere as indicated, shall be provided with grooves, which shall be filled with a construction joint sealant. The material used for forming the grooves shall be left in the grooves until just before the grooves are cleaned

JOINTS IN CONCRETE STRUCTURES

03290-12

and filled with joint sealant. After removing the forms from the grooves, all laitance and fins shall be removed, and the grooves shall be sandblasted. The grooves shall be allowed to become thoroughly dry, after which they shall be blown out; immediately thereafter, they shall be primed, bond breaker tape placed in the bottom of the groove, and filled with the joint sealant. The primer used shall be supplied by the same manufacturer supplying the sealant. No sealant will be permitted to be used without a primer. Care shall be used to completely fill the sealant grooves. Areas designated to receive a sealant filler shall be thoroughly cleaned, as outlined for the grooves, before application of the sealant.

- J. The primer and sealant shall be placed strictly in accordance with the printed recommendations of the manufacturer, taking special care to properly mix the sealant before application. The sides of the sealant groove shall not be coated with bond breaker, curing compound, or any other substance which would interfere with proper bonding of the sealant. All sealant shall achieve final cure at least 7 days before the structure is filled with water.
- K. All sealant shall be installed by a competent waterproofing specialty contractor who has a successful record of performance in similar installations. Before Work is commenced, the crew performing the Work shall be instructed as to the proper method of application by a representative of the sealant manufacturer.
- L. Thorough, uniform mixing of two-part, catalyst-cured materials is essential; special care shall be taken to properly mix the sealer before its application. Before any sealer is placed, arrange to have the crew performing the Work carefully instructed as to the proper method of mixing and application by a representative of the sealant manufacturer.
- M. Any joint sealant which, after the manufacturer's recommended curing time for the job conditions of the Work hereunder, fails to fully and properly cure shall be completely removed; the groove shall be thoroughly sandblasted to remove all traces of the uncured or partially cured sealant and primer, and shall be resealed with the indicated joint sealant. All costs of such removal, joint treatment, resealing and appurtenant work shall be at no additional cost to the Owner.

END OF SECTION 03290

JOINTS IN CONCRETE STRUCTURES

03290-13

SECTION 03300 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The Contractor shall provide finished structural concrete, complete, in accordance with the Contract Documents.
- B. The following types of concrete are covered in this Section:
 - 1. **STRUCTURAL CONCRETE**: Normal weight (145 PCF) concrete to be used in all cases except where noted otherwise in the Contract Documents. *Assume all concrete for this project is structural concrete.*
 - 2. **LEAN CONCRETE**: Concrete to be used for thrust blocks, anchor blocks, pipe trench cut-off blocks and cradles, where the preceding items are detailed on the Plans as unreinforced. Concrete to be used as protective cover for dowels intended for future connection.
- C. The term “hydraulic structure” used in these Specifications refers to environmental engineering concrete structures for the containment, treatment, or transmission of water, or other fluids.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. The Work of the following Sections applies to the Work of this Section. Other Sections, not referenced below, shall also apply to the extent required for proper performance of this Work.
 - 1. Section 03100 - Concrete Formwork
 - 2. Section 03200 - Reinforcement Steel
 - 3. Section 03290 - Joints in Concrete Structures
 - 4. Section 03315 – Grout
 - 5. ~~Section 09800 – Protective Coatings~~

CAST-IN-PLACE CONCRETE

03300-1

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. Except as otherwise indicated in this Section, the Contractor shall comply with the latest adopted edition of the Standard Specifications for Public Works Construction (SSPWC), together with the latest adopted editions of the Regional Amendments; and the latest American Concrete Institute ACI 318 Code requirements and ACI Standard Design Codes and Construction Specifications.
- B. The current edition of the Uniform Building Code (UBC) of International Conference of Buildings Officials (ICBO).
- C. National Sanitation Foundation
 - 1. NSF / ANSI 61: Drinking Water System Components – Health Effects
- D. Federal Specifications:
 - 1. UU-B-790A(1)(2): Building Paper, Vegetable Fiber (Kraft, Water-Proofed, Water Repellant and Fire Resistant)
- E. Commercial Standards:
 - 1. ACI 117: Standard Tolerances for Concrete Construction and Materials
 - 2. ACI 214: Recommended Practice for Evaluation of Strength Test Results of Concrete
 - 3. ACI 301: Specifications for Structural Concrete for Buildings
 - 4. ACI 309: Consolidation of Concrete
 - 5. ACI 315: Details and Detailing of Concrete Reinforcement
 - 6. ACI 318: Building Codes Requirements for Reinforced Concrete
 - 7. ACI 350R: Environmental Engineering Concrete Structures

CAST-IN-PLACE CONCRETE
03300-2

F. ASTM Standards in Building Codes:

1. ASTM C 31: Practice for Making and Curing Concrete Test Specimens in the Field
2. ASTM C 33: Specification for Concrete Aggregates
3. ASTM C 39: Test Method for Compressive Strength of Cylindrical Concrete Specimens
4. ASTM C 40: Test Method for Organic Impurities in Fine Aggregates for Concrete
5. ASTM C 42: Test Method of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
6. ASTM C 88: Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
7. ASTM C 94: Specification for Ready-Mixed Concrete
8. ASTM C 136: Test Method for Sieve Analysis of Fine and Coarse Aggregates
9. ASTM C 138: Test Method for Unit Weight, Yield, and Air Content of Concrete
10. ASTM C 143: Test Method for Slump of Hydraulic Cement Concrete
11. ASTM C 150: Specification for Portland Cement
12. ASTM C 156: Test Method for Water Retention by Concrete Curing Materials
13. ASTM C 157: Test Method for Length Change of Hardened Hydraulic Cement Mortar and Concrete
14. ASTM C 192: Practice for Making and Curing Concrete Test Specimens in the Laboratory
15. ASTM C 231: Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method

CAST-IN-PLACE CONCRETE

03300-3

16. ASTM C 260: Specification for Air-Entraining Admixtures for Concrete
17. ASTM C 289: Test Method for Potential Reactivity of Aggregates (Chemical Method)
18. ASTM C 309: Specification for Liquid Membrane-Forming Compounds for Curing Concrete
19. ASTM C 494: Specification for Chemical Admixtures for Concrete
20. ASTM C 107: Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation
21. ASTM D 1751: Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-Extruding and Resilient Bituminous Types)
22. ASTM D 2419: Test Method for Sand Equivalent Value of Soils and Fine Aggregate
23. ASTM E 119: Method for Fire Tests of Building Construction and Materials

1.04 CONTRACTOR SUBMITTALS

- A. Mix Designs: Before starting the Work and within 14 days of the Notice to Proceed, the Contractor shall submit to the Owner's Representative, for review, preliminary concrete mix designs which shall illustrate the proportions and gradations of all materials proposed for each class and type of concrete specified herein in accordance with Specification Section 01300 – Contractor Submittals. The mix designs shall be checked and certified to conform to these Specifications by an independent testing laboratory acceptable to the Owner's Representative or Resident Project Representative to be in conformance with these Specifications. All costs related to such checking and testing shall be borne by the Contractor at no cost to the Owner.
- B. Delivery Tickets: Where ready-mix concrete is used, the Contractor shall furnish delivery tickets at the time of delivery of each load of concrete. Each ticket shall show the state-certified equipment used for measuring and the total quantities, by weight, of cement, sand, each class of aggregate, admixtures, and the amounts of water in the aggregate added at the batching plant, and the amount of water allowed to be added at the site for the specific

CAST-IN-PLACE CONCRETE

03300-4

design mix. In addition, each ticket shall state the mix number, total yield in cubic yards, and the time of day, to the nearest minute, corresponding to the times when the batch was dispatched, when it left the plant, when it arrived at the site, when unloading began, and when unloading was finished.

- C. The Contractor shall provide the following submittals in accordance with ACI 301:
 - 1. Mill tests for cement.
 - 2. Admixture certification. Chloride ion content must be included.
 - 3. Aggregate gradation and certification.
 - 4. Materials and methods for curing.
- D. The Contractor shall provide catalog cuts and other manufacturer's technical data demonstrating compliance with the requirements indicated and specified herein for all admixtures used in the concrete mix design.

1.05 QUALITY ASSURANCE

A. GENERAL

- 1. Tests on component materials and for compressive strength and shrinkage of concrete will be performed as specified herein. Test for determining slump will be in accordance with the requirements of ASTM C 143.
- 2. The cost of all laboratory tests requested by the Resident Engineer for cement, aggregates, and concrete, will be borne by the Contractor. The laboratory must meet or exceed the requirements of ASTM C 1077.
- 3. Concrete for testing shall be supplied by the Contractor at no cost to the Owner and the Contractor shall provide assistance to the independent testing laboratory acceptable to the Resident Engineer in obtaining samples, and disposal and clean up of excess material.
- 4. A minimum of one (1) set of concrete cylinders and a slump test shall be obtained for every major concrete placement. A minimum of one (1) set of concrete cylinders shall be obtained for several concrete structures, foundations and slabs. Specific to this project one set of cylinders and a slump test shall be obtained for the Parking Lot/Delivery/Electrical Slab. One set of cylinders and a

CAST-IN-PLACE CONCRETE

03300-5

slump test shall be required for the Emergency Power Generator Set pcc foundation. Cylinders and a slump test for the concrete replacement work inside the Operations Building, for the reconstruction of the Operations Building west wall per keynote 53 on plan sheet 8 and for the long duration temporary bypass pumping system pcc slab shall not be required; however the pcc concrete delivery slips for all concrete installation work and items shall be provided to the Resident Engineer. One (1) set of cylinders shall be obtained for every forty (40) yards of concrete placed for a particular pour. For instance, if the walls of a structure require eighty (80) yards of concrete; then two (2) sets of concrete cylinders shall be required.

B. Field Compression Tests:

1. Compression test specimens will be taken during construction from the first placement of each class of concrete specified herein and at intervals thereafter as selected by the Resident Engineer to ensure continued compliance with these Specifications. Each set of test specimens will consist of four (4) cylinders.
2. Compression test specimens for concrete shall be made in accordance with Section 9.2 of ASTM C 31. Specimens shall be 6-inch diameter by 12-inch high cylinders.
3. Compression tests shall be performed in accordance with ASTM C 39. One (1) test cylinder will be tested at 7 days and two (2) at 28 days. The remaining cylinder will be held to verify test results, if needed.

C. Evaluation and Acceptance of Concrete:

1. Evaluation and acceptance of the compressive strength of concrete shall be according to the requirements of ACI 318, Chapter 5, “Concrete Quality”, and as specified herein.
2. A statistical analysis of compression test results will be performed according to the requirements of ACI 214. The standard deviation of the test results shall not exceed 640 PSI, when ordered at equivalent water content as estimated by slump.
3. If any concrete fails to meet these requirements, immediate corrective action shall be taken to increase the compressive strength for all subsequent batches of the type of concrete affected.

CAST-IN-PLACE CONCRETE
03300-6

4. When the standard deviation of the test results exceeds 640 PSI, the average strength for which the mix is designed shall be increased by an amount necessary to satisfy the statistical requirement that the probability of any test being more than 500 PSI below or the average of any three (3) consecutive tests being below the specified compressive strength is 1 in 100. The required average strength shall be calculated by Criterion No. 3 of ACI 214 using the actual standard deviation.
5. All concrete which fails to meet the ACI requirements and these Specifications is subject to removal and replacement at no cost to the Owner.

D. Construction Tolerances: Set and maintain concrete forms and perform finishing operations so as to ensure that the completed Work is within the tolerances specified herein. Surface defects and irregularities are defined as finishes and are to be distinguished from tolerances. Tolerance is the specified permissible variation from lines, grades, or dimensions shown. Where tolerances are not stated in the Specifications, permissible deviations will be in accordance with ACI 117.

1. The following construction tolerances are hereby established and apply to finished walls and slab unless otherwise illustrated:

<u>Item</u>	<u>Tolerance</u>
Variation of the constructed linear outline from the established position in plan.	In 10 feet: ¼ inch In 20 feet or more: ½ inch
Variation from the level or from the grades shown.	In 10 feet: ¼ inch In 20 feet or more: ½ inch
Variation from the plumb.	In 10 feet: ¼ inch In 20 feet or more: ½ inch
Variation in the thickness of slabs and walls.	Minus ¼ inch; Plus ½ inch
Variation in the locations and sizes of slabs and wall openings.	Plus or minus ¼ inch

E. Floor Slab Surface Hardener:

1. Job Mockup: In a location designated by the Resident Engineer, place a minimum 100 square feet floor mockup using materials and

CAST-IN-PLACE CONCRETE
03300-7

procedures proposed for use in the Project. Revise materials and procedures as necessary to obtain acceptable finish surface. Maintain the same controls and procedures used in the acceptable mockup throughout the Project.

2. Field Service: During job mockup and initial period of installation, the manufacturer of the surface hardener shall furnish the service of a trained, full-time representative to advise on proper use of the product. Notify surface hardener manufacturer at least three (3) days before initial use of the product.
3. Installer Qualifications: Installer shall have a minimum of three (3) years experience and shall be specialized in the application of dry shake surface hardeners.

PART 2 - PRODUCTS

2.01 CONCRETE MATERIALS

A. General:

1. All materials specified herein shall be classified by the Environmental Protection Agency as acceptable for potable water use within 30 days of application.
 2. Materials shall be delivered, stored, and handled so as to prevent damage by water or breakage. Only one (1) brand of cement shall be used. Cement reclaimed from cleaning bags or leaking containers shall not be used. All cement shall be used in the sequence of receipt of shipments.
- B. All materials furnished for the Work shall comply with the requirements of Sections 201, 203, and 204 of ACI 301, as applicable.
- C. Storage of materials shall conform to the requirements of Section 2.5 of ACI 301 or the SSPWC.
- D. Materials for concrete shall conform to the following requirements:
1. Cement shall be standard brand Portland Cement conforming to ASTM C 150 for Type V. A minimum of 85 percent of cement by weight shall pass a 325 screen. A single brand of cement shall be used throughout the Work, and before its use, the brand shall be acceptable to the Resident Engineer. The cement shall be suitably

CAST-IN-PLACE CONCRETE

03300-8

protected from exposure to moisture until used. Cement that has become lumpy shall not be used. Sacked cement shall be stored in such a manner so as to permit access for inspection and sampling. Certified mill test reports, including fineness, for each shipment of cement to be used shall be submitted to the Resident Engineer if requested regarding compliance with these Specifications.

2. Water for mixing and curing shall be potable, clean, and free from objectionable quantities of silty organic matter, alkali, salts and other impurities. The water shall be considered potable, for the purposes of this Section, only if it meets the requirements of the local governmental agencies. Agricultural water with high total dissolved solids concentration (over 1,000 mg/l) shall not be used.
3. Aggregates shall be obtained from pits acceptable to the Resident Engineer, shall be nonreactive, and shall conform to ASTM C 33. Maximum size of coarse aggregate shall be as specified herein. Lightweight sand for fine aggregate will not be permitted.
 - a) Coarse aggregates shall consist of clean, hard, durable gravel, crushed gravel, crushed rock or a combination thereof. The coarse aggregates shall be prepared and handled in two or more size groups for combined aggregates with a maximum size greater than $\frac{3}{4}$ inch. When the aggregates are proportioned for each batch of concrete the two size groups shall be combined. See the Paragraph in Part 2 entitled "Trial Batch and Laboratory Tests" for the use of the size groups.
 - b) Fine aggregates shall be natural sand or a combination of natural and manufactured sand that are hard and durable. When tested in accordance with ASTM D 2419, the sand equivalency shall not be less than 75 percent for an average of three samples, nor less than 70 percent for an individual test. Gradation of fine aggregate shall conform to ASTM C 33, with 15 to 30 percent passing the number 50 screen and 5 to 10 percent passing the number 100 screen. The fineness modulus of sand used shall not be over 3.00.
 - c) Combined aggregates shall be well graded from coarse to fine sizes, and shall be uniformly graded between screen sizes to produce a concrete that has optimum workability and consolidation characteristics. Where a trial batch is required for a mix design, the final combined aggregate gradations will be established during the trial batch process.

CAST-IN-PLACE CONCRETE

03300-9

- d) When tested in accordance with ASTM C 33, the ratio of silica released to reduction in alkalinity shall not exceed 1.0.
 - e) When tested in accordance with ASTM C 33, the fine aggregate shall produce a color in the supernatant liquid no darker than the reference standard color solution.
 - f) When tested in accordance with ASTM C 33, the coarse aggregate shall show a loss not exceeding 42 percent after 500 revolutions, or 10.5 percent after 100 revolutions.
 - g) When tested in accordance with ASTM C 33, the loss resulting after five cycles shall not exceed 10 percent for fine or coarse aggregate when using sodium sulfate.
4. Ready-mix concrete shall conform to the requirements of ASTM C 94.
5. Admixtures: All admixtures shall be compatible and by a single manufacturer capable of providing qualified field service representation. Admixtures shall be used in accordance with manufacturer's recommendations. If the use of an admixture is producing an inferior end result, discontinue use of the admixture. Admixtures shall not contain thiocyanates nor more than 0.05 percent chloride ion, and shall be nontoxic after 30 days.
- a) Set controlling and water reducing admixtures: Admixtures may be added at the Contractor's option to control the set, affect water reduction, and increase workability. The addition of an admixture shall be at no increase in cost to the Owner. The use of an admixture shall be subject to acceptance by the Resident Engineer. Concrete containing an admixture shall be first placed at a location determined by the Resident Engineer. Admixtures specified herein shall conform to the requirements of ASTM C 494. The required quantity of cement shall be used in the mix regardless of whether or not an admixture is used.
 - 1) Concrete shall not contain more than one water-reducing admixture. Concrete containing an admixture shall be first placed at a location determined by the Resident Engineer.

CAST-IN-PLACE CONCRETE
03300-10

- 2) Set controlling admixture shall be either with or without water-reducing properties. Where the air temperature at the time of placement is expected to be consistently over 80°F, a set retarding admixture such as Plastocrete by Sika Corporation; Pozzolith 300R by Master Builders; Daratard by W. R. Grace; or equal shall be used. Where the air temperature at the time of placement is expected to be consistently under 40°F, a noncorrosive set accelerating admixture such as Plastocrete 161FL by Sika Corporation; Pozzutec 20 by Master Builders; Daraset by W. R. Grace; or equal shall be used.
- 3) Normal range water reducer shall conform to ASTM C 494, Type A, WRDA 79 by W. R. Grace; Pozzolith 322-N by Master Builders; Plastocrete 161 by Sika Corporation; or equal. The quality of admixture used and the method of mixing shall be in accordance with the manufacturer's instructions and recommendations.
- 4) High range water reducer shall conform to ASTM C 494, Type F or G. Daracem 100 or WDRA 19 by W. R. Grace; Sikament FF or Sikament 86 by Sika Corporation; Rheobuild 1000 or Rheobuild 716 by Master Builders; or equal. High range water reducer shall be added to the concrete after all other ingredients have been mixed and initial slump has been verified. No more than 14 ounces of water reducer per sack of cement shall be used. Water reducer shall be considered as part of the mixing water when calculating water cement ratio.
- 5) If the high range water reducer is added to the concrete at the job site, it may be used in conjunction with the same water reducer added at the batch plant. Concrete shall have a slump of 3 inches + ½ inch before adding the high range water reducing admixture at the job site. The high range water-reducing admixture shall be accurately measured and pressure injected into the mixer as a single dose by an experienced technician. A standby system shall be provided and tested before each day's operation of the job site system.

CAST-IN-PLACE CONCRETE

03300-11

- 6) Concrete shall be mixed at mixing speed for a minimum of 30 mixer revolutions after the addition of the high range water reducer.
 - 7) Fly ash: Fly ash shall not be allowed.
6. Shrinking Reducing Agent Admixture: All Structural Concrete shall include 0.5 gallons, per cubic yard of concrete, of W.R. Grace Eclipse, or an approved equal.

2.02 CURING MATERIALS

- A. Materials for curing concrete as specified herein shall conform to the following requirements and ASTM C 309:
1. All curing compounds shall be white pigmented and resin based. Sodium silicate compounds shall not be allowed. Concrete curing compound shall be Spartan Cote Cure-Seal Hardener by the Burke Company; Super Rez Seal by Euclid Chemical Company; MB-429 as manufactured by Master Builders; or equal. Water-based resin curing compounds shall be used only where local air quality regulations prohibit the use of a solvent-based compound. Water-based curing compounds shall be Aqua Resincure by the Burke Company; Aqua-Cure by Euclid Chemical Company; Masterkure-W by Master Builders; or equal.
 2. Polyethylene sheet for use as a concrete curing blanket shall be white, and shall have a nominal thickness of 6 mils. The loss of moisture when determined in accordance with the requirements of ASTM C 156 shall not exceed 0.055 grams per square centimeter of surface.
 3. Polyethylene-coated water proof paper sheeting for use as concrete curing blanket shall consist of white polyethylene sheeting free of visible defects, uniform in appearance, having a nominal thickness of 2 mils and permanently bonded to waterproof paper conforming to the requirements of Federal Specification UU-B-790A(1)(2). The loss of moisture, when determined in accordance with the requirements of ASTM C156, shall not exceed 0.055 gram per square centimeter of surface.
 4. Polyethylene-coated burlap for use as concrete curing blanket shall be 4 mils thick, white opaque polyethylene film impregnated or

CAST-IN-PLACE CONCRETE

03300-12

extruded into one side of the burlap. Burlap shall weigh not less than 9 ounces per square yard. The loss of moisture, when determined in accordance with the requirements of ASTM C 156, shall not exceed 0.055 gram per square centimeter of surface.

5. Curing mats for use in Curing Method 6 as specified herein, shall be heavy shag rugs or carpets or cotton mats quilted at 4 inches on center. Curing mats shall weigh a minimum of 12 ounces per square yard when dry.
6. Evaporation retardant shall be a material such as Confilm as manufactured by Master Builders; Eucobar as manufactured by Euclid Chemical Company; or equal.

2.03 NONWATERSTOP JOINT MATERIALS

- A. Materials for nonwaterstop joints in concrete shall conform to the following requirements:
 1. Preformed joint filler shall be a nonextruding, resilient, bituminous type conforming to the requirements of ASTM D 1751.
 2. Mastic joint sealer shall be a material that does not contain evaporating solvents; that will tenaciously adhere to concrete surfaces; that will remain permanently resilient and pliable; that will not be affected by continuous presence of water and will not in any way contaminate potable water; and that will effectively seal the joints against moisture infiltration even when the joints are subject to movement due to expansion and contraction. The sealer shall be composed of special asphalts or similar materials blended with lubricating and plasticizing agents to form a tough, durable mastic substance containing no volatile oils or lubricants and shall be capable of meeting the test requirements set forth hereinafter, if testing is required by the Resident Engineer.

2.04 MISCELLANEOUS MATERIALS

- A. Damp-proofing agent shall be an asphalt emulsion, such as Hydrocide 600 by Sonneborn; Damp-proofing Asphalt Coating by Euclid Chemical Company; Sealmastic by W. R. Meadows Inc., or equal.
- B. Bonding agents shall be epoxy adhesives conforming to the following products for the applications specified:

CAST-IN-PLACE CONCRETE
03300-13

1. For bonding freshly-mixed, plastic concrete to hardened concrete, Sikadur 32 Hi-Mod Epoxy Adhesive, as manufactured by Sika Corporation; Concessive Liquid (LPL), as manufactured by Master Builders; BurkEpoxy MV as manufactured by The Burke Company; or equal.
2. For bonding hardened concrete or masonry to steel, Sikadur 31 Hi-Mod Gel as manufactured by Sika Corporation; BurkEpoxy NS as manufactured by The Burke Company; Concessive Paste (LPL) as manufactured by Master Builders; or equal

2.05 CONCRETE DESIGN REQUIREMENTS

A. Mix Design:

1. General: Concrete shall be composed of cement, admixtures, aggregates and water. These materials shall be of the qualities specified. The exact proportions in which these materials are to be used for different parts of the Work will be determined during the trial batch. In general, the mix shall be designed to produce a concrete capable of being deposited so as to obtain maximum density and minimum shrinkage and, where deposited in forms, to have good consolidation properties and maximum smoothness of surface. In mix designs, the percentage of sand of the total weight of fine and coarse aggregate shall not exceed 41 for hydraulic structures or 50 for all other structures, unless noted otherwise. The aggregate gradations shall be formulated to provide fresh concrete that will not promote rock pockets around reinforcing steel or embedded items. The proportions shall be changed whenever necessary or desirable to meet the required results at no additional cost to the Owner. All changes shall be subject to review by the Resident Engineer.

CAST-IN-PLACE CONCRETE

03300-14

2. Water-Cement Ratio and Compressive Strength: *The minimum compressive strength and cement content of concrete used for this project shall be not less than that specified in the following table:*

<u>Type of Work</u>	Min. 28-Day Compressive Strength (PSI)	Max Size Aggregate (in)	Minimum Cement Per CU YD (lb)	Max W/C Ratio (by weight)
Structural Concrete:				
Normal weight reinforced concrete (145 pcf)	5,000	3/4	658	0.45
Lean Concrete	4,500	3/4	611	0.45

NOTE: The Contractor is cautioned that the limiting parameters specified above are not a mix design. Additional cement or water-reducing agent may be required to achieve workability demanded by the Contractor's construction methods and aggregates. The Contractor is responsible for any costs associated with furnishing concrete with the required workability.

3. Adjustments to Mix Design: The mixes used shall be changed whenever such change is necessary or desirable to secure the required strength, density, workability, and surface finish and the Contractor shall be entitled to no additional compensation because of such changes.

B. Consistency:

1. The quantity of water entering into a batch of concrete shall be just sufficient, with a normal mixing period, to produce a concrete which can be worked properly into place without segregation, and which can be compacted by the vibratory methods herein specified to give the desired density, impermeability and smoothness of surface. The quantity of water shall be changed as necessary, with variations in the nature or moisture content of the aggregates, to maintain uniform production of a desired consistency. The consistency of the concrete in successive batches shall be determined by slump tests in accordance with ASTM C 143. The slumps shall be as follows:

CAST-IN-PLACE CONCRETE
03300-15

<u>Part of Work</u>	<u>Slump (in)</u>
All concrete, unless noted otherwise	4 inches
With high range water reducer added	5 inches

C. Trial Batch and Laboratory Tests:

1. Before placing any concrete, a testing laboratory approved by the Resident Engineer will prepare a trial batch of each class of structural concrete, based on the preliminary concrete mixes submitted by the Contractor. During the trial batch the aggregate proportions may be adjusted by the testing laboratory using the two coarse aggregate size ranges to obtain the required properties. If one size range produces an acceptable mix, a second size range need not be used. Such adjustments shall be considered refinements to the mix design and shall not be the basis for extra compensation to the Contractor. All concrete shall conform to the requirements of this Section, whether the aggregate proportions are from the Contractor's preliminary mix design, or whether the proportions have been adjusted during the trial batch process. The trial batch will be prepared using the aggregates, cement and admixture proposed for the project. The trial batch materials shall be of a quantity such that the testing laboratory can obtain 3 drying shrinkage, and six compression test specimens from each batch. The cost, of not more than three laboratory trial batch tests for each specified concrete strength will be borne by the Contractor. The Contractor shall furnish and deliver the materials in steel drums to the approved testing laboratory. Any additional trial batch testing required shall be performed by the testing laboratory at no additional cost to the Owner.
2. The determination of compressive strength will be made by testing 6-inch diameter by 12 inch high cylinders; made, cured and tested in accordance with ASTM C 192 and ASTM C 39. Three compression test cylinders will be tested at 7 days and 3 at 28 days. The average compressive strength for the three cylinders tested at 28 days for any given trial batch shall not be less than 125 percent of the specified compressive strength.
3. A sieve analysis of the combined aggregate for each trial batch shall be performed according to the requirements of ASTM C 136. Values shall be given for percent passing each sieve.

CAST-IN-PLACE CONCRETE
03300-16

4. In lieu of trial batch and laboratory tests specified in this Section, the Contractor may submit previously-designed, tested, and successfully-used concrete mixes, using materials similar to those intended for this project, together with a minimum of three certified test reports of the 28 day strength of the proposed concrete mix.

D. Shrinkage Limitation:

1. The maximum concrete shrinkage for specimens cast in the laboratory from the trial batch, as measured at 21 day drying age or at 28 day drying age shall be 0.036 percent or 0.042 percent, respectively. Use a mix design for construction that has first met the trial batch shrinkage requirements. Shrinkage limitations apply only to structural concrete.
2. The maximum concrete shrinkage for specimens cast in the field shall not exceed the trial batch maximum shrinkage requirement by more than 25 percent.
3. If the required shrinkage limitation is not met during construction, take any or all of the following actions, at no additional cost to the Owner for securing the specified shrinkage requirements. These actions may include changing the source of aggregates, cement and/or admixtures; reducing water content; washing of aggregate to reduce fines; increasing the number of construction joints, modifying the curing requirements; or other actions designed to minimize shrinkage or the effects of shrinkage.

E. Measurement of Cement and Aggregate:

1. The amount of cement and of each separate size of aggregate entering into each batch of concrete shall be determined by direct weighing equipment acceptable to the Owner's Representative.
2. Weighing Tolerances:

<u>Material</u>	<u>Percent of Total Weight</u>
Cement	1
Aggregates	3
Admixtures	3

CAST-IN-PLACE CONCRETE
03300-17

F. Measurement of Water:

1. The quantity of water entering the mixer shall be measured by a suitable water meter or other measuring device of a type acceptable to the Resident Engineer and capable of measuring the water in variable amounts within a tolerance of one percent. The water feed control mechanism shall be capable of being locked in position so as to deliver constantly any specified amount of water to each batch of concrete. A positive quick-acting valve shall be used for a cut-off in the water line to the mixer. The operating mechanism must be such that leakage will not occur when the valves are closed.

2.06 READY-MIXED CONCRETE

- A. At the Contractor's option, ready-mixed concrete may be used meeting the requirements as to materials, batching, mixing, transporting, and placing as specified herein and in accordance with ASTM C 94, including the following supplementary requirements.
- B. Ready-mixed concrete shall be delivered to the site of the Work, and discharge shall be completed within one and one-half hour (90 minutes) after the addition of the cement to the aggregates or before the drum has been revolved 250 revolutions, whichever is first.
- C. Truck mixers shall be equipped with electrically-actuated counters by which the number of revolutions of the drum or blades may be readily verified. The counter shall be of the resettable, recording type, and shall be mounted in the driver's cab. The counters shall be actuated at the time of starting mixers at mixing speeds.
- D. Each batch of concrete shall be mixed in a truck mixer for not less than 70 revolutions of the drum or blades at the rate of rotation designated by the manufacturer of equipment. Additional mixing, if any, shall be at the speed designated by the manufacturer of the equipment as agitating speed. All materials including mixing water shall be in the mixer drum before actuating the revolution counter for determining the number of revolution of mixing.
- E. Truck mixers and their operation shall be such that the concrete throughout the mixed batch as discharged is within acceptable limits of uniformity with respect to consistency, mix, and grading. If slump tests taken at approximately the one-quarter (1/4) and three-quarter (3/4) points of the load during discharge give slumps differing by more than one inch (1") when the specified slump is 3 inches or less, or if they differ by more than 2 inches when the specified slump is more than 3 inches, the mixer shall not

CAST-IN-PLACE CONCRETE

03300-18

be used on the Work unless the causing condition is corrected and satisfactory performance is verified by additional slump tests. All mechanical details of the mixer, such as water measuring and discharge apparatus, condition of the blades, speed of rotation, general mechanical condition of the unit, and clearance of the drum, shall be checked before a further attempt to use the unit will be permitted.

- F. Each batch of ready-mixed concrete delivered at the job site shall be accompanied by a delivery ticket furnished to the Resident Engineer in accordance with Subsection 03300-1.04B.
- G. The use of nonagitating equipment for transporting ready-mixed concrete will not be permitted. Combination truck and trailer equipment for transporting ready-mixed concrete will not be permitted. The quality and quantity of materials used in ready-mixed concrete and in batch aggregates shall be subject to continuous inspection at the batching plant by the Resident Engineer.

2.07 FLOOR HARDENER (SURFACE APPLIED)

- A. Surface hardener shall be a light reflective nonoxidizing metallic aggregate dry shake surface hardener.
 - 1. Surface hardener shall be premeasured, premixed and packaged at the factory.
 - 2. Apply surface hardener at the rate of 1.8 to 2.5 lb per square foot.
 - 3. Surface hardener shall be Alumiplate®, by Master Builders, Inc., or equal.
- B. Curing Compound shall meet the moisture retention requirements of ASTM C 309 and surface hardener manufacturer's recommendations.
- C. Monomolecular Film: Evaporation retarder shall be used to aid in maintaining concrete moisture during the early placement stages of plastic concrete. Evaporation retarder shall be as recommended by surface hardener manufacturer.

2.08 NSF / ANSI STANDARD 61

- A. All cementitious material, admixtures, curing compounds, and other industrial produced materials used in concrete, or for curing or repairing of concrete, that can contact potable water or water that will be treated to become potable shall be listed in NSF / ANSI Standard 61.

CAST-IN-PLACE CONCRETE
03300-19

PART 3 - EXECUTION

3.01 PROPORTIONING AND MIXING

- A. Proportioning: Proportioning of the concrete mix shall conform to the requirements of Chapter 3, “Proportioning” of ACI 301.
- B. Mixing: Mixing of concrete shall conform to the requirements of Chapter 7 of said ACI 301 Specifications.
- C. Slump: Maximum slumps shall be as specified herein.
- D. Retempering: Retempering of concrete or mortar which has partially hardened shall not be permitted.

3.02 PREPARATION OF SURFACES FOR CONCRETE

- A. General: Earth surfaces shall be thoroughly wetted by sprinkling, before the placing of any concrete, and these surfaces shall be kept moist by frequent sprinkling up to the time of placing concrete thereon. The surface shall be free from standing water, mud, and debris at the time of placing concrete.
- B. Joints in Concrete: Concrete surfaces upon or against which concrete is to be placed, where the placement of the concrete has been stopped or interrupted so that, as determined by the Resident Engineer, the new concrete cannot be incorporated integrally with that previously placed, are defined as construction joints. The surfaces of horizontal joints shall be given a compacted, roughened surface for good bond. The joint surfaces shall be cleaned of all laitance, loose or defective concrete, foreign material, and roughened to a minimum of ¼ inch amplitude. Such cleaning and roughening shall be accomplished by hydroblasting or sandblasting (exposing aggregate) followed by thorough washing. All pools of water shall be removed from the surface of construction joints, and the joint surface shall be coated with an epoxy-bonding agent, unless indicated otherwise, before the new concrete is placed.
- C. Placing Interruptions: When placing of concrete is to be interrupted long enough for the concrete to take a set, the working face shall be given a shape by the use of forms or other means, that will secure proper union with subsequent Work; provided that construction joints shall be made only where acceptable to the Resident Engineer.

CAST-IN-PLACE CONCRETE
03300-20

- D. Embedded Items: No concrete shall be placed until all formwork, installation of parts to be embedded, reinforcement steel, and preparation of surfaces involved in the placing have been completed and accepted by the Resident Engineer at least 4 hours before placement of concrete. All surfaces of forms and embedded items that have become encrusted with dried grout from concrete previously placed shall be cleaned of all such grout before the surrounding or adjacent concrete is placed.
- E. All inserts or other embedded items shall conform to the requirements herein.
- F. All reinforcement, anchor bolts, sleeves, inserts, and similar items shall be set and secured in the forms where illustrated on the Plans or by approved shop drawings and shall be acceptable to the Resident Engineer before any concrete is placed. Accuracy of placement is the responsibility of the Contractor.
- G. Casting New Concrete Against Old: Where concrete is to be cast against old concrete (any concrete which is greater than 60 days of age), the surface of the old concrete shall be thoroughly cleaned and roughened by hydroblasting or sandblasting (exposing aggregate). The joint surface shall be coated with an epoxy bonding agent unless indicated otherwise by the Resident Engineer.
- H. No concrete shall be placed in any structure until all water entering the space to be filled with concrete has been properly cut off or has been diverted by pipes, or other means, and carried out of the forms, clear of the Work. No concrete shall be deposited underwater nor shall the Contractor allow still water to rise on any concrete until the concrete has attained its initial set. Water shall not be permitted to flow over the surface of any concrete in such manner and at such velocity as will injure the surface finish of the concrete. Pumping or other necessary dewatering operations for removing ground water, if required, will be subject to the review of the Resident Engineer.
- I. Corrosion Protection: Pipe, conduit, dowels, and other ferrous items required to be embedded in concrete construction shall be so positioned and supported before placement of concrete that there will be a minimum of 2 inches clearance between said items and any part of the concrete reinforcement. Securing such items in position by wiring or welding them to the reinforcement will not be permitted.
- J. Openings for pipes, inserts for pipe hangars and brackets, and the setting of anchors shall, where practicable, be provided for during the placing of concrete.

CAST-IN-PLACE CONCRETE

03300-21

- K. Anchor bolts shall be accurately set, and shall be maintained in position by templates while embedded in concrete.
- L. Cleaning: The surfaces of all metalwork to be in contact with concrete shall be thoroughly cleaned of all dirt, grease, loose scale and rust, grout, mortar, and other foreign substances immediately before the concrete is placed.

3.03 HANDLING, TRANSPORTING AND PLACING

- A. General: Placing of concrete shall conform to the applicable requirements of Chapter 8 of ACI 301 and the requirements of this Section. No aluminum materials shall be used in conveying any concrete.
- B. Nonconforming Work or Materials: Concrete which upon or before placing is found not to conform to the requirements specified herein shall be rejected and immediately removed from the Work. Concrete which is not placed in accordance with these Specifications, or which is of inferior quality, shall be removed and replaced at no additional expense to the Owner.
- C. Unauthorized Placement: No concrete shall be placed except in the presence Resident Engineer. The Contractor shall notify the Resident Engineer in writing at least 48 hours in advance of placement of any concrete.
- D. Placement in Wall Forms: Concrete shall not be dropped through reinforcement steel or into any deep form, nor shall concrete be placed in any form in such a manner as to leave accumulation of mortar on the form surfaces above the placed concrete. In such cases, some means such as the use of hoppers and, if necessary, vertical ducts of canvas, rubber, or metal shall be used for placing concrete in the forms in a manner that it may reach the place of final deposit without separation. In no case shall the free fall of concrete exceed 4 feet below the ends of ducts, chutes, or buggies. Concrete shall be uniformly distributed during the process of depositing and in no case after depositing shall any portion be displaced in the forms more than 6 feet in horizontal direction. Concrete in forms shall be deposited in uniform horizontal layers not deeper than 2 feet; and care shall be taken to avoid inclined layers or inclined construction joints except where such are required for sloping members. Each layer shall be placed while the previous layer is still soft. The rate of placing concrete in forms shall not exceed 5 feet of vertical rise per hour. Sufficient illumination shall be provided in the interior of all forms so that the concrete at the places of deposit is visible from the deck or runway.

CAST-IN-PLACE CONCRETE
03300-22

- E. Conveyor Belts and Chutes: All ends of chutes, hopper gates, and all other points of concrete discharge throughout the Contractor's conveying, hoisting and placing system shall be so designed and arranged that concrete passing from them will not fall separated into whatever receptacle immediately receives it. Conveyor belts, if used, shall be of a type acceptable to the Resident Engineer. Chutes longer than 50 feet will not be permitted. Minimum slopes of chutes shall be such that concrete of the specified consistency will readily flow in them. If a conveyor belt is used, it shall be wiped clean by a device operated in such a manner that none of the mortar adhering to the belt will be wasted. All conveyor belts and chutes shall be covered.
- F. Placement in Slabs: Concrete placed in sloping slabs shall proceed uniformly from the bottom of the slab to the top, for the full width of the placement. As the Work progresses, the concrete shall be vibrated and carefully worked around the slab reinforcement, and the surface of the slab shall be screeded in an up-slope direction.
- G. Temperature of Concrete: The temperature of concrete when it is being placed shall be not more than $90^{\circ}F$ nor less than $55^{\circ}F$ for sections less than 12 inches thick nor less than $50^{\circ}F$ for all other sections. Concrete ingredients shall not be heated to a temperature higher than that necessary to keep the temperature of the mixed concrete, as placed, from falling below the specified minimum temperature. When the temperature of the concrete is $85^{\circ}F$ or above, the time between the introduction of the cement to the aggregates and discharge at the Site shall not exceed 45 minutes. If concrete is placed when the weather is such that the temperature of the concrete would exceed $90^{\circ}F$, the Contractor shall employ effective means, such as precooling of aggregates and mixing water using ice or placing at night, as necessary to maintain the temperature of the concrete, as it is placed, below $90^{\circ}F$. The Contractor shall be entitled to no additional compensation on account of the foregoing requirements.
- H. Cold Weather Placement:
1. Placement of concrete shall conform to ACI 306.1 - Standard Specification for Cold Weather Concreting, and the following.
 2. Remove all snow, ice and frost from the surfaces, including reinforcement, against which concrete is to be placed. Before beginning concrete placement, thaw the subgrade to a minimum depth of 6 inches. All reinforcement and embedded items shall be warmed to above $32^{\circ}F$ before concrete placement.

CAST-IN-PLACE CONCRETE
03300-23

3. Maintain the concrete temperature above $50^{\circ}F$ for at least 3 days after placement.

I. Hot Weather Placement:

1. Placement of concrete shall conform to ACI 305R - Hot Weather Concreting, and the following.
2. Only set retarding admixture shall be used in concrete when air temperature is expected to be consistently over $80^{\circ}F$.
3. The maximum temperature of concrete shall not exceed $90^{\circ}F$ immediately before placement.
4. From the initial placement to the curing state, concrete shall be protected from the adverse effect of high temperature, low humidity, and wind.

3.04 PUMPING OF CONCRETE

- A. General: If the pumped concrete does not produce satisfactory end results, discontinue the pumping operation and proceed with the placing of concrete using conventional methods.
- B. Pumping Equipment: The pumping equipment must have two (2) cylinders and be designed to operate with one (1) cylinder only in case the other one is not functioning. In lieu of this requirement, the Contractor shall maintain a standby pump on the site during pumping.
- C. The minimum diameter of the hose (conduits) shall be in accordance with ACI 304.2R.
- D. Pumping equipment and hoses (conduits) that are not functioning properly, shall be replaced.
- E. Aluminum conduits for conveying the concrete shall not be permitted.
- F. Field Control: Concrete samples for slump, air content, and test cylinders will be taken at the placement (discharge) end of the line.

3.05 ORDER OF PLACING CONCRETE

- A. The order of placing concrete in all parts of the Work shall be acceptable to the Resident Engineer. In order to minimize the effects of shrinkage, the concrete shall be placed in units as bounded by construction joints. The

CAST-IN-PLACE CONCRETE

03300-24

placing of units shall be accomplished by placing alternate units in a manner such that each unit placed shall have cured at least 7 days for hydraulic structures and 3 days for all other structures before the contiguous unit or units are placed, except that the corner sections of vertical walls shall not be placed until the two (2) adjacent wall panels have cured at least 14 days for hydraulic structures and 7 days for all other structures.

- B. The surface of the concrete shall be level whenever a run of concrete is stopped. To ensure a level, straight joint on the exposed surface of walls, a wood strip at least $\frac{3}{4}$ inch thick shall be tacked to the forms on these surfaces. The concrete shall be carried about $\frac{1}{2}$ inch above the underside of the strip. About one (1) hour after the concrete is placed, the strip shall be removed and any irregularities in the edge formed by the strip shall be leveled with a trowel and all laitance shall be removed.

3.06 TAMPING AND VIBRATING

- A. As concrete is placed in the forms or in excavations, it shall be thoroughly settled and compacted, throughout the entire depth of the layer which is being consolidated, into a dense, homogeneous mass, filling all corners and angles, thoroughly embedding the reinforcement, eliminating rock pockets, and bringing only a slight excess of water to the exposed surface of concrete during placement. Vibrators shall be Group 3 (per ACI 309) high speed power vibrators (8,000 to 12,000 rpm) of an immersion type in sufficient number and with (at least one) standby units as required. Group 2 vibrators may be used only at specific locations when accepted by the Resident Engineer.
- B. Care shall be exercised in placing concrete around waterstops. The concrete shall be carefully worked by rodding and vibrating to make sure that all air and rock pockets have been eliminated. Where flat-strip type waterstops are placed horizontally, the concrete shall be worked under the waterstops by hand, making sure that all air and rock pockets have been eliminated. Concrete surrounding the waterstops shall be given additional vibration, over and above that used for adjacent concrete placement to assure complete embedment of the waterstops in the concrete.
- C. Concrete in walls shall be internally vibrated and at the same time rammed, stirred, or worked with suitable appliances, tamping bars, shovels, or forked tools until it completely fills the forms or excavations and closes snugly against all surfaces. Subsequent layers of concrete shall not be placed until the layers previously placed have been worked thoroughly as specified. Vibrators shall be provided in sufficient numbers, with standby units as required, to accomplish the results herein specified within 15 minutes after concrete of the prescribed consistency is placed in the forms. The vibrating

CAST-IN-PLACE CONCRETE

03300-25

head shall be kept from contact with the surfaces of the forms. Care shall be taken not to vibrate concrete excessively or to work it in any manner that causes segregation of its constituents.

3.07 FINISHING CONCRETE SURFACES

- A. General: Surfaces shall be free from fins, bulges, ridges, offsets, honeycombing, or roughness of any kind, and shall present a finished, smooth, continuous hard surface. Allowable deviations from plumb or level and from the alignment, profiles, and dimensions shown are defined as tolerances and are specified in Part 1, herein. These tolerances are to be distinguished from irregularities in finish as described herein. Aluminum finishing tools shall not be used.
- B. Formed Surfaces: No treatment is required after form removal except for curing, repair or defective concrete, and treatment of surface defects. Where architectural finish is required, it shall be as specified or as shown.
1. Surface holes larger than ½ inch in diameter or deeper than ¼ inch are defined as surface defects in basins and exposed walls.
- C. Unformed Surfaces: After proper and adequate vibration and tamping, all unformed top surfaces of slabs, floors, walls, and curbs shall be brought to a uniform surface with suitable tools. Immediately after the concrete has been screeded, it shall be treated with a liquid evaporation retardant. The retardant shall be used again after each Work operation as necessary to prevent drying shrinkage cracks. The classes of finish specified for unformed concrete surfaces are designated and defined as follows:
1. FINISH U1 - Sufficient leveling and screeding to produce an even, uniform surface with surface irregularities not to exceed 3/8-inch. No further special finish is required.
 2. FINISH U2 - After sufficient stiffening of the screeded concrete, surfaces shall be float finished with wood or metal floats or with a finishing machine using float blades. Excessive floating of surfaces while the concrete is plastic and dusting of dry cement and sand on the concrete surface to absorb excess moisture will not be permitted. Floating shall be the minimum necessary to produce a surface that is free from screed marks and is uniform in texture. Surface irregularities shall not exceed 1/4-inch. Joints and edges shall be tooled where shown or as determined by the Resident Engineer.
 3. FINISH U3 - After the floated surface (as specified for Finish U2) has hardened sufficiently to prevent excess of fine material from

CAST-IN-PLACE CONCRETE

03300-26

being drawn to the surface, steel troweling shall be performed with firm pressure such as will flatten the sandy texture of the floated surface and produce a dense, uniform surface free from blemishes, ripples, and trowel marks. The finish shall be smooth and free of all irregularities.

4. FINISH U4 - Steel trowel finish (as specified for Finish U3) without local depressions or high points. In addition, the surface shall be given a light hairbroom finish with brooming perpendicular to drainage unless otherwise shown. The resulting surface shall be rough enough to provide a nonskid finish.

D. Unformed surfaces shall be finished according to the following schedule:

UNFORMED SURFACE FINISH SCHEDULE

<u>Area</u>	<u>Finish</u>
Grade slabs and foundations to be covered with concrete or fill material	U1
Floors to be covered with grouted tile or topping grout	U2
Slabs which are water bearing with slopes 10 percent and less	U4
Sloping slabs which are water bearing with slopes greater than 10 percent	U4
Slabs not water bearing	U4
Slabs to be covered with built-up roofing	U2
Interior slabs and floors to receive architectural finish	U3
Top surface of walls	U4

E. Floor Hardener (Surface Applied) - Required

1. Provide concrete with the following additional requirements:
 - a) Maximum slump of 4 inches when peak ambient temperatures are expected to be more than 65°F, and no

CAST-IN-PLACE CONCRETE
03300-27

more than 3 inches when ambient temperatures are below 65°F.

- b) Maximum air content of 3 percent.
 - c) Do not use calcium chloride or set-accelerating admixtures containing calcium chloride.
 - d) Do not use admixtures that increase bleeding.
 - e) Do not use fly ash.
2. After the concrete has been leveled and as soon as the concrete will support an operator and machine without disturbing the level or working up excessive fines, float the surface of the slab with a mechanical float fitted with float shoes. Following floating, apply 1/2 to 2/3 of the total amount of dry shake surface hardener so that a uniform distribution of surface hardener is obtained. The use of a mechanical spreader is recommended. Once the shake has absorbed sufficient moisture (indicated by the darkening of the shake), float the surface. Immediately apply the remaining 1/3 to 1/2 of the shake and allow to absorb moisture. Do not place dry shake on concrete surface when bleed water is present.
 3. Use finishing machines with detachable float shoes. Compact surface by a third mechanical floating if time and setting characteristics of the concrete will allow. Do not add water to the surface.
 4. As surface further stiffens, indicated by loss of sheen, hand or mechanically trowel with blades set relatively flat. Remove all marks and pinholes in the final raised trowel operation.
 5. Follow all application instructions of the floor surface hardener manufacturer.
 6. Cure finished floors using fill-forming curing compound recommended by surface hardener manufacturer. Uniformly apply curing compound over the entire surface at a coverage that will provide moisture retention in excess of the requirements of ASTM C 309. Maintain ambient temperature of 50°F or above during the curing period.
 7. Keep floors covered and free of traffic and loads for a minimum of 14 days after completion.

CAST-IN-PLACE CONCRETE

03300-28

3.08 ARCHITECTURAL FINISH

A. General: Architectural finishes shall be required only where specifically called out on the Plans. In all other cases, the paragraph above, entitled “Finishing Concrete Surfaces”, shall apply.

1. Immediately after the forms have been stripped, the concrete surface shall be inspected and any poor joints, voids, rock pockets, or other defective areas shall be repaired and all form-tie holes filled as indicated herein.
2. Architectural finishes shall not be applied until the concrete surface has been repaired as required and the concrete has cured at least 14 days.
3. All architecturally treated concrete surfaces shall conform to the accepted sample required herein in texture, color, and quality. It shall be the Contractor’s responsibility to maintain and protect the concrete finish.

B. Smooth Concrete Finish:

1. The concrete surface shall be wetted, and a grout shall be applied with a brush. The grout shall be prepared by mixing one (1) part Portland Cement and one (1) part of fine sand that will pass a No. 16 sieve with sufficient water to give it the consistency of thick paint. The cement used in said grout shall be 1/2 gray and 1/2 white Portland Cement, as determined by the Owner’s Representative. White Portland Cement shall be Atlas White or equal. Calcium chloride in the amount of 5 percent by volume of the cement shall be used in the brush coat. The freshly applied grout shall be vigorously rubbed into the concrete surface with a wood float filling all small air holes. After all surface grout had been removed with a steel trowel, the surface shall be allowed to dry and, when dry, shall be vigorously rubbed with burlap to remove completely all surface grout so that there is no visible paint-like film of grout on the concrete. The entire cleaning operation for any area shall be completed the day it is started, and no grout shall be left on the surface overnight.
2. Cleaning operations for any given day shall be terminated at panel joints. It is essential that the various operations be carefully timed to secure the desired effect which is a light-colored concrete surface

CAST-IN-PLACE CONCRETE

03300-29

of uniform color and texture without any appearance of a point or grout film.

3. In the event that improper manipulation results in an inferior finish, rub such inferior areas with carborundum bricks.
4. Before beginning any of the final treatment on exposed surfaces, treat in a satisfactory manner a trial area of at least 200 square feet in some inconspicuous place selected by the Resident Engineer and preserve said trial area undisturbed until the completion of the job.

C. Sandblasted Concrete Finish:

1. Sandblasting shall be done in a safe manner acceptable to local authorities and per OSHA requirements. The sandblasting shall be a light sandblast to remove laitance and to produce a uniform fine aggregate surface texture with approximately 1/32 to 1/16 inch of surface sandblasted off. Corners, patches, form panel joints, and soft spots shall be sandblasted with care.
2. A 3 square foot sample panel of the sandblasted finish shall be provided by the Contractor for acceptance by the Resident Engineer before starting the sandblasting Work. The sample panel shall include a corner, plugs, and joints and shall be marked after approval. All other sandblasting shall be equal in finish to the sample panel.
3. Protection against sandblasting shall be provided on all surfaces and materials not requiring sandblasting but within or adjacent to areas being sandblasted. After sandblasting, the concrete surfaces shall be washed with clean water and excess sand removed.

3.09 CURING AND DAMP-PROOFING

- A. General: All concrete shall be cured for not less than 14 days after placing, in accordance with the methods specified herein for the different parts of the Work, and described in detail in the following paragraphs:

<u>Surface To Be Cured or Damp-proofed</u>	<u>Method</u>
Unstripped forms	1
Wall sections with forms removed	6

CAST-IN-PLACE CONCRETE
03300-30

Construction joints between footings and walls, and between floor slab and columns	2
Encasement concrete and thrust blocks	3
All concrete surfaces not specifically provided for elsewhere in this Paragraph	6
Floor slabs on grade	6
Slabs not on grade	6

- B. Method 1: Wooden forms shall be wetted immediately after concrete has been placed and shall be kept wet with water until removed. If steel forms are used the exposed concrete surfaces shall be kept continuously wet until the forms are removed. If forms are removed within 14 days of placing the concrete, curing shall be continued in accordance with Method 6, herein.
- C. Method 2: The surface shall be covered with burlap mats which shall be kept wet with water for the duration of the curing period, until the concrete in the walls has been placed. No curing compound shall be applied to surfaces cured under Method 2.
- D. Method 3: The surface shall be covered with moist earth not less than 4 hours, nor more than 24 hours, after the concrete is placed. Earthwork operations that may damage the concrete shall not begin until at least 7 days after placement of concrete.
- E. Method 4: The surface shall be sprayed with a liquid curing compound.
1. It shall be applied in accordance with the manufacturer's printed instructions at a maximum coverage rate of 200 square feet per gallon and in such a manner as to cover the surface with a uniform film which will seal thoroughly.
 2. Where the curing compound method is used, care shall be exercised to avoid damage to the seal during the curing period. Should the seal be damaged or broken before the expiration of the curing period, the break shall be repaired immediately by the new application of additional curing compound over the damaged portion.
 3. Wherever curing compound may have been applied by mistake to surfaces against which concrete subsequently is to be placed and to

CAST-IN-PLACE CONCRETE

03300-31

which it is to adhere, said compound shall be entirely removed by wet sandblasting just before the placing of new concrete.

4. Where curing compound is specified, it shall be applied as soon as the concrete has hardened enough to prevent marring on unformed surfaces, and within 2 hours after removal of forms from contact with formed surfaces. Repairs required to be made to formed surfaces shall be made within the said 2 hour period; provided, however, that any such repairs which cannot be made within the said 2 hour period shall be delayed until after the curing compound has been applied. When repairs are to be made to an area on which curing compound has been applied, the area involved shall first be wet-sandblasted to remove the curing compound, following which repairs shall be made as specified herein.
5. At all locations where concrete is placed adjacent to a panel which has been coated with curing compound, the previously coated panel shall have curing compound reapplied to an area within 6 feet of the joint and to any other location where the curing membrane has been disturbed.
6. Before final acceptance of the Work, all visible traces of curing compound shall be removed from all surfaces in such a manner that does not damage surface finish.

F. Method 5:

1. Until the concrete surface is covered with curing compound, the entire surface shall be kept damp by applying water using nozzles that atomize the flow so that the surface is not marred or washed. The concrete shall be given a coat of curing compound in accordance with Method 4, herein. Not less than 1 hour nor more than 4 hours after the coat of curing compound has been applied, the surface shall be wetted with water delivered through a fog nozzle, and concrete-curing blankets shall be placed on the slabs. The curing blankets shall be polyethylene sheet, polyethylene-coated waterproof paper sheeting or polyethylene-coated burlap. The blankets shall be laid with the edges butted together and with the joints between strips sealed with 2 inch wide strips of sealing tape or with edges lapped not less than 3 inches and fastened together with a waterproof cement to form a continuous watertight joint.
2. The curing blankets shall be left in place during the 14 day curing period and shall not be removed until after concrete for adjacent Work has been placed. Should the curing blankets become torn or

CAST-IN-PLACE CONCRETE
03300-32

otherwise ineffective, replace damaged sections. During the first 3 days of the curing period, no traffic of any nature and no depositing, temporary or otherwise, of any materials shall be permitted on the curing blankets. During the remainder of the curing period, foot traffic and temporary depositing of materials that impose light pressure will be permitted only on top of plywood sheets 5/8 inch minimum thickness, laid over the curing blanket. Add water under the curing blanket as often as necessary to maintain damp concrete surfaces at all times.

G. Method 6: This method applies to both walls and slabs.

1. The concrete shall be kept continuously wet by the application of water for a minimum period of at least 14 consecutive days, beginning immediately after the concrete has reached final set or forms have been removed or until the concrete surface is covered with the curing medium. The entire surface shall be kept damp by applying water using nozzles that atomize the flow so that the surface is not marred or washed.
2. Heavy curing mats shall be used as a curing medium to retain the moisture during the curing period. The curing medium shall be weighted or otherwise held in place to prevent being dislodged by wind or any other causes and to be substantially in contact with the concrete surface. All edges shall be continuously held in place.
3. The curing blankets and concrete shall be kept continuously wet by the use of sprinklers or other means both during and after normal working hours. The concrete shall be maintained in a cool condition from the heat of hydration and the solar heat of the sun.
4. Immediately after the application of water has terminated at the end of the curing period, the curing medium shall be removed, any dry spots shall be rewetted, and curing compound shall be immediately applied in accordance with Method 4, herein.
5. Dispose of excess water from the curing operation to avoid damage to the Work.

H. Damp-proofing: The exterior surface of all buried roof slabs shall be damp-proofed as follows:

1. Immediately after completion of curing the surface shall be sprayed with a damp-proofing agent consisting of an asphalt emulsion. Application shall be in two (2) coats. The first coat shall be diluted

CAST-IN-PLACE CONCRETE

03300-33

to 1/2 strength by the addition of water and shall be sprayed on so as to provide a maximum coverage rate of 100 square feet per gallon of dilute solution. The second coat shall consist of an application of the specified material, undiluted, and shall be sprayed on so as to provide a maximum coverage rate of 100 square feet per gallon. Damp-proofing material shall be as specified herein.

2. As soon as the asphalt emulsion, applied as specified herein, has taken an initial set, the entire area thus coated shall be coated with whitewash. Any formula for mixing the whitewash may be used which produces a uniformly coated white surface and which so remains until placing of the backfill. Should the whitewash fail to remain on the surface until the backfill is placed, apply additional whitewash.

3.10 PROTECTION

- A. Protect all concrete against injury until final acceptance by the Owner.
- B. Fresh concrete shall be protected from damage due to rain, hail, sleet, or snow. Provide such protection while the concrete is still plastic and whenever such precipitation is imminent or occurring.

3.11 CURING IN COLD WEATHER

- A. Water curing of concrete may be reduced to 6 days during periods when the mean daily temperature in the vicinity of the worksite is less than 40°F; provided that, during the prescribed period of water curing, when temperatures are such that concrete surfaces may freeze, water curing shall be temporarily discontinued.
- B. Concrete cured by an application of curing compound will require no additional protection from freezing if the protection at 50°F for 72 hours is obtained by means of approved insulation in contact with the forms or concrete surfaces; otherwise the concrete shall be protected against freezing temperatures for 72 hours immediately following 72 hours protection at 50°F. Concrete cured by water curing shall be protected against freezing temperatures for 3 days immediately following the 72 hours of protection at 50°F.
- C. Discontinuance of protection against freezing temperatures shall be such that the drop in temperature of any portion of the concrete will be gradual and will not exceed 40°F in 24 hours. In the spring, when the mean daily temperature rises above 40°F for more than 3 successive days, the specified 72 hour protection at a temperature not lower than 50°F may be

CAST-IN-PLACE CONCRETE

03300-34

discontinued for as long as the mean daily temperature remains above 40°F; provided, that the concrete shall be protected against freezing temperatures for not less than 48 hours after placement.

- D. Where artificial heat is employed, special care shall be taken to prevent the concrete from drying. Use of unvented heaters will be permitted only when unformed surfaces of concrete adjacent to the heaters are protected for the first 24 hours from an excessive carbon dioxide atmosphere by application of curing compound; provided, that the use of curing compound for such surfaces is otherwise permitted by these Specifications.

3.12 TREATMENT OF SURFACE DEFECTS

- A. As soon as forms are removed, all exposed surfaces shall be carefully examined and any irregularities shall be immediately rubbed or ground in a satisfactory manner in order to secure a smooth, uniform, and continuous surface. Plastering or coating of surfaces to be smoothed will not be permitted. No repairs shall be made until after inspection by the Resident Engineer. In no case will extensive patching of honeycombed concrete be permitted. Concrete containing minor voids, holes, honeycombing, or similar depression defects shall have them repaired as specified herein. Concrete containing extensive voids, holes, honeycombing, or similar depression defects, shall be completely removed and replaced. All repairs and replacements herein specified shall be promptly executed by the Contractor at its own expense.
- B. Defective surfaces to be repaired shall be cut back from trueline in a minimum depth of ½ inch over the entire area. Feathered edges will not be permitted. Where chipping or cutting tools are not required in order to deepen the area properly, the surface shall be prepared for bonding by the removal of all laitance or soft material, and not less than 1/32 inch depth of the surface film from all hard portions, by means of an efficient sandblast. After cutting and sandblasting, the surface shall be wetted sufficiently in advance of shooting with shotcrete or with cement mortar so that while the repair material is being applied, the surfaces under repair will remain moist, but not so wet as to overcome the suction upon which a good bond depends. The material used for repair proposed shall consist of a mixture of 1 sack of cement to 3 cubic feet of sand. For exposed walls, the cement shall contain such a proportion of Atlas White Portland Cement as is required to make the color of the patch match the color of the surrounding concrete.
- C. Holes left by tie-rod cones shall be reamed with suitable toothed reamers so as to leave the surfaces of the holes clean and rough. These holes then shall be repaired in an approved manner with dry-packed cement grout. Holes left by form-tying devices having a rectangular cross-section, and other

CAST-IN-PLACE CONCRETE

03300-35

imperfections having a depth greater than their least surface dimension, shall not be reamed but shall be repaired in an approved manner with dry-packed cement grout.

- D. All repairs shall be built up and shaped in such a manner that the completed Work will conform to the requirements of this Section, as applicable, using approved methods which will not disturb the bond, cause sagging, or cause horizontal fractures. Surfaces of said repairs shall receive the same kind and amount of curing treatment as required for the concrete in the repaired section.
- E. Before filling any structure with water, all cracks that may have developed shall be “vee’d” and filled with construction joint sealant for water-bearing structures conforming to the materials and methods specified in Section 03290 - Joints in Concrete Structures. This repair method shall be accomplished on the water bearing face of members. Before backfilling, faces of members in contact with fill, which are not covered with a waterproofing membrane, shall also have cracks repaired as specified herein.

3.13 PATCHING HOLES IN CONCRETE

A. Patching Small Holes:

1. Holes which are less than 12 inches in their least dimension and extend completely through concrete members, shall be filled as specified herein.
2. Small holes in members which are water-bearing or in contact with soil or other fill materials, shall be filled with nonshrink grout. Where a face of the member is exposed to view, the nonshrink grout shall be held back 2 inches from the finished surface. The remaining 2 inches shall then be patched according to the paragraph in Part 3 entitled - Treatment of Surface Defects.
3. Small holes through all other concrete members shall be filled with nonshrink grout, with exposed faces treated as above.

B. Patching Large Holes:

1. Holes which are larger than 12 inches in their least dimension, shall have a keyway chipped into the edge of the opening all around,

CAST-IN-PLACE CONCRETE

03300-36

unless a formed keyway exists. The holes shall then be filled with concrete as specified.

2. Holes which are larger than 24 inches in their least dimension and which do not have reinforcing steel extending from the existing concrete, shall have reinforcing steel set in grout in drilled holes. The reinforcing added shall match the reinforcing in the existing wall unless required otherwise by the Improvement Plans or approved shop drawings.
3. Large holes in members which are water bearing or in contact with soil or other fill, shall have a bentonite type waterstop material placed around the perimeter of the hole as specified in the Section 03290 - Joints in Concrete Structures, unless there is an existing waterstop in place.

3.14 CARE AND REPAIR OF CONCRETE

- A. The Contractor shall protect all concrete against injury or damage from excessive heat, lack of moisture, overstress, or any other cause until final acceptance by the Owner. Particular care shall be taken to prevent the drying of concrete and to avoid roughening or otherwise damaging the surface. Any concrete found to be damaged, or which may have been originally defective, or which becomes defective at any time before the final acceptance of the completed Work, or which departs from the established line or grade, or which, for any other reason, does not conform to the requirements of the Contract Documents, shall be satisfactorily repaired or removed and replaced with acceptable concrete at the Contractor's expense.

END OF SECTION 03300

CAST-IN-PLACE CONCRETE
03300-37

SECTION 03315 - GROUT

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The Contractor shall provide grout in accordance with the Contract Documents.
- B. The following types of grout shall be covered in this Section:
 - 1. Cement Grout
 - 2. Packaged Grout
 - A. Nonshrink Grout: This type of grout is to be used wherever grout is illustrated in the Contract Documents unless another type is specifically referenced.
 - B. Epoxy Grout
 - C. Pump and Motor Grout
 - 3. Topping Grout and Concrete Fill

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. The Work of the following Sections apply to the Work of this Section. Other Sections, not referenced below, shall also apply to the extent required for proper performance of this Work.
 - 1. Section 01660 – Mechanical Equipment Installation and Start-up.
 - 2. Section 03300 – Cast-in-Place Concrete.
 - 3.

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. Commercial Standards:
 - 1. CRD-C 621 Corps of Engineers Specification for Non-Shrink Grout

GROUT
03315-1

B. National Sanitation Foundation

1. NSF / ANSI 61: Drinking Water System Components – Health Effects

C. ASTM Standard in Building Codes:

1. ASTM C 109: Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in or 50-mm Cube Specimens)
2. ASTM C 531: Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical Resistant Mortars, Grouts, and Monolithic Surfacing
3. ASTM C 579: Test Methods for Compressive Strength of Chemical Resistant Mortars, Grouts, and Monolithic Surfacing
4. ASTM C 827: Test Method for Change in Height at Early Ages of Cylindrical Specimens from Cementitious Mixture
5. ASTM C 881: Specification for Epoxy-Resin-Base Bonding System for Concrete
6. ASTM C 882: Standard Test for Bond Strength of Epoxy-Resin Systems Used with Concrete
7. ASTM C 884: Standard Test Method for Thermal Compatibility between Concrete and an Epoxy-Resin Overlay
8. ASTM D 638: Standard Test Methods for Tensile Properties of Plastics
9. ASTM D 696: Test Method for Coefficient of Linear Thermal Expansion of Plastics
10. ASTM D 2471: Standard Test Methods for Gel Time and Peak Exothermic Temperature of Reacting Thermosetting Resins

GROUT
03315-2

1.04 CONTRACTOR SUBMITTALS

- A. The Contractor shall submit certified test results verifying the compressive strength, shrinkage, and expansion requirements indicated herein; and manufacturer's literature containing instructions and recommendations on the mixing, handling, placement and appropriate uses for each type of nonshrink and epoxy grout used in the Work in accordance with the requirements of the Specification Section 01300 – Contractor Submittals.

1.05 QUALITY ASSURANCE

A. Field Tests:

1. Compression test specimens will be taken during construction from the first placement of each type of grout, and at intervals thereafter as selected by the Owner's Representative to ensure continued compliance with these Specifications. The specimens will be prepared by a Geotechnical Consultant/Laboratory to be compensated by the Contractor. The Resident Engineer shall approve the Geotechnical Consultant/Laboratory firm.
2. Compression tests and fabrication of specimens for cement grout and non-shrink grout shall be performed as specified in ASTM C 109 at intervals during construction as determined by the Resident Engineer. A set of three (3) specimens will be prepared for testing at 7 days, 28 days, and each additional time period as appropriate. The Contractor shall bear the expenses related to this item.
3. Compression tests and fabrication of specimens for epoxy grout shall be performed as specified in ASTM C 579, Method B, at intervals during construction as determined by the Resident Engineer. A set of three (3) specimens will be prepared for testing at 7 days, and each earlier time period as appropriate. The Contractor shall bear the expenses relative to this item.
4. Placed grout, which fails to meet the requirements of these Specifications, is subject to removal and replacement at no additional cost to the Owner.
5. The cost of all laboratory tests on grout will be borne by the Contractor. The Contractor shall assist the approved Geotechnical Consultant/Laboratory Firm in obtaining specimens for testing. The Contractor shall also be responsible, without additional cost to the Owner, for additional tests and investigation on work performed which is non-compliant with the Specifications. The Geotechnical

GROUT
03315-3

Consultant/Laboratory Firm shall supply all materials necessary for fabricating the test specimens.

- B. Construction Tolerances: Construction tolerances shall be as specified in the Section 03300 - Cast-in-Place Concrete, except as modified herein or elsewhere in the Contract Documents.

PART 2 - PRODUCTS

2.01 CEMENT GROUT

- A. Cement Grout: Cement grout shall be composed of one part cement, three parts sand, and the minimum amount of water necessary to obtain the desired consistency. Where needed to match the color of adjacent concrete, white Portland Cement shall be blended with regular cement as needed. The minimum compressive strength at 28 days shall be 5,000 PSI.
- B. Cement grout materials shall be as specified in Section 03300 - Cast-in-Place Concrete.

2.02 PREPACKAGED GROUTS

- A. Nonshrink Grout:
 1. Nonshrink grout shall be a prepackaged, inorganic, nongas-liberating, nonmetallic, cement-based grout requiring only the addition of water. The manufacturer's instructions shall be printed on each bag or other container in which the materials are packaged. The specific formulation for each class of nonshrink grout indicated herein shall be that recommended by the manufacturer for the particular application.
 2. Class A nonshrink grouts shall have a minimum 28 day compressive strength of 6,000 PSI; shall have no shrinkage (0.0 percent) and a maximum 4.0 percent expansion in the plastic state when tested in accordance with ASTM C 827; and shall have no shrinkage (0.0 percent) and a maximum of 0.2 percent expansion in the hardened state when tested in accordance with CRD-C 621.
 3. Class B nonshrink grouts shall have a minimum 28-day compressive strength of 5,000 PSI and shall meet the requirements of CRD-C 621.

GROUT
03315-4

4. Application:

- a) Class A nonshrink grout shall be used for the repair of all holes and defects in concrete members which are water bearing or in contact with soil or other fill material, grouting under all equipment base plates, and at all locations where grout is indicated; except, for the applications of Class B nonshrink grout and epoxy grout indicated herein. Class A nonshrink grout may be used in place of Class B nonshrink grout for all applications.
- b) Class B nonshrink grout shall be used for the repair of all holes and defects in concrete members which are not water bearing and not in contact with soil or other fill material, grouting under all base plates for structural steel members, pump base plate support structure, and grouting railing posts in place.

B. Epoxy Grout:

1. Epoxy grout shall be a pourable, nonshrink, 100 percent solids system. The epoxy grout system shall have three components: resin, hardener, and specially blended aggregate, all premeasured and prepackaged. The resin component shall not contain any nonreactive diluents. Resins containing butyl glycidyl ether (BGE) or other highly volatile and hazardous reactive diluents are not acceptable. Variation of component ratios is not permitted unless specifically recommended by the manufacturer. Manufacturer's instructions shall be printed on each container in which the materials are packaged. Epoxy grout shall be BurkEpoxy Anchoring Grout by The Burke Company, Sika or an approved equal.
2. The chemical formulation of the epoxy grout shall be that recommended by the manufacturer for the particular application.
3. The mixed epoxy grout system shall have a minimum working life of 45 minutes at 75°F.
4. The epoxy grout shall develop a compressive strength of 5,000 PSI in 24 hours and 10,000 PSI in 7 days when tested in accordance with ASTM C 579, Method B. There shall be no shrinkage (0.0 percent) and a maximum 4.0 percent expansion when tested in accordance with ASTM C 827.

GROUT
03315-5

5. The epoxy grout shall exhibit a minimum effective bearing area of 95 percent. This shall be determined by a test consisting of filling a 2 inch diameter by 4 inch high metal cylinder mold covered with a glass plate coated with a release agent. A weight shall be placed on the glass plate. At 24 hours after casting, the weight and plate shall be removed and the void area in the plate measured. The surface of the grout shall be probed with a sharp instrument to locate all voids.
6. The peak exotherm of a 2-inch diameter by 4 inch high cylinder shall not exceed $95^{\circ}F$ when tested with $75^{\circ}F$ material at laboratory temperature. The epoxy grout shall exhibit a maximum thermal coefficient of 30×10^{-6} inches/inch/degree F when tested according to ASTM C 531 or ASTM D 696.
7. Application: Epoxy grout shall be used to embed all anchor bolts and reinforcing steel required to be set in grout, and for all other applications in the Contract Documents where grout type is not specifically indicated.
8. For crack repair, the Contractor shall use pressure injection epoxy grout as recommended by the manufacturer and approved by the Owner's Representative.

C. Grout for Pumps and Motors

1. Grout for pumps and motors shall be epoxy grouts meeting the following minimum requirements:
 - a) Creep shall be less than 0.005 in/in when tested by ASTM C 881 method. The test shall be at $70^{\circ}F$ and $140^{\circ}F$ with a load of 400 PSI.
 - b) Linear shrinkage shall be less than 0.080 percent and thermal expansion less than 17×10^{-6} in/in/degree F when tested by ASTM C 531.
 - c) The compressive strength shall be a minimum of 12,000 PSI in 7 days when tested by ASTM C 579 Method 8, modified.
 - d) Bond strength of grout to Portland Cement concrete shall be greater than 2,000 PSI when using ASTM C 882 test method.

GROUT
03315-6

- e) Grout shall pass the thermal compatibility test when overlaid on Portland Cement concrete using test method ASTM C 884.
 - f) Tensile strength and modulus of elasticity shall be determined by ASTM D 638. The tensile strength shall not be less than 1,700 PSI and the modulus of elasticity shall not be less than 1.8×10^6 PSI.
 - g) Gel time and peak exothermic temperature shall be determined by ASTM D 2471. Peak exothermic temperature shall not exceed $110^\circ F$ when a specimen 6 inches in diameter by 12 inches high is used. Gel time shall be at least 150 minutes.
 - h) The grout shall be suitable for supporting precision machinery subject to high impact and shock loading in industrial environments while exposed to elevated temperatures as high as $150^\circ F$, with a load of 2,000 PSI.
- 2. Primer, if required, shall conform to the written recommendations of the grout manufacturer.
 - 3. Surface preparations shall conform to the written recommendations of the grout manufacturer.
 - 4. Placement and Curing:
 - a) Placement and curing procedures shall be in accordance with the written recommendations of the grout manufacturer.
 - b) A grouting performance demonstration/training session shall be conducted by the grout manufacturer's representative prior to foundation and base plate preparation and the first grouting on site. This training session shall demonstrate proper preparation and installation methods and that the grouting material meets the strength requirements.
 - 5. Grout shall be Escoweld, Chockfast Red Epoxy Grout as manufactured by Philadelphia Resin Corp.; Five Star DP Epoxy Grout as manufactured by Five Star Products, Inc.; or equal.

GROUT
03315-7

2.03 TOPPING GROUT AND CONCRETE FILL

- A. Grout for topping of slabs and concrete fill for built-up surfaces of tank, channel, and basin bottoms shall be composed of cement, fine aggregate, coarse aggregate, water, and admixtures proportioned and mixed as specified herein. All materials and procedures specified for normal concrete in Section 03300 - Cast-in-Place Concrete, shall apply except as noted otherwise herein.
- B. Topping grout and concrete fill shall contain a minimum of 564 pounds of cement per cubic yard with a maximum water cement ratio of 0.45. Where concrete fill is thicker than 3 inches, sitework concrete, as specified in Section 03300 - Cast-in-Place Concrete, may be used when accepted by the Owner's Representative.
- C. Coarse aggregate shall be graded as follows:

<u>U.S. Standard Sieve Size</u>	<u>Percent by Weight Passing</u>
1/2"	100
3/8"	90 - 100
No. 4	20 - 55
No. 8	5 - 30
No. 16	0 - 10
No. 30	0

- D. Final mix design shall be as determined by trial mix design under supervision of the approved testing laboratory.
- E. Strength: Minimum compressive strength of topping grout and concrete fill at the end of 28 days shall be 4,000 PSI.

2.04 CURING MATERIALS

- A. Curing materials shall be as specified in Section 03300 - Cast-in-Place Concrete for cement grout and as recommended by the manufacturer of prepackaged grouts.

2.05 MEASUREMENT OF INGREDIENTS

- A. Measurements for cement grout shall be made accurately by volume using containers. Shovel measurement shall not be allowed.

GROUT
03315-8

- B. Prepackaged grouts shall have ingredients measured by means recommended by the manufacturer.

2.06 NSF / ANSI STANDARD 61

- A. All cementitious material, admixtures, curing compounds, and other industrial produced materials used in concrete, or for curing or repairing of concrete, that can contact potable water or water that will be treated to become potable shall be listed in NSF / ANSI Standard 61.

PART 3 - EXECUTION

3.01 GENERAL

- A. All surface preparation, curing, and protection of cement grout shall be as indicated in Section 03300 - Cast-in-Place Concrete. The finish of the grout surface shall match that of the adjacent concrete.
- B. The manufacturer of Class A nonshrink grout and epoxy grout shall provide on-site technical assistance to Contractor upon request.
- C. Base concrete or masonry must have attained its design strength before grout is placed, unless authorized by the Owner's Representative.
- D. The consistency of grouts shall be that necessary to completely fill the space to be grouted for the particular application. Dry pack consistency is such that the grout is plastic and moldable but will not flow. Where "dry pack" is called for in the Contract Documents, it shall mean a grout of that consistency; the type of grout to be used shall be as indicated herein for the particular application.
- E. The slump for topping grout and concrete fill shall be adjusted to match placement and finishing conditions but shall not exceed 4 inches.

3.02 GROUTING PROCEDURES

- A. Prepackage Grouts: All mixing, surface preparation, handling, placing, consolidation, curing, and other means of execution for prepackaged grouts shall be accomplished according to the instructions and recommendations of the manufacturer.

GROUT
03315-9

B. Base Plate Grouting:

1. For base plates, the original concrete shall be blocked out or finished off a sufficient distance below the plate to provide for a minimum 1 inch thickness of grout or a thickness as indicated on the Plans.
2. After the base plate has been set in position at the proper elevation by steel wedges or double nuts on the anchor bolts, the space between the bottom of the plate and the original pour of concrete shall be filled with non-shrink-type grout. The mixture shall be of a trowelable consistency and tamped or rodded solidly into the space between the plate and the base concrete. A backing board or stop shall be provided at the back side of the space to be filled with grout. Where this method of placement is not practical or where required by the Resident Engineer, alternate grouting methods shall be submitted for acceptance by the Resident Engineer.

C. Topping Grout and Concrete Fill:

1. All mechanical, electrical, and finish Work shall be completed prior to placement of topping or concrete fill. The base slab shall be given a roughened textured surface by sandblasting or hydroblasting exposing the aggregates to ensure bonding to the base slab.
2. The minimum thickness of grout topping and concrete fill shall be one inch (1") unless otherwise specified by the Plans. Where the finished surface of concrete fill is to form an intersecting angle of less than 45° with the concrete surface it is to be placed against, a key shall be formed in the concrete surface at the intersection point. The key shall be a minimum of 3-1/2 inches wide by 1-1/2 inches deep.
3. The base slab shall be thoroughly cleaned and wetted prior to placing topping or concrete fill. No topping or concrete fill shall be placed until the slab is free from standing pools, ponds of water. A thin coat of neat Type II cement grout shall be broomed onto the surface of the slab just before topping or concrete fill placement. The topping or concrete fill shall be compacted by rolling or tamping, brought to established grade, and floated. Grouted concrete fill for tank and basin bottoms where scraping mechanism are to be installed shall be screeded by blades attached to the revolving mechanism of the equipment in accordance with the procedures outlined by the equipment manufacturer after the grout is brought to the established grade.

GROUT
03315-10

4. Topping grout placed on sloping slabs shall proceed uniformly from the bottom of the slab to the top, for the full width of the placement.
5. The surface shall be tested with a straight edge to detect high and low spots which shall be immediately eliminated. When the topping or concrete fill have hardened sufficiently, it shall be steel troweled to a smooth surface free from pinholes and other imperfections. An approved type of mechanical trowel may be used to assist in this operation, but the last pass over the surface shall be by hand-troweling. During finishing, no water, dry cement or mixture of dry cement and sand shall be applied to the surface.

3.03 CONSOLIDATION

- A. Grout shall be placed in such a manner, for the consistency necessary for each application, so as to assure that the space to be grouted is completely filled.

END OF SECTION 03315

GROUT
03315-11

SECTION 15380 – VERTICAL MULTISTAGE BOOSTER PUMP STATION

PART I – GENERAL

1.01 DESCRIPTION

A. Furnish and install a Vertical Multistage Booster Pump Station for a potable water system as specified herein and illustrated on the plans. The Vertical Multistage Booster Pump Station shall be furnished as a packaged item by a single equipment manufacturer or authorized representative. The contractor shall furnish and install all equipment and provide the necessary services to provide a complete Vertical Multistage Booster Pump Station. The Vertical Multistage Booster Pump Station shall include the pumps; skid; variable frequency drives (VFD’s); suction and discharge piping, fittings and valves; control panel with HMI; communication interfaces; electrical enclosure; air conditioning system for electrical enclosure; bladder type diaphragm tank; transducers, sensors and gauges and all other components and appurtenances necessary for a fully operational pump station. The Vertical Multistage Booster Pump Station components in contact with potable water shall be certified to National Sanitation Foundation (NSF) 61 Standards and UL-NSF listed. The manufacturer or authorized representative shall provide necessary start-up training through a factory trained authorized representative. The single equipment manufacturer or authorized representative shall provide a warranty for the Vertical Multistage Booster Pump Station as included within these specifications.

The Vertical Multistage Booster Pump Station shall include six (6) vertical in-line multistage pumps capable of producing 560 Gallons per Minute at 180 feet total dynamic head. One of the pumps is to remain in reserve as a spare pump. Five (5) of the pumps shall be normally active and capable of producing 2,800 gallons per minute at 180 feet total dynamic head (78 psi) pressure.

The Gateway Water Treatment Plant Vertical Multistage Booster Pump Station design parameters are as follows:

GRUNDFOS HYDRO MPC ECUE-6CR95-2 <small>System Model Number</small>		*	2800 GPM <small>System Design Flow Rate</small>	78 PSI <small>System Design Pressure</small>	14 INCHES <small>System Piping Size</small>
0 PSI <small>Minimum Suction Pressure</small>		480 VAC <small>System Electrical Voltage</small>		3 PHASE 60 HZ <small>System Electrical Phase and Frequency</small>	
CR95-2 <small>Pump Model Number</small>		560 GPM <small>Pump Capacity (GPM)</small>		180 FEET <small>Pump Total Head (Feet)</small>	
40 HP <small>Pump Horsepower</small>	3500 RPM <small>Pump RPM</small>	55 FLA <small>System Full Load Amperage</small>			

VERTICAL MULTISTAGE BOOSTER PUMP STATION

015380-1

*The Vertical Multistage Booster Pump Station shall be a Grundfos Hydro MPC ECUE-6CR95-2 or an approved equal.

The Vertical Multistage Booster Pump Station is to be installed inside the water treatment plant operations building. The operations building is a metal structure. The operations building is not air conditioned. The operations building rollup door is open during the daytime when the plant operators are present at the water treatment plant. The Vertical Multistage Booster Pump Station will therefore be subject to the outside elements and temperatures of 120 degrees Fahrenheit in the summer months. The Vertical Multistage Booster Pump Station will be subject to the Imperial Valley fine airborne dust which permeates and enters electrical enclosures and other enclosed areas. It will be necessary for the Vertical Multistage Booster Pump Station electrical control panel enclosure to be equipped with an air conditioning system to keep the VFD's and electrical control panels cool during the hot summer months. It will be necessary for the Vertical Multistage Booster Pump Station electrical enclosure to be seal tight to prevent dirt and dust from entering the enclosure.

A flowmeter and associated converter are to be provided for this project as separate items from the Vertical Multistage Booster Pump Station. The flowmeter converter is to be placed within the Vertical Multistage Booster Pump Station electrical control panel enclosure to be in a cool environment during the hot summer months. The Vertical Multistage Booster Pump Station electrical control panel enclosure shall be constructed to accommodate the flowmeter converter and a flowmeter AC/DC transformer .

There is an existing data logger and cloud-based alarm and monitoring system within the Gateway water treatment plant operations building. The alarm and data information from the Vertical Multistage Booster Pump Station communication interface unit are to be transmitted to the existing data logger. See the electrical plans for the location of the existing data logger and cloud-based alarm and monitoring system within the operations building.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 01660 – Mechanical Equipment – Installation and Start-Up
- B. Section 05450 – Pressure Gauges

1.03 REFERENCE STANDARDS

VERTICAL MULTISTAGE BOOSTER PUMP STATION

015380-2

The work in this section is subject to the requirements of applicable portions of the following standards:

- A. AWWA – American Water Works Association Hydraulic Institute
- B. ANSI – American National Standards Institute
- C. ASTM – American Society of Testing and Materials
- D. HI – Hydraulic Institute
- E. ASME – American Society of Mechanical Engineers
- F. IEEE – Institute of Electrical and Electronics Engineers
- G. NEMA – National Electrical Manufacturers Association
- H. NEC – National Electrical Code
- I. ISO – International Standards Organization
- J. UL – Underwriters Laboratories, Inc.
- K. IEC – International Electrotechnical Commission
- L. NSF – National Sanitation Foundation

1.04 SUBMITTALS

Submittals shall be forwarded in conformance with *Section 01300, Contractor Submittals*. As a minimum, the following submittals are to be forwarded for the Vertical Multistage Booster Pump Station:

- A. Process and Instrumentation Diagram (P & ID)
- B. Packaged system general arrangement drawing. Illustrate all mechanical and electrical items including the vertical multistage pumps and motors; suction and discharge piping, fittings and valves; check valves; bladder type diaphragm tank; electrical control panel enclosure; transducers, sensors and gauges; skid framing; pipe supports; electrical circuitry routing and all other physical items. The drawing is to be prepared at a scale. Sections of the Vertical Multistage Booster Pump Station are to be included, as required. The pump and electrical control panel enclosure and skid support frame may be supplied by a different manufacturer/supplier, however; the packaged system arrangement drawing shall accurately illustrate the skid frame in support of the approved pump and electrical control panel enclosure.
- C. Equipment approval checklist.

VERTICAL MULTISTAGE BOOSTER PUMP STATION

015380-3

- D. Vertical Multistage pump curve and data; pump materials including pump suction/discharge base, pump head, motor stool, impellers, diffuser chambers, outer sleeve, shaft, impeller wear rings, shaft journals, chamber bearings and o-rings.
- E. High efficiency pump motor including, Nema Standard, Nema C-Flange, service factor, power factor, totally enclosed fan cooled motor, bearing life, voltage, amps, horsepower, motor efficiency, rpm, insulation, motor class and similar items.
- F. Electrical conductors, conduits, flex conduit, grounding, electrical materials, electrical boxes and panels, terminal strips, transformers, load centers, circuit breakers, disconnect switches, gutters, distribution blocks, etc.
- G. Sensors, Transducers and Gauges.
- H. Nema 12 electrical enclosure, NEMA rating, piano hinges for the door panels, 3-point locking system door handle and interior fluorescent lighting with lighting switch. Provide a power wiring circuit diagram, control wiring circuit diagram, terminal legend, electrical components, wiring identification, main disconnect breaker, branch breakers, control relays for alarm functions, alarm circuitry, system fault lights, pump running lights and surge arrestor.
- I. Piping, gate or butterfly valves, check valves as listed within the contents of these specifications.
- J. Coating system for packaged Vertical Multistage Booster Pump Station including pumps and motors, piping, skid, enclosure and similar items.
- K. Pump system microprocessor based controller including HMI color display screen, battery backup to maintain power, built-in data logging including estimated flow rate from VFD, redundant primary sensor, secondary sensor, speed of pumps, inlet pressure, discharge pressure, power consumption, controlling parameter (process value). Include controller status readings, hardware inputs and outputs and pump system programming per the pump system controller specifications following later within this specification. Also to be included are the programmable set points, advanced water shortage protection, automatic adjustment of set point (set point influence), controller ability to receive remote analog set point (remote control), ramp

VERTICAL MULTISTAGE BOOSTER PUMP STATION

015380-4

- time after set point adjustment, pump system controller storage of up to 24 warnings and alarms in memory, pump run test capability, change number of pumps which are operational, instantaneous power consumption, pump performance curves, estimated flow rate (separate from flow meter), pipe friction loss compensation, communication options and common field-bus protocols, built in ethernet connection, variable pressure control, Multi-sensor, reduced operation, power and energy consumption, specific energy, check valve failure detection, flow meter input, differential pressure subtraction, field service contact.
- L. A list of alarm and monitoring data to be transmitted from the Communication Interface Unit to the existing Water Treatment Plant data logger and cloud-based alarm and monitoring system shall be provided.
 - M. A list of control panel operational lights and devices shall be provided.
 - N. Variable Frequency Drives shall comply with the requirements listed in this specification. The VFD requirements are lengthy and will therefore not be listed in this submittal requirement section. However, the VFD submittal data shall provide information on each of the many listed items outlined within this specification.
 - O. Sequence of Operation
 - P. Low Flow Stop Function
 - Q. System Construction
 - R. Skid based structure. Illustrate members of skid based structure on the packaged system arrangement drawing. Submittal information shall include skid base structure materials, standards of design and standards of manufacture as listed in this specification and the improvement plans. The Vertical Multistage Booster Pump Station skid shall be capable of sustaining the weight of the Vertical Multistage Pumps, suction and discharge pipelines, valves, check valves and fittings, electrical control panel and all other pump station components.
 - S. Bladder type diaphragm tank.
 - T. Transducers, sensors and gauges.

VERTICAL MULTISTAGE BOOSTER PUMP STATION

015380-5

- U. Coating System to be applied to the Vertical Multistage Booster Pump Station. The color palette shall be included with submittal documentation.
- V. Factory Testing Certification regarding hydrostatic testing of piping and electrical testing verification.
- W. Manufacturer's Warranty for Vertical Multistage Booster Pump Station – 24 months from the filing of the project Notice of Completion.
- X. Operations and Maintenance manuals shall be submitted at the time the pumping system is shipped to site by the manufacturer. *Manuals shall be prepared in conformance with Technical Specification Section 01730.* Manuals shall be prepared specifically for this project and shall not be a generalized manual applicable to many different Vertical Multistage Booster Pump Stations. Technical manuals shall be included for each equipment item that is field serviceable. Per technical specification section 01730 a total of four (4) operation and maintenance manuals shall be provided.
- Y. Minimum ½ ton, 480 Volt, 3 phase, 60 hertz air conditioning system shall be included with the Control Panel Enclosure. The electrical circuit for the air conditioning system shall include a breaker. The Control Panel Enclosure shall be constructed to support the weight of the air conditioning system and the air flow inlet and outlets associated with the air conditioning system.
- Z. A Vertical Multistage Booster Pump Station and Control Panel recommended spare parts list shall be forwarded as a submittal document.

PART 2 – PRODUCTS

2.01 DESIGN REQUIREMENTS

- A. Furnish and install a Vertical Multistage Booster Pump Station as illustrated on the plans and as specified herein. The Vertical Multistage Pump Station shall be a standalone package system that is operated by a microprocessor-based controller. The Vertical Multistage Booster Pump Station shall consist of six (6) centrifugal pumps capable of producing 560 Gallons per Minute at a Total Dynamic Head of 180 feet (78 psi). The pumps and motors shall be furnished as specified in later sections of this

VERTICAL MULTISTAGE BOOSTER PUMP STATION

015380-6

specification section. One of the pumps is to remain in reserve as a spare pump. Five (5) of the pumps shall be in a normally active status and capable of producing a flow of 2,800 Gallons per Minute at 78 psi pressure. All pumps shall have variable frequency drives for modulating control to increase or decrease the pump speed to deliver the distribution system demand flow at a set point pressure. The set point pressure for the Vertical Multistage Booster Pump Station is to be 78 psi. The controller shall have the ability to alternate automatically the run time of individual pumps to allow each pump to be exercised and age at the same rate. The controller shall establish the booster pumps sequence of operation, operate the system during low flow demands, possess data logging capabilities for system monitoring and be capable of displaying and communicating alarm conditions. The controller shall be programmable which will allow the set point pressure, pumping sequences and other control system parameters to be modified.

The Vertical Multistage Booster Pump Station shall also include discharge and suction piping, check valves, valves, pipe supports and other ancillary piping components.

A bladder diaphragm tank shall be supplied with the skid mounted booster pump station to supply water to the distribution system during low flow periods. The 132 gallon hydro-pneumatic tank and its requirements are illustrated on plan sheet 9.

A Nema 12 electrical enclosure shall be provided as part of the Vertical Multistage Booster Pump Station. The enclosure shall possess a 3-point locking system door handle and piano hinged door frames with the ability to lock the doors open. The electrical enclosure shall be equipped with an interior fluorescent lighting system with an interior lighting switch. The electrical enclosure shall contain the controller with human machine interface (HMI), variable frequency drives, communication interfaces, transformers, load centers with branch breakers, main breaker and all other electrical and control system devices for a fully functional Vertical Multistage Booster Pump Station. The enclosure shall also accommodate the flowmeter converter and the AC/DC transformer to provide the DC power to energize the flowmeter and flowmeter converter. The flowmeter and converter will be supplied separately from the Vertical Multistage Booster Pump Station. An air conditioning unit shall be mounted in a separate enclosure on the side of the Booster Pump Station Electrical Control Panel Enclosure. The microprocessor-based Air Conditioning Unit shall be enclosed in a 32.7 inch long x 12 inch wide x 12 inch deep NEMA 4X stainless steel enclosure. The air conditioning unit shall be powered by 460 volt, 3 phase, 60 hertz power and there shall be a main circuit breaker on the power line feed to the air conditioning unit. The air conditioning unit shall have a cooling capacity of 1,870 BTU/Hour. The air conditioning unit shall be mounted on the outside of the Nema 12 Booster Pump Station Control Panel Enclosure. The air conditioning unit shall weigh approximately 71.5 pounds. An internal air inlet and electrical circuitry/connection opening and a separate internal air outlet opening shall be established through the Nema 12 Booster Pump

VERTICAL MULTISTAGE BOOSTER PUMP STATION

015380-7

Station Control Panel Enclosure to accommodate the air conditioning unit. The air conditioning unit shall be a Saginaw Control Engineering SCE – AC1870B4460VSS Enviro – Therm Series Air Conditioner.

The electrical system extending to the pumping units shall be in conformance with the electrical technical specifications. The conduit shall be EMT with seal-tight flexible conduit at motor connections. Disconnect switches shall be provided at each motor location.

The Vertical Multistage Booster Pump Station base structure is to be composed of carbon steel with lifting provisions incorporated into the skid design. The complete Vertical Multistage Booster Pump Station will be mounted and connected to the common structural steel base along with the electrical control panel. Pipe supports are to be connected to the structural steel base. The skid based structure dimensions are illustrated on plan sheet 9. The skid base structure shall be furnished as specified in later sections of this specification section.

2.02 VARIABLE SPEED PACKAGED PUMPING SYSTEM

- A. Furnish and install a pre-fabricated and tested variable speed packaged pumping system to maintain constant water delivery pressure.
- B. The packaged pump system shall be a standard product of a single pump manufacturer. The entire pump system including pumps and pump logic controller, shall be designed, built, and tested by the same manufacturer.
- C. The complete packaged water booster pump system shall be certified and listed by UL (Category QCZJ – Packaged Pumping Systems) for conformance to U.S. and Canadian Standards.
- D. The complete packaged pumping system shall be NSF61 / NSF372 Listed for drinking water and low lead requirements.
- E. The packaged pump system shall be ASHRAE 90.1 – 2010 compliant without the need of a remote mounted sensor. The control logic used to simulate a remote mounted sensor shall be proportional pressure control with squared or linear adaptation. An actual flow rate or calculated flow rate based on performance curves (5th order polynomial) loaded into the controller; shall be used to adjust setpoint pressure in proportional pressure control.

VERTICAL MULTISTAGE BOOSTER PUMP STATION

015380-8

2.03 PUMPS

- A. All pumps shall be ANSI NSF 61 / NSF372 listed for drinking water and low lead requirements.
- B. The pumps shall be of the in-line vertical multi-stage design.
- C. The head-capacity curve shall have a steady rise in head from maximum to minimum flow within the preferred operating region. The shut-off head shall be a minimum of 20% higher than the head at the best efficiency point.
- D. ~~Small Vertical In-Line Multi-Stage Pumps (Nominal flow from 3 to 125 gallons per minute) shall have the following features:~~
1. ~~The pump impellers shall be secured directly to the pump shaft by means of a splined shaft arrangement.~~
 2. ~~The suction/discharge base shall have ANSI Class 250 flange or internal pipe thread (NPT) connections as determined by the pump station manufacturer.~~
 3. ~~Pump Construction:~~

a. Suction/discharge base, pump head, motor stool:	Cast iron (Class 30)
b. Impellers, diffuser chambers, outer sleeve:	304 Stainless Steel
c. Shaft	316 or 431 Stainless Steel
d. Impeller wear rings:	304 Stainless Steel
e. Shaft journals and chamber bearings:	Silicon Carbide
f. O-rings:	EPDM

~~Shaft couplings for motor flange sizes 184TC and smaller shall be made of cast iron or sintered steel. Shaft couplings for motor flange sizes larger than 184TC shall be made of ductile iron (ASTM 60-40-18).~~

~~Optional materials for the suction/discharge base and pump head shall be cast 316 stainless steel (ASTM CF-8M) resulting in all wetted parts of stainless steel.~~

VERTICAL MULTISTAGE BOOSTER PUMP STATION

015380-9

4. ~~The shaft seal shall be a balanced o-ring cartridge type with the following features:~~

- ~~a. Collar, Drivers, Spring: 316 Stainless Steel~~
- ~~b. Shaft Sleeve, Gland Plate: 316 Stainless Steel~~
- ~~c. Stationary Ring: Silicon Carbide~~
- ~~d. Rotating Ring: Silicon Carbide~~
- ~~e. O-rings: EPDM~~

~~The Silicon Carbide shall be imbedded with graphite.~~

5. ~~Shaft seal replacement shall be possible without removal of any pump components other than the coupling guard, shaft coupling and motor. The entire cartridge shaft seal shall be removable as a one piece component. Pumps with motors equal to or larger than 15 hp (fifteen horsepower) shall have adequate space within the motor stool so that shaft seal replacement is possible without motor removal.~~

E. Large (CR32 to CR155) In-line Vertical Multi-Stage Pumps (Nominal flows from 130 to 1070 gallons per minute) shall have the following features:

1. The pump impellers shall be secured directly to the smooth pump shaft by means of a split cone and nut design.
2. The suction/discharge base shall have ANSI Class 125 or Class 250 flange connections in a slip ring (rotating flange) design as indicated in the drawings or pump schedule.
3. Pump Construction.
 - a. Suction/discharge base, pump head: Ductile Iron (ASTM 65-45-12)
 - b. Shaft couplings, flange rings: Ductile Iron (ASTM 65-45-12)
 - c. Shaft 431 Stainless Steel
 - d. Motor Stool Cast Iron (ASTM Class 30)
 - e. Impellers, diffuser chambers, outer sleeve: 304 Stainless Steel
 - f. Impeller wear rings: 304 Stainless Steel

VERTICAL MULTISTAGE BOOSTER PUMP STATION

015380-10

- g. Intermediate Bearing Journals: Silicon Carbide
- h. Intermediate Chamber Bearings: Leadless Tin Bronze
- i. Chamber Bushings: Graphite Filled PTFE
- j. O-rings: EPDM

4. The shaft seal shall be a balanced o-ring cartridge type with the following features:

- a. Collar, Drivers, Spring: 316 Stainless Steel
- b. Shaft Sleeve, Gland Plate: 316 Stainless Steel
- c. Stationary Ring: Silicon Carbide
- d. Rotating Ring: Silicon Carbide
- e. O-rings: EPDM

The Silicon Carbide shall be imbedded with graphite.

5. Shaft seal replacement shall be possible without removal of any pump components other than the coupling guard, motor couplings, motor and seal cover. The entire cartridge shaft seal shall be removable as a one piece component. Pumps with motors equal to or larger than 15 hp (fifteen horsepower) shall have adequate space within the motor stool so that shaft seal replacement is possible without motor removal.

2.04 VARIABLE FREQUENCY DRIVES (Panel Mount)

- A. The VFD shall convert incoming fixed frequency single-phase or three-phase AC power into a variable frequency and voltage for controlling the speed of three-phase AC induction motors. The VFD shall be a six-pulse input design, and the input voltage rectifier shall employ a full wave diode bridge; VFD's utilizing controlled SCR rectifiers shall not be acceptable. The output waveform shall closely approximate a sine wave. The VFD shall be of a PWM output design utilizing current IGBT inverter technology and voltage vector control of the output PWM waveform.
- B. The VFD shall include a full-wave diode bridge rectifier and maintain a displacement power factor of near unity regardless of speed and load.

VERTICAL MULTISTAGE BOOSTER PUMP STATION

015380-11

- C. The VFD shall produce an output waveform capable of handling maximum motor cable distances of up to 1,000 ft. (unshielded) without tripping or derating.
- D. The VFD shall utilize an output voltage-vector switching algorithm, or equivalent, in both variable and constant torque modes. VFD's that utilize Sine-Coded PWM or Look-up tables shall not be acceptable.
- E. VFD shall automatically boost power factor at lower speeds.
- F. The VFD shall be able to provide its full rated output current continuously at 110% of rated current for 60 seconds.
- G. An empty pipe fill mode shall be available to fill an empty pipe in a short period of time, and then revert to the PID controller for stable operation.
- H. Switching of the input power to the VFD shall be possible without interlocks or damage to the VFD at a minimum interval of 2 minutes.
- I. Switching of power on the output side between the VFD and the motor shall be possible with no limitation or damage to the VFD and shall require no additional interlocks.
- J. An air conditioning unit shall be mounted in a separate enclosure on the side of the Booster Pump Station Electrical Control Panel Enclosure containing the VFD units. The microprocessor-based Air Conditioning Unit shall be enclosed in a 32.7 inch long x 12 inch wide x 12 inch deep NEMA 4X stainless steel enclosure. The air conditioning unit shall be powered by 460 volt, 3 phase, 60 hertz power and there shall be a main circuit breaker on the power line feed to the air conditioning unit. The air conditioning unit shall have a cooling capacity of 1,870 BTU/Hour. The air conditioning unit shall be mounted on the outside of the Nema 12 Booster Pump Station Control Panel Enclosure. The air conditioning unit shall weigh approximately 71.5 pounds. An internal air inlet and electrical circuitry/connection opening and a separate internal air outlet opening shall be established through the Nema 12 Booster Pump Station Control Panel Enclosure to accommodate the air conditioning unit. The air conditioning unit shall be a Saginaw Control Engineering SCE – AC1870B4460VSS Enviro – Therm Series Air Conditioner.
- K. VFD shall provide full torque to the motor given input voltage fluctuations of up to +10% to -15% of the rated input voltage.

VERTICAL MULTISTAGE BOOSTER PUMP STATION

015380-12

- L. The VFD shall provide internal DC link reactors to minimize power line harmonics and to provide near unity power factor. VFD's without a DC link reactor shall provide a 5% impedance line side reactor.
- M. VFD to be provided with the following protective features:
1. VFD shall have input surge protection utilizing MOV's, spark gaps, and Zener diodes to withstand surges of 2.3 times line voltage for 1.3 msec.
 2. VFD shall include circuitry to detect phase imbalance and phase loss on the input side of the VFD.
 3. VFD shall include current sensors on all three-output phases to detect and report phase loss to the motor. The VFD will identify which of the output phases is low or lost.
 4. VFD shall auto-derate the output voltage and frequency to the motor in the presence of sustained ambient temperatures higher than the normal operating range, so as not to trip on an inverter temperature fault. The use of this feature shall be user-selectable and a warning will be exported during the event. Function shall reduce switching frequency before reducing motor speed.
 5. VFD shall auto-derate the output frequency by limiting the output current before allowing the VFD to trip on overload. Speed can be reduced, but not stopped.
 6. The VFD shall have the option of an integral RFI filter. VFD enclosures shall be made of metal to minimize RFI and provide immunity.
- N. VFD to be provided with the following interface features:
1. VFD shall provide an alphanumeric backlit display keypad, which may be remotely mounted using standard 9-pin cable. VFD may be operated with keypad disconnected or removed entirely. Keypad may be disconnected during normal operation without the need to stop the motor or disconnect power to the VFD.
 2. VFD shall display all faults in plain text; VFD's, which can display only fault codes, are not acceptable.
 3. All VFD's shall be of the same series, and shall utilize a common control card and LCP (keypad/display unit) throughout the rating range. The control cards and keypads shall be interchangeable through the entire range of drives used on the project.

VERTICAL MULTISTAGE BOOSTER PUMP STATION

015380-13

4. VFD keypad shall be capable of storing drive parameter values in non-volatile RAM uploaded to it from the VFD, and shall be capable of downloading stored values to the VFD to facilitate programming of multiple drives in similar applications, or as a means of backing up the programmed parameters.
5. A red FAULT light, a yellow WARNING light and a green POWER-ON light shall be provided. These indications shall be visible both on the keypad and on the VFD when the keypad is removed.
6. A start guide menu with factory preset typical parameters shall be provided on the VFD to facilitate commissioning.
7. VFD shall provide full galvanic isolation with suitable potential separation from the power sources (control, signal, and power circuitry within the drive) to ensure compliance with PELV requirements and to protect PLC's and other connected equipment from power surges and spikes.
8. All inputs and outputs shall be optically isolated. Isolation boards between the VFD and external control devices shall not be required.
9. There shall be three programmable digital inputs for interfacing with the systems external control and safety interlock circuitry. An additional digital input is preprogrammed for start/stop.
10. The VFD shall have two analog signal inputs. One dedicated for sensor input and one for external set point input.
11. One programmable analog output shall be provided for indication of a drive status.
12. The VFD shall provide two user programmable relays with selectable functions. Two form 'C' 230VAC/2A rated dry contact relay outputs shall be provided.
13. The VFD shall store in memory the last 5 faults with time stamp and recorded data.
14. The VFD shall be equipped with a standard RS-485 serial communications port for communication to the multi-pump controller. The bus communication protocol for the VFD shall be the same as the controller protocol.

O. VFD service conditions:

1. Ambient temperature operating range, -10 to 45°C (14 to 113°F) Continuous; 50 °C max temperature Intermittent.
2. 0 to 95% relative humidity, non-condensing.
3. Elevation to 1000 meters (3,300 feet) without derating.

VERTICAL MULTISTAGE BOOSTER PUMP STATION

015380-14

4. VFD's shall be rated for line voltage of 525 to 690VAC, 380 to 480VAC, or 200 to 240VAC; with +10% to -15% variations. Line frequency variation of $\pm 2\%$ shall be acceptable.
5. No side clearance shall be required for cooling of the units.

2.06 FIXED SPEED MOTORS

A. Fixed Speed Motors are to be provided with the following basic features:

1. Designed for continuous duty operation, NEMA design B with a 1.15 service factor.
2. Totally Enclosed Fan Cooled with Class F insulation.
3. Nameplate shall have, as a minimum, all information as described in NEMA Standard MG 1-20.40.1.
4. Motors shall have a NEMA C-Flange for vertical mounting.
5. Drive end bearings shall be adequately sized so that the minimum L10 bearing life is 17,500 hours at the minimum allowable continuous flow rate for the pump.
6. Motor Class – Premium Efficiency Motors shall be provided.
7. Phase – 3 Phase.
8. Voltage – 480 Volts.
9. Motor Power Rating – 40 HP.
10. Motor Efficiency
11. Motor Power Factor

VERTICAL MULTISTAGE BOOSTER PUMP STATION

015380-15

2.06 PUMP SYSTEM CONTROLLER

- A. The pump system controller shall be a standard product developed and supported by the pump manufacturer.
- B. The controller shall be microprocessor based capable of having software changes and updates via personal computer (notebook). The controller user interface shall have a color display with a minimum screen size of 3-1/2" x 4-5/8" for easy viewing of system status parameters and for field programming. The display shall have a back light with contrast adjustment. Password protection of system settings shall be standard.
- C. Galvanic Isolation: The controller shall provide internal galvanic isolation to all digital and analog inputs as well as all fieldbus connections.
- D. Backup Battery: The controller shall have the ability to be connected to a backup battery to supply power to the controller during periods of loss of supply power.
- E. Home Status Screen: The controller shall display the following as status readings from a single display on the controller (this display shall be the default):
- Current value of the control parameter, (typically differential pressure)
 - Most recent existing alarm (if any)
 - System status with current operating mode
 - Status of each pump with current operating mode and rotational speed as a percentage (%)
 - Estimated flow-rate, (or actual flow if flow sensor is used)
 - One user defined measured parameter (i.e. power consumption)
- F. Inputs/Outputs: The controller shall have as a minimum the following hardware inputs and outputs:
- Three analog inputs (4-20mA or 0-10VDC)
 - Three digital inputs
 - Two digital outputs
 - Ethernet connection (built-in web server)
 - Field Service connection to PC for advanced programming, software and/or firmware upgrades and data logging
- G. Pump system programming: As a minimum, the following parameters shall be available and/or field adjustable:

VERTICAL MULTISTAGE BOOSTER PUMP STATION

015380-16

- Sensor Settings: Suction, Discharge, Differential Pressure [analog supply/range]
 - PI Controller: Proportional gain (Kp) and Integral time (Ti)
 - Low suction: Pressure/level shutdown via digital contact
 - Limit Exceeding function: For low system, low suction warnings and shut down [via analog input]
 - *Flow meter settings (if used, analog signal)*
- H. Pump Curve Data: The actual pump performance curves (5th order polynomial) shall be loaded (software) into the pump system controller. Pump curve data shall be used for the following:
- a. Display and data logging of calculated flow rate
 - b. Variable pressure control (quadratic or proportional)
 - c. Pump outside of duty range protection
 - d. Sequence pumps based on efficiency
- I. Variable Pressure Control: The controller shall have variable pressure control to compensate for pipe friction loss by decreasing the pressure set-point at lower flow-rates and increasing the pressure set-point at higher flow-rates by using the actual flow rate or calculated flow rate. Variable pressure control that uses power consumption and speed only shall not be considered equal to variable pressure control that uses actual differential pressure measurement along with pump power and speed.
- J. Multi-Sensor: The controller shall be able to control using up to six differential pressure (DP) sensors (zones). Each zone shall have a programmable maximum and minimum DP range. The controller shall be capable of an energy optimal mode where pump speed/energy shall be reduced until any of the zones reach the minimum DP setting.
- K. Check Valve Failure Detection (Systems with integrated VFD motors): The system controller shall be able to detect motors turning in the opposite direction and give check valve failure notification.
1. For minor leaks the pump shall start with a warning indicated
 2. For major leaks the pump shall remain off to prevent damage with an alarm indication
- L. Pulse flow meter: The system controller shall be able to receive pulse readings from a digital pulse meter and log/display accumulated flow.

VERTICAL MULTISTAGE BOOSTER PUMP STATION

015380-17

- M. DP Subtraction: The system controller shall be able to control off subtraction of two pressure or temperature sensors for differential pressure or differential temperature control.
- N. Programmable Setpoints: The system controller shall be able to accept up to seven programmable set-points via a digital input, (additional input/output module may be required).
- O. Setpoint Influence: The system pressure set-point shall be capable of being automatically adjusted by using an external set-point influence. The set-point influence function enables the user to adjust the control parameter (typically differential pressure) by measuring an additional parameter. (Example: Lower the system differential pressure set-point based on a flow or outdoor temperature measurement).
- P. Remote Control: The controller shall be capable of receiving a remote analog set-point (4-20mA or 0-10 VDC) as well as a remote system on/off (digital) signal.
- Q. Setpoint Ramp: The controller shall be able to adjust the ramp time of a change in set point (increase and decrease).
- R. Warnings and Alarms: The pump system controller shall store up to 24 warnings and alarms in memory. The time, date and duration of each alarm shall be recorded. A potential-free relay shall be provided for alarm notification to the building management system. The controller shall display the following alarm conditions:

Individual pump failure	Check valve failure
VFD trip/failure	Loss of sensor signal (4-20 mA)
Loss of remote set-point signal (4-20mA)	External Fault
Pump outside of duty range	Limit 1 and 2 exceeded*

*The controller shall be capable of monitoring two analog signals (i.e. suction pressure and discharge pressure) for additional pump or system protection.

- S. Built-in data log: The controller shall have built-in data logging capability. Logged values shall be graphically displayed on the controller and shall be downloadable to a notebook/pc as a delimited text file. A minimum of 7200 samples per logged value shall be available for the following parameters:
- Estimated flow-rate (or actual flow if flow sensor is connected)
 - Speed of pumps
 - Process Value/sensor feedback (usually differential pressure)

VERTICAL MULTISTAGE BOOSTER PUMP STATION

015380-18

- Power consumption
 - Controlling parameter (setpoint)
 - Inlet pressure (when remote differential pressure is the primary sensor)
- T. Redundant Primary Sensor: The controller shall be capable of receiving a redundant sensor input to function as a backup to the primary sensor.
- U. Secondary Sensor: Upon loss of signal from the remote sensor, the controller shall be capable of reverting control to the pump system mounted sensors with a programmable setpoint. The pumps shall maintain a constant, proportional or quadratic pressure across the system until the remote setpoint signal is restored.
- V. Pump Test: The controller shall have a pump “Test Run” feature such that pumps are switched on during periods of inactivity (system is switched to the “off” position but with electricity supply still connected). The inoperative pumps shall be switched on for a period of three to four seconds every 24 hours, 48 hours or once per week and at a programmable time of day.
- W. Reduced Operation: During backup generator operation, the controller shall be capable of reducing the power consumed by the pump system by either limiting the number of pumps in operation or by limiting the amount of power consumption (kW). The controller shall receive a digital input indicating backup generator operation.
- X. Power and Energy Consumption: The controller shall be capable of displaying instantaneous power consumption (Watts or kilowatts) and cumulative energy consumption (kilowatt-hours).
- Y. Specific Energy: When a flow sensor is connected, the controller shall be capable of displaying instantaneous specific energy in Watt-hours per gallon (Wh/gal) or Watt-hours per 1,000 gallons (Wh/kgal).
- Z. Built-in Ethernet: The controller shall have an Ethernet connection with a built-in web server allowing for connection to a building computer network with read/write access to the controller via a web browser.
- AA. Service Contact Information: The controller shall have a programmable Service Contact Field that can be populated with service contact information including: contact name, address, phone number(s) and website.

VERTICAL MULTISTAGE BOOSTER PUMP STATION

015380-19

2.07 CONTROL PANEL

SCCR: The complete control panel assembly shall have a Short Circuit Current Rating of 100 kA

BMS Integration: Standard shall be BACnet MS/TP

*Other protocols available: BACnet IP, Ethernet IP, Modbus RTU, Modbus TCP, LON

The pump system controller shall be mounted within a NEMA 12 dead front enclosure. The NEMA 12 control panel shall include a main disconnect, circuit breakers for each pump and the control circuit and control relays for alarm functions. The control panel shall include the following:

- 80 dB System Fault Audible Alarm with push button to silence
- Emergency/Normal Operation Switches (Control bypass)
- Individual Service Disconnect Switches (accessible outside of panel)
- Pump Run Lights (Green)
- System Fault Light (Red)
- Surge Arrestor

See section 2.01 for the NEMA 12 dead front control panel requirements.

2.08 SEQUENCE OF OPERATION

The system controller shall operate equal capacity variable speed pumps to maintain a constant differential pressure (system set-point from remote DP sensor) or proportional pressure differential pressure setpoint (system setpoint from local mounted sensor(s)), depending on the application. The system controller shall receive an analog signal [4-20mA] from the factory installed pressure transducer on the discharge and suction manifolds, indicating the actual system pressure and inlet pressure. The controller shall be capable of controlling off the subtraction of discharge minus suction transducers for differential pressure across the manifolds.

A. Standard Cascade Control (Pumping Efficiency Based):

The pump system controller shall adjust pump speed as necessary to maintain system set-point pressure as flow demand increases. Utilizing the pump curve information (5th order polynomial), the pump system controller shall stage on additional pumps when pump hydraulic efficiency will be higher with additional pumps in operation. Exception: When the flow and head are outside the operating pump(s) allowable operating range the controller shall switch on an additional pump thus distributing flow and

VERTICAL MULTISTAGE BOOSTER PUMP STATION

015380-20

allowing all pump(s) to operate in allowable operating range. When the system pressure is equal to the system set-point, all pumps in operation shall reach equal operating speeds. The pump system controller shall have field adjustable Proportional Gain and Integral time (PI) settings for system optimization.

Optional Cascade Control (Pump Start Speed Based):

As flow demand increases the pump speed shall be increased to maintain the system set-point pressure. When the operating pump(s) reach 96% of full speed (adjustable), an additional pump will be started and will increase speed until the system set-point is achieved. When the system pressure is equal to the system set-point all pumps in operation shall reach equal operating speeds. The pump system controller shall have field adjustable Proportional Gain and Integral time (PI) settings for system optimization.

- B. The system controller shall be capable of switching pumps on and off to satisfy system demand without the use of flow switches, motor current monitors or temperature measuring devices.
- C. All pumps in the system shall alternate automatically based on demand, time and fault. If flow demand is continuous (no flow shut-down does not occur), the system controller shall have the capability to alternate the pumps every 24 hours, every 48 hours or once per week. The interval and actual time of the pump change-over shall be field adjustable.
- D. The system controller shall be able to control a pressure maintenance pump, (jockey pump), in the system in pressure boosting applications. The set point of the pressure maintenance pump shall be able to be any value above or below the pump system's set point. The pressure maintenance pump shall be able to be staged on as back-up pump when capacity of pump system is exceeded.

2.09 LOW FLOW STOP FUNCTION (Constant Pressure Applications)

The system controller shall be capable of stopping pumps during periods of low-flow or zero-flow without wasting water or adding unwanted heat to the liquid. Temperature based no flow shutdown methods that have the potential to waste water and add unwanted temperature rise to the pumping fluid are not acceptable and shall not be used.

VERTICAL MULTISTAGE BOOSTER PUMP STATION

015380-21

Standard Low Flow Stop and Energy Saving Mode

If a low or no flow shut-down is required (periods of low or zero demand) a bladder type diaphragm tank shall be installed with a pre-charge pressure of 70% of system set-point. The tank shall be piped to the discharge manifold or system piping downstream of the pump system. When only one pump is in operation the system controller shall be capable of detecting low flow (less than 10% of pump nominal flow) without the use of additional flow sensing devices. When a low flow is detected, the system controller shall increase pump speed until the discharge pressure reaches the stop pressure (system set-point plus 50% of programmed on/off band, adjustable). The pump shall remain off until the discharge pressure reaches the start pressure (system setpoint minus 50% of programmed on/off band, adjustable). Upon low flow shut-down a pump shall be restarted in one of the following two ways:

- A. Low Flow Restart: If the low flow condition still exists, the pump shall start and the speed shall again be increased until the stop pressure is reached and the pump shall again be switched off.
- B. Normal Flow Restart: If the pump system controller determines a low flow condition no longer exists the pump shall start and the speed shall be increased until the system pressure reaches the system set-point.

[OPTIONAL] Low Flow Stop and Energy Saving Mode

The pump system controller shall be capable receiving a digital signal from a flow switch or an analog signal from a flow meter to indicate a low flow condition. A bladder type diaphragm tank shall be installed with a pre-charge pressure of 70% of system set-point. The tank shall be piped to the discharge manifold or system piping downstream of the pump system. When low flow is detected (signal from flow switch or meter), the system controller shall increase pump speed until the discharge pressure reaches the stop pressure (system set-point plus 50% of programmed on/off band). The pump shall remain off until the discharge pressure reaches the start pressure (system set-point minus 50% of programmed on/off band). The pump shall remain in the energy saving on/off mode during low flow indication. When low flow is no longer present (low flow indication ceases), the pump(s) shall resume constant pressure operation.

It shall be possible to change from the standard low flow stop to the optional low flow stop (and vice-versa) via the user interface.

VERTICAL MULTISTAGE BOOSTER PUMP STATION

015380-22

2.10 SYSTEM CONSTRUCTION

- A. Suction and discharge manifold construction shall be accomplished such that it ensures minimal pressure drops, minimizes potential for corrosion, and prevents bacteria growth at intersection of piping into the manifold. Manifold construction that includes sharp edge transitions or interconnecting piping protruding into the manifold is not acceptable. Manifold construction shall be such that water stagnation cannot exist in manifold during operation to prevent bacteria growth inside the manifold.
- B. The suction and discharge manifolds material shall be 316 stainless steel. Manifold connection sizes shall be as follows:
- | | |
|-----------------------|---------------------------------|
| 3 inch and smaller: | Male NPT threaded |
| 4inch through 8 inch: | ANSI Class 150 rotating flanges |
| 10 inch and larger: | ANSI Class 150 flanges |
- C. Pump Isolation valves shall be provided on the suction and discharge of each pump. Isolation valve sizes 2 inch and smaller shall be nickel plated brass full port ball valves. Isolation valve sizes 3 inch and larger shall be a full lug style butterfly valve. The valve disk shall be of stainless steel. The valve seat material shall be EPDM and the body shall be cast iron, coated internally and externally with fusion-bonded epoxy.
- D. A spring-loaded non-slam type check valve shall be installed on the discharge of each pump. The valve shall be a wafer style type fitted between two flanges. The head loss through the check valve shall not exceed 5 psi at the pump design capacity. Check valves 1-1/2" and smaller shall have a POM composite body and poppet, a stainless steel spring with EPDM or NBR seats. Check valves 2" and larger shall have a body material of stainless steel or epoxy coated iron (fusion bonded) with an EPDM or NBR resilient seat. Spring material shall be stainless steel. Disk shall be of stainless steel or leadless bronze.
- E. For systems that require a diaphragm tank, a connection of no smaller than 3/4" shall be provided on the discharge manifold. Review the plans to determine the connection diameter size.
- F. A pressure transducer shall be factory installed on the discharge manifold (or field installed as specified on plans). Systems with positive inlet gauge pressure shall have a factory installed pressure transducer on the suction manifold for water shortage protection. Pressure transducers shall be made of 316 stainless steel. Transducer accuracy shall be +/- 1.0% full scale with hysteresis and repeatability of no greater than 0.1% full scale. The output signal shall be 4-20 mA with a supply

VERTICAL MULTISTAGE BOOSTER PUMP STATION

015380-23

voltage range of 9-32 VDC. The Pump Station Control Panel shall contain the transformers to convert A.C. voltage to D.C. voltage for the transducers.

- G. A bourdon tube pressure gauge, 2.5 inch diameter, shall be placed on the suction and discharge manifolds. The gauge shall be liquid filled and have copper alloy internal parts in a stainless steel case. Gauge accuracy shall be 2/1/2 %. The gauge shall be capable of a pressure of 30% above its maximum span without requiring recalibration.
- H. *Systems with a flooded suction inlet or suction lift configuration shall have a factory installed water shortage protection device on the suction manifold. The suction pipeline for this project has a flooded suction inlet.*
- I. The base frame shall be constructed of corrosion resistant 304 stainless steel for systems with CR pump sizes up to CR64. The pump system base shall be powder coated white aluminum RAL9006, carbon steel ASTM A36 structural steel, for systems with CR95 and larger pumps.
- J. Rubber vibration dampeners shall be fitted between each pump and base frame to minimize vibration.
- K. Depending on the system size and configuration, the control panel shall be mounted in one of the following ways:

On a 304 stainless steel fabricated control cabinet stand attached to the system skid. On a 304 stainless steel fabricated skid, separate from the main system skid On its own base (floor mounted with plinth)

2.11 ELECTRICAL INSTALLATION AND MATERIALS

- 1. Electrical Design
 - a. All electrical material shall be UL Listed or recognized.
 - b. Conduit shall be nominally sized per NEC, but shall not be less than ¾” minimum.
 - c. Flexible conduit is permitted to be ½”.
 - d. External ground provisions shall be provided for all major equipment and main electrical devices (motors, control panels, power panels, transformers, disconnects, gutters, etc.)

VERTICAL MULTISTAGE BOOSTER PUMP STATION

015380-24

- e. Individual grounding shall be provided for each power circuit. Multiple grounds shall not be acceptable.
2. Electrical materials and installation for below skid finish surface conduit routing
- a. RMC (Rigid Metallic Conduit) shall be provided and installed per NEC Article 344
 - b. Form 85 fittings shall be provided and installed per NEC Article 314
 - c. XHHW wiring shall be provided and installed per NEC Articles 110, 300, 430, and 695 for power circuits
 - d. Wiring for control and power circuits (except electric motor circuits) shall be labeled on the end of each circuit with heat shrink type tagging. Motor circuit wiring shall be marked with phasing tape.
 - e. Seal tight flex shall be provided and installed per NEC Article 350
 - f. Grounding shall be provided and installed per NEC Article 250
3. Electrical materials and installation for above skid finish surface and building electrical
- a. EMT- shall be provided and installed per NEC Article 358
 - b. Standard 4" x 11-1/2" 1900 boxes fittings shall be provided and installed per NEC Article 210, 220, and 314
 - c. XHHW wiring shall be sized, provided, and installed per NEC Articles 110, 300, 430, 695.
 - d. Wiring for control and power circuits (except electric motor circuits) shall be labeled on the end of each circuit with heat shrink type tagging. Motor circuit wiring shall be marked with phasing tape.
 - e. Flexible conduit and seal tight fittings shall be provided and installed per NEC Article 348 in runs up to 36".
 - f. Grounding shall be provided and installed per NEC Article 250

VERTICAL MULTISTAGE BOOSTER PUMP STATION

015380-25

- g. Electrical boxes and panels shall be NEMA 12 minimum.
- h. Terminal strips shall be rated for 35A at 600V and shall be suitable for #26 AWG to #10 AWG wire size.
- i. Transformer shall be general purpose dry type.
- j. Load centers shall be QO, plug-on type panels.
- k. Circuit breakers shall be plug-on type and provide protection for over current and short circuit.
- l. Disconnects shall be general duty 3PH 600V devices and shall be NEMA 12 minimum enclosure.
- m. Gutters shall be NEMA 12 minimum
- n. Distribution blocks shall be 3-pole 600V and shall be 4 tap or 6 tap load side type

2.12 SYSTEM CONSTRUCTION

A. Skid Base Structure

1. Materials

- a. All skids shall be constructed of fabricated carbon steel.
- b. All materials used in the construction of the skid base, equipment mounting provisions, and support materials shall be new.
- c. All structural steel shapes, bars, plates shall be ASTM A36 grade meeting the requirements of ASTM A6.
- d. All structural channel, I-beam, and square tubing provided as skid running members (main supports) shall be provided with MTR reports upon request.

2. Standards of Design

- a. Load bearing beams shall be contained within and welded to a steel, I-beam or structural channel exterior.

VERTICAL MULTISTAGE BOOSTER PUMP STATION

015380-26

- b. Appropriate space and clearance shall be provided for access, operation, and maintenance of supplied equipment.
 - ~~c. Unit will be constructed as open I beam or C channel base that shall be sized for the weight of the equipment being provided. Open frame design shall be filled with compactable material, finished with concrete, and sloped to drain by installing contractor. All equipment will be attached to main skid members and connected appropriately (including pump, driver, controller)~~
 - d. Lifting provisions shall be incorporated into the skid design. The preferred method of lifting provision shall be lifting lugs installed in the exterior running members of the skid structure.
3. Standards of Manufacture
- a. All welded structural members, brackets, pipe supports, equipment supports, and racks will be completely seal welded. Plates shall be seal welded.
 - b. All structural welds will be performed by AWS D1.1 certified welders.
 - c. All welds shall be of high quality and ground clean. The welds shall be free of slag, pinholes, and undercut.
 - d. All major equipment shall be bolted to main skid structural members. Equipment may be installed on stands, risers, etc. No equipment may be attached to floor plate or light weight (less than ¼”) angle brackets.
 - e. All skids shall be provided with two drilled and tapped grounding lugs located at opposite corners of the skid and seal welded to the exterior structural member web.
 - f. The measurement of the skid diagonal will fall within ¼” of the calculated value using the square root of the sum of the squares of the measured length and the measured width.
 - g. The main welded skid joints (4 corners) shall be liquid penetrant tested in accordance with ASTM E1417-95a, Standard Practice for Liquid Penetrant Examination Using Solvent Removable Process.
 - h. The lifting lugs shall be liquid penetrant tested in accordance with ASTM E1417-95a, Standard Practice for Liquid Penetrant Examination Using Solvent Removable Process.

VERTICAL MULTISTAGE BOOSTER PUMP STATION

015380-27

2.12 BLADDER DIAPHRAGM

A bladder diaphragm tank shall be included with the Vertical Multistage Booster Pump Station to supply water to the distribution system during low flow periods. A 132 gallon, pre-charged steel bladder diaphragm tank with replaceable heavy-duty butyl bladder shall be supplied and installed as part of the Vertical Multistage Booster Pump Station. The bladder diaphragm tank is to be supplied with a California code-sight glass. The bladder diaphragm tank shall have NPT epoxy lined system connections and a 0.302"-32 charging valve connection (standard tire valve) to facilitate the on-site charging of the tank to meet system requirements. The tank must be constructed in accordance with most recent addendum to Section VIII, Division 1 of the ASME Boiler and Pressure Vessel Code and stamped 125 PSIG design pressure.

2.14 COATINGS FOR EQUIPMENT, STRUCTURAL STEEL AND PIPING

A. SCOPE

This specification shall define the requirements for the preparation, coating application and protective coating systems to be used for the skid mounted booster pump station.

The County of Imperial Public Works Director shall select the top coat color during the submittal review process.

B. CODES AND STANDARDS

The contractor shall comply with the applicable provisions of the latest editions of the following:

1. Steel Structures Painting Council (SSPC).
2. American Society of Testing and Materials (ASTM)
3. Occupational Safety and Health Administration (OSHA)
4. Laws and Regulations administered by the United States Environmental Protection Agency
5. Manufacturer's Project Data Sheets
6. Material Safety Data Sheets (M.S.D.S.)

VERTICAL MULTISTAGE BOOSTER PUMP STATION

015380-28

7. State and local codes.

C. STORAGE

1. Coatings shall be stored in sections by type and manufacturer.
2. Manufacturer shall label each container to indicate the usable shelf life. This shelf life shall be observed (rotate stock).
3. Unless otherwise specified by the manufacturer, temperature shall be maintained between 50 degrees Fahrenheit minimum and a maximum of 100 degrees Fahrenheit.

D. GENERAL APPLICATION REQUIREMENTS

1. Refer to Manufacturers Data Sheet for paint instructions.
2. Surfaces not to be painted will be protected by masking or grease.
 - a. All operation mechanisms such as pumps and motor shafts, couplings, valve stems, linkages, packing glands, limit/pressure switches, etc., shall be adequately protected prior to painting.
 - b. All gauges and faces, nameplates, door handles, door gaskets, valve position indicators, etc. shall be adequately masked prior to painting.
 - c. All masking and other protection used during the painting process shall be removed immediately after painting unless required for shipment.
3. Surfaces to be painted shall be free of grease, oil, dirt, rust, mil scale, weld splatter and moisture. Improper surface preparation can cause failure of the paint to adhere to the bare metal or to the previously applied paint coat. Paint, crayon and chalk identifying markings shall be cleaned off prior to painting.
 - a. Prime painting of unprotected metallic surface shall be performed immediately following cleaning. Re-cleaning is necessary if surfaces to be painted become contaminated after initial cleaning or if elapsed time is more than 8 hours.
4. For surfaces requiring painting, which are inaccessible after assembly, preparation and painting with primer shall be completed before assembly.

VERTICAL MULTISTAGE BOOSTER PUMP STATION

015380-29

5. All external surfaces shall have a finish coat applied. Exceptions to this include control panels, junction boxes, machined surfaces, stainless steel items, copper tubing and aluminum material unless otherwise noted.

6. Equipment and machinery including drivers, pumps, controllers, electrical components and instruments shall be supplied with manufacturers standard coatings unless noted otherwise.

E. EXTERIOR PAINT SYSTEM

1. SURFACE PREPARATION

a. Steel surfaces shall receive a near white blast (SSPC-SP10) in accordance with the requirements of the Steel Structures Painting Council. Blast shall provide an average profile of 2 ½ - 3 ½ mil.

b. Major components such as motors, pumps, etc. shall be solvent wiped and coated with the following finished coat.

2. FIRST COAT

a. Inorganic Zinc shall be applied to all steel surfaces prepared in accordance with section 2.05 E.1 above.

b. Coating shall be applied in accordance with manufacturer's instructions.

c. Coating shall be applied to provide an overall average thickness of 2-3 mils (DFT).

3. SECOND COAT

a. Cycloaliphatic Amine Epoxy shall be applied to all surfaces prepared and coated with the inorganic zinc first coat.

b. Coating shall be applied in accordance with manufacturer's instructions.

c. Coating shall be applied to provide an overall average thickness of 4-6 mils (DFT).

4. FINISH COAT

a. Top Coat – Aliphatic Acrylic Polyurethane shall be applied to all surfaces prepared and coated with the cycloaliphatic amine epoxy

VERTICAL MULTISTAGE BOOSTER PUMP STATION

015380-30

second coat and major items with a factory applied coating such as the pumps, motors and similar equipment.

b. Coating shall be applied in accordance with manufacturer's instructions.

c. Coating shall be applied to provide an overall average thickness of 3-5 mils (DFT)

F. INTERIOR PIPE COATING

1. SURFACE PREPARATION

~~a. Pipe interior surfaces shall receive a near white blast (SSPC-SP10) in accordance with the requirements of the Steel Structures Painting Council. Blast shall provide an average profile of 2-3 mils.~~

2. FIRST COAT

~~a. High build cross-linked epoxy shall be applied to the interior pipe surfaces prepared in accordance with the surface preparation requirements above.~~

~~b. Coating shall be applied in accordance with manufacturer's instructions.~~

~~c. Coating shall be applied to provide an overall average thickness of 4-6 mils (DFT).~~

3. FINAL COAT

~~a. High build cross-linked epoxy shall be applied to the previously coated interior pipe surfaces.~~

~~b. Coating shall be applied in accordance with manufacturer's instructions.~~

~~c. Coating shall be applied to provide an overall average thickness of 4-6 mils (DFT).~~

~~d. If using Skotchkote 134 HG powder coat for NSF application then follow manufacturer's recommendations.~~

G. QUALITY ASSURANCE

1. Painted surfaces shall be smooth, uniform in coverage and tightly adherent to the base metal.

VERTICAL MULTISTAGE BOOSTER PUMP STATION

015380-31

2. Porosity, pinholes or lack of coverage are not permitted.
3. Runs or sags shall not exceed 5% in any given square foot area and in cumulation shall not exceed more than 2% of any painted surface.
4. Blisters and mud cracking are not acceptable in any area and require rework.
5. Paint dry film thickness (DFT) shall conform to the requirements given and shall be verified by calibrated magnetic gage or equivalent.
6. The effective conforming thickness shall be the average of five random measurements evenly spaced over each 100 square feet of area to be measured. (Reference SSPC-PA2).
 - a. No single measurement from a given painted surface shall be:
 1. Less than 80% of the minimum DFT requirement.
 2. More than 150% of the maximum DFT requirement.
7. Painting process shall be documented using supplier's standard forms.

2.15 HYDROSTATIC TESTING AND ELECTRICAL VERIFICATION

A. The Vertical Multistage Booster Pump Station piping system shall undergo a factory hydrostatic test at the end of the production cycle. The piping system shall be filled with water and pressurized to 1.5 times the pump nameplate design pressure. The pressure shall be maintained for a minimum of 10 minutes with no leakage prior to shipment. After the Vertical Multistage Booster Pump Station is installed at the project site, a second hydraulic test shall be required in conformance with Technical Specification 02666.

Electrical verification shall be performed at the factory, consisting of but not limited to proper function of lights, outlets, fans, dampers, A.C. units, and controls operation. Grounding continuity testing and Hi-Pot testing on motor wiring shall be performed and recorded as part of the quality process.

2.16 FIELD QUALITY CONTROL

A. The Vertical Multistage Booster Pump Station shall be field tested before commissioning and the Civil Design Engineer, Electrical Design Engineer, County of Imperial Public Works Representative and the Chief WTP Operator shall witness the start-up of the Booster Pump Station.

VERTICAL MULTISTAGE BOOSTER PUMP STATION

015380-32

B. The Vertical Multistage Booster Pump Station Manufacturers Representative shall complete the start-up of the microprocessor-based controller and HMI color display, variable frequency drives and pumps and motors. All controller and VFD features as listed in these specifications shall be checked and verified during the start-up. The system shall be operated at low flows and the peak flow of 2,800 GPM at 78 psi residual pressure. The data and alarm functions to be transmitted to the existing data logger and cloud based alarm and monitoring system shall be reviewed and tested. The Vertical Multistage Booster Pump Station Manufacturers Representative shall take the extra responsibility of checking that the data and alarm functions are being received by the existing data logger and cloud based alarm and monitoring system and being transmitted to the Chief Plant Operators computer. The Vertical Multistage Booster Pump Station Manufacturers Representative shall also interface with the Flow meter system startup representative to insure the flow meter signal transmitted to the converter inside the Vertical Multistage Pump Station Controller and VFD panel enclosure is being transmitted to the communication interface unit for transmission to the existing data logger and cloud based alarm and monitoring system. It shall be verified that the flow meter signal is being received by the existing data logger and cloud based alarm and monitoring system. It is to be confirmed that the flow meter signal is connected to the pump station controller.

C. A total of two (2) separate start-up trips shall be required by the pump station Manufactures Representative. The first trip shall consist of one (1) – 10 hour day at the Water Treatment Plant site to verify that the installation was completed in conformance with the Vertical Multistage Pump Station Manufacturers requirements. Initial Vertical Multistage Pump Station start-up shall occur if time permits. The electrical contractor or subcontractor, Chief WTP operator, flowmeter supplier representative, County of Imperial Public Works Department Representative, Design Civil Engineer and Design Electrical Engineer shall be present at the startup.

A second trip (2) shall consist of two (2) – 10 hour days at the Water Treatment Plant site to complete the start-up of the Vertical Multistage Booster Pump Station as described above. The electrical contractor or subcontractor, Chief WTP Operator, flowmeter supplier representative, County of Imperial Public Works Representative, Design Electrical Engineer and Design Civil Engineer shall be present at the start-up. A minimum of eight (8) hours of operator training regarding the Vertical Multistage Booster Pump Station shall be included in the second start-up trip services.

The two (2) separate start-up trip costs shall include all travel expenses, lodging and meals. The Vertical Multistage Booster Pump Station Manufacturer shall include all start-up costs with the manufacture and supply of the Vertical Multistage Booster Pump Station.

VERTICAL MULTISTAGE BOOSTER PUMP STATION

015380-33

2.17 TESTING

- A. The tester used for testing the pump system shall be constructed and calibrated according to the requirements of hydraulic test standard ISO 9906.
- B. The entire pump station shall as a minimum be factory tested for functionality and documented results of functionality test supplied with pump station.

Functionality testing shall include the following parameters:

- 1. Complete System Hydrostatic Test – 1.5 times the nameplate maximum pressure
 - 2. No-Flow Detection Shutoff Test
 - 3. Water Shortage Test
 - 4. Two-Point Setpoint Performance Test.
- C. Water used for testing shall be treated with three different filtration systems to ensure only clean water is used for testing pump station.
 - 1. 25 micron mechanical filter – removes solid parts from water
 - 2. Activated carbon filter – keeps water clear and eliminates odor
 - 3. Ultraviolet light system – kills all bacteria growth
- D. Performance testing shall also include:
 - 1. 10-Point Verified Performance Test
 - 2. Witnessed Verified Performance Test
- E. The Start-up testing requirements are listed in section 2.16.

2.18 WARRANTY

- A. The warranty period shall be for a 24 months commencing on the day the project Notice of Completion is filed at the County Records Office.

END OF SECTION 0153380

VERTICAL MULTISTAGE BOOSTER PUMP STATION

015380-34

SECTION 15400 – MAGNETIC FLOWMETER

PART 1 - GENERAL

1.01 DESCRIPTION

A. An electromagnetic flow meter shall be provided for this project downstream of the new potable water variable frequency drive distribution pumps. The meter shall utilize bipolar pulse DC coil excitation to measure voltage induced by the flow of conductive liquid through a magnetic flux. The voltage shall be linearly proportional to flow velocity from 0.033 to 33 feet per second. The flowmeter and converter will be located within a sheltered building. The meter is to be installed in a horizontal position. The converter is to be located remote within the new Booster Pump Station Control Panel. The magnetic flow meter requirements are as follows:

- A1. Flowmeter Nominal Size 8 inch diameter
- A2. Flowmeter Flow Range 33 GPM to 4,870 GPM
- A3. Minimum Upstream Flow 8 inches
disturbance distance
- A4. Minimum Downstream 0 inches
Flow disturbance distance
- A5. Application Potable Water
- A6. Accuracy Plus or Minus 0.05%
- A7. Totalizer Attached to 9 – digit - digital totalizer
Flowmeter reading in units of GPM

1.02 SUBMITTALS

- A. Furnish complete Product Data, Shop Drawings, Test Reports, Operating Manuals, Record Drawings, Manufacturer’s certifications, Manufacturer’s Field Reports.
- B. Product Data:
 - 1. Dimensional Drawings.

MAGNETIC FLOWMETER
015400-1

2. Materials of Construction.
 - a. Sensor.
 - b. Liner.
 - c. Electrodes.
 - d. Flanges.
3. Measurement accuracy.
4. Range and range ability.
5. Enclosure Rating.
6. Classification Rating.
7. Power:
 - a. Voltage.
 - b. Wattage.
8. Output options

1.03 QUALITY ASSURANCE

- A. Manufacture facilities shall be certified to the quality standards of International Organization for Standardization (ISO) Standard 9001-Quality Systems – Model for Quality Assurance in Design/Development, Production, Installation, and Servicing.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Store all instruments in a dedicated structure with space conditioning to meet the recommended storage requirements provided by the manufacturer.
- B. Any instruments that are not stored in strict conformance with the manufacturer's recommendation shall be replaced.

MAGNETIC FLOWMETER
015400-2

1.05 PROJECT OR SITE CONDITIONS

- A. Provide instruments suitable for the installed site conditions including but not limited to material compatibility, site altitude, process and ambient temperature, and humidity conditions.

1.06 WARRANTY

- A. The meter and converter shall have a two (2) year warranty from the date the meter is placed in service.

1.07 MAINTENANCE

- A. Provide all spare parts, necessary for maintenance and calibration purposes throughout the warranty period. Deliver all of these supplies before the notice of completion is filed at the Imperial County Recorder's Office.

1.08 LIFECYCLE MANAGEMENT

- A. Instrument documentation, like original calibration certificates, manuals and product status information shall be accessed via a web enabled system with a license. The instrument-specific information shall be accessed via its serial number. When services are provided by an authorized service provider the services information like subsequent field calibrations shall be archived and accessible via this web enabled system.

PART 2 - PRODUCTS

2.01 MANUFACTURER

- A. McCrometer Model Number UM-06-08-A-S-R-025-A-1, or an approved equal.

2.02 MANUFACTURER UNITS

- A. The flow meter shall be a flanged sensor (by application and instrument schedule) which complies with AWWA C751 and converter which may be mounted integral (compact) to the sensor or remote with interconnecting cables up to 500 feet in length.

MAGNETIC FLOWMETER
015400-3

1. The flow metering system shall be microprocessor-based and possess a non-volatile memory to store the sensor calibration and converter setup information. The electronics shall be interchangeable for meters sizes 1"-90"
2. The sensor shall be the proper size to measure the design flow rate of the piping and measure bi-directional flow as a standard.
3. The sensor shall consist of a stainless steel flow tube with ANSI B16.5 or AWWA C207 ~~carbon steel or~~ stainless steel flanges. The flanges shall be Class 150 for 24" and smaller, and AWWA Class D for 28" and larger (listed by the application and instrument schedule).
 - a. Sensors from 1"-12" shall have fixed (welded) or rotating lap joint flanges.
 - b. Sensors from 14"-120" shall have the flanges welded to the sensor body.
4. The sensor liner and electrode material shall be chosen to be compatible with the process fluid. All fluids require a minimum conductivity of 5µs/cm (20µs/cm for deionized water).
5. The sensor tube shall be lined with polyurethane, hard rubber, or fusion bonded epoxy in accordance with NSF-61 based upon the size of the flow meter and the process media conditions.
6. The sensor shall house two measuring electrodes, a grounding electrode, and one for physical empty pipe detection. The electrodes shall be bullet-nosed shaped and made of 316L SS.
 - a. ~~Optional unrestricted mounting magnetic flowmeter sensor for applications without the typical inlet/outlet straight pipe run requirements. The full bore magnetic flowmeter in sizes 1"-120" shall maintain zero pressure loss while achieving 0.5% of rate accuracy even when mounted directly before or after a piping elbow, T-fitting or insertion device. This flow tube shall have four measuring electrodes (sizes 1-2.5") and six measuring electrodes (sizes 3"-120") plus a grounding electrode and an empty pipe electrode. Optional 0.2% of rate calibration is available with this sensor design however the flowmeter must be installed~~

MAGNETIC FLOWMETER

015400-4

~~with the proper upstream (5 diameters) and downstream (2 diameters) pipe run requirements.~~

7. The external sensor housing shall enclose the coil assemblies and internal wiring. The materials shall be designed and constructed to prevent moisture ingress and promote corrosion resistance.
 8. The electrode circuit shall have a minimum impedance of 10^{12} ohms to overcome moderate coating buildup.
 9. The sensor shall be rated for NEMA 4X service as standard.
 - ~~a. An optional sensor rating for NEMA 6/IP67 service shall allow for temporary immersion in water depths of 10 feet for 168 hours or 30 feet for 48 hours.~~
 - ~~b. An optional sensor rating for NEMA 6P/IP68 service shall allow for permanent immersion in water depths up to 10 feet.~~
 10. If NEMA 6 or 6P is specified in the instrument schedule, the converter shall be remotely mounted and custom length cables shall be attached at the factory.
 - ~~11. In the event of industrial treatment or corrosive/brackish environments, the flow sensor shall be painted and certified according to ISO 12944 corrosion class. Third party modification or sensor preparations will not be accepted without type test documentation to support the exposure conditions, depth and duration of resistance.~~
- B. *The converter shall be a three-stage microprocessor controller mounted integrally or remotely as specified in the instrument schedule. The converter shall incorporate a universal 100-240 VAC.18-30 VDC power supply. The converter shall receive a 120 VAC, 1 phase, 60 hertz power supply. The converter shall be equipped with an AC/DC transformer to supply the required DC power supply to operate the converter. The converter housing will carry a NEMA 4X rating and shall be constructed to prevent moisture ingress, promote corrosion resistance, and be impervious to saline environments.*

MAGNETIC FLOWMETER
015400-5

1. The converter shall allow local programming that can be operated through the enclosure window without opening the electrical enclosure.
2. The converter display shall indicate simultaneous flow rate and total flow with 3 totalizers (forward, reverse, and net total) and user-selectable engineering units, readout of diagnostic error messages, and support 12 standard languages.
3. The converter shall safeguard against entering of invalid data for the particular meter size and all programming parameters shall be access-code protected with a minimum requirement of dual passwords according to data sensitivity.
4. The converter output shall be specified, as either:
 - a. 4-20 mA HART®, 0-20mA, pulse/frequency/switch
 - ~~b. Modbus RS-485~~
 - ~~c. Profibus® DP~~
 - ~~d. Or a standard, unmodified form of Ethernet (ex. EtherNet/IP™)~~
5. The converter output(s) shall be integral to the magnetic flowmeter converter electronics and using an external third party signal converter is unacceptable.
6. There shall be no limitation of converter operational capability or diagnostic dependency between integral and compact mounting orientation.
7. The converter output selected must be supported by add-on instructions (AOI), Level 3 add-on profiles (AOP), device drivers (DD), general station description (GSD) files, instructions and pre-engineered code.
8. The converter shall support commissioning options via a service interface or device driver less operation via an internal web server accessible through a converter accessible RJ-45 Ethernet port or a WLAN (Wireless Local Area Network) connection as specified.

MAGNETIC FLOWMETER
015400-6

9. The converter shall retain all setup parameters and accumulated measurements internally in non-volatile memory in the event of power failure. The memory unit shall be transferrable from a damaged unit or used for a duplicate device with no loss of device parameters or data stored.
10. The converter shall be protected against voltage spikes from the power source with internal transient protection. Power consumption shall be no more than 16 VA, independent of meter size.
11. Device failure modes, self-monitoring characteristics and remedy diagnosis shall follow NAMUR standards NE 43 and NE 107.
12. The converter shall provide access to service and monitoring parameters designed to identify transient or permanent process influences.
13. The converter and sensor shall include a method to verify flow meter performance to the original manufacturer specifications.
 - a. The system shall be traceable to factory calibration using a third party, attested onboard system pursuant to ISO standards.
 - b. The verification technique shall not require external handhelds, interfaces, special tooling or electrical access for a verification to be performed.
 - c. The converter shall store up to eight verifications in the microprocessor.
 - d. A verification of the system shall be possible at any time, locally or remotely, on demand and under process conditions.
 - e. The verification report shall be compliant to common quality systems such as ISO 9000 7.6.a to prove reliability of the meter specified accuracy.

MAGNETIC FLOWMETER
015400-7

2.03 ACCESSORIES

- A. Stainless steel tag – labeled to match the contract documents.
- B. Provide grounding rings, as per manufacturer’s recommendations.
- C. ~~Provide sun shield for outdoor installations as required per the instrument schedule.~~

2.04 SOURCE QUALITY CONTROL & CALIBRATION

- A. Magnetic flow meters shall be factory calibrated on an ISO-17025 accredited test stand per “General Requirements for the Competence of Testing and Calibration Laboratories” with certified accuracy traceable to NIST.
- B. Evidence of accreditation shall originate from a national verification agency such as A2LA.
- C. Each meter shall ship with a certificate of a 5-point wet flows calibration report which includes the signal converter exceeding stated standard accuracy of 0.5% of rate.
 - 1. ~~Optional calibration to 0.2% of rate shall be performed.~~
 - 2. ~~An optional performance calibration for a flat Accuracy Specification calibration shall be performed for low initial design flow rate.~~
- D. A real-time computer generated printout of the actual calibration data points shall indicate apparent and actual flows. The flow calibration data shall be confirmed by the manufacturer and shipped with the meters to the project site.
- E. The manufacturer shall provide complete documentation covering the traceability of all calibration instruments.
- F. The manufacturer shall provide ISA data sheet ISA-TR20.00.01 as latest revision of form 20F2321. The manufacturer shall complete the form with all known data and model codes and dash out the inapplicable fields. Incomplete data sheets submitted will result in a rejected submittal.

MAGNETIC FLOWMETER
015400-8

2.05 SAFETY

- A. All electrical equipment shall meet the requirements of ANSI/NFPA 70, National Electric Code latest edition.
- B. All devices shall be certified for use in hazardous areas: Class 1, Div. 2, Groups B/C; temperature rating T3 (200 deg. C)
- C. All devices shall be suitable for use as non-incendive devices when used with appropriate non-incendive associated equipment. Devices with intrinsically safe ratings will normally be acceptable with vendor's approval.
- D. Electrical equipment housing shall conform to NEMA 4X classification.
- E. Non-intrinsically safe electrical equipment shall be approved by a Nationally Recognized Testing Laboratory (NRTL) such as FM, UL, CSA, etc. for the specified electrical area classification.
- F. Electrical equipment specified as intrinsically safe shall qualify as "simple apparatus" or NRTL approved intrinsically safe equipment per ANSI/ISA-RP12.6 "Installation of Intrinsically Safe Systems for Hazardous (Classified) Locations," latest edition.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine the complete set of plans, the process fluids, pressures, and temperatures and furnish instruments that are compatible with installed process condition.
- B. Examine the installation location for the instrument and verify that the instrument will work properly when installed.

3.02 INSTALLATION

- A. As shown on installation details and mechanical drawings.
- B. As recommended by the manufacturer's installation and operational manual.
- C. Specific attention should be given to the following technical requirements:

MAGNETIC FLOWMETER
015400-9

1. Verify ground rings (if required) have been installed according to the manufacturer recommendations.
 2. Reduced inlet installations must either be specified in the device ordering information or accompanied by manufacturer's documented evidence of third party testing and data collection in comparison to a traceable standard.
- D. The power supplied between the converter and the meter tube (sensor) and signal between the meter tube and the converter shall be isolated and placed in separate submersible cables.

3.03 FIELD QUALITY CONTROL

- A. Each instrument shall be tested before commissioning and the ENGINEER shall witness the interface capability in the PLC control system and associated registers.
1. Each instrument shall provide direct programming capability through the PLC.
 2. Each instrument shall provide direct control of totalizer reset functions through the PLC.
 3. Each instrument shall be supported with a device profile permitting direct integration in the PLC.
- B. The ENGINEER shall witness all instrument verifications in the field.
- C. A Manufacturer's Factory Field Representative or Manufacturer's authorized service provider shall be present for the two (2) separate start-up and commissioning periods. The Manufacturer's Factory Field Representative shall be present at the site for eight hours on each of the start-up and commission days (total of 16 hours). All costs for transportation, lodging and meals shall be included in the manufacturer's field representative's costs for the startup and commission activities.
1. Manufacturer representative shall verify installation of all installed flow tubes and converters.

MAGNETIC FLOWMETER
015400-10

2. Manufacturer representative shall notify the ENGINEER in writing of any problems or discrepancies and proposed solutions.
3. Manufacturer representative shall perform field verification at the time of installation for long term analysis of device linearity, repeatability and electronics health. A comparative report shall be generated for each meter tested.
4. Manufacturer representative shall generate a configuration report for each meter.
5. Manufacturer shall certify the flowmeter calibration is accurate and certify, sign and date the calibration certification in conformance with the requirements of the Regional Water Quality Control Board Division of Drinking Water State of California.

3.04 ADJUSTING

- A. Verify factory setup of all instruments in accordance with the Manufacturer's instructions

3.05 PROTECTION

- A. All instruments shall be fully protected after installation and before commissioning. Replace any instruments damaged before commissioning.
 1. The ENGINEER shall be the sole party responsible for determining the corrective measures.

END OF SECTION 015400

MAGNETIC FLOWMETER
015400-11

SECTION 15450 - PRESSURE GAUGES

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The Contractor shall furnish and install pressure gauges complete, including all fittings, snubbers, connections, gaskets, supports, and accessories as illustrated on the Plans.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 15380 – Variable Frequency Drive Pumping System

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. Comply with reference specifications of the General Requirements.

1.04 CONTRACTOR SUBMITTALS

- A. Submittals shall include catalog sheets, material lists, manufacturer's brochures, technical bulletins, specifications and/or diagrams.

1.05 QUALITY ASSURANCE

- A. Comply with General Requirement Section 01660.

PART 2 - PRODUCTS

2.01 PRESSURE GAUGES

- A. General: Pressure gauges shall be provided on suction and discharge booster pump piping, on each side of pressure reducing valves and at the fire hydrant near the southeast corner of the Operations Building to monitor the short duration temporary bypass pressure; and as illustrated on the Plans. In all locations (such as certain pump suction connections) where pressures may vary from below to above atmospheric head, compound gauges shall be installed.
- B. Gauge Construction: Gauges shall be industrial quality type with Type 316 stainless steel movement and stainless steel case. Unless otherwise shown

PRESSURE GAUGES

15450-1

or specified, gauges shall have a 4.5 inch dial, ½ inch threaded connection, a Type 316 stainless steel snubber adapter, and a brass ball valve - shut off valve with hand lever. Gauges shall be calibrated to read in applicable units, with an accuracy of ± 1 percent, to 150 percent of the working pressure of the pipe or vessel to which they are connected. All gauges shall be vibration and shock resistant. Gauges shall read 0 psi to 100 psi.

C. Diaphragm Seal: ~~Gauges attached to systems involving chemical solutions, corrosive fluids, sludge, sewage, or other liquids containing solids, shall be equipped with diaphragm seals, or equal protective pressure sensing devices, as follows:~~

1. ~~For: sewage, sludge, liquids containing solids, pulsating flow~~

~~Seals of all Type 316 stainless steel, with stainless steel diaphragm for pressures over 15 psi, and elastomer diaphragm for pressures of 15 PSI and below, Type 316 stainless steel nuts and bolts, fill connection and valved flush port size ¼ inch NPT, capable of disassembly without loss of filler fluid. All filler fluid shall be glycerine.~~

~~Manufacturer, or Equal:
Ashcroft, model 101;
U.S. Gauge (Ametek), SG;
Marshalltown, Series 225-01.~~

2. ~~For: chlorine and sulfur dioxide under pressure~~

~~Seals of carbon steel with Tantalum diaphragm of 800 PSI rating.~~

~~Manufacturer, or Equal:
Pennwalt (W&T);
Fischer and Porter.~~

PRESSURE GAUGES
15450-2

3. ~~For: chemical solutions.~~

~~Seals with PVC body for removable mounting rated at 200 PSI, with Type 316 stainless steel bolts and nuts, 1/2 inch inlet, 1/4 inch outlet, liquid filled with Teflon diaphragm for pressure, and suitable elastomer diaphragm for vacuum service.
Manufacturer, or Equal:
Plast-O-Matic Valves, Inc.;
Harrington Ind. Plastics, Inc.;
Utilities Supply.~~

D. Gauge Manufacturers, or Equal:

1. Bailey Controls;
2. Ashcroft Industrial Instruments (Dresser);
3. Foxboro/Jordan, Inc.;
4. Rosemont;
5. U.S. Gauge Div. of Ametek.
6. Marsh
7. WIKA

E. Snubber Manufacturers, or Equal:

1. Cajon Company;
2. Weksler Instruments, Corp.

2.02 SLEEVE PRESSURE GAUGES

- A. General: Sleeved pressure gauges shall be provided as illustrated on the Plans.
- B. Construction: Pressure shall be sensed by a flexible sleeve contained in a flanged cast iron or steel spool or wafer body, and transmitted to the gauge through a captive fluid. The sleeve shall be of Buna N and fabricated so as to isolate the body from the process liquid. Gauges shall be calibrated to

PRESSURE GAUGES

15450-3

read in applicable units, with an accuracy of ± 1 percent, to 150 percent of the working pressure of the system to which they are connected.

C. Manufacturers, or Equal:

1. Red Valve Company, Inc.;
2. Ronningen-Petter.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. All gauges shall be installed with the face in the vertical position, as illustrated on the Plans, and in strict accordance with the manufacturer's printed instructions. Care shall be taken to minimize the effect of water hammer or vibrations on the gauges. In extreme cases, the gauges may have to be mounted independently, with flexible connectors.

3.02 INSTALLATION, CALIBRATION, TESTING, PRECOMMISSIONING, START-UP AND INSTRUCTION

- A. Comply with manufacturers recommendations.

END OF SECTION 15450

PRESSURE GAUGES

15450-4

SECTION 26 05 00 – BASIC ELECTRICAL REQUIREMENTS

1.1 SCOPE OF WORK

- A. Basic Electrical Requirements specifically applicable to Division 26 and 33 Sections.
- B. All labor, materials, equipment and services necessary to furnish and install complete electrical systems and related items of work as indicated to Drawings or specified herein.
- C. The work in general shall consist of, but is not limited to the following:
 - 1. Electrical service, underground trenching and conduit, transformer pad, and accessories as indicated.
 - 2. Service entrance section, electrical panels, conduit, wiring, etc., for all electrical distribution as indicated.
 - 3. Automatic transfer switch, standby emergency system generator, wiring, conduit and accessories as indicated.
 - 4. Electrical devices, wiring, conduit, and accessories as indicated.
 - 5. Boxes, wiring, conduit, and accessories for instrumentation controls & signals as indicated.
 - 6. Water treatment system motors, equipment, and controls wiring, equipment connections, etc., when such items are specified as work under other Sections and as indicated.
 - 7. Painting as specified under other Sections, except for factory-finished material and equipment.
- D. Drawings are diagrammatic. Refer to Civil Drawings and specifications for exact locations for equipment furnished by others.

1.2 WORK SEQUENCE

- A. Install work as scheduled to accommodate Owner's occupancy requirements. During the construction period coordinate electrical schedule and operations with other trades, Owner and/or Engineer.

1.3 REFERENCES AND REGULATORY REQUIREMENTS

- A. Conform to applicable California Building Code.
- B. Workmanship and material of electrical work shall comply with or exceed applicable provisions of the following (most recent additions including addenda and errata):
 - 1. All Local Codes and Ordinances.
 - 2. California/National Electrical Code (NEC) (NFPA 70).
 - 3. National Bureau of Fire Underwriters (NBFU).
 - 4. American National Standards Institute (ANSI).
 - 5. American Society for Testing and Materials (ASTM).
 - 6. National Electrical Manufacturers Association (NEMA).
 - 7. Standards and requirements for serving utilities.
 - 8. California Fire Code.
 - 9. Standards of Installation (NECA).
 - 10. Safety and Health Standards (OSHA).
 - 11. Americans with Disabilities Act (ADA).
 - 12. Factory Mutual (FM).

1.4 SUBMITTALS

- A. Submit shop drawings and product data grouped to include complete submittals of related systems, products, and accessories in a single submittal. Partial submittals will not be reviewed.
- B. Mark dimensions and values in units to match those specified.

1.5 PROJECT/SITE CONDITIONS

- A. Install Work in locations shown on Drawings, unless prevented by Project conditions.
- B. Prepare drawings showing proposed rearrangement of Work to meet Project conditions, including changes to Work specified in other Sections. Obtain permission of Owner and/or Architect before proceeding.
- C. SITE WORK: Contractor shall employ an independent locating service to locate and verify all existing services, whether specifically shown on the drawings or not. Location of services shall be recorded on record documents. No trenching or excavation shall commence until locations are verified. The Owner shall be notified in writing prior to any trenching requiring a utility shutdown. Any services interrupted by trenching or excavating shall be repaired by the contractor with no additional cost to the Owner. Existing services not specifically indicated on the drawings to be relocated, which interfere with building components, shall be brought to the Engineer's immediate attention. Prepare drawings showing proposed re-routing, area(s) affected, and length of interruption(s).

1.6 SEQUENCING AND SCHEDULING

- A. Construct Work in sequence under provisions of the General Specifications.

END OF SECTION 26 05 00

SECTION 26 05 03 – EQUIPMENT WIRING CONNECTIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes electrical connections to equipment.
- B. Related Sections:
 - 1. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables.
 - 2. Section 26 05 33 - Raceway and Boxes for Electrical Systems.

1.2 REFERENCES.

- A. National Electrical Manufacturers Association:
 - 1. NEMA WD 1 - General Requirements for Wiring Devices.
 - 2. NEMA WD 6 - Wiring Devices-Dimensional Requirements.

1.3 SUBMITTALS

- A. Product Data: Submit wiring device manufacturer's catalog information showing dimensions, configurations, and construction.
- B. Manufacturer's installation instructions.

1.4 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations, sizes, and configurations of equipment connections.

1.5 COORDINATION

- A. Obtain and review shop drawings, product data, manufacturer's wiring diagrams, and manufacturer's instructions for equipment furnished under other sections.
- B. Determine connection locations and requirements.
- C. Sequence rough-in of electrical connections to coordinate with installation of equipment.
- D. Sequence electrical connections to coordinate with start-up of equipment.

PART 2 - PRODUCTS

2.1 CORD AND PLUGS

- A. Manufacturers:

1. Hubbell.
 2. Pass and Seymour.
 3. Leviton.
 4. Substitutions: Under provisions of General Specifications.
- B. Attachment Plug Construction: Conform to NEMA WD 1.
- C. Configuration: NEMA WD 6; match receptacle configuration at outlet furnished for equipment.
- D. Cord Construction: Type SO multi-conductor flexible cord with identified equipment grounding conductor, suitable for use in damp locations.
- E. Size: Suitable for connected load, length of cord, and rating of branch circuit overcurrent protection.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify equipment is ready for electrical connection, for wiring, and to be energized.

3.2 INSTALLATION

- A. Make electrical connections.
- B. Make conduit connections to equipment using flexible conduit. Use liquidtight flexible conduit with watertight connectors in damp or wet locations.
- C. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.
- D. Install receptacle outlet to accommodate connection with attachment plug.
- E. Install cord and cap for field-supplied attachment plug.
- F. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.
- G. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.
- H. Install terminal block jumpers to complete equipment wiring requirements.
- I. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.

3.3 ADJUSTING

- A. Cooperate with utilization equipment installers and field service personnel during checkout and starting of equipment to allow testing and balancing and other startup operations. Provide personnel to operate electrical system and checkout wiring connection components and configurations.

END OF SECTION 26 05 03

SECTION 26 05 19 – LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes building wire and cable; and wiring connectors and connections.
- B. Related Sections:
 - 1. Section 26 05 53 - Identification for Electrical Systems: Product requirements for wire identification.

1.2 REFERENCES

- A. International Electrical Testing Association:
 - 1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
- B. National Fire Protection Association:
 - 1. NFPA 70 - National Electrical Code.
 - 2. NFPA 262 - Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces.

1.3 SYSTEM DESCRIPTION

- A. Product Requirements: Provide products as follows:
 - 1. Solid conductor for feeders and branch circuits 10 AWG and smaller.
 - 2. Stranded conductors for control circuits.
 - 3. Conductor not smaller than 12 AWG for power and lighting circuits.
 - 4. Conductor not smaller than 16 AWG for control circuits.
 - 5. 10 AWG conductors for 20 ampere, 120 volt branch circuits longer than 75 feet.
- B. Wiring Methods: Provide the following wiring methods:
 - 1. Concealed Dry Interior Locations: Use only building wire, Type THHN/THWN 90 degree C rated insulation, in raceway.
 - 2. Exposed Dry Interior Locations: Use only building wire, Type THHN/THWN 90 degree C rated insulation, in raceway.
 - 3. Above Accessible Ceilings: Use only building wire, Type THHN/THWN 90 degree C rated insulation, in raceway.
 - 4. Wet or Damp Interior Locations: Use only building wire, Type THHN/THWN 90 degree C rated insulation, in raceway.
 - 5. Exterior Locations: Use only building wire, Type THHN/THWN 90 degree C rated insulation, in raceway.
 - 6. Underground Locations: Use only building wire, Type THHN/THWN 90 degree C rated insulation, in raceway.
 - 7. Use wiring and methods indicated on drawings.

1.4 DESIGN REQUIREMENTS

- A. Conductor sizes are based on copper.

1.5 SUBMITTALS

- A. Product Data: Submit for building wire and each cable assembly type.

1.6 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of components and circuits.

1.7 QUALITY ASSURANCE

- A. Provide wiring materials located in plenums with peak optical density not greater than 0.5, average optical density not greater than 0.15, and flame spread not greater than 5 feet (1.5 m) when tested in accordance with NFPA262.

1.8 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

1.9 FIELD MEASUREMENTS

- A. Verify field measurements are as indicated on Drawings.

1.10 COORDINATION

- A. Where wire and cable destination is indicated and routing is not shown, determine routing and lengths required.
- B. Wire and cable routing indicated is approximate unless dimensioned.

PART 2 - PRODUCTS

2.1 BUILDING WIRE

- A. Manufacturers:
 1. Okonite.
 2. General Cable Co.
 3. Southwire.
 4. American.
 5. Substitutions: Under provisions of General Specifications.
- B. Product Description: Single conductor insulated wire.
- C. Conductor: Copper.
- D. Insulation: 600 volt rating; material rated 90 degrees C.

2.2 WIRING CONNECTORS

- A. Split Bolt Connectors:
 - 1. Kearney.
 - 2. Teledyne Penn-Union.
- B. Solderless Pressure Connectors:
 - 1. Cadweld.
 - 2. Burndy.
- C. Compression Connectors:
 - 1. Kearney.
 - 2. Teledyne- Penn-Union.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify interior of building has been protected from weather.
- B. Verify mechanical work likely to damage wire and cable has been completed.
- C. Verify raceway installation is complete and supported.

3.2 PREPARATION

- A. Completely and thoroughly swab raceway before installing wire.

3.3 INSTALLATION

- A. Route wire and cable to meet Project conditions.
- B. Neatly train and lace wiring inside boxes, equipment, and panelboards.
- C. Identify and color code wire and cable under provisions of Section 26 05 53. Identify each conductor with its circuit number or other designation indicated.
- D. Special Techniques--Building Wire in Raceway:
 - 1. Pull conductors into raceway at same time.
 - 2. Install building wire 4 AWG and larger with pulling equipment.
- E. Special Techniques - Cable:
 - 1. Protect exposed cable from damage.
 - 2. Support cables above accessible ceiling, using spring metal clips or cable ties to support cables from structure. Do not rest cable on ceiling panels.
 - 3. Use suitable cable fittings and connectors.
- F. Special Techniques - Wiring Connections:
 - 1. Clean conductor surfaces before installing lugs and connectors.
 - 2. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
 - 3. Tape uninsulated conductors and connectors with electrical tape to 150 percent of insulation rating of conductor.
 - 4. Install split bolt connectors for copper conductor splices and taps, 6 AWG and larger.

5. Install solderless pressure connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller.

G. Install solid conductor for feeders and branch circuits 10 AWG and smaller.

3.4 WIRE COLOR

A. General:

1. For wire sizes 10 AWG and smaller, install wire colors in accordance with the following:
 - a. Black and red for single phase circuits at 120/240 volts.
 - b. Black, red, and blue for circuits at 120/208 volts single or three phase.
 - c. Orange, brown, and yellow for circuits at 277/480 volts single or three phase.
2. For wire sizes 8 AWG and larger, identify wire with colored tape at terminals, splices and boxes. Colors are as follows:
 - a. Black and red for single phase circuits at 120/240 volts.
 - b. Black, red, and blue for circuits at 120/208 volts single or three phase.
 - c. Orange, brown, and yellow for circuits at 277/480 volts single or three phase.

B. Neutral Conductors: White. When two or more neutrals are located in one conduit, individually identify each with proper circuit number.

C. Branch Circuit Conductors: Install three or four wire home runs with each phase uniquely color coded.

D. Feeder Circuit Conductors: Uniquely color code each phase.

E. Ground Conductors:

1. For 6 AWG and smaller: Green.
2. For 4 AWG and larger: Identify with green tape at both ends and visible points including junction boxes.

3.5 FIELD QUALITY CONTROL

A. Inspect and test in accordance with NETA ATS, except Section 4.

B. Perform inspections and tests listed in NETA ATS, Section 7.3.1.

END OF SECTION 26 05 19

SECTION 26 05 26 – GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Rod electrodes.
 - 2. Wire.
 - 3. Mechanical connectors.
 - 4. Exothermic connections.
- B. Related Sections:
 - 1. Section - Concrete Reinforcing: Bonding or welding bars when reinforcing steel is used for electrodes.

1.2 REFERENCES

- A. Institute of Electrical and Electronics Engineers:
 - 1. IEEE 142 - Recommended Practice for Grounding of Industrial and Commercial Power Systems.
 - 2. IEEE 1100 - Recommended Practice for Powering and Grounding Electronic Equipment.
- B. International Electrical Testing Association:
 - 1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
- C. National Fire Protection Association:
 - 1. NFPA 70 - National Electrical Code.

1.3 SYSTEM DESCRIPTION

- A. Grounding systems use the following elements as grounding electrodes:
 - 1. Metal underground water pipe.
 - 2. Metal building frame.
 - 3. Concrete-encased electrode.
 - 4. Rod electrode.

1.4 PERFORMANCE REQUIREMENTS

- A. Grounding System Resistance: 25 ohms maximum.

1.5 SUBMITTALS

- A. Product Data: Submit data on grounding electrodes, aircraft static grounding receptacles, and connections.
- B. Test Reports: Indicate overall resistance to ground and resistance of each electrode.

1.6 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of components and grounding electrodes.

1.7 QUALITY ASSURANCE

- A. Provide grounding materials conforming to requirements of NEC, IEEE 142, and UL labeled.

1.8 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site in original factory packaging, labeled with manufacturer's identification.
- B. Protect from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original packaging.
- C. Do not deliver items to project before time of installation. Limit shipment of bulk and multiple-use materials to quantities needed for immediate installation.

1.10 COORDINATION

- A. Complete grounding and bonding of building reinforcing steel prior concrete placement.

PART 2 - PRODUCTS

2.1 ROD ELECTRODES

- A. Manufacturers:
 - 1. Apache Grounding/Erico Inc.
 - 2. Copperweld, Inc.
 - 3. Erico, Inc.
 - 4. O-Z Gedney Co.
- B. Product Description:
 - 1. Material: Copper.
 - 2. Diameter: 3/4 inch.
 - 3. Length: 10 feet.

2.02 WIRE

- A. Material: Stranded copper.
- B. Foundation Electrodes: 4 AWG.
- C. Grounding Electrode Conductor: Copper conductor bare or insulated.

- D. Bonding Conductor: Copper conductor bare or insulated.

2.3 MECHANICAL CONNECTORS

- A. Manufacturers:
 1. Apache Grounding/Erico Inc.
 2. Copperweld, Inc.
 3. ILSCO Corporation.
 4. O-Z Gedney Co.
 5. Thomas & Betts, Electrical.
- B. Description: Bronze connectors, suitable for grounding and bonding applications, in configurations required for particular installation.

2.4 EXOTHERMIC CONNECTIONS

- A. Manufacturers:
 1. Cadweld.
 2. Copperweld, Inc.
 3. Thermoweld.
- B. Product Description: Exothermic materials, accessories, and tools for preparing and making permanent field connections between grounding system components.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify final backfill and compaction has been completed before driving rod electrodes.

3.2 PREPARATION

- A. Remove paint, rust, mill oils, and surface contaminants at connection points.

3.3 INSTALLATION

- A. Install in accordance with IEEE and manufacturer instructions.
- B. Install rod electrodes at locations as indicated on Drawings. Install additional rod electrodes to achieve specified resistance to ground.
- C. Install grounding and bonding conductors concealed from view.
- D. Install 4 AWG bare copper wire in foundation footing as indicated on Drawings or install grounding electrode conductor and connect to reinforcing steel in foundation footing as indicated on Drawings.
- E. Bond together metal siding not attached to grounded structure; bond to ground.
- F. Install isolated grounding conductor for designated circuits in accordance with IEEE 1100.

- G. Equipment Grounding Conductor: Install separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.
- H. Install continuous grounding using underground cold water system and building steel as grounding electrode. Where water piping is not available, install artificial station ground by means of driven rods or buried electrodes.
- I. Permanently ground entire light and power system in accordance with NEC, including service equipment, distribution panels, lighting panelboards, switch and starter enclosures, motor frames, grounding type receptacles, and other exposed non-current carrying metal parts of electrical equipment.
- J. Install branch circuits feeding isolated ground receptacles with separate insulated grounding conductor, connected only at isolated ground receptacle, ground terminals, and at ground bus of serving panel.
- K. Accomplish grounding of electrical system by using insulated grounding conductor installed with feeders and branch circuit conductors in conduits. Size grounding conductors in accordance with NEC. Install from grounding bus of serving panel to ground bus of served panel, grounding screw of receptacles, lighting fixture housing, light switch outlet boxes or metal enclosures of service equipment. Ground conduits by means of grounding bushings on terminations at panelboards with installed number 12 conductor to grounding bus.
- L. Grounding electrical system using continuous metal raceway system enclosing circuit conductors in accordance with NEC.
- M. Permanently attach equipment and grounding conductors prior to energizing equipment.

3.4 FIELD QUALITY CONTROL

- A. Inspect and test in accordance with NETA ATS, except Section 4.
- B. Grounding and Bonding: Perform inspections and tests listed in NETA ATS, Section 7.13.
- C. Perform ground resistance testing in accordance with IEEE 142.
- D. Perform continuity testing in accordance with IEEE 142.
- E. When improper grounding is found on receptacles, check receptacles in entire project and correct. Perform retest.

END OF SECTION 26 05 26

SECTION 26 05 29 – HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Conduit supports.
 2. Formed steel channel.
 3. Spring steel clips.
 4. Sleeves.
 5. Mechanical sleeve seals.
 6. Firestopping relating to electrical work.
 7. Firestopping accessories.
 8. Equipment bases and supports.

1.2 REFERENCES

- A. ASTM International:
1. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
 2. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
 3. ASTM E814 - Standard Test Method for Fire Tests of Through-Penetration Fire Stops.
 4. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems.
- B. FM Global:
1. FM - Approval Guide, A Guide to Equipment, Materials & Services Approved By Factory Mutual Research For Property Conservation.
- C. National Fire Protection Association:
1. NFPA 70 - National Electrical Code.
- D. Underwriters Laboratories Inc.:
1. UL 263 - Fire Tests of Building Construction and Materials.
 2. UL 723 - Tests for Surface Burning Characteristics of Building Materials.
 3. UL 1479 - Fire Tests of Through-Penetration Firestops.
 4. UL 2079 - Tests for Fire Resistance of Building Joint Systems.
 5. UL - Fire Resistance Directory.

1.3 DEFINITIONS

- A. Firestopping (Through-Penetration Protection System): Sealing or stuffing material or assembly placed in spaces between and penetrations through building materials to arrest movement of fire, smoke, heat, and hot gases through fire rated construction.

1.4 SYSTEM DESCRIPTION

- A. Firestopping Materials: ASTM E814 and UL 1479 to achieve fire ratings as noted on Drawings for adjacent construction.

1.5 PERFORMANCE REQUIREMENTS

- A. Firestopping: Conform to applicable code for fire resistance ratings and surface burning characteristics.

1.6 SUBMITTALS

- A. Product Data:
 - 1. Hangers and Supports: Submit manufacturers catalog data including load capacity.
 - 2. Firestopping: Submit data on product characteristics, performance and limitation criteria.
- B. Firestopping Schedule: Submit schedule of opening locations and sizes, penetrating items, and required listed design numbers to seal openings to maintain fire resistance rating of adjacent assembly.
- C. Design Data: Indicate load carrying capacity of hangers and supports.
- D. Manufacturer's Installation Instructions:
 - 1. Hangers and Supports: Submit special procedures and assembly of components.
 - 2. Firestopping: Submit preparation and installation instructions.
- E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing work of this section with minimum three years documented experience.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site in original factory packaging, labeled with manufacturer's identification.
- B. Protect from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original packaging.

1.9 ENVIRONMENTAL REQUIREMENTS

- A. Do not apply firestopping materials when temperature of substrate material and ambient air is below 60 degrees F.
- B. Maintain this minimum temperature before, during, and for minimum 3 days after installation of firestopping materials.

PART 2 - PRODUCTS

2.1 CONDUIT SUPPORTS

- A. Manufacturers:
 - 1. Allied Tube & Conduit Corp.
 - 2. Electroline Manufacturing Company.
 - 3. O-Z Gedney Co.
 - 4. Substitutions: Under provisions of General Specifications.
- B. Hanger Rods: Threaded high tensile strength galvanized carbon steel with free running threads.
- C. Beam Clamps: Malleable Iron, with tapered hole in base and back to accept either bolt or hanger rod. Set screw: hardened steel.
- D. Conduit clamps for trapeze hangers: Galvanized steel, notched to fit trapeze with single bolt to tighten.
- E. Conduit clamps - general purpose: One hole malleable iron for surface mounted conduits.
- F. Cable Ties: High strength nylon temperature rated to 185 degrees F. Self locking.

2.2 FORMED STEEL CHANNEL

- A. Manufacturers:
 - 1. Unistrut Corp.
 - 2. Allied Tube & Conduit Corp.
 - 3. B-Line Systems.
 - 4. Midland Ross Corporation, Electrical Products Division.
 - 5. Substitutions: Under provisions of General Specifications.
- B. Product Description: Galvanized 12 gage thick steel. With holes 1-1/2 inches on center.

2.3 SPRING STEEL CLIPS

- A. Manufacturers:
 - 1. O-Z/Gedney.
 - 2. Spring City Electrical Mfg..
 - 3. Erico Products.
 - 4. Substitutions: Under provisions of General Specifications
- B. Product Description: Mounting hole and screwclosure.

2.4 FIRESTOPPING

- A. Manufacturers:
 - 1. Dow Corning Corp..
 - 2. Fire Trak Corp.
 - 3. Hilti Corp.
 - 4. International Protective Coating Corp.
 - 5. 3M fire Protection Products.
 - 6. The RectorSeal Corporation Bio Fireshield.

7. Substitutions: Under provisions of General Specifications
- B. Product Description: Different types of products by multiple manufacturers are acceptable as required to meet specified system description and performance requirements; provide only one type for each similar application.
1. Silicone Firestopping Elastomeric Firestopping: Single or multiple component silicone elastomeric compound and compatible silicone sealant.
 2. Foam Firestopping Compounds: Single or multiple component foam compound.
 3. Formulated Firestopping Compound of Incombustible Fibers: Formulated compound mixed with incombustible non-asbestos fibers.
 4. Fiber Stuffing and Sealant Firestopping: Composite of mineral fiber stuffing insulation with silicone elastomer for smoke stopping.
 5. Mechanical Firestopping Device with Fillers: Mechanical device with incombustible fillers and silicone elastomer, covered with sheet stainless steel jacket, joined with collars, penetration sealed with flanged stops.
 6. Intumescent Firestopping: Intumescent putty compound which expands on exposure to surface heat gain.
 7. Firestop Pillows: Formed mineral fiber pillows.

2.5 FIRESTOPPING ACCESSORIES

- A. Primer: Type recommended by firestopping manufacturer for specific substrate surfaces and suitable for required fire ratings.
- B. Installation Accessories: Provide clips, collars, fasteners, temporary stops or dams, and other devices required to position and retain materials in place.
- C. General:
1. Furnish UL listed products.
 2. Select products with rating not less than rating of wall or floor being penetrated.
- D. Non-Rated Surfaces:
1. Stamped steel, chrome plated, hinged, split ring escutcheons or floor plates or ceiling plates for covering openings in occupied areas where conduit is exposed.
 2. For exterior wall openings below grade, furnish modular mechanical type seal consisting of interlocking synthetic rubber links shaped to continuously fill annular space between conduit and cored opening or water-stop type wall sleeve.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify openings are ready to receive sleeves.
- B. Verify openings are ready to receive firestopping.

3.2 PREPARATION

- A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter affecting bond of firestopping material.
- B. Remove incompatible materials affecting bond.
- C. Install backing or damming materials to arrest liquid material leakage.

- D. Obtain permission from Architect/Engineer before using powder-actuated anchors.
- E. Obtain permission from Architect/Engineer before drilling or cutting structural members.

3.3 INSTALLATION - HANGERS AND SUPPORTS

- A. Anchors and Fasteners:
 - 1. Concrete Structural Elements: Provide precast inserts, expansion anchors, powder actuated anchors and preset inserts.
 - 2. Steel Structural Elements: Provide beam clamps, spring steel clips, steel ramset fasteners, and welded fasteners.
 - 3. Concrete Surfaces: Provide self-drilling anchors and expansion anchors.
 - 4. Hollow Masonry, Plaster, and Gypsum Board Partitions: Provide toggle bolts and hollow wall fasteners.
 - 5. Solid Masonry Walls: Provide expansion anchors and preset inserts.
 - 6. Sheet Metal: Provide sheet metal screws.
 - 7. Wood Elements: Provide wood screws.
- B. Inserts:
 - 1. Install inserts for placement in concrete forms.
 - 2. Install inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
 - 3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
 - 4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
 - 5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above slab.
- C. Install conduit and raceway support and spacing in accordance with NEC.
- D. Do not fasten supports to pipes, ducts, mechanical equipment, or conduit.
- E. Install multiple conduit runs on common hangers.
- F. Supports:
 - 1. Fabricate supports from structural steel or formed steel channel. Install hexagon head bolts to present neat appearance with adequate strength and rigidity. Install spring lock washers under nuts.
 - 2. Install surface mounted cabinets and panelboards with minimum of four anchors.
 - 3. In wet and damp locations install steel channel supports to stand cabinets and panelboards 1 inch off wall.

3.4 INSTALLATION - FIRESTOPPING

- A. Install material at fire rated construction perimeters and openings containing penetrating sleeves, piping, ductwork, conduit and other items, requiring firestopping.
- B. Apply primer where recommended by manufacturer for type of firestopping material and substrate involved, and as required for compliance with required fire ratings.
- C. Apply firestopping material in sufficient thickness to achieve required fire and smoke rating, to uniform density and texture.

- D. Fire Rated Surface:
 1. Seal opening at floor, wall, partition, ceiling, and roof as follows:
 - a. Install sleeve through opening and extending beyond minimum of 1 inch on both sides of building element.
 - b. Size sleeve allowing minimum of 1 inch void between sleeve and building element.
 - c. Pack void with backing material.
 - d. Seal ends of sleeve with UL listed fire resistive silicone compound to meet fire rating of structure penetrated.
 2. Where cable tray, conduit, and wireway penetrates fire rated surface, install firestopping product in accordance with manufacturer's instructions.

- E. Non-Rated Surfaces:
 1. Seal opening through non-fire rated wall, partition, floor, ceiling, and roof opening as follows:
 - a. Install sleeve through opening and extending beyond minimum of 1 inch on both sides of building element.
 - b. Size sleeve allowing minimum of 1 inch void between sleeve and building element.
 - c. Install type of firestopping material recommended by manufacturer.
 2. Install escutcheons, floor plates or ceiling plates where conduit, penetrates non-fire rated surfaces in occupied spaces. Occupied spaces include rooms with finished ceilings and where penetration occurs below finished ceiling.
 3. Exterior wall openings below grade: Assemble rubber links of mechanical seal to size of conduit and tighten in place, in accordance with manufacturer's instructions.

3.5 INSTALLATION - EQUIPMENT BASES AND SUPPORTS

- A. Provide housekeeping pads of concrete, minimum 3-1/2 inches thick and extending 6 inches beyond supported equipment.
- B. Using templates furnished with equipment, install anchor bolts, and accessories for mounting and anchoring equipment.
- C. Construct supports of steel members or formed steel channel. Brace and fasten with flanges bolted to structure.

3.6 INSTALLATION - SLEEVES

- A. Exterior watertight entries: Seal with adjustable interlocking rubber links.
- B. Conduit penetrations not required to be watertight: Sleeve and fill with silicon foam.
- C. Set sleeves in position in forms. Provide reinforcing around sleeves.
- D. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.
- E. Extend sleeves through floors 1 inch above finished floor level. Caulk sleeves.
- F. Where conduit or raceway penetrates floor, ceiling, or wall, close off space between conduit or raceway and adjacent work with stuffing or fire stopping insulation and caulk airtight. Provide close fitting metal collar or escutcheon covers at both sides of penetration.
- G. Install escutcheons at finished surfaces.

3.7 FIELD QUALITY CONTROL

- A. Inspect installed firestopping for compliance with specifications and submitted schedule.

3.8 CLEANING AND PROTECTION OF FINISHED WORK

- A. Clean adjacent surfaces of firestopping materials.
- B. Protect adjacent surfaces from damage by material installation.

END OF SECTION 26 05 29

SECTION 26 05 33 – RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes conduit and tubing, wireways, outlet boxes, pull and junction boxes, and handholes.

1.2 REFERENCES

- A. American National Standards Institute:
 - 1. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.
 - 2. ANSI C80.3 - Specification for Electrical Metallic Tubing, Zinc Coated.
- B. National Electrical Manufacturers Association:
 - 1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
 - 2. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.
 - 3. NEMA OS 1 - Sheet Steel Outlet Boxes, Device Boxes, Covers, and Box Supports.
 - 4. NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers, and Box Supports.
 - 5. NEMA RN 1 - Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.
 - 6. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Tubing and Conduit.
 - 7. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing.

1.3 SYSTEM DESCRIPTION

- A. Raceway and boxes located as indicated on Drawings, and at other locations required for splices, taps, wire pulling, equipment connections, and compliance with regulatory requirements. Raceway and boxes are shown in approximate locations unless dimensioned. Provide raceway to complete wiring system.
- B. Underground More than 5 feet outside Foundation Wall: Provide plastic coated conduit and thickwall nonmetallic conduit. Provide cast metal boxes or nonmetallic handhole.
- C. Underground Within 5 feet from Foundation Wall: Provide plastic coated conduit and thickwall nonmetallic conduit. Provide cast metal or nonmetallic boxes.
- D. In or Under Slab on Grade: Provide plastic coated rigid steel conduit or intermediate metal conduit and thickwall nonmetallic conduit. Provide cast or nonmetallic metal boxes.
- E. Outdoor Locations, Above Grade: Use rigid steel, intermediate metal conduit, and electrical metallic tubing. Provide cast metal or nonmetallic outlet, pull, and junction boxes.
- F. In Slab Above Grade: Provide rigid steel conduit and intermediate metal conduit. Provide cast boxes.
- G. Wet and Damp Locations: Provide galvanized rigid steel conduit, intermediate metal conduit and electrical metallic tubing. Provide cast metal or nonmetallic outlet, junction, and pull boxes. Provide flush mounting outlet box in finished areas.

- H. Concealed Dry Locations: Provide rigid steel, intermediate metal conduit, electrical and metallic tubing. Provide sheet-metal boxes. Provide flush mounting outlet box in finished areas. Provide hinged enclosure for large pull boxes.
- I. Exposed Dry Locations: Use rigid steel conduit to 8 feet above flush floor or to first junction box. Use rigid steel conduit, intermediate metal conduit or electrical metallic tubing at other locations. Provide sheet-metal boxes. Provide flush mounting outlet box in finished areas. Provide hinged enclosure for large pull boxes.

1.4 DESIGN REQUIREMENTS

- A. Minimum Raceway Size:
 - 1. Above floor: 1/2 inch unless otherwise specified.
 - 2. Underground: 3/4 inch unless otherwise specified.

1.5 SUBMITTALS

- A. Product Data: Submit for the following:
 - 1. Flexible metal conduit.
 - 2. Liquidtight flexible metal conduit.
 - 3. Nonmetallic conduit.
 - 4. Raceway fittings.
 - 5. Conduit bodies.
 - 6. Wireway.
 - 7. Pull and junction boxes.
 - 8. Handholes.
- B. Manufacturer's Installation Instructions: Submit application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

1.6 CLOSEOUT SUBMITTALS

- A. Project Record Documents:
 - 1. Record actual routing of conduits larger than 2 inch trade size.
 - 2. Record actual locations and mounting heights of outlet, pull, and junction boxes.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.
- B. Protect PVC conduit from sunlight.

1.8 COORDINATION

- A. Coordinate installation of outlet boxes for equipment connected under Section 26 05 03.
- B. Coordinate mounting heights, orientation and locations of outlets mounted above counters, benches, and backsplashes.

PART 2 - PRODUCTS

2.1 METAL CONDUIT

- A. Manufacturers:
 - 1. Allied Tube and Conduit.
 - 2. Hubbell Inc.
 - 3. AFC.
 - 4. Substitutions: Under provisions of General Specifications.
- B. Rigid Steel Conduit: ANSI C80.1.
- C. Intermediate Metal Conduit (IMC): Rigid steel.
- D. Fittings and Conduit Bodies: NEMA FB 1; material to match conduit.

2.2 PVC COATED METAL CONDUIT

- A. Manufacturers:
 - 1. Occidental Coating.
 - 2. P.C.D.
 - 3. Robroy Industries.
 - 4. Substitutions: Under provisions of General Specifications.
- B. Product Description: NEMA RN 1; rigid steel conduit with external PVC coating, 40 mil thick.
- C. Fittings and Conduit Bodies: NEMA FB 1; steel fittings with external PVC coating to match conduit.

2.3 FLEXIBLE METAL CONDUIT

- A. Manufacturers:
 - 1. Acme International.
 - 2. Electri-Flex Co.
 - 3. Hubbell Inc.
 - 4. Substitutions: Under provisions of General Specifications
- B. Product Description: Interlocked steel or aluminum construction.
- C. Fittings: NEMA FB 1.

2.4 LIQUIDTIGHT FLEXIBLE METAL CONDUIT

- A. Manufacturers:
 - 1. Acme International.
 - 2. Electri-Flex Co.
 - 3. Hubbell Inc.
 - 4. Substitutions: Under provisions of General Specifications.
- B. Product Description: Interlocked steel or aluminum construction with PVC jacket.
- C. Fittings: NEMA FB 1.

2.5 ELECTRICAL METALLIC TUBING (EMT)

- A. Manufacturers:
 - 1. Allied Tube and Conduit.
 - 2. AFC.
 - 3. Hubbell Inc.
 - 4. Substitutions: Under provisions of General Specifications.
- B. Product Description: ANSI C80.3; galvanized tubing.
- C. Fittings and Conduit Bodies: NEMA FB 1; steel or malleable iron, compression type.

2.6 NONMETALLIC CONDUIT

- A. Manufacturers:
 - 1. Carlon.
 - 2. RACO.
 - 3. Can-Tex..
 - 4. Substitutions: Under provisions of General Specifications.
- B. Product Description: NEMA TC 2; Schedule 40 or 80PVC.
- C. Fittings and Conduit Bodies: NEMA TC3.

2.7 WIREWAY

- A. Manufacturers:
 - 1. Circle AW.
 - 2. Thomas & Betts Corp.
 - 3. Substitutions: Under provisions of General Specifications.
- B. Product Description: General purpose or Raintight type wireway as required.
- C. Knockouts: Manufacturer's standard.
- D. Size: Dimensions as indicated on Drawings or as required by the NEC for the intended application.
- E. Cover: Hinged or screw cover as indicated or as required for the intended applications. Provide with full gaskets when required.
- F. Connector: Flanged.
- G. Fittings: Lay-in type.
- H. Finish: Rust inhibiting primer coating with manufacturer's standard gray enamel finish.

2.8 OUTLET BOXES

- A. Sheet Metal Outlet Boxes: NEMA OS 1, galvanized steel.
 - 1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; furnish 1/2 inch male fixture studs where required.
 - 2. Concrete Ceiling Boxes: Concrete type.
- B. Nonmetallic Outlet Boxes: NEMA OS 2.

- C. Cast Boxes: NEMA FB 1, Type FD, cast ferrous alloy. Furnish gasketed cover by box manufacturer. Furnish threaded hubs.
- D. Wall Plates for Finished Areas: As specified in Section 26 27 26.
- E. Wall Plates for Unfinished Areas: Furnish gasketed cover.

2.9 SMALL PULL AND JUNCTION BOXES

- A. Sheet Metal Boxes: NEMA OS 1, galvanized steel.
- B. Hinged Enclosures: As specified.
- C. Surface Mounted Cast Metal Box: NEMA 250, Type 4; flat-flanged, surface mounted junction box:
 1. Material: Galvanized cast iron or aluminum.
 2. Cover: Furnish with ground flange, neoprene gasket, and stainless steel cover screws.
- D. In-Ground Cast Metal Box: NEMA 250, Type 6, galvanized cast iron, flanged, recessed cover box for flush mounting. Nonskid cover with neoprene gasket and stainless steel cover screws. Cover Legend: "ELECTRIC" or as indicated.
- E. Fiberglass or Concrete Composite Handholes: Die-molded, glass-fiber or concrete composite hand holes. Cable Entrance: Pre-cut 6 inch x 6 inch cable entrance at center bottom of each side. Cover: Glass-fiber or concrete composite, weatherproof cover with nonskid finish. Cover Legend: "ELECTRIC" or as indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify outlet locations and routing and termination locations of raceway prior to rough-in.

3.2 INSTALLATION

- A. Ground and bond raceway and boxes in accordance with Section 26 05 26.
- B. Fasten raceway and box supports to structure and finishes in accordance with Section 26 05 29.
- C. Identify raceway and boxes in accordance with Section 26 05 53.
- D. Arrange raceway and boxes to maintain headroom and present neat appearance.

3.3 INSTALLATION - RACEWAY

- A. Install conduit in accordance with NECA "Standard of Installation".
- B. Raceway routing is shown in approximate locations unless dimensioned. Route to complete wiring system.
- C. Arrange raceway supports to prevent misalignment during wiring installation.

- D. Support raceway using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.
- E. Group related raceway; support using conduit rack. Construct rack using steel channel specified in Section 26 05 29; provide space on each for 25 percent additional raceways.
- F. Do not support raceway with wire or perforated pipe straps. Remove wire used for temporary supports
- G. Do not attach raceway to ceiling support wires or other piping systems.
- H. Construct wireway supports from steel channel specified in Section 26 05 29.
- I. Route exposed raceway parallel and perpendicular to walls.
- J. Route raceway installed above accessible ceilings parallel and perpendicular to walls.
- K. Route conduit in and under slab from point-to-point.
- L. Maximum Size Conduit in Slab Above Grade: 3/4 inch. Do not cross conduits in slab.
- M. Maintain clearance between raceway and piping for maintenance purposes.
- N. Maintain 12 inch clearance between raceway and surfaces with temperatures exceeding 104 degrees F.
- O. Cut conduit square using saw or pipe cutter; de-burr cut ends.
- P. Bring conduit to shoulder of fittings; fasten securely.
- Q. Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for minimum 20 minutes.
- R. Install conduit hubs or sealing locknuts to fasten conduit to sheet metal boxes in damp and wet locations and to cast boxes.
- S. Install no more than equivalent of three 90 degree bends between boxes. Install conduit bodies to make sharp changes in direction, as around beams. Install hydraulic one-shot bender to fabricate or factory elbows for bends in metal conduit larger than 2 inch size.
- T. Avoid moisture traps; install junction box with drain fitting at low points in conduit system.
- U. Install fittings to accommodate expansion and deflection where raceway crosses seismic, control and expansion joints.
- V. Install suitable pull string or cord in each empty raceway except sleeves and nipples.
- W. Install suitable caps to protect installed conduit against entrance of dirt and moisture.
- X. Surface Raceway: Install flat-head screws, clips, and straps to fasten raceway channel to surfaces; mount plumb and level. Install insulating bushings and inserts at connections to outlets and corner fittings.
- Y. Close ends and unused openings in wireway.
- Z. Exposed conduit floor penetrations shall be plastic coated steel or intermediate metal conduit or PVC wrapped (10 mil tape with 1/2 lap) galvanized rigid steel or intermediate metal conduit.

Concealed floor penetrations in a finished wall or chase may be thickwall Schedule 80 non-metallic conduit. Extend non-metallic conduit to nearest junction box.

3.4 INSTALLATION - BOXES

- A. Install wall mounted boxes at elevations to accommodate mounting heights as indicated on Drawings.
- B. Adjust box location up to 5 feet prior to rough-in to accommodate intended purpose.
- C. Orient boxes to accommodate wiring devices oriented as specified in Section 26 27 26.
- D. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.
- E. In Accessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable recessed luminaire.
- F. Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.
- G. Do not install flush mounting box back-to-back in walls; install with minimum 6 inches separation. Install with minimum 24 inches separation in acoustic rated walls.
- H. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.
- I. Install stamped steel bridges to fasten flush mounting outlet box between studs.
- J. Install flush mounting box without damaging wall insulation or reducing its effectiveness.
- K. Install adjustable steel channel fasteners for hung ceiling outlet box.
- L. Do not fasten boxes to ceiling support wires or other piping systems.
- M. Support boxes independently of conduit.
- N. Install gang box where more than one device is mounted together. Do not use sectional box.
- O. Install gang box with plaster ring for single device outlets.

3.5 INTERFACE WITH OTHER PRODUCTS

- A. Install conduit to preserve fire resistance rating of partitions and other elements, using materials and methods in accordance with General Specifications.
- B. Route conduit through roof openings for piping and ductwork or through suitable roof jack with pitch pocket. Coordinate location with roofing installation specified in Specifications.
- C. Locate outlet boxes to allow luminaires positioned as indicated on Drawings.
- D. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.

3.6 ADJUSTING

- A. Adjust flush-mounting outlets to make front flush with finished wall material.
- B. Install knockout closures in unused openings in boxes.

3.7 CLEANING

- A. Clean interior of boxes to remove dust, debris, and other material.
- B. Clean exposed surfaces and restore finish.

END OF SECTION 26 05 33

SECTION 26 05 53 – IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes building wire and cable; metal clad cable (lighting systems only); and wiring connectors and connections.
- B. Section Includes:
 - 1. Nameplates.
 - 2. Labels.
 - 3. Wire markers.
 - 4. Conduit markers.
 - 5. Stencils.
 - 6. Underground Warning Tape.
 - 7. Lockout Devices.
- C. Related Sections:
 - 1. Section - Paints and Coatings: Execution requirements for painting specified by this section.

1.2 SUBMITTALS

- A. Product Data:
 - 1. Submit manufacturer's catalog literature for each product required.
 - 2. Submit electrical identification schedule including list of wording, symbols, letter size, color coding, tag number, location, and function.
- B. Samples:
 - 1. Submit two tags, actual size.
 - 2. Submit two labels, actual size.
- C. Manufacturer's Installation Instructions: Indicate installation instructions, special procedures, and installation.

1.3 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of tagged devices; include tag numbers.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Accept identification products on site in original containers. Inspect for damage.
- B. Accept materials on site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.
- C. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.5 ENVIRONMENTAL REQUIREMENTS

- A. Install labels and nameplates only when ambient temperature and humidity conditions for adhesive are within range recommended by manufacturer.

1.6 EXTRA MATERIALS

- A. Furnish two containers of spray-on adhesive.

PART 2 - PRODUCTS

2.1 NAMEPLATES

- A. Product Description: Laminated three-layer plastic with engraved white letters on black contrasting background color.
- B. Letter Size:
 - 1. 1/8 inch high letters for identifying individual equipment and loads.
 - 2. 1/4 inch high letters for identifying grouped equipment and loads.
- C. Minimum nameplate thickness: 1/8 inch.

2.2 LABELS

- A. Labels: Embossed adhesive tape, with 3/16 inch white letters on black background.

2.3 WIRE MARKERS

- A. Description: Cloth tape, split sleeve, or tubing type wire markers.
- B. Legend:
 - 1. Power and Lighting Circuits: Branch circuit or feeder number.
 - 2. Control Circuits: Control wire number as indicated on shop drawings.

2.4 CONDUIT AND RACEWAY MARKERS

- A. Description: Labels fastened with adhesive.
- B. Color:
 - 1. 480 Volt System: Black lettering on white background.
 - 2. 208 Volt System: Black lettering on white background.

2.5 UNDERGROUND WARNING TAPE

- A. Description: 4 inch wide plastic tape, detectable type, colored red for electrical and orange for telephone, communications or cable TV per American Public Works Association (APWA) standards with suitable warning legend describing buried electrical or communications lines.

2.6 LOCKOUT DEVICES

- A. Anodized aluminum or reinforced nylon hasp with erasable label surface; size minimum 7-1/4 x 3 inches.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.

3.2 INSTALLATION

- A. Install identifying devices after completion of painting.
- B. Nameplate Installation:
 - 1. Install nameplate parallel to equipment lines.
 - 2. Install nameplate for each electrical distribution and control equipment enclosure with corrosive-resistant mechanical fasteners, or adhesive.
 - 3. Install nameplates for each control panel and major control components located outside panel with corrosive-resistant mechanical fasteners, or adhesive.
 - 4. Secure nameplate to equipment front using screws, rivets, or adhesive.
 - 5. Secure nameplate to inside surface of door on recessed panelboard in finished locations.
 - 6. Install nameplates for the following:
 - a. Switchboards.
 - b. Panelboards.
 - c. Service Disconnects.
 - d. Telephone Mounting Boards.
- C. Label Installation:
 - 1. Install label parallel to equipment lines.
 - 2. Install label for identification of individual control device stations.
 - 3. Install labels for permanent adhesion and seal with clear lacquer.
- D. Wire Marker Installation:
 - 1. Install wire marker for each conductor at panelboard, pull boxes, outlet and junction boxes, and each load connection.
 - 2. Mark data cabling at each end. Install additional marking at accessible locations along the cable run.
 - 3. Install labels at data outlets identifying patch panel and port designation.
- E. Conduit Marker Installation:
 - 1. Install conduit marker for each conduit longer than 6 feet.
 - 2. Conduit Marker Spacing: 20 feet on center.
- F. Underground Warning Tape Installation:
 - 1. Install underground warning tape along length of each underground conduit, raceway, or cable 6 to 8 inches below finished grade, directly above buried conduit, raceway, or cable.

END OF SECTION 26 05 53

SECTION 26 22 00 – LOW-VOLTAGE TRANSFORMERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes two-winding transformers.
- B. Related Sections:
 - 1. Section 26 05 33 - Raceway and Boxes for Electrical Systems.

1.2 REFERENCES

- A. National Electrical Manufacturers Association:
 - 1. NEMA ST 1 - Specialty Transformers (Except General Purpose Type).
 - 2. NEMA ST 20 - Dry Type Transformers for General Applications.
- B. International Electrical Testing Association:
 - 1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

1.3 SUBMITTALS

- A. Product Data: Submit outline and support point dimensions of enclosures and accessories, unit weight, voltage, kVA, and impedance ratings and characteristics, tap configurations, insulation system type, and rated temperature rise.
- B. Test Reports: Indicate loss data, efficiency at 25, 50, 75 and 100 percent rated load, and sound level.

1.4 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of transformers.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store in clean, dry space. Maintain factory wrapping or provide additional canvas or plastic cover to protect units from dirt, water, construction debris, and traffic.
- B. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided. Handle carefully to avoid damage to transformer internal components, enclosure, and finish.

PART 2 - PRODUCTS

2.1 TWO-WINDING TRANSFORMERS

- A. Manufacturers:
 - 1. General Electric.
 - 2. Square D.
 - 3. ITE/Siemens.
 - 4. Substitutions as permitted by the general specifications..
- B. Product Description: NEMA ST 20, factory-assembled, air-cooled, dry type transformers, ratings as indicated on Drawings.
- C. Insulation system and average winding temperature rise for rated kVA as follows:
 - 1. 1-15 kVA: Class 185 with 115 degrees C rise.
 - 2. 16-500 kVA: Class 220 with 150 degrees C rise.
- D. Case temperature: Do not exceed 35 degrees C rise above ambient at warmest point at full load.
- E. Winding Taps:
 - 1. Transformers Less than 15 kVA: Two 5 percent below rated voltage, full capacity taps on primary winding.
 - 2. Transformers 15 kVA and Larger: NEMA ST 20.
- F. Sound Levels: NEMA ST 20. Maximum sound levels are as follows:
 - 1. 1-25 kVA: 45 dB.
 - 2. 26-150 kVA: 50 dB.
 - 3. 151-225 kVA: 55 dB.
- G. Basic Impulse Level: 10 kV.
- H. Ground core and coil assembly to enclosure by means of visible flexible copper grounding strap.
- I. Mounting:
 - 1. 1-15 kVA: Suitable for wall mounting.
 - 2. 16-75 kVA: Suitable for wall, floor, or trapeze mounting.
 - 3. Larger than 75 kVA: Suitable for floor or trapeze mounting.
- J. Coil Conductors: Continuous copper windings with terminations brazed or welded.
- K. Enclosure: NEMA ST 20, Type 1 or Type 3R as indicated, ventilated. Furnish lifting eyes or brackets.
- L. Isolate core and coil from enclosure using vibration-absorbing mounts.
- M. Nameplate: Include transformer connection data and overload capacity based on rated allowable temperature rise.

2.2 SOURCE QUALITY CONTROL

- A. Production test each unit according to NEMA ST 20.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify mounting supports are properly sized and located including concealed bracing in walls.

3.2 INSTALLATION

- A. Set transformer plumb and level.
- B. Use flexible conduit, in accordance with Section 26 05 33, 2 feet minimum length, for connections to transformer case. Make conduit connections to side panel of enclosure.
- C. Support transformers in accordance with Section 26 05 29.
 - 1. Mount wall-mounted transformers using integral flanges or accessory brackets furnished by manufacturer.
 - 2. Mount floor-mounted transformers on vibration isolating pads suitable for isolating transformer noise from building structure.
 - 3. Mount trapeze-mounted transformers as indicated on Drawings.
- D. Provide seismic restraints.
- E. Install grounding and bonding in accordance with Section 26 05 26.

3.3 FIELD QUALITY CONTROL

- A. Inspect and test in accordance with NETA ATS, except Section 4.
- B. Perform inspections and tests listed in NETA ATS, Section 7.2.1.

3.4 ADJUSTING

- 3.5 Measure primary and secondary voltages and make appropriate tap adjustments.

END OF SECTION 26 22 00

SECTION 26 24 13 – SWITCHBOARDS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes main meter switchboard.
- B. Related Sections:
 - 1. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
 - 2. Section 26 05 53 - Identification for Electrical Systems.
 - 3. Section 26 28 13 - Fuses.
 - 4. Section 33 71 73 - Electrical Utility Services: Utility metering equipment.

1.2 REFERENCES

- A. American National Standards Institute:
 - 1. ANSI C12.1 - Code for Electricity Metering.
 - 2. ANSI C39.1 - Requirements, Electrical Analog Indicating Instruments.
- B. Institute of Electrical and Electronics Engineers:
 - 1. IEEE C57.13 - Standard Requirements for Instrument Transformers.
 - 2. IEEE C62.41 - Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits.
- C. National Electrical Manufacturers Association:
 - 1. NEMA AB 1 - Molded Case Circuit Breakers and Molded Case Switches.
 - 2. NEMA FU 1 - Low Voltage Cartridge Fuses.
 - 3. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).
 - 4. NEMA PB 2 - Deadfront Distribution Switchboards.
 - 5. NEMA PB 2.1 - General Instructions for Proper Handling, Installation, Operation, and Maintenance of Deadfront Distribution Switchboards Rated 600 Volts or Less.
- D. International Electrical Testing Association:
 - 1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

1.3 SUBMITTALS

- A. Shop Drawings: Indicate front and side views of enclosures with overall dimensions shown; conduit entrance locations and requirements; nameplate legends; size and number of bus bars for each phase, neutral, and ground; and switchboard instrument details.
- B. Product Data: Submit electrical characteristics including voltage, frame size and trip ratings, fault current withstand ratings, and time-current curves of equipment and components.
- C. Test Reports: Indicate results of factory production and field tests.

1.4 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations, configurations, and ratings of switchboards and their components on single line diagrams and plan layouts.
- B. Operation and Maintenance Data: Submit spare parts data listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver in 48 inch maximum width shipping splits, individually wrapped for protection and mounted on shipping skids.
- B. Accept switchboards on site. Inspect for damage.
- C. Store in clean, dry space. Maintain factory wrapping or provide additional canvas or plastic cover to protect units from dirt, water, construction debris, and traffic.
- D. Handle in accordance with NEMA PB 2.1. Lift only with lugs provided. Handle carefully to avoid damage to switchboard internal components, enclosure, and finish.

1.7 ENVIRONMENTAL REQUIREMENTS

- A. Conform to NEMA PB 2 service conditions during and after installation of switchboards.

1.8 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

1.9 SEQUENCING

- A. Sequence Work to avoid interferences with building finishes and installation of other products.

1.10 MAINTENANCE MATERIALS

- A. Furnish two of each key.

1.11 EXTRA MATERIALS

- A. Furnish three of each size and type of fuse installed.

PART 2 - PRODUCTS

2.1 DISTRIBUTION SWITCHBOARDS

- A. Manufacturers:
 - 1. General Electric (GE).
 - 2. Eaton.
 - 3. Siemens.
 - 4. Square D.
 - 5. Substitutions: Under provisions of General Specifications.
- B. Product Description: NEMA PB 2, enclosed switchboard with electrical ratings and configurations as indicated on Drawings.
- C. Service Conditions:
 - 1. Temperature: 122 degrees F.
 - 2. Altitude: 30 feet.
- D. Device Mounting:
 - 1. Main Section: Individually mounted.
 - 2. Distribution Section: Panel mounted.
- E. Bus:
 - 1. Material: Copper or Copper with tin plating, standard size.
 - 2. Connections: Bolted, accessible from front for maintenance.
- F. Ground Bus: Extend length of switchboard.
- G. Line and Load Terminations: Accessible from front only of switchboard, suitable for conductor materials and sizes as indicated on Drawings.
- H. Utility Metering Compartment: Furnish metering transformer compartment for Utility Company's use, in accordance with Utility Company requirements.
- I. Pull Section: Width as required by utility company, depth and height to match switchboard. Arrange as indicated on Drawings.
- J. Future Provisions: Fully equip spaces for future devices with bussing and bus connections, insulated and braced for short circuit currents. Furnish continuous current rating as indicated on Drawings.
- K. Enclosure: Type 1 General Purpose or 3R Raintight as indicated.
- L. Align sections at front and rear.
- M. Switchboard Height: 90 inches, excluding floor sills, lifting members and pull boxes.
- N. Finish: Manufacturer's standard light gray enamel over external surfaces. Coat internal surfaces with minimum one coat corrosion-resisting paint, or plate with cadmium or zinc.

2.2 FUSIBLE SWITCH ASSEMBLIES

- A. Product Description: NEMA KS 1, Type HD, load interrupter knife switch. Handle lockable in OFF position.
- B. Fuse clips: Designed to accommodate NEMA FU 1, Class R fuses.

2.3 MOLDED CASE CIRCUIT BREAKER

- A. Product Description: NEMA AB 1, molded-case circuit breaker.

2.4 INSULATED CASE CIRCUIT BREAKER

- A. Product Description: NEMA AB 1, enclosed, insulated-case circuit breaker.

2.5 SOURCE QUALITY CONTROL

- A. Furnish shop inspection and testing in accordance with NEMA PB 2.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify surface is suitable for switchboard installation.

3.2 INSTALLATION

- A. Install in accordance with NEMA PB 2.1.
- B. Tighten accessible bus connections and mechanical fasteners after placing switchboard.
- C. Install fuses in each switch and coordinate sizes with connected load.
- D. Install engraved plastic nameplates in accordance with Section 26 05 53.
- E. Install breaker circuit directory.
- F. Ground and bond switchboards in accordance with Section 26 05 26.

3.3 FIELD QUALITY CONTROL

- A. Inspect and test in accordance with NETA ATS, except Section 4.
- B. Perform inspections and tests listed in NETA ATS, Section 7.1.

3.4 ADJUSTING

- A. Adjust operating mechanisms for free mechanical movement.
- B. Tighten bolted bus connections.
- C. Adjust circuit breaker trip and time delay settings to values as instructed by factory representative.

3.5 CLEANING

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

END OF SECTION 26 24 13

SECTION 26 24 16 – PANELBOARDS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes branch circuit panelboards.
- B. Related Sections:
 - 1. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
 - 2. Section 26 05 53 - Identification for Electrical Systems.

1.2 REFERENCES

- A. Institute of Electrical and Electronics Engineers:
 - 1. IEEE C62.41 - Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits.
- B. National Electrical Manufacturers Association:
 - 1. NEMA AB 1 - Molded Case Circuit Breakers and Molded Case Switches.
 - 2. NEMA PB 1 - Panelboards.
 - 3. NEMA PB 1.1 - General Instructions for Proper Installation, Operation, and Maintenance of Panelboards Rated 600 Volts or Less.
- C. International Electrical Testing Association:
 - 1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
- D. National Fire Protection Association:
 - 1. NFPA 70 - National Electrical Code.
- E. Underwriters Laboratories Inc.:
 - 1. UL 67 - Safety for Panelboards.

1.3 SUBMITTALS

- A. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, integrated short circuit ampere rating, circuit breaker arrangement and sizes.
- B. Product Data: Submit catalog data showing specified features of standard products.

1.4 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of panelboards and record actual circuiting arrangements.
- B. Operation and Maintenance Data: Submit spare parts listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

1.6 MAINTENANCE MATERIALS

- A. Furnish two of each panelboard key. Panelboards keyed alike.

PART 2 - PRODUCTS

2.1 BRANCH CIRCUIT PANELBOARDS

- A. Manufacturers:
 - 1. Square-D NQOD, NF, and I-Line Series.
 - 2. GE Electrical A Series or Spectra Series.
 - 3. Siemens P1, P2, and P3 Series.
 - 4. Eaton Cutler-Hammer Pow-R-Line 1A, 2A, and 3A Series.
 - 5. Substitutions: Under provisions of General Specifications.
- B. Product Description: NEMA PB 1, circuit breaker type panelboard.
- C. Panelboard Bus: Copper, current carrying components, ratings as indicated on Drawings. Furnish copper ground bus in each panelboard.
- D. Minimum integrated short circuit rating: 10,000 amperes rms symmetrical for 208 volt and 240 volt panelboards or as indicated on Drawings. 14,000 amperes rms symmetrical for 480 volt panelboards, or as indicated on Drawings.
- E. Molded Case Circuit Breakers: NEMA AB 1, circuit breakers with integral thermal and instantaneous magnetic trip in each pole. Thermal magnetic trip circuit breakers for lighting and appliance branch circuit panelboards. Furnish circuit breakers UL listed as Type HACR for air conditioning equipment branch circuits, Type SWD for lighting circuits and Class A ground fault interrupter circuit breakers. Do not use tandem circuit breakers. Use common trip handle for all poles.
- F. Circuit Breaker Accessories: Trip units and auxiliary switches as indicated on Drawings.
- G. Enclosure: NEMA PB 1, Type 1 or 3R as indicated. MCC mounted where indicated.
- H. Cabinet Front: Surface type, fastened with concealed trim clamps, screws or hinge and latch, hinged door with flush lock, metal directory frame, finished in manufacturer's standard gray enamel.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install panelboards in accordance with NEMA PB 1.1.
- B. Install panelboards plumb.

- C. Install recessed panelboards flush with wall finishes.
- D. Height: 6 feet to top of panelboard; install panelboards taller than 6 feet with bottom no more than 4 inches above floor.
- E. Install filler plates for unused spaces in panelboards.
- F. Provide typed circuit directory for each branch circuit panelboard. Revise directory to reflect circuiting changes to balance phase loads.
- G. Install engraved plastic nameplates in accordance with Section 26 05 53.
- H. Install spare conduits out of each recessed panelboard to accessible location above ceiling. Minimum spare conduits: 5 empty 1 inch. Identify each as SPARE.
- I. Ground and bond panelboard enclosure according to Section 26 05 26. Connect equipment ground bars of panels in accordance with NFPA 70.

3.2 FIELD QUALITY CONTROL

- A. Inspect and test in accordance with NETA ATS, except Section 4.
- B. Perform circuit breaker inspections and tests listed in NETA ATS, Section 7.6.

3.3 ADJUSTING

- A. Measure steady state load currents at each panelboard feeder; rearrange circuits in panelboard to balance phase loads to within 15 percent of each other. Maintain proper phasing for multi-wire branch circuits.

END OF SECTION 26 24 16

SECTION 26 28 13 – FUSES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes fuses.

1.2 REFERENCES

- A. National Electrical Manufacturers Association:
 - 1. NEMA FU 1 - Low Voltage Cartridge Fuses.

1.3 DESIGN REQUIREMENTS

- A. Select fuses to provide appropriate levels of short circuit and overcurrent protection for the following components: wire, cable, bus structures, and other equipment. Design system to maintain component damage within acceptable levels during faults.
- B. Select fuses to coordinate with time current characteristics of other overcurrent protective elements, including other fuses, circuit breakers, and protective relays. Design system to maintain operation of device closest to fault operates.

1.4 FUSE PERFORMANCE REQUIREMENTS

- A. Motor Branch Circuits: Class RK5.

1.5 SUBMITTALS

- A. Product Data: Submit data sheets showing electrical characteristics, including time-current curves.

1.6 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual sizes, ratings, and locations of fuses.

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

1.8 MAINTENANCE MATERIALS

- A. Furnish two fuse pullers.

1.9 EXTRA MATERIALS

- A. Furnish three spare fuses of each Class, size, and rating installed.

PART 2 - PRODUCTS

2.1 FUSES

- A. Manufacturers:
 - 1. Bussman.
 - 2. Gould Shawmut.
 - 3. Reliance.
 - 4. Substitutions: Under provisions of General Specifications.
- B. Dimensions and Performance: NEMA FU 1, Class as specified or as indicated on Drawings.
- C. Voltage: Rating suitable for circuit phase-to-phase voltage.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install fuse with label oriented so manufacturer, type, and size are easily read.

END OF SECTION 26 28 13

SECTION 26 28 19 – ENCLOSED SWITCHES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes fusible and non-fusible switches.
- B. Related Sections:
 - 1. Section 26 28 13 - Fuses.

1.2 REFERENCES

- A. National Electrical Manufacturers Association:
 - 1. NEMA FU 1 - Low Voltage Cartridge Fuses.
 - 2. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).
 - 3. NEMA ICS 10 - Industrial Control and Systems: AC Transfer Switch Equipment.
- B. International Electrical Testing Association:
 - 1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
- C. Underwriters Laboratories Inc.:
 - 1. UL 1008 - Transfer Switch Equipment.

1.3 SUBMITTALS

- A. Product Data: Submit catalog sheets showing voltage, switch size, ratings and size of switching and overcurrent protective devices, short circuit ratings, dimensions, and enclosure details.

1.4 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of enclosed switches and ratings of installed fuses.
- B. Operation and Maintenance Data: Submit routine preventative maintenance and lubrication schedule. List special tools, maintenance materials, and replacement parts.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

PART 2 - PRODUCTS

2.1 SWITCH ASSEMBLIES

- A. Manufacturers:
 - 1. Cutler Hammer.
 - 2. GE Electrical.
 - 3. Square 'D'.
 - 4. Substitutions: Under provisions of General Specifications.
- B. Fusible Switch Assemblies: NEMA KS 1, Type HD with externally operable handle interlocked to prevent opening front cover with switch in ON position, enclosed load interrupter knife switch. Handle lockable in OFF position. Fuse clips designed to accommodate NEMA FU 1, Class R fuses.
- C. Non-Fusible Switch Assemblies: NEMA KS 1, Type HD with externally operable handle interlocked to prevent opening front cover with switch in ON position enclosed load interrupter knife switch. Handle lockable in OFF position.
- D. Enclosures: NEMA KS 1, to meet conditions. Fabricate enclosure from steel finished with manufacturer's standard gray enamel.
 - 1. Interior Dry Locations: Type 1.
 - 2. Exterior Locations: Type 3R.
- E. Furnish switches with entirely copper current carrying parts.

2.2 SWITCH RATINGS

- A. Switch Rating: Horsepower rated for AC as indicated on Drawings.
- B. Short Circuit Current Rating: UL listed for 200,000 rms symmetrical amperes when used with or protected by Class R or Class J fuses (30-600 ampere switches employing appropriate fuse rejection schemes).

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install enclosed switches plumb. Provide supports in accordance with Section 26 05 29.
- B. Height: 5 feet to operating handle.
- C. Install fuses for fusible disconnect switches. Refer to Section 26 28 13 for product requirements.
- D. Install engraved plastic nameplates in accordance with Section 26 05 53.
- E. Apply adhesive tag on inside door of each fused switch indicating NEMA fuse class and size installed.

3.2 FIELD QUALITY CONTROL

- A. Inspect and test in accordance with NETA ATS, except Section 4.

- B. Perform inspections and tests listed in NETA ATS, Section 7.5.

END OF SECTION 26 28 19

SECTION 26 32 13 – ENGINE GENERATORS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes complete package engine generator system including engine, generator, enclosure, controller, exhaust silencer, automatic transfer switch, integral fuel tank, remote control panel, emergency shut off, batteries, and charger.
- B. Related Sections:
 - 1. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
 - 2. Section 26 05 53 - Identification for Electrical Systems.

1.2 REFERENCES

- A. National Electrical Manufacturers Association:
 - 1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
 - 2. NEMA AB 1 - Molded Case Circuit Breakers and Molded Case Switches.
 - 3. NEMA ICS 10 - Industrial Control and Systems: AC Transfer Switch Equipment.
 - 4. NEMA MG 1 - Motors and Generators.
- B. International Electrical Testing Association:
 - 1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
- C. National Fire Protection Association:
 - 1. NFPA 30 - Flammable and Combustible Liquids Code.
 - 2. NFPA 110 - Standard for Emergency and Standby Power Systems.
- D. Underwriters Laboratories Inc.:
 - 1. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures.

1.3 SYSTEM DESCRIPTION

- A. Description: Engine generator assembly and accessories to provide source of power for Level 1 application in accordance with NFPA 110.
- B. Capacity: As indicated on the Drawings. Elevation of 40 feet above sea level, standby rating using specified engine cooling scheme.

1.4 SUBMITTALS

- A. Shop Drawings: Indicate electrical characteristics and connection requirements. Include plan and elevation views with overall and interconnection point dimensions, fuel consumption rate curves at various loads, ventilation and combustion air requirements, electrical diagrams including schematic and interconnection diagrams.

- B. Product Data: Submit data showing dimensions, weights, ratings, interconnection points, and internal wiring diagrams for engine, generator, control panel, transfer switch, battery, battery charger, exhaust silencer, vibration isolators, and fuel tank.
- C. Test Reports: Indicate results of performance testing.
- D. Manufacturer's Field Reports: Indicate inspections, findings, and recommendations.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: Submit instructions and service manuals for normal operation, routine maintenance, oil sampling and analysis for engine wear, and emergency maintenance procedures.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience, and with service facilities within 250 miles of project.
- B. Supplier: Authorized distributor of specified manufacturer with minimum three years documented experience.

1.7 WARRANTY

- A. Furnish five year manufacturer warranty.

1.8 MAINTENANCE SERVICE

- A. Furnish service and maintenance of engine generator and transfer switches for one year from Date of Substantial Completion.

1.9 MAINTENANCE MATERIALS

- A. Furnish one set of tools required for preventative maintenance of engine generator system. Package tools in adequately sized metal tool box.
- B. Furnish two of each fuel, oil and air filter element.

PART 2 - PRODUCTS

2.1 SERVICE CONDITIONS

- A. Temperature: 120 degrees F.
- B. Altitude: 40 feet.

2.2 ENGINE

- A. Manufacturers:
 - 1. Caterpillar.
 - 2. Generac.
 - 3. Kohler.
 - 4. Cummins Onan.
 - 5. Substitutions under provisions of general specifications.
- B. Product Description: Water-cooled V-type, four-stroke cycle, compression ignition Diesel internal combustion engine.
- C. Rating: Sufficient to operate under 10 percent overload for one hour in ambient of 120 degrees F at elevation of 40 feet
- D. Fuel System: No. 2 fuel oil.
- E. Engine speed: 1800 rpm.
- F. Safety Devices: Engine shutdown on high water temperature, low oil pressure, overspeed, and engine overcrank. Limits as selected by manufacturer.
- G. Engine Starting: DC starting system with positive engagement, number and voltage of starter motors in accordance with manufacturer's instructions. Furnish remote starting control circuit, with MANUAL-OFF-REMOTE selector switch on engine-generator control panel.
- H. Engine Jacket Heater: Thermal circulation type water heater with integral thermostatic control, sized to maintain engine jacket water at 90 degrees F, and suitable for operation on 120 volts AC.
- I. Radiator: Radiator using glycol coolant, with blower type fan, sized to maintain safe engine temperature in ambient temperature of 110 degrees F Radiator air flow restriction 0.5 inches of water maximum.
- J. Engine Accessories: Fuel filter, lube oil filter, intake air filter, lube oil cooler, fuel transfer pump, fuel priming pump, gear-driven water pump. Furnish fuel pressure gage, water temperature gage, and lube oil pressure gage on engine/generator control panel.
- K. Mounting: Furnish unit with suitable spring-type vibration isolators and mount on structural steel base.
- L. Emissions: As required by Federal, State, and Local authorities. Engine shall meet applicable EPA non-road mobile regulations and/or the EPA NSPS rule for stationary reciprocating compression ignition engines. Additionally, the engine shall comply with the State Emission regulations at the time of installation. Actual engine emissions values shall be in compliance with applicable EPA emissions standards per ISO 8178–D2 Emissions Cycle at specified eKW/bHP rating. Emissions requirements and certifications of this equipment shall meet EPA standards.

2.3 GENERATOR

- A. Product Description: NEMA MG1, three phase, reconnectable brushless synchronous generator with brushless exciter. 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 10seconds.
- B. Rating: Standby duty rated 350 kW, 437.5 kVA, at 0.8 power factor, 480Y/277 volts, 60 Hz at 1800 rpm.

- C. Insulation Class: H.
- D. Temperature Rise: 130 degrees C Standby.
- E. Enclosure: NEMA MG1, open drip proof.
- F. Voltage Regulation: digital, paralleling capability. Furnish generator mounted volts per hertz exciter-regulator to match engine and generator characteristics, with voltage regulation plus or minus 1 percent from no load to full load. Furnish manual controls to adjust voltage droop, voltage level (plus or minus 5 percent) and voltage gain.

2.4 GOVERNOR

- A. Product Description: Isochronous governor to maintain engine speed within 0.5 percent, steady state, and 5 percent, no load to full load, with recovery to steady state within 2 seconds following sudden load changes.

2.5 SKID-MOUNTED FUEL TANK

- A. Product Description: Steel double wall UL-142 tank, with fill and vent, sufficient capacity for minimum 20 hours operation at 100% load, level control, and leak detection.
- B. Furnish flexible fuel line connections, fuel gage, check valve, high and low fuel level alarm contacts, and indicating light.
- C. Conform to NFPA 30.

2.6 AUTOMATIC TRANSFER SWITCH

- A. Manufacturers:
 1. Caterpillar CTGD.
 2. Generac.
 3. Kohler.
 4. Cummins Onan.
 5. Substitutions under provisions of general specifications.
- B. Product Description: NEMA ICS 10, UL 1008, automatic transfer switch.
- C. Configuration: Electrically operated, mechanically held, open transition with time delay automatic transfer switch.
- D. Interrupting Capacity: 100 percent of continuous rating.
- E. Withstand Current Rating: Minimum 42,000 rms symmetrical amperes, when used with molded case circuit breaker.
- F. Control Features and Functions:
 1. Indicating Lights: Mount in cover of enclosure to indicate NORMAL SOURCE AVAILABLE, ALTERNATE SOURCE AVAILABLE, switch position.
 2. Test Switch: Mount in cover of enclosure to simulate failure of normal source.
 3. Return to Normal Switch: Mount in cover of enclosure to initiate manual transfer from alternate source to normal source.
 4. Transfer Switch Auxiliary Contacts: 1 normally open; 1 normally closed.

5. Normal Source Monitor: Monitor normal source voltage and frequency; initiate transfer when voltage drops below 85 percent or frequency varies more than 3 percent from rated nominal value.
 6. Alternate Source Monitor: Monitor alternate source voltage and frequency; inhibit transfer when voltage is below 85 percent or frequency varies more than 3 percent from rated nominal value.
 7. In-Phase Monitor: Inhibit transfer until source and load are in phase.
- G. Automatic Sequence of Operation:
1. Initiate Time Delay to Start Alternate Source Engine Generator: Upon initiation by normal source monitor.
 2. Time Delay To Start Alternate Source Engine Generator: 0 to 10 seconds, adjustable.
 3. Initiate Transfer Load to Alternate Source: Upon initiation by normal source monitor and permission by alternate source monitor.
 4. Time Delay Before Transfer to Alternate Power Source: 0 to 6 seconds, adjustable.
 5. Initiate Retransfer Load to Normal Source: Upon permission by normal source monitor.
 6. Time Delay on Retransfer to Normal Power: 0 to 60 minutes, adjustable; bypass time delay in event of alternate source failure.
- H. Time Delay Before Engine Shut Down: 0 to 30 minutes, adjustable, of unloaded operation.
- I. Engine Exerciser: Start engine every 7 to 30 days; run for 30 minutes before shutting down. Bypass exerciser control when normal source fails during exercising period.
- J. Alternate System Exerciser: Transfer load to alternate source during engine exercising period.
- K. Enclosure:
1. Enclosure: ICS 10, Type 3R.
 2. Finish: Manufacturer's standard gray or beige enamel.

2.7 ACCESSORIES

- A. Exhaust Silencer: Critical type silencer, with muffler, companion flanges and flexible stainless steel exhaust fitting, sized in accordance with engine manufacturer's instructions.
- B. Weather-protective Sound Attenuated Enclosure: Reinforced steel housing allowing access to control panel and service points, with lockable doors and panels. Furnish fixed louvers, integral fuel tank, battery rack, and silencer. The enclosure shall be completely lined with sound deadening material of a self extinguishing design with a reflective surface.
- C. Batteries: Heavy duty, diesel starting type lead-acid storage batteries, 170 ampere-hours minimum capacity. Match battery voltage to starting system. Furnish cables and clamps.
- D. Battery Tray: Treated for electrolyte resistance, constructed to contain spillage.
- E. Battery Charger: Current limiting type designed to float at 2.17 volts for each cell and equalize at 2.33 volts for each cell. Furnish overload protection, full wave rectifier, DC voltmeter and ammeter, and 120 volts AC fused input. Furnish wall mounted enclosure to meet NEMA 250, Type 1 requirements.
- F. Line Circuit Breaker: NEMA AB 1, molded case circuit breaker on generator output with integral thermal and instantaneous magnetic trip in each pole. Furnish battery voltage operated shunt trip, connected to open circuit breaker on engine failure. Unit mount in enclosure to meet NEMA 250, Type 1 requirements.

- G. Engine-Generator Control Panel: NEMA 250, Type 1 generator-mounted control panel enclosure with solid state, microprocessor based engine and generator controls and indicators by the engine manufacturer. Furnish provision for padlock and the following equipment and features:
 - 1. Frequency Meter: 45-65 Hz. range, 3.5 inch dial.
 - 2. AC Output Voltmeter: 3.5 inch dial, 2 percent accuracy, with phase selector switch.
 - 3. AC Output Ammeter: 3.5 inch dial, 2 percent accuracy, with phase selector switch.
 - 4. Output voltage adjustment.
 - 5. Push-to-test indicator lamps, one each for low oil pressure, high water temperature, overspeed, and overcrank.
 - 6. Engine start/stop selector switch.
 - 7. Engine running time meter.
 - 8. Oil pressure gage.
 - 9. Water temperature gage.
 - 10. Auxiliary Relay: 3PDT, operates when engine runs, with contact terminals prewired to terminal strip.
 - 11. Additional visual indicators and alarms in accordance with by NFPA 110.
 - 12. Remote Alarm Contacts: Factorywire SPDT contacts to terminal strip for remote alarm functions in accordance with NFPA 110.

- H. Remote Annunciator Panel: Surface mounted panel with painted finish. Furnish audible and visible indicators and alarms in accordance with NFPA 110.
 - 1. High battery voltage (alarm).
 - 2. Low battery voltage (alarm).
 - 3. Low fuel (alarm).
 - 4. System ready.
 - 5. Anticipatory-high water temperature.
 - 6. Anticipatory-low oil pressure.
 - 7. Low coolant temperature.
 - 8. Switch in off position (alarm).
 - 9. Overcrank (alarm).
 - 10. Emergency stop (alarm).
 - 11. High water temperature (alarm).
 - 12. Overspeed (alarm).
 - 13. Low oil pressure (alarm).
 - 14. Line power available.
 - 15. Generator power available.
 - 16. Lamp test and horn silence switch.

2.8 SOURCE QUALITY CONTROL

- A. Provide shop inspection and testing of completed assembly.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install engraved plastic nameplates in accordance with Section 26 05 53.
- B. Ground and bond generator and other electrical system components in accordance with Section 26 05 26.

3.2 FIELD QUALITY CONTROL

- A. Inspect and test in accordance with NFPA 110 Chapter 7 and NETA ATS, except Section 4.

- B. Perform inspections and tests listed in NETA ATS, Section 7.22.

3.3 MANUFACTURER'S FIELD SERVICES

- A. Prepare and start up parallel engine-generators assembly including automatic transfer switch and all switchgear and controllers.

3.4 ADJUSTING

- A. Adjust generator output voltage and engine speed to meet specified ratings.

3.5 CLEANING

- A. Clean engine and generator surfaces. Replace oil and fuel filters with new.

3.6 DEMONSTRATION AND TRAINING

- A. Furnish minimum 4 hours of instruction each for two persons, to be conducted at project site with manufacturer's representative.
- B. Describe loads connected to emergency system and restrictions for future load additions.
- C. Simulate power outage by interrupting normal source, and demonstrate system operates to provide emergency power.

END OF SECTION 26 32 13

SECTION 33 71 73 – ELECTRICAL UTILITY SERVICES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes arrangement with Utility Companies for permanent electric service; payment of Utility Company charges for service; service provisions; and utility metering equipment.
- B. Related Sections:
 - 1. Section - Cast-In-Place Concrete: Concrete pads.

1.2 REFERENCES

- A. Imperial Irrigation District Energy Department: Developer Energy Planning Guide.

1.3 SYSTEM DESCRIPTION

- A. Utility Company:
 - 1. Electric: Imperial Irrigation District (I.I.D.).
- B. Electrical System Characteristics: Voltage and capacity as indicated in the electrical drawings. 60 Hertz.
- C. Service Entrance: Underground.
- D. Underground Service Provisions:
 - 1. Utility Raceway Connection: At Utility Company's terminal pole, switch cabinet, pad-mounted transformer, equipment pedestal or other location as indicated in the project drawings and the utility company final engineered drawings..
 - 2. Utility Service-Entrance Conductor Connection: At Utility Company's pad-mounted transformer.

1.4 SUBMITTALS

- A. Submit Utility-Company-prepared drawings.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with Utility Company written requirements.
- B. Maintain one copy of each document onsite.

1.6 FIELD MEASUREMENTS

- A. Verify field measurements are as indicated on Drawings and Utility Company drawings.

1.7 COORDINATION

- A. Arrange with Utility Company to obtain permanent electric service to the Project.
- B. Coordinate with all utility companies, relocation of overhead or underground lines interfering with construction. Where power, telephone, or cable lines are to be relocated, bill utility company costs, directly to Owner.
- C. Contact utility company and obtain utility company engineered drawings regarding construction related to new site work and service installation. Include all contractor required construction and costs in this contract and in the bid. Contractor required construction shall include trenching & backfill, conduit, transformer pads, and other construction as required by the utility company.
- D. Utility company charges for service installation will be paid by Owner and are not part of this contract. The contractor shall coordinate between the utilities and the Owner for payment to the utility company.

PART 2 - PRODUCTS

2.1 UTILITY METERS

- A. Furnished by Utility Company.
- B. Contractor's furnished service entrance section and metering compartment shall be as approved by the Utility Company.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify service equipment is ready to be connected and energized.

3.2 INSTALLATION

- A. Install service entrance conduits to building service entrance equipment.

- 3.3 Install transformer pad for Utility Company transformer, in accordance with Utility Company specifications.

END OF SECTION 33 71 73



**GATEWAY COUNTY SERVICE AREA
WATER TREATMENT PLANT
IMPROVEMENTS**

**COUNTY OF IMPERIAL
PROJECT NUMBER 6914GTWTP**

**PROJECT MANUAL
VOLUME 3 OF 3
SPECIAL CONDITIONS**

JULY 12, 2024

**THG PROJECT NO.
542.116E**

TABLE OF CONTENTS

SPECIAL CONDITIONS

SECTION	DESCRIPTION	
1	SEQUENCE OF CONSTRUCTION FOR MAINTAINING THE WATER TREATMENT PLANT OPERATIONAL DURING THE CONSTRUCTION PERIOD AND A LISTING OF MAJOR ITEMS	00840-1
2	IMPERIAL IRRIGATION DISTRICT – CONSTRUCTION SERVICES PROPOSAL (CSP)	00840-2
3	EMERGENCY POWER GENERATOR SET PERMITS	00840-3
4	BUILDING AND GRADING PERMITS AND ENVIRONMENTAL HEALTH, LPA APPROVAL	00840-4
5	LIMITED GEOTECHNICAL REPORT	00840-5

SPECIAL CONDITIONS – SECTION 00840-1

SEQUENCE OF CONSTRUCTION FOR MAINTAINING THE WATER TREATMENT PLANT OPERATIONAL DURING THE CONSTRUCTION PERIOD AND A LISTING OF MAJOR PROJECT ITEMS

The Gateway of the Americas Water Treatment Plant (WTP) is to remain operational throughout the construction period; except during converting the electrical power service from the existing electrical panels to the new electrical panels and other electrical conversions. ***Potable water is to be conveyed to the water distribution pipeline system during the entire project duration.*** The Gateway to the Americas WTP Improvement Project primary work components include the removal and replacement of the Booster Pump Station and associated upstream and downstream piping, the removal and replacement of the WTP electrical panels and the installation of a new emergency power generator set to provide emergency power during electrical outages. In addition, The Imperial Irrigation District is to construct a new underground primary electrical circuit, new transformer and new IID underground service from the new transformer to the new service entrance section (SES).

A potable water supply is to be maintained to the Gateway Service Area water distribution pipeline network, without interruption, during the entire duration of the improvement project. To limit the time that the temporary booster pumping system is operated and maintained the physical project construction shall not be allowed to commence until all equipment, material, and other items necessary for the project construction have been delivered to the contractor's staging area and inventoried by the Resident Engineer. It is anticipated that the generator set, automatic transfer switch, service entrance section, motor control center, vertical multistage booster pump station, piping, valves, fittings and other items will not be delivered to the site for up to nine months after the submittal documents for these items are approved. There will therefore be a substantial waiting period between when all the submittals for the equipment, materials and other items are approved, and physical project construction occurs. It is anticipated that the physical project construction, including equipment start up, will be completed in 110 calendar days after all the equipment, material and other items arrive at the contractor's staging area. The total project length will therefore be 274 calendar days (9 months) + 110 calendar days = *384 Calendar Days*. The Sequence of Construction for this project is listed as follows:

1. Forward all submittal documentation for all equipment, material, and other items according to Technical Condition Section 01300. Since submittal preparation and processing is a project schedule critical path item, Technical Condition Section 01300 establishes stringent time limits for the preparation, submission and processing of submittal documents.
2. The Resident Engineer, chief water treatment plant operator and Imperial County Public Works representative shall inventory all equipment, material and other items delivered to the contractor's staging area and verify all required items are at the contractor's staging area prior to allowing physical construction to commence.
3. Install a short duration temporary pumping system capable of conveying 110 gallons per minute at 127 feet of total dynamic head (55 psi) to the Gateway Service Area water

pipeline distribution system. The short duration temporary pumping system is illustrated on plan sheet 13. The short duration temporary pumping system shall deliver only a potable water supply to the Gateway Service Area pipeline distribution system, not fire demand water, during a 48-hour period. There shall be no fire protection flow delivered to the Gateway Service Area pipeline distribution system during the 48-hour period. The Imperial County Fire Department shall employ emergency measures requiring extra personnel, additional fire trucks and equipment, fire tender water supply trucks, and ensure alternate fire water sources are available during the 48-hour period.

A long duration temporary pumping system shall be installed during the 48-hour period while the short duration temporary pumping system is operational. The long duration temporary pumping system shall provide both a potable water supply and fire flow to the Gateway Service Area pipeline distribution system during the installation of the remaining water treatment plant improvements. The long duration temporary pumping system shall be activated at the time the short duration temporary pumping system is de-activated to ensure a continuous water supply is maintained to the Gateway Service Area pipeline distribution system.

The short duration temporary pumping system shall convey water from the existing 1,000,000-gallon ground storage reservoir outlet pipeline to the existing fire hydrant located southeast of the Operations Building. See plan sheet 13 illustrating the short duration temporary pumping system. The contractor shall extend electrical circuitry from existing panel "A" inside the existing Operations Building to the location of the short duration temporary pump location. The contractor shall construct a concrete pedestal, electrical disconnect switch and all other required electrical items for the short duration temporary pumping system. See the electrical plans for the short duration temporary pumping system requirements. The contractor shall maintain personnel stationed at the project site to observe and maintain the short duration temporary pumping system operational for the 48 hour period.

The components of the short duration temporary pumping system shall be NSF/ANSI 61 compliant. The short duration temporary pumping system components shall be forwarded for review as submittal documents and shall be required to be at the contractor's staging area prior to the start of physical construction work. The pipeline and piping components upstream and downstream of the pumping unit, including the pressure relief bypass piping shall be disinfected in accordance with AWWA C651-23 procedures prior to placing the short duration temporary pumping system in service.

The completion of the long duration temporary pumping system installation shall occur during the 48-hour period that the short duration temporary pumping system is operational. A number of long duration temporary pumping system installation items can be completed prior to the 48-hour period while the short duration temporary pumping system is operational. *Following is a list of the major physical construction items to be completed to construct the long duration temporary pumping system.*

LONG DURATION TEMPORARY BYPASS MAJOR ITEMS

1. Construct the pcc concrete slab and underlying class 2 base support material to support the long duration temporary pumping system per Section M-M on plan sheet 14. The pcc slab shall be constructed 10 days prior to the commencement of the short duration temporary pumping system bypass.

2. Install two (2) temporary electrical generator sets at the project site near the long duration booster pump station pcc slab noted in item 1 above and illustrated on plan sheet 13. One (1) generator set will power either the existing 10 HP, 20 HP or one of the 50 HP 480 Volt, 3 phase pumps which supply the domestic water supply to the Gateway Service Area. The 10 HP pump supplies a potable water supply to the Gateway Service Area during domestic water usage low demand periods. The 20 HP pump supplies water to the Gateway Service Area during domestic water usage high demand periods. The 50 HP pump supplies water to the distribution system when there is a high domestic water demand coupled with a construction water demand. The long duration booster pump station will operate on either the 10 HP, 20 HP or 50 HP pump most of the time; except when there is a fire flow demand or when a 50 HP pump is manually operated for water treatment plant filter backwashing. Filter backwashing is required approximately every 6 hours.

A second generator will be required to provide an electrical power supply to energize the existing 10 HP, 20 HP and two (2) 50 HP pumps during fire flow demands (130 HP total) or to 2 - 50 HP (100 HP total) pumps during a high domestic demand and construction water demand occurring during filter backwashing. A total of either 100 HP or 130 HP of pumping capacity operating on 480 Volt, 3 phase power would be required to be provided an electrical power supply by the second generator.

Trailer mounted or fixed mounted electrical generator sets can be provided as determined by the Contractor. The contractor shall provide all temporary foundations for fixed mounted electrical generator sets. The contractor shall install all electrical circuitry between the generator sets and the long duration booster pump station. A control method to automatically energize and de-energize the small generator supplying power for the domestic water supply and large generator supplying power for fire flow demand shall be provided. The Contractor shall supply an electrical diagram submittal document illustrating the power and control circuitry to be provided between the generator sets and the relocated existing booster pump station control panel for review by the electrical design engineer.

The contractor shall include all costs (including providing fuel to the generator sets) to operate and maintain the generator sets on a 24 hour a day basis (including weekends and holidays) during the long duration temporary bypass period until such time as the Gateway Service Area water supply is provided by the new vertical multistage booster pump station. The Contractor shall apply for and obtain any required permits for the operation of the generator sets. A permit from the Imperial County Air Pollution Control District (ICAPCD) shall be obtained. The Contractor shall pay the expenses associated with applying for and obtaining the permit.

3. Remove existing distribution pump station skid and as “called out” by Existing/Demolition Keynote 21 on plan sheet 8 from the existing Operations Building and install the existing distribution pump skid on the concrete slab constructed per item 1 above and Section M-M on plan sheet 14. Secure the existing pump skid to the new pcc slab with the appropriately sized expansion bolts. The removal and installation of the existing distribution pump skid shall be completed during the 48-hour period after the short duration temporary bypass commences. See Detail J on plan sheet 14. Detail J illustrates pictures of the existing distribution pump station skid, piping and electrical control panel.

4. Install the existing booster pump station Nema 1 electrical control panel located in the Operations Building on the newly constructed slab during the 48 hour period after the short duration temporary bypass commences. Install the existing booster pump station electrical control panel in a Nema 3R Hoffman dead front enclosure. Secure the booster pump station control panel and Nema 3R Hoffman dead front enclosure to the pcc support slab with appropriately sized expansion bolts. See Detail J on plan sheet 14 illustrating pictures of the existing booster pump station electrical control panel.

5. Per long term duration temporary bypass keynote 4 on plan sheet 13, “Install all electrical circuitry between the existing booster pump station control panel and existing booster pump station during the 48-hour period after the short duration temporary bypass commences. Install any required hydraulic pipelines and pipe connections required for the existing electrical panel to operate the existing booster pump station within a pressure range from 74 psi to 82 psi during the 48-hour period after the short duration temporary bypass commences.”

6. Complete the demolition of existing piping, fittings and valves and installation of new piping, fittings and valves inside the Operations Building as illustrated on plan sheets 8, 9, 10 and 11 during the 48 hour period after the short duration temporary bypass commences.

Seventy-two (72) hours prior to the commencement of pipeline demolition work the contractor shall be prepare to transmit leaking water from existing isolation valves at the piping demolition/installation work area to a temporary percolation pond. The contractor shall construct the temporary percolation pond, as illustrated on plan sheet 13, prior to the commencement of the short duration temporary bypass. The contractor shall provide all required pumps, fuel, temporary power, suction hoses, discharge hoses and all other required items to convey leaking water from the pipe demolition/installation work area inside the Operations Building to the temporary percolation pond.

7. Complete the installation of new piping and fittings from the relocated existing booster pump station skid to the new piping, fittings, and valves located in the Operations Building per item 6 above during the 48 hour period after the short duration temporary bypass commences.

8. After the relocation of the existing booster pump station and booster pump station electrical control panel and the completion of all other required work as noted in items 1 through 7 above, the long duration temporary pumping system shall be activated. The long

duration temporary pumping system shall be powered by temporary generator sets as previously described in item 2. The short duration temporary pumping system shall be taken out of service after the long duration temporary pumping system is activated.

MAJOR ITEMS AFTER LONG TERM DURATION TEMPORARY BYPASS SYSTEM IS INSTALLED AND OPERATIONAL

Following are the remaining major project items to complete after the long duration temporary bypass items are completed. Minor project items have not been listed.

1. Install a new vertical multistage booster pump station and any remaining downstream piping, fittings, valves, pressure gauges, flowmeter, existing pressure relief valve and any other miscellaneous piping items.
2. Install new vertical multistage booster pump station control panel with an air conditioning system in a separate enclosure attached to the new vertical multistage booster pump station control panel enclosure.
3. Install new 350 KW generator set, pcc support foundation, conduit and conductors, shroud and all items associated with the generator set.
4. Complete electrical work as required by Electrical plan sheets 15, 16 and 17, the Electrical Technical Specifications and Civil plan sheets 3, 4, 5, 9, 11, 13 and 14 and the Vertical Multistage Booster Pump Station Technical Section 15380 and Technical Specification Sections 01300, 01505, 01520, 01660 and 15400.

The electrical work required to be completed per the “*Scheduling, Outages and Phasing Work*” listed on Electrical Drawing 3 is particularly noteworthy. Items 2, 3 and 4 of the “*Scheduling, Outages and Phasing Work*” note the following:

Item 2 states, “minimize (electrical related) disruption to operations. (Electrical) outages shall be limited to 6 hours maximum duration during scheduled times specifically approved by the owner.”

Item 3 states, “Provide, maintain & operate an alternate power source or temporary generator at contractor expense for any outages that require an extended outage. The new project generator set shall not be used for this purpose.” For clarification purposes, an extended electrical outage shall be defined as an electrical outage which is greater than six (6) hours in length.

Item 4 requires the Contractor to submit a schedule and phasing plan (for electrical related work) prior to starting the work. This schedule and phasing plan shall ensure that electrical outages do not occur for over six (6) hours in length.

5. Complete the demolition and replacement of the parking lot area including but not limited to the electrical panel housekeeping pad, pcc sidewalks, bollards, signs and pavement striping.
6. Install shade structure over new electrical panels located along the east exterior wall of the Operations Building.
7. Complete coating of above grade piping, fitting and valves as required by plan sheet 9 and Technical Specification Section 15380.
8. Remove and replace fiberglass grates over the existing pipe chase inside the Operations Building.
9. Repair west operation room wall after the removal and installation of piping as required by Existing/Demolition Keynote 53 on Civil Drawing 8.
10. Remove existing pcc curbs in the operations building per Construction Keynote 19 on Civil Drawing 9. Install concrete floor in area of the removed pcc curb.
11. Remove and dispose of existing elevated steel fuel tank per existing/demolition keynote 44 on Civil Drawing 8.
12. Remove and dispose of inoperable diesel-powered fire pump per existing/demolition keynote 40 on Civil Drawing 8.
13. Install existing chlorine flow analyzer discharge piping as illustrated on Civil Drawing 9 and section M-M on Civil Drawing 12.
14. Repair walls after removal or replacement of piping per existing/demolition keynote 45 on Civil Drawing C8 and construction keynote 2 on Civil Drawing C9.
15. Complete final clean-up and grading of the project site as required by the Final Cleanup and Grading note on Civil Drawing 3 and Technical Conditions section 02 200 – 3.10.
16. Complete startup of the Generator Set. Coordinate the startup of the Generator Set with the Imperial County Air Pollution Control District.
17. Complete startup of the new Vertical Multistage Booster Pump Station and Control Panel and Air Conditioning System.
18. Complete startup of the flowmeter and flowmeter transmitter.
19. Reprogram data logger and cloud based alarm and monitoring system in accordance with keynote 5 on Electrical Drawing 2.

END OF SECTION 00840-1

SPECIAL CONDITIONS – SECTION 00840 – 2

IMPERIAL IRRIGATION DISTRICT – CONSTRUCTION SERVICES PROPOSAL (CSP)

The Imperial Irrigation District (IID) Energy Department is the purveyor of the electrical power supply for this project. During the project design, the investigation of the Gateway to the Americas Water Treatment Plant IID power service was reviewed. It was determined that the increased electrical load demand resulting from this improvement project would require an upgrade of the existing IID electrical power service.

A Customer Service Proposal (CSP) was applied for by the County of Imperial and processed through the Imperial Irrigation District Energy Division during the initial design phase. The CSP includes the design of the primary and secondary power supply system to the new SES panel by the IID Engineering Department. The CSP also includes IID constructing the primary and secondary electrical improvements in accordance with the CSP design documents. The IID primary and secondary construction includes overhead primary power improvements, underground construction and the removal and replacement of the existing pad mounted transformer.

The IID CSP design documents – IID File 60127410 dated January 5, 2022 are included in this section of the Special Conditions. The contractor shall complete the portions of the electrical installation not completed by IID forces as noted within the CSP design documents. The contractor shall be required to pay the IID CSP construction installation cost and include the cost within the bid proposal submitted for this project. The IID estimated during the initial project design period that the CSP construction installation cost would be \$40,685.00. This cost will likely be increased by the IID prior to the bid opening. IID will be requested to provide an updated CSP construction installation cost during the project bidding period. A revised CSP construction installation cost will be included as an Addendum item forwarded to all plan holders prior to the bid opening.

The contractor is instructed to include the CSP installation cost of \$40,685.00 in the bid proposal for this project. The contractor shall be responsible to pay the IID for the CSP installation cost. If the actual CSP installation cost is greater than \$40,685.00 then a positive change order shall be processed to compensate the contractor for the increased difference between the actual CSP installation cost and the \$40,685.00 included in the contractor's bid proposal. If the actual CSP installation cost is less than \$40,685.00 then a negative change order shall be processed to compensate the County of Imperial for the difference between the \$40,685 and the actual CSP installation cost.

The CSP cost also includes the IID forces connecting the power conductors to the metering section of the new SES enclosure after the County of Imperial Building Department inspects and approves the new electrical improvements and tags the metering section of the SES.

The approved IID CSP – File 60127410 dated January 5, 2022, follows this Special Conditions Section.

IID CSP
00840-2 1

END OF SECTION 00840-2



IID

A century of service.

ENGINEERING

JAN - 5 2022

COMPLETE

CONTRACTOR NOTES

THIS WORK REQUIRES IID UNDERGROUND INSPECTION. FOR THE UNDERGROUND INSPECTION PROCESS, SEE DETAIL PAGES 7 THRU 11 FROM THE DEVELOPER ENERGY PLANNING GUIDE. ALL EQUIPMENT OR MATERIAL INSTALLED, COVERED, OR ENCLOSED BY THE CONTRACTOR PRIOR TO IID INSPECTION SHALL BE REMOVED OR UNCOVERED FOR INSPECTION, AND REINSTALLED, AT NO EXPENSE TO IID. IID WILL NOT ACCEPT OR ENERGIZE FACILITIES THAT FAIL TO MEET THE REQUIREMENTS OUTLINED IN THE PROCESS.

DETAIL PAGES

DETAIL PAGES REFER TO THE DEVELOPER ENERGY PLANNING GUIDE (D.E.P.G.) REV. 5.0 2020, IT CAN BE OBTAINED ON THE IID WEBSITE WWW.IID.COM/ENERGY/NEW-CONSTRUCTION



CAUTION: ENERGIZED STRUCTURES & CABLE

DO NOT PERFORM ANY TYPE OF WORK ON OR AROUND ENERGIZED STRUCTURES. A QUALIFIED IID ELECTRICAL WORKER MUST BE PRESENT AT JOB SITE BEFORE ANY CONDUIT OR ANY TYPE OF WORK IS PERFORMED. PLEASE CONTACT IID INSPECTION DESK AT LA QUINTA @:(760) 398-5828 ; IMPERIAL @:(760) 482-3300. INSPECTION SCHEDULES ARE SUBJECT TO A MINIMUM 48 HOUR ADVANCE NOTICE AND ARE BY APPOINTMENT ONLY.

- CUSTOMER
- DISTRIBUTION SUPERVISOR
- DISTRIBUTION
- PROJECT MANAGER
- INSPECTOR
- _____
- _____
- _____

PROJECT SITE



CALEXICO LOCATION MAP

NOT TO SCALE



IID ENERGIZED EQUIPMENT WILL BE REMOVED PRIOR TO CONTRACTOR MAKING MODIFICATIONS TO SITE

CUSTOMER CONTACT: JACK HOLT
PHONE NUMBER: 760-337-3883

PROJECT MANAGER: JOEL LOPEZ
DISTRIBUTION ESTIMATOR: LUIS FLORES

SERVICE NOTIFICATION: 4030001
SERVICE ORDER: 60127410

SHEET 1 OF 3

IMPERIAL IRRIGATION DISTRICT
IMPERIAL, CA
IMPERIAL VALLEY ENERGY PROJECT

U.G. DISTRIBUTION
IMPERIAL COUNTY GATEWAY
CALEXICO

APPROVED: *AO* DATE: *1/5/22*
CHECKED BY: *D.R. 01-04-22*
DESIGN'D: L. FLORES DATE: 01/04/2022

FILE NAME: 60127410

UNDERGROUND SERVICE ALERT

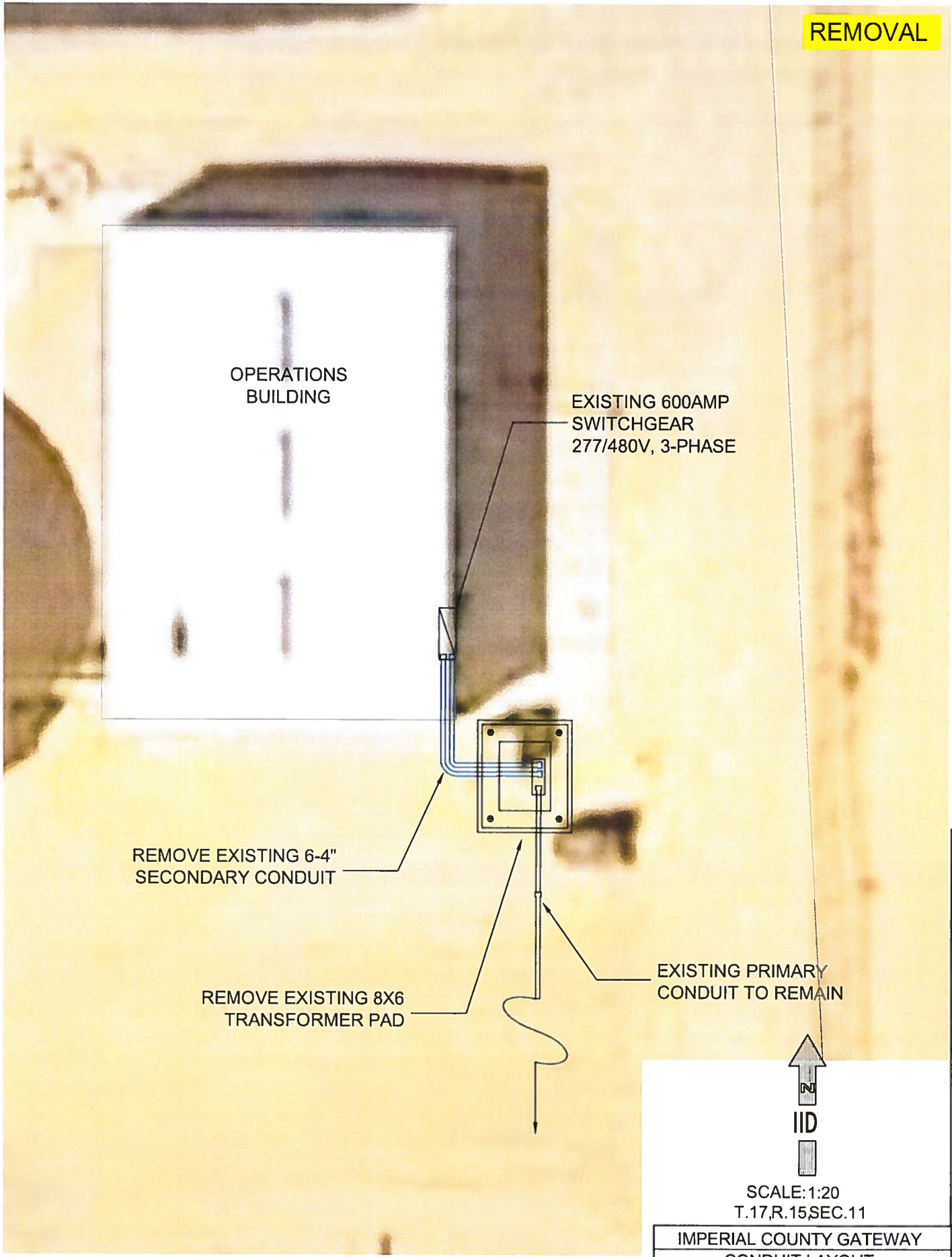
1-800-422-4133
CALL USA/SC

FOR UNDERGROUND LOCATING
2 WORKING DAYS BEFORE YOU DIG



REV.#	PG#	DATE	BY	DESCRIPTION

REMOVAL



OPERATIONS BUILDING

EXISTING 600AMP SWITCHGEAR 277/480V, 3-PHASE

REMOVE EXISTING 6-4" SECONDARY CONDUIT

REMOVE EXISTING 8X6 TRANSFORMER PAD

EXISTING PRIMARY CONDUIT TO REMAIN



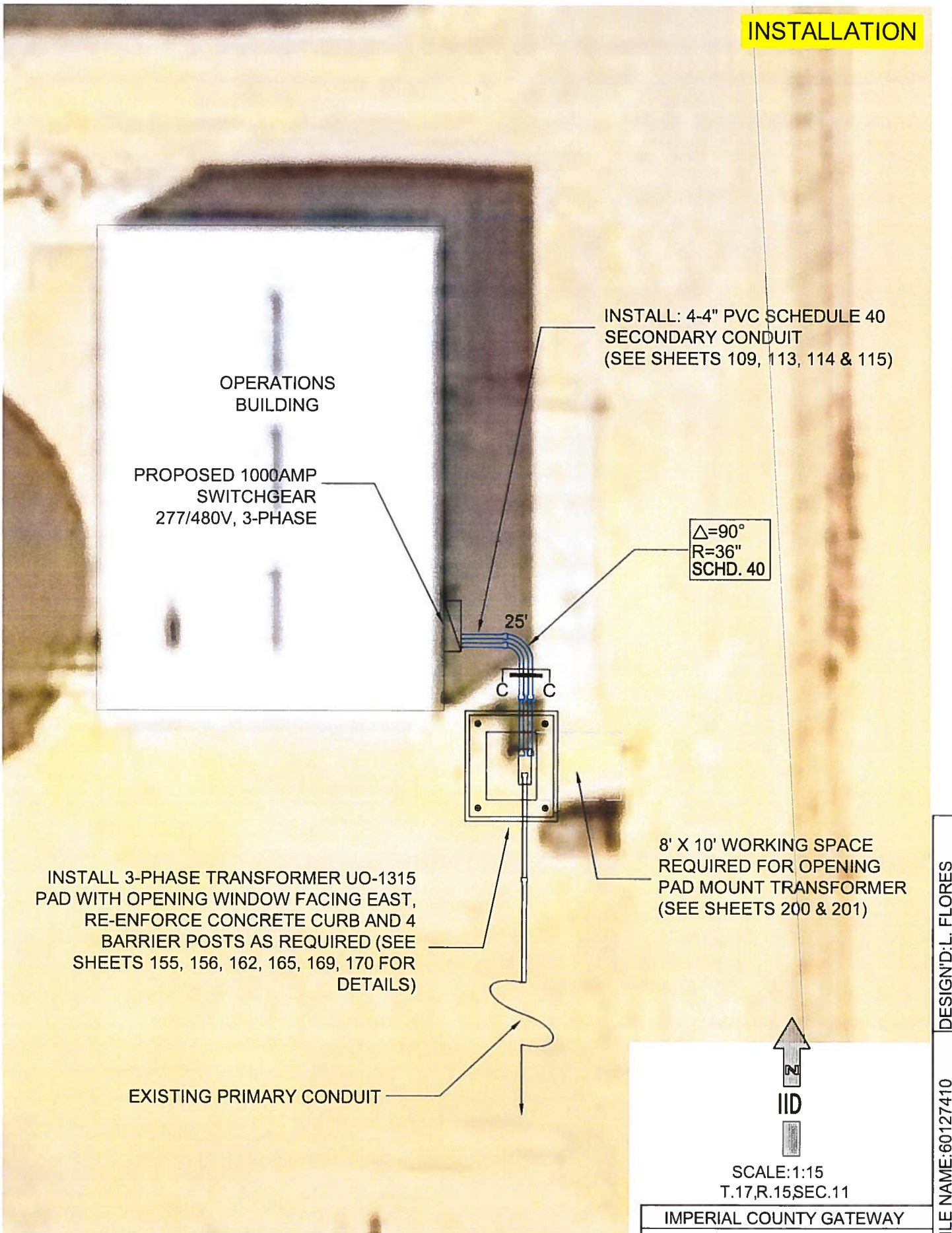
SCALE: 1:20
T.17,R.15,SEC.11

IMPERIAL COUNTY GATEWAY
CONDUIT LAYOUT

DESIGN'D: L. FLORES

FILE NAME: 60127410

INSTALLATION



DESIGN'D: L. FLORES

FILE NAME: 60127410

SCALE: 1:15
T.17,R.15,SEC.11

IMPERIAL COUNTY GATEWAY
CONDUIT LAYOUT



IMPERIAL IRRIGATION DISTRICT

Customer Project Development • 333 S. Waterman Ave • El Centro, CA 92243

NOTE: CONTACT IID AT (760) 482-3300 TO SCHEDULE A PRE-CONSTRUCTION MEETING **BEFORE** PROJECT TRENCHING GETS UNDERWAY AND TO REVIEW U.G. INSPECTION SCHEDULE.

UNDERGROUND INSPECTION PROCESS

1. Pre -construction meeting with Electrical Contractor.
 - A. IID Inspector and Contractor to meet ***BEFORE*** any construction or excavating. IID Inspector will explain and/or highlight general installation notes according to the job. IID Inspector will also answer any questions the contractor has to avoid any delays in the future.
2. Trench depth and inspection of primary or secondary conduit installation.
 - A. Verify minimum primary and secondary trench depth is met.
 - B. Verify correct conduit(s) is being used, schedule 40 for below ground and schedule 80 for above ground use.
 - C. Verify approved diameter of conduit is being installed; see Contractor's Notes (drawing).
 - D. Verify spacing between conduits (3") is met and spacers are installed at every six feet.
3. Concrete encasement of conduit(s) where required or 12 inches of "native soil or sand."
 - A. Concrete encasement is required for street crossings, parking lots, driveways, and sidewalks. Encasement to be three sack mix at 2,000 p.s.i sand slurry. When these applications are not the case, then two sack slurry mix to be used.
 - B. Verify there is a three-inch envelope of encasement all around conduit (spacers must be installed prior to encasing)
4. Caution tape over encasement or 12 inch of backfill.
5. Cadweld connection of ground wire to ground rod located at the bottom of the trench for all transformer precast pads, single phase sector precast pads, and three phase sector sleeves.
 - A. Verify ground rods are 5/8" x 10'
 - B. Verify copper strand is 2/0 wire.
6. Backfill of trench and compaction.
 - A. Backfill of trench shall or excavated areas must be a minimum of 90% compaction.



IMPERIAL IRRIGATION DISTRICT

Customer Project Development • 333 S. Waterman Ave • El Centro, CA 92243

Continued:

7. Stub out markers are installed where applicable.
8. Backfill of all transformer precast pads, single phase sector precast pads, and sector sleeve locations.
9. Verification of compaction test results for all transformer precast pads and all single phase sector precast pads.
 - A. Location of all transformer precast pad and single phase sector precast pads to be a compaction of 90% minimum by contractor/developer.
 - B. Compaction will be performed at a minimum of 2' beyond proposed transformer and single phase sector precast pads on all four sides.
 - C. Contractor to contact IID Inspector after compaction has been completed. IID Inspector must pass visual compaction prior to compaction test.
 - D. After IID Inspector passes compaction by contractor, the contractor will obtain a compaction test.
 - a) **NOTE**: A maximum of ½" of sand fill will be approved for leveling of compaction area. If the sand fill exceeds the maximum requirement, the IID Inspector will fail the compaction.
 - E. All transformer and single phase sector precast pads will not be installed until compaction test report has been received and reviewed by IID Inspector.
 - F. After compaction test report is reviewed by IID Inspector, the inspector must be present when contractor installs all transformer precast pads.
 - a) **NOTE**: After compaction test has been reviewed by IID Inspector, transformer precast pad must be installed within 24 hours. If transformer precast pad is not installed within allotted time, IID will require a re-test of compaction from contractor/developer.
10. Installation of any concrete vault, transformer precast pad, sector sleeve or secondary pullbox.
 - A. Verify there are no visible cracks on all transformer precast pads, single phase sector precast pads, concrete vaults, and sector sleeves.
 - B. Verify vaults, all transformer precast pads, sector sleeves, and secondary pullboxes are installed above their appropriate final grade (See Developers Energy Planning Guide).

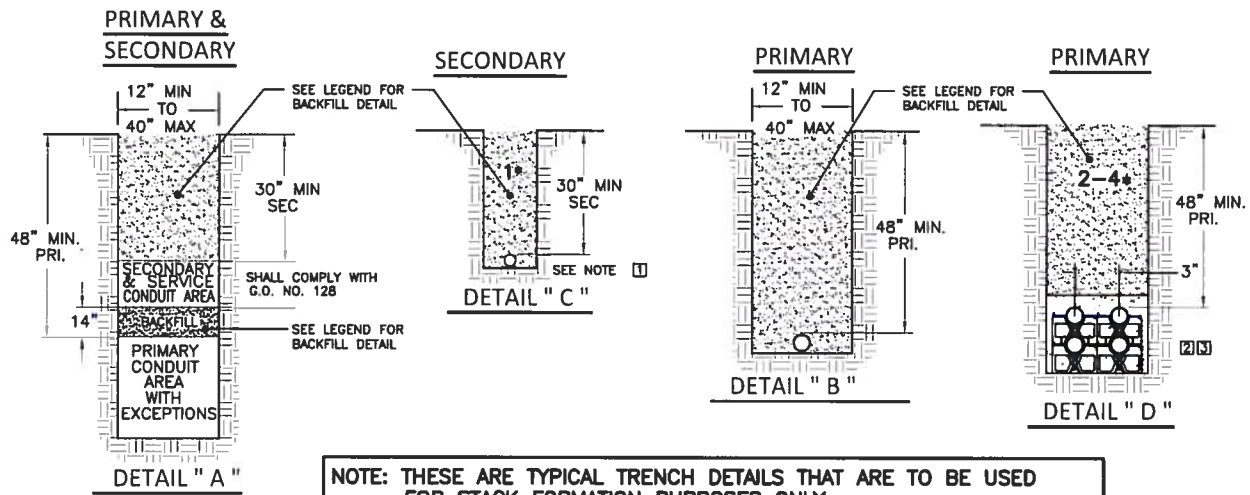


IMPERIAL IRRIGATION DISTRICT

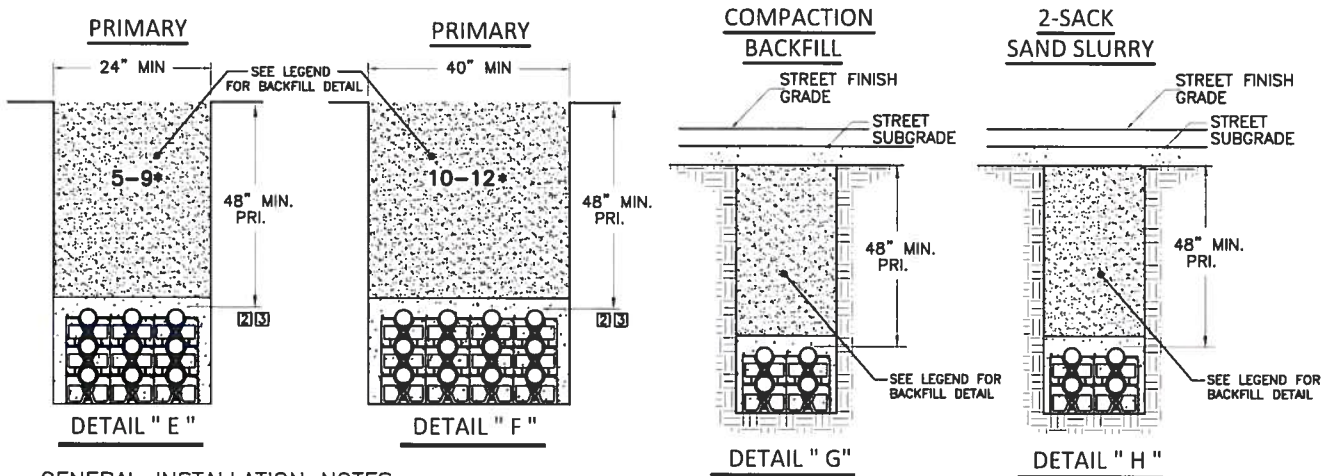
Customer Project Development • 333 S. Waterman Ave • El Centro, CA 92243

Continued:

11. Framing and pouring concrete pad for customer meter panel.
12. Installation of customer meter panel.
13. Barrier post installation (when applicable).
 - A. Verify footing is 36" in depth and 18" in diameter.
 - B. Barrier post is set 30" below finish grade.
 - C. Barrier post is 4" steel pipe.
 - D. Barrier post is painted High Visibility Yellow.
14. Final: Cold and/or hot mandrel inspection.



NOTE: THESE ARE TYPICAL TRENCH DETAILS THAT ARE TO BE USED FOR STACK FORMATION PURPOSES ONLY. MIN. DEPTH WILL BE (PRI. 48", SEC. 30") AT ANY DEPTH.



GENERAL INSTALLATION NOTES

1. USE PLASTIC SPACERS THAT PROVIDE 3" SEPARATION.
2. PLASTIC SPACERS SHALL BE USED ON CONDUIT RUNS TO BE CONCRETE ENCASED BOTH AS SINGLE OR BANKED INSTALLATIONS AND ON DUCT BANKS NOT ENCASED. (REFER TO NOTE 3.48).
3. CONDUIT RUNS SHALL NOT CROSS EACH OTHER WHEN ON THE SAME LEVEL AND/OR PLANE. (REFER NOTE 3.23)
4. THE MAXIMUM OBTAINABLE SEPARATION BETWEEN POWER FACILITIES AND ALL OTHER SUBSTRUCTURES SHALL BE MAINTAINED AT ALL TIMES, 12" MIN. WHEN PARALLELING AND 12" MIN. WHEN CROSSING ENCASED IN CONCRETE.
5. WHEN CONCRETE ENCASEMENT IS SPECIFIED ON THE JOB, ENCASEMENT SHALL BE A 3 SACK MIX (2000 PI) WITH SAND SLURRY WILL BE USED BELOW STREETS, PARKING LOTS, DRIVEWAYS, AND SIDEWALKS. WHEN STREETS, PARKING LOTS, DRIVEWAYS, AND SIDEWALKS DO NOT EXIST OVER THE DUCT SYSTEM, A 2 SACK SAND SLURRY MAY BE USED. (REFER TO NOTES 3.18, 3.19).
6. ENCASE IN CONCRETE 3" ENVELOPE WHERE REQUIRED. SEE CONDUIT LAYOUT SHEETS (JOB COPY) FOR LOCATION OF CONCRETE TRENCHES.
7. LINE GUARD TAPE REQUIRED IN ALL TRENCHES. (REFER TO NOTE 3.46 STANDARD100.5).

*IDENTIFY # OF CONDUITS

LEGEND

- CONDUIT
- ▣ 3 SACK MIX SAND SLURRY
- ▣ 2 SACK SAND SLURRY
- ▣ 90% COMPACTION BACKFILL (BACKFILL TO BE NATIVE SOIL OR CALTRANS CLASS 2 AGGREGATE BASE OR CRUSHER FINE WITH 3/8 INCH ROCK).

IMPERIAL IRRIGATION DISTRICT	
DRAWN BY	<i>JK</i>
REVIEWED	<i>MS</i>
APPROVED	<i>MS</i>
REVISION	REV 6
DATE	9-27-2016

TRENCH DETAILS

100.3

3.38.1 Table 5 Riser Sweep Radius – Vertical

RISER SWEEP RADIUS INDEX (VERTICAL) TABLE 5						
SECONDARY	Radius	Pole Riser	Equip. Riser	Trans. Pad	Secondary	Meter Panels
Conduit Dia.		PVC SCH	PVC SCH	PVC SCH	PVC SCH	PVC SCH
2"	24" Radius	N/A	40	40	40	40
3"	36" Radius	80	40	40	40	40
4"	*36"-48" Radius	80	40	40	40	40
PRIMARY	Radius	Pole Riser	Equip. Riser	Trans. Pad	Secondary	Meter Panels
Conduit Dia.		PVC SCH	PVC SCH	PVC SCH	PVC SCH	PVC SCH
4"	48" Radius	80	40	40	N/A	N/A
5"	*48"-60" Radius	80	40	40	N/A	N/A
6"	60" Radius	80	N/A	N/A	N/A	N/A

*Contact your IID Customer Service Project Manager for instructions.

N/A = Not Applicable

3.39 The installation of the conduit system will be conducted by a single contractor or other entity to give the project continuity, reducing the possibility of deviations from the G.O. 128 regulations, Authority having jurisdiction, and IID standards. Developer/Contractor will accept the most strict or highest requirements from the entities mentioned above.

3.40 Marking Tape over Conduits:

3.40.1 Contractor shall install 2 inch line guard III tape, red in color with black lettering "**CAUTION BURIED ELECTRIC LINE BELOW**" (See 3.46, Standard 100.5)

3.40.2 Contractor will install tape 12 inches (1') above the power conduits. When conduit(s) is/are encased in concrete, Developer/Contractor shall back fill with compacted (90%) native soil to meet the 12 inch (1') requirement. (See 3.46, Standard 100.5)

3.41 Mandrel

3.41.1 The installation contractor shall mandrel all primary ducts and secondary service ducts. IID shall provide the mandrel and the IID inspector for the mandrel process. Refer to 3.41.1 Pulling Rope, Table 8 Conduit rope/Measured Rope Requirements for Primary Pulls. Inspection field check schedules are subject to a minimum 48 hour advance notice and are by appointment only; Imperial (760) 482-3300; La Quinta (760) 398-5828

3.41.2 IID Inspector will conduct a field check prior to mandrel test to ensure IID structures are:

3.41.2.1 Not damaged

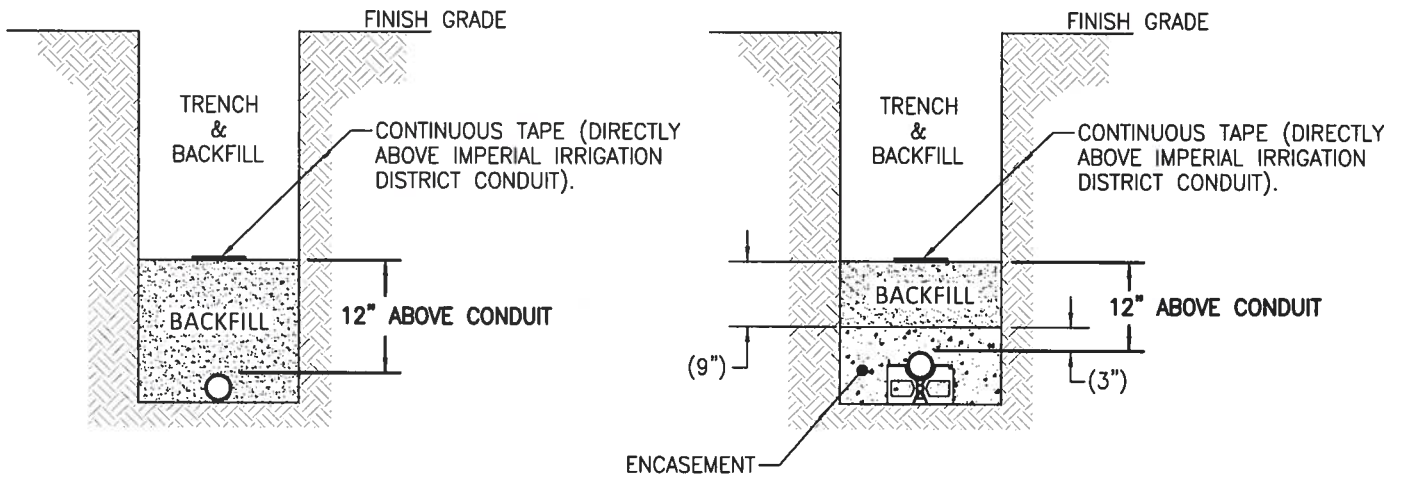
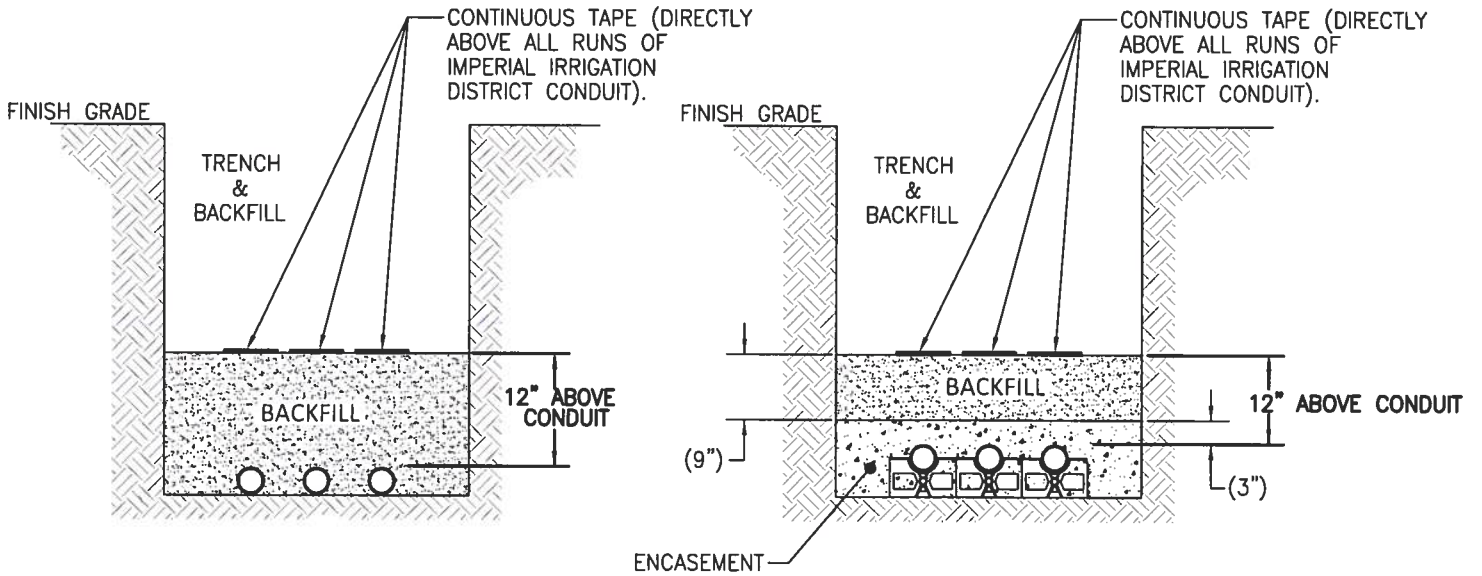
3.41.2.2 Clear of debris

3.41.2.3 No obstructions to IID structures (accessibility)

3.41.3 If mandrel is requested from IID structure to meter panel, IID Inspector will field check the following:

- 3.41.3.1 Scratch coat or brown coat must be installed on residence/building
- 3.41.3.2 Wallboard must be installed on the wall the meter panel is located.
- 3.42 After field checks are approved by IID Inspector:
 - 3.42.1 Cold Mandrel: Can continue per IID Inspectors instructions
 - 3.42.2 Hot Mandrel: Will be scheduled at a later date to an IID Troubleshooter
- 3.43 IID Inspector is required to be in attendance on all mandrel tests
- 3.44 Pulling rope: In all duct runs, the installation contractor is to furnish and install the following:
 - 3.44.1 Polypropylene rope usually yellow in color is acceptable
 - 3.44.2 All conduits may be filled with polypropylene rope, knots & splices are not allowed at any time.
 - 3.44.2.1 Note: If pulling wire at a later date (any time after construction), Developer/Contractor is responsible and required to pull in new rope that have no splices.
 - 3.44.2.2 Note: When multiple conduits are installed, Mule tape, ½" wide with foot markers, is required in one conduit. Mule tape will meet or exceed 1,250 lbs. tensile strength.
 - 3.44.2.3 Note: Detectable mule tape, rope, or wire is prohibited
- 3.45 Table 8 Conduit Rope/Measured Rope Requirements

CONDUIT ROPE/MEASURED ROPE REQUIREMENTS			
Rope Type	Conduit Length	Conduit which will contain Wire	Rope Tensile Strength (Average Breaking Strength)
1) Polypropylene ¾"	0' – 1000'	No Knots	1,250 lbs. Min.
2) Polypropylene ½"	1000' – Greater	No Knots	2,500 lbs. Min.




TYPICAL TRENCH DETAIL
W/LINEGUARD III TAPE OR EQUIVALENT

NOTES:

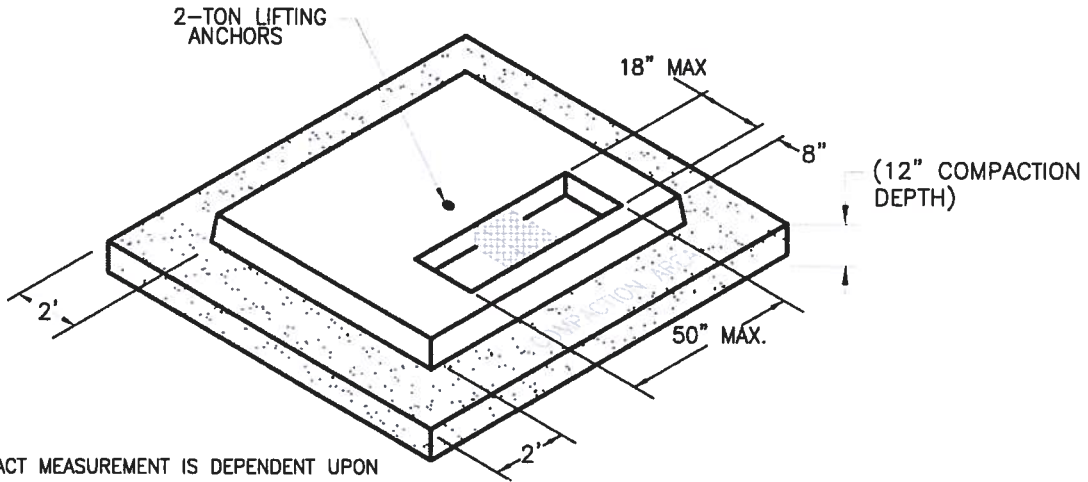
1. INSTALL LINE GUARD III TAPE (RED, MINIMUM 2" WIDE). TAPE TO BE FURNISHED & INSTALLED BY CONTRACTOR AND SHALL READ: **"CAUTION: BURIED ELECTRIC LINE BELOW"**.
2. TAPE WILL BE INSTALLED 12" ABOVE HIGHEST PRIMARY OR SECONDARY IMPERIAL IRRIGATION DISTRICT TRENCH.

IMPERIAL IRRIGATION DISTRICT	
DRAWN BY	<i>gr</i>
REVIEWED	<i>ps</i>
APPROVED	<i>ms</i>
REVISION	REV 5
DATE	12-31-2013

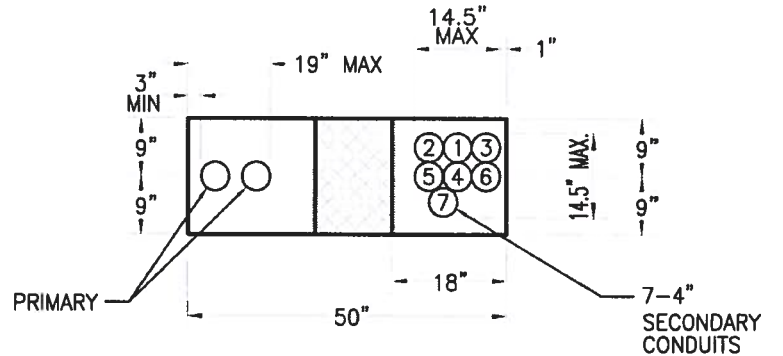
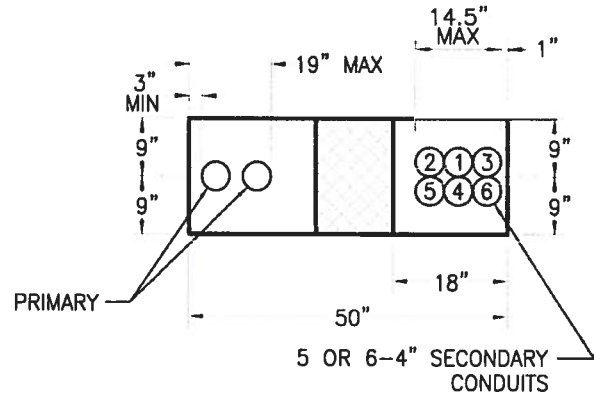
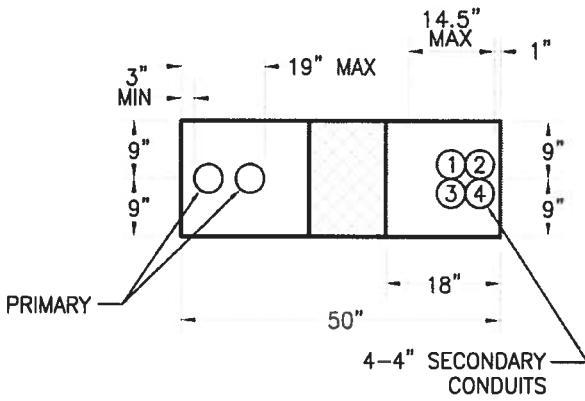
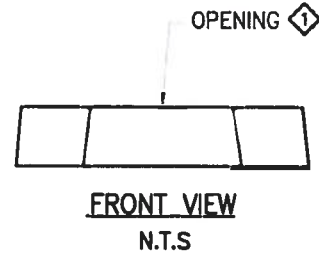
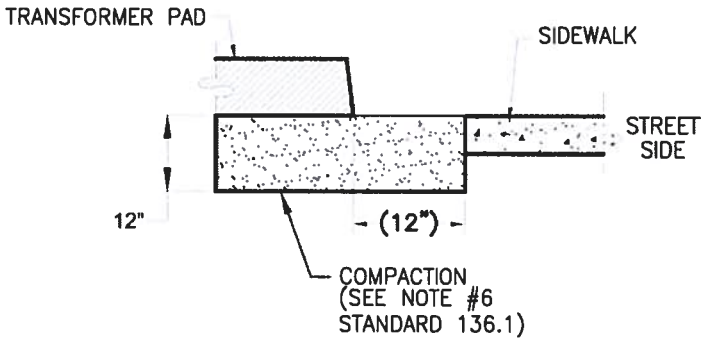


LINE GUARD III TAPE

100.5



*NOTE: EXACT MEASUREMENT IS DEPENDENT UPON MANUFACTURER SPECIFICATIONS. SEE STANDARD 136.1, CONSTRUCTION NOTE 2. APPROVED MANUFACTURERS AND STRUCTURERS.



SHADED AREA TO BE CLEAR OF ALL CONDUIT

NOTE:

WINDOW OPENING ON TOP OF PAD IS SLIGHTLY SMALLER THAN BOTTOM OPENING A RESULT OF FORM CONSTRUCTION

IMPERIAL IRRIGATION DISTRICT		
DRAWN BY		 PRECAST CONCRETE PAD DETAIL FOR THREE-PHASE TRANSFORMERS 45KVA TO 500KVA
REVIEWED		
APPROVED		
REVISION	REV 7	
DATE	9-27-2016	
		136

CONSTRUCTION NOTES:

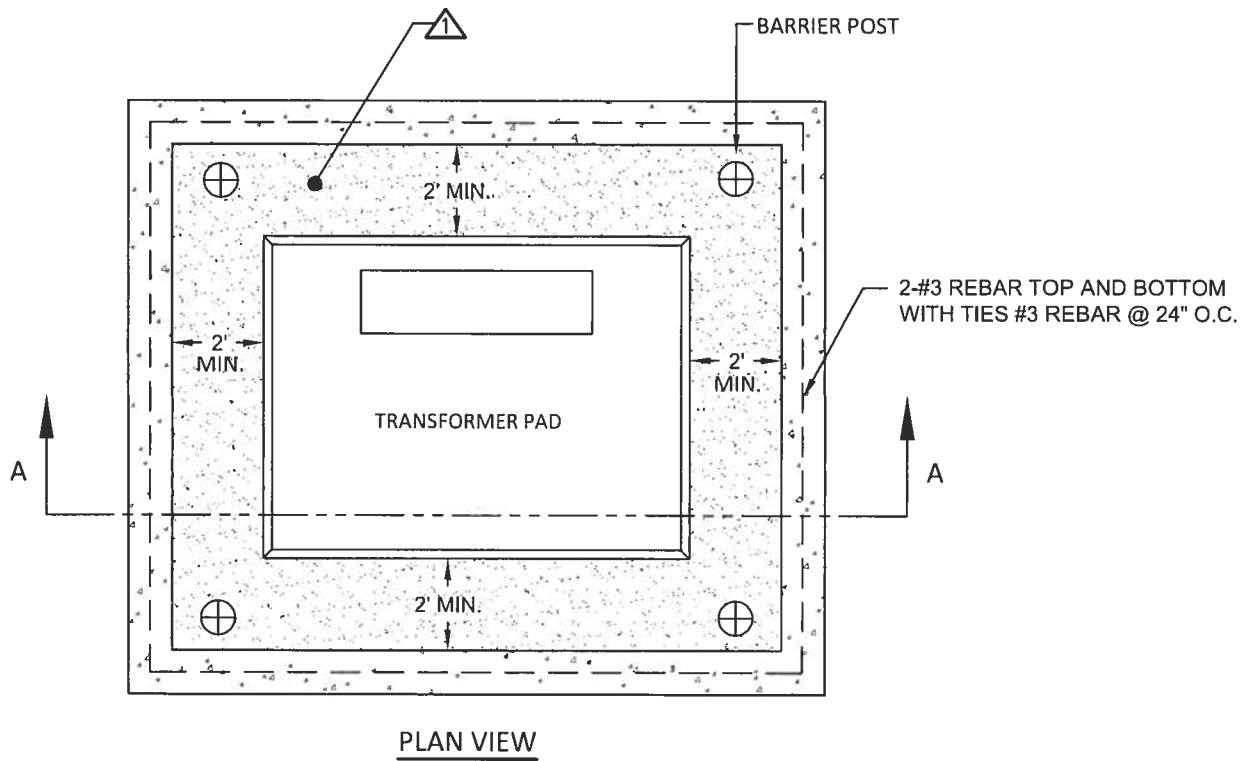
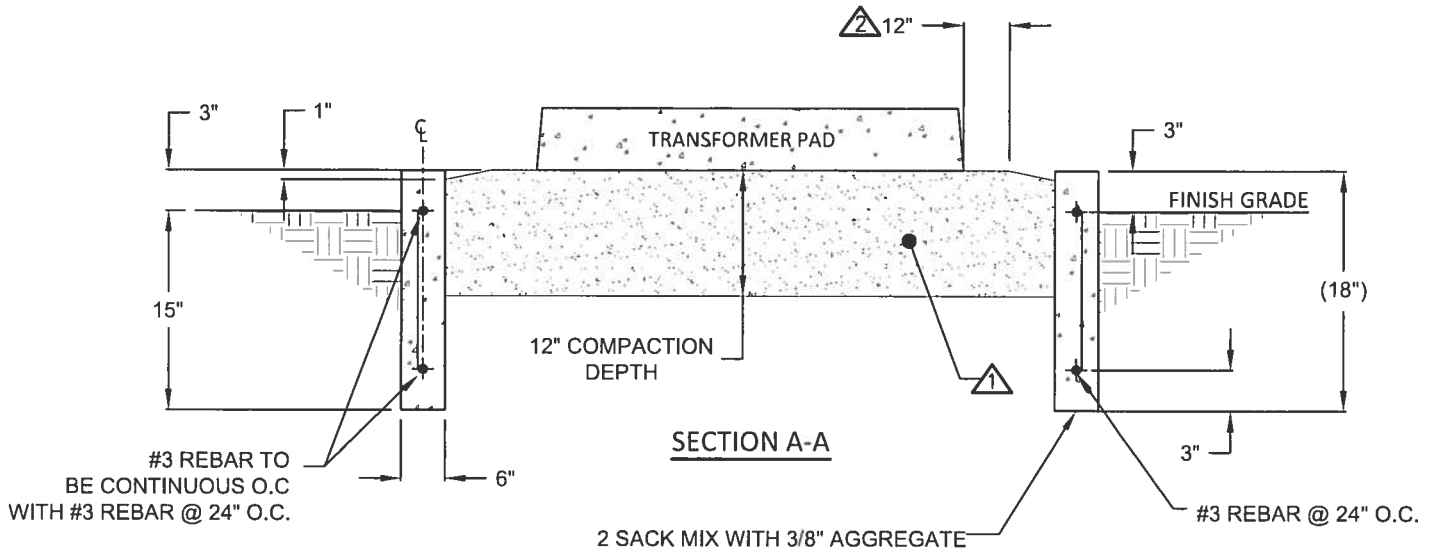
1. A PRECAST CONCRETE PAD SHALL BE USED.
2. APPROVED MANUFACTURERS AND STRUCTURES.

50KV - 500KV TRANSFORMER PAD			
MANUFACTURER	PHONE No.	STRUCTURE No.	FRONT/SIDE/THICKNESS DIMENSIONS
SUPERIOR READY MIX	(760) 352-4341	3426 HLR	94"(F) X 73"(S) X 8"(T)
JENSEN PRECAST	1-775-352-2700	PD7296-T8-25	96"(F) X 72"(S) X 8"(T)
OLD CASTLE	1-800-626-3860	IID-7296-8-TP	96"(F) X 72"(S) X 8"(T)

(F) = FRONT (S) = SIDE (T) = THICKNESS

3. CONTRACTOR TO PROVIDE TWO 5/8"x10' COPPERWELD GROUND RODS PER PAD (INSTALLATION BY CONTRACTOR).
4. SIZE AND NUMBER OF CONDUITS IN EACH PAD TO BE AS SHOWN ON CONDUIT LAYOUT.
5. ANCHORAGE TO BE SET BY I.I.D. WHEN TRANSFORMER IS INSTALLED.
6. CONTRACTOR SHALL PROVIDE & INSTALL 12" OF CLASS 2 AGGREGATE ROAD BASE MATERIAL OR CRUSHER FINES WITH 3/8" ROCKS UNDERNEATH TRANSFORMER PAD, AND COMPACT ALL ROAD BASE UNDERNEATH TRANSFORMER PAD TO A MINIMUM COMPACTION OF 90%. SEE STANDARD 136. SECTION 3, 3.4.
7. CONDUITS TO TERMINATE 1" ABOVE TOP OF TRANSFORMER PAD.


IMPERIAL IRRIGATION DISTRICT		
DRAWN BY	<i>JR</i>	 <p>PRECAST CONCRETE PAD DETAIL FOR THREE-PHASE TRANSFORMER 45KVA TO 500KVA</p>
REVIEWED	<i>MB</i>	
APPROVED	<i>MB</i>	
REVISION	REV 7	
DATE	9-27-2016	
		136.1



NOTES:

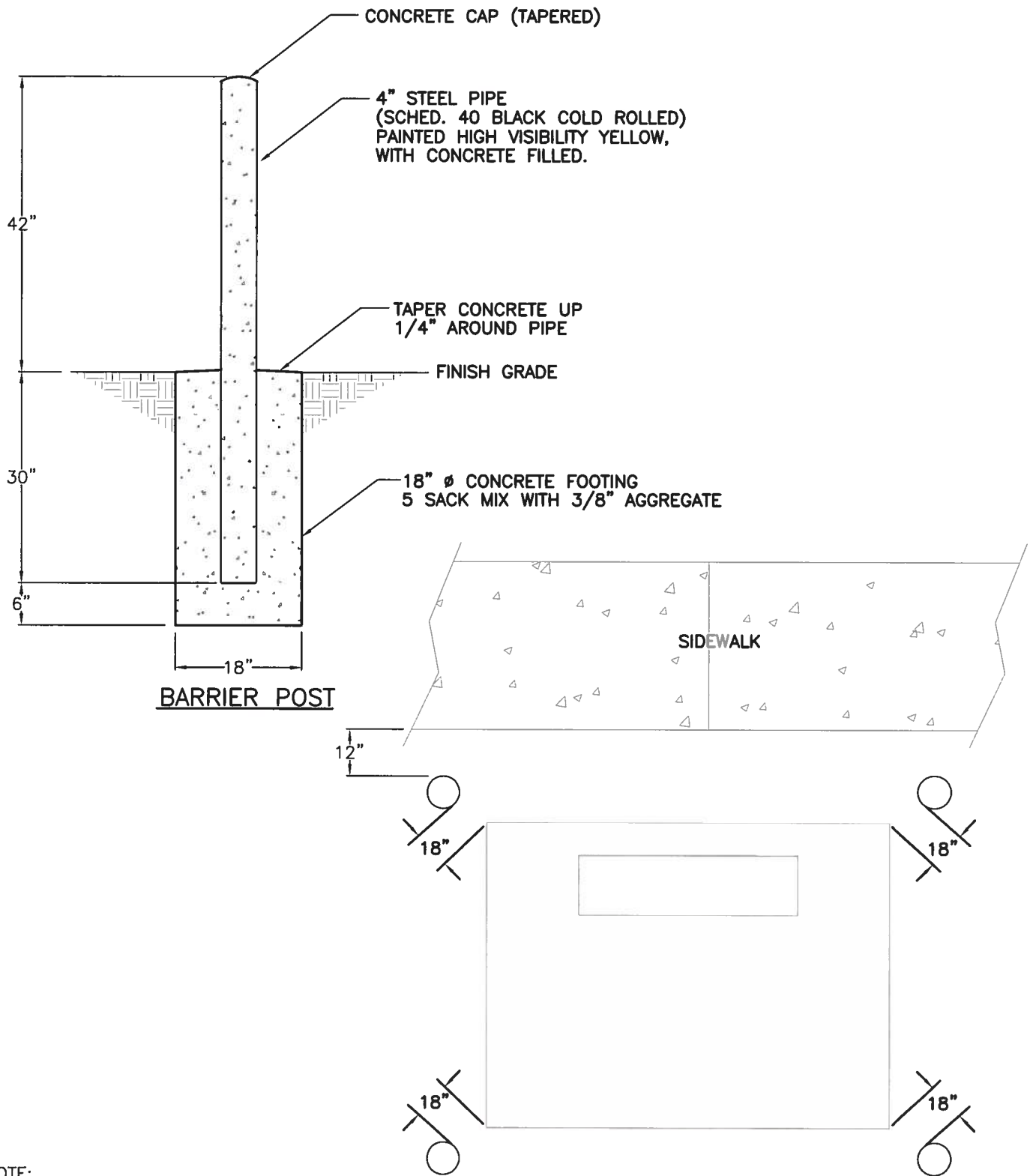
- COMPACTED AREA SHALL BE CALTRANS CLASS 2 AGGREGATE BASE OR CRUSHER FINES WITH 3/8" ROCKS.
SECTION 5.5 COMPACTION PROCESS.
- A MAXIMUM OF 1/2" OF SAND FILL WILL BE APPROVED FOR LEVELING OF COMPACTION AREA.
SECTION 5.5 COMPACTION PROCESS.

IMPERIAL IRRIGATION DISTRICT	
DRAWN BY	<i>JR</i>
REVIEWED	<i>MB</i>
APPROVED	<i>MB</i>
REVISION	REV 3
DATE	9-27-2016



**TRANSFORMER PAD
CONCRETE RE-ENFORCEMENT
CURB DETAIL**

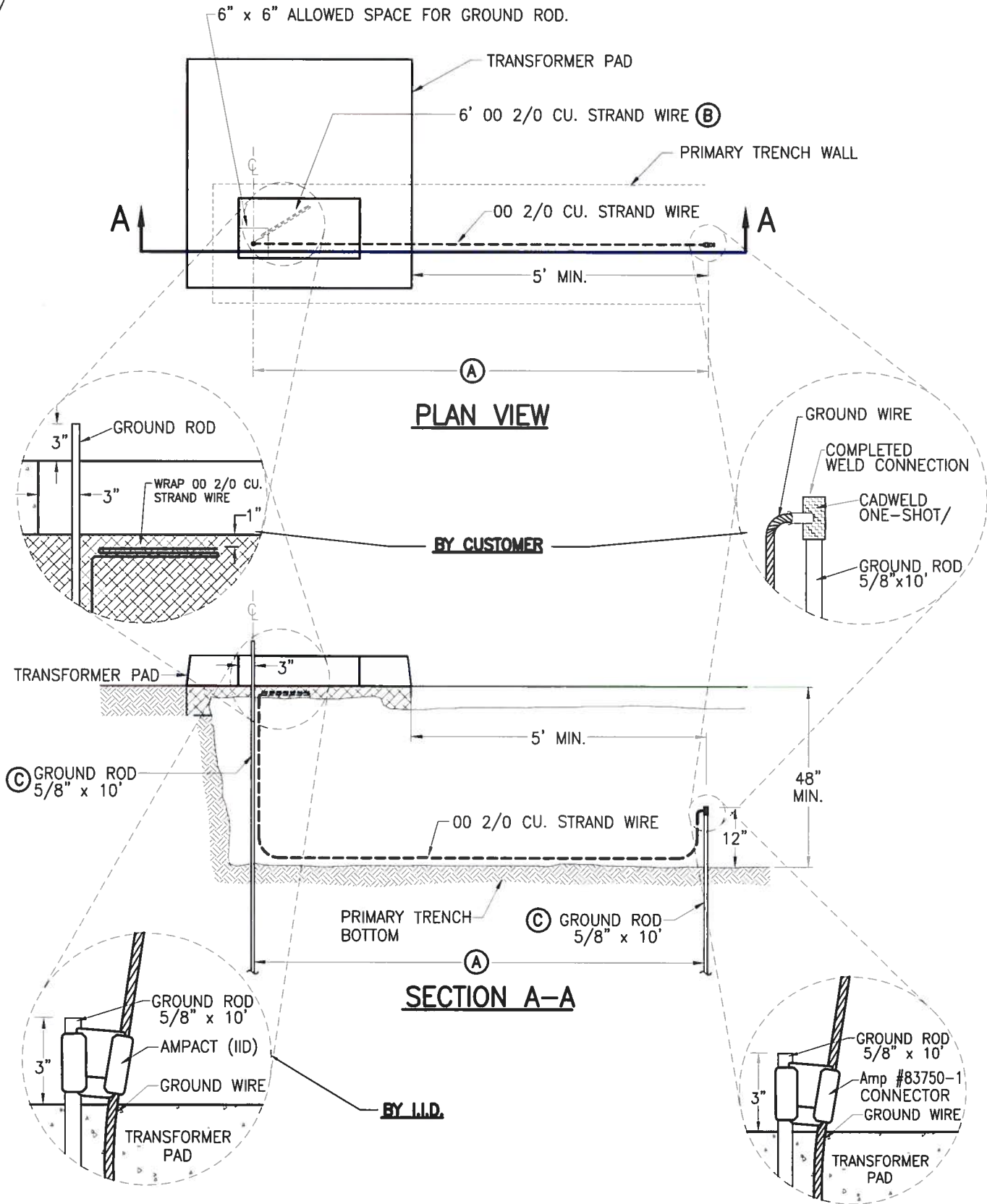
100.9



NOTE:

1. REMOVABLE BARRIER POSTS ARE NOT ALLOWED.
2. IMPERIAL VALLEY TRANSFORMER PAD SHOWN.

IMPERIAL IRRIGATION DISTRICT		
DRAWN BY	<i>gr</i>	 <p>TYPICAL BARRIER POST DETAIL</p>
REVIEWED	<i>pl</i>	
APPROVED	<i>ms</i>	
REVISION	REV 5	
DATE	9-27-2016	
		181.6



DRAWN BY		IMPERIAL IRRIGATION DISTRICT	
REVIEWED	<i>[Signature]</i>		TRENCH GROUND WIRE FOR THREE PHASE TRANSFORMER PADS TO BE INSTALLED BY CONTRACTOR
APPROVED	<i>[Signature]</i>		
REVISION	REV 8		
DATE	11-21-2016		

CONSTRUCTION NOTES:

- Ⓐ GROUND RODS TO HAVE A 6'-0" MINIMUM SEPARATION.
- Ⓑ WRAP 6' OF WIRE (NOT EXPOSED) 1" UNDERGROUND NEXT TO GROUND ROD.
- Ⓒ **LOCATE GROUND RODS SO THEY DO NOT TOUCH CONDUITS.** GENERAL ORDER 128 REQUIRES GROUND RODS TO BE DRIVEN.


BILL OF MATERIAL

ITEM	QTY	DESCRIPTION	STOCK No.	PAGE No.
1	1	CONCRETE PAD, SEE STANDARD 136 THRU 137		
2	1	CADWELD, ONE-SHOT/Amp CONNECTOR #83750-1	40003365	
3	20'	WIRE - COPPER 00 2/0 STRAND, SOFT DRAWN BARE	40004222	
4	2	GROUND ROD, 5/8" x 10', COPPERWELD	40003814	

NOTES:

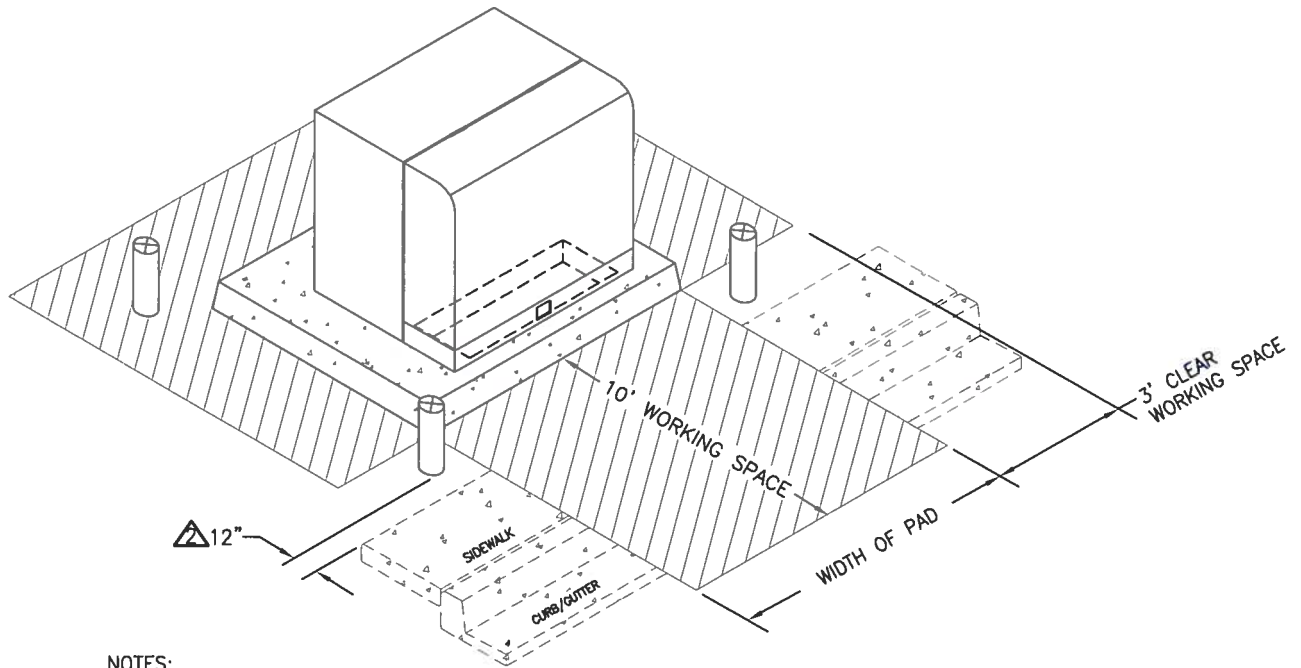
THE SERVICE TRENCH IS ON PRIVATE PROPERTY AND BELONGS TO THE CUSTOMER, THEREFORE, THE TRENCH GROUND WIRE SHOULD ALWAYS BE INSTALLED IN THE PRIMARY TRENCH.

IMPERIAL IRRIGATION DISTRICT	
DRAWN BY	<i>gr</i>
REVIEWED	<i>pl</i>
APPROVED	<i>MB</i>
REVISION	REV 7
DATE	11-21-2016



**TRENCH GROUND WIRE FOR
THREE PHASE TRANSFORMERS PAD
TO BE INSTALLED BY CUSTOMER**

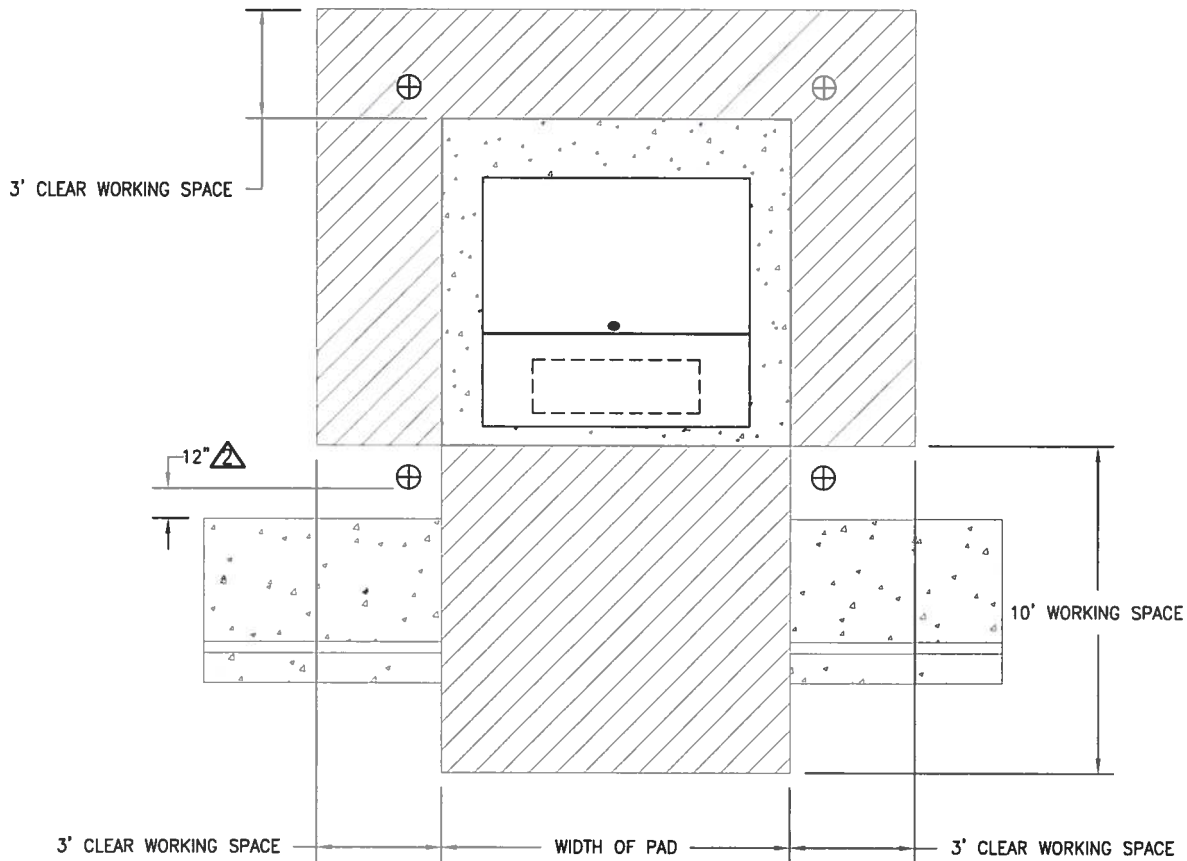
190.31



NOTES:

1. THE PURPOSE OF THIS DRAWING IS TO ILLUSTRATE THE REQUIRED CLEARANCES FROM AN I.I.D TRANSFORMER TO OTHER UTILITIES (18") AND MINIMUM HOT STICK CLEARANCE.

⚠ WHEN BARRIER POSTS ARE REQUIRED, REFER TO BARRIER POST DETAIL 181.6, SECTION 5.32. IF BARRIER POSTS ARE NOT REQUIRED, TRANSFORMER PRECAST PAD SHALL HAVE A 12" (1') OFFSET BEHIND SIDEWALK.



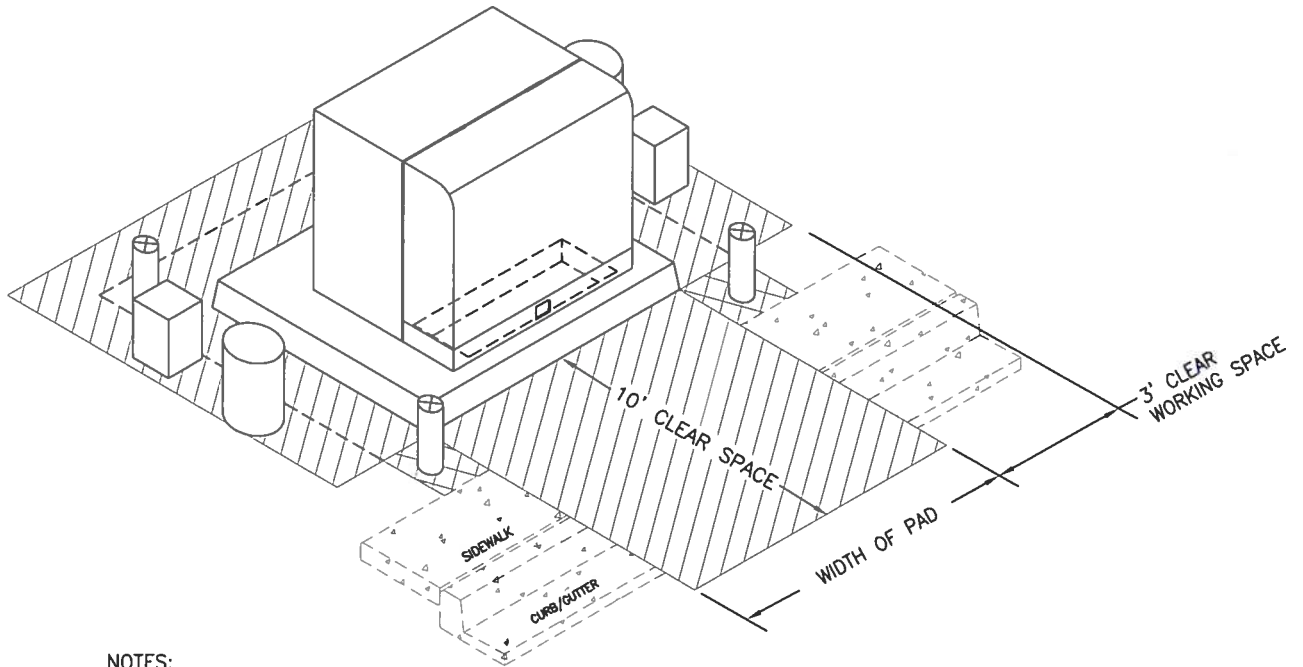
IMPERIAL IRRIGATION DISTRICT

DRAWN BY	<i>gr</i>
REVIEWED	<i>MD</i>
APPROVED	<i>MS</i>
REVISION	REV 2
DATE	9-29-2016



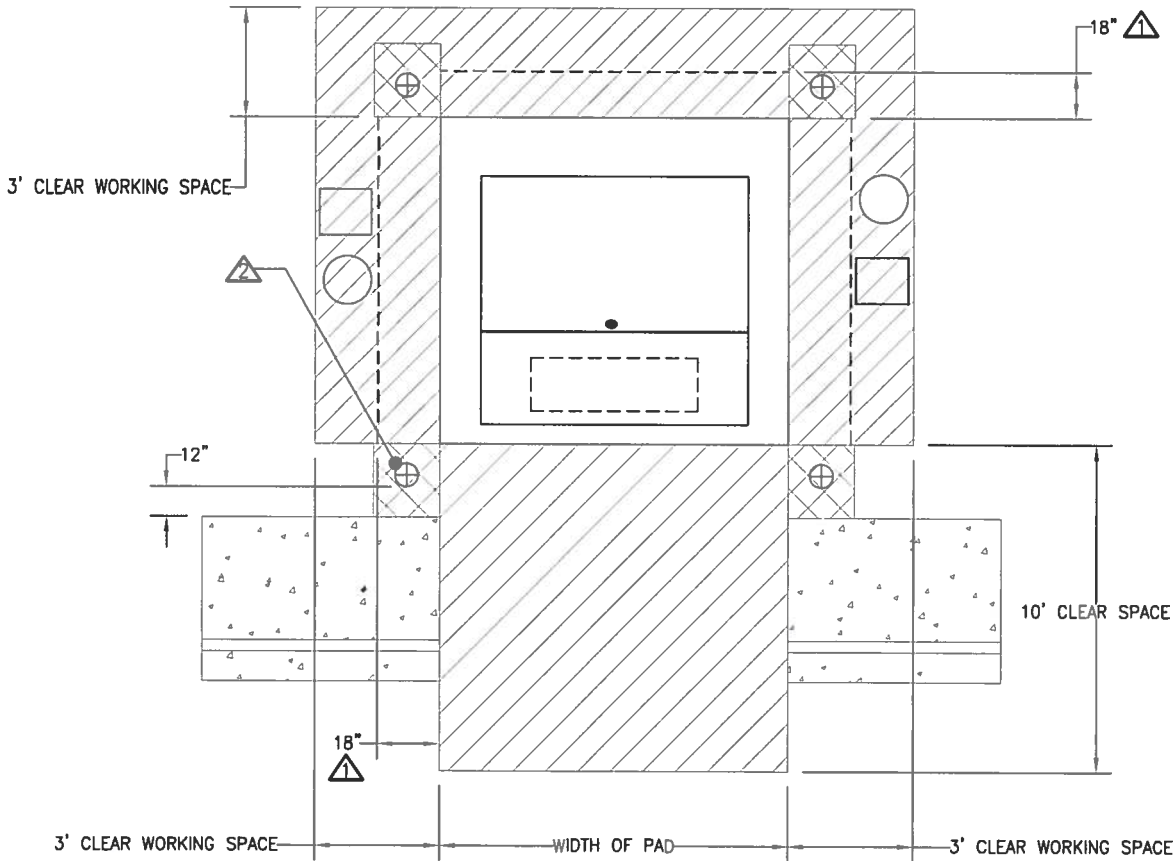
**PRECAST TRANSFORMER PAD
SPATIAL CLEARANCES**

202.4



NOTES:

- ⚠ THE PURPOSE OF THIS DRAWING IS TO ILLUSTRATE THE REQUIRED CLEARANCES FROM AN I.I.D TRANSFORMER TO OTHER UTILITIES (18") AND MINIMUM HOT STICK CLEARANCE.
- ⚠ WHEN BARRIER POSTS ARE REQUIRED, ALL OTHER UTILITIES TO STAY CLEAR OF AREA. (REFER TO BARRIER POST DETAIL, 181.6, SECTION 5.32.)



IMPERIAL IRRIGATION DISTRICT		
DRAWN BY	<i>JR</i>	 <p>PRECAST TRANSFORMER PAD SPATIAL CLEARANCES WITH COMMUNICATION</p>
REVIEWED	<i>MB</i>	
APPROVED	<i>MB</i>	
REVISION	REV 2	
DATE	9-29-2016	

202.5

SPECIAL CONDITIONS – SECTION 00840 – 3

EMERGENCY POWER GENERATOR SET PERMITS

There are two (2) separate applications and permits or approvals required for the new Emergency Power Generator Set and associated Automatic Transfer Switch to be installed at the Gateway to the America Water Treatment Plant. A permit application and permit to operate are to be processed through the Imperial County Air Pollution Control District (ICAPCD). An application for “Interconnection of distributed generation facility” is to be processed through the Imperial Irrigation District (IID) Energy Department with written authorization from the IID to operate the generator issued to the Emergency Power Generator Set Owner at the conclusion of the permitting process. It should also be noted that the Imperial County Planning and Development Services Department (Building Department) will also inspect the Emergency Power Generator Set and Automatic Transfer Switch installation under the Building Department Permit issued to the contractor. *There will therefore be three agencies involved in the Emergency Power Generator Set inspection and approval; ICAPCD, IID Energy Department and the County of Imperial Building Department. The County of Imperial is the Owner of the Gateway to the Americas Water Treatment Plant and the party which will be responsible for the operation, maintenance and permit requirements for the Emergency Power Generator Set and Automatic Transfer Switch. The County of Imperial shall therefore prepare the applications (with assistance from the contractor and generator supplier) and pay the application and permit fees.* The ICAPCD “Authority to Construct (the Generator Set and Transfer Switch)” and “Permit to Operate (the Emergency Power Generator Set and Transfer Switch)” will be issued to the County of Imperial. IID will require an *Interconnection Agreement* be executed between the IID and County of Imperial prior to the IID issuing the County of Imperial written authorization to operate the Emergency Power Generator Set and Automatic Transfer Switch. Following is the approximate procedure for the permitting and authorization to operate the Emergency Power Generator Set and Electrical Transfer Switch through ICAPCD and the IID Energy Department:

Approximate Emergency Power Generator Set ICAPCD Permitting and Authorization Procedure

1. *Imperial County Public Works Department is to prepare the “ICAPCD Application for Permit” and “Internal Combustion Engine Summary Form” after the Emergency Power Generator Set and Automatic Transfer Switch submittal document is approved. The Contractor and Emergency Power Generator Set supplier shall provide specific information regarding the Generator Set to the County of Imperial to allow the application and forms to be prepared.*
2. The Imperial County Public Works Department is to forward the completed
 - a. and signed ICAPCD Application for Permit and Internal Combustion Engine
 - b. Summary Form along with an application fee to ICAPCD.

EMERGENCY POWER GENERATOR SET

00840-3 1

3. ICAPCD will start processing the permit. ICAPCD will forward a “*Conditions for Authority to Construct (the Emergency Power Generator Set)*” letter and guidelines to the Imperial County Public Works Department. The Conditions for Authority to Construct will approve the installation of the Emergency Power Generator Set to commence.
 - a. The County of Imperial is to sign and date the Authority to Construct documents and return a copy to ICAPCD.
4. The Imperial County Public Works Department is to contact ICAPCD within thirty (30) days of the commencement of the Emergency Power Generator Set Operation to schedule a ICAPCD schedule for an inspection of the Emergency Power Generator Set.
5. An ICAPCD Permit to Operate (the Emergency Power Generator Set) ***will not*** be issued to the County of Imperial Public Works Department until the permitted equipment has been observed by ICAPCD under operation, and determined to comply with all applicable rules, regulations and permit conditions.

The Imperial County Air Pollution Control District Office is located at 150 South 9th Street, El Centro, California 92243. The telephone number of the ICAPCD Office is (442) 265-1800.

Approximate Emergency Power Generator Set IID Energy Department Permitting Procedure

1. The County of Imperial Public Works Department is to prepare and forward an “*Application for Interconnection of Distributed Generation Facility form*” to the IID Energy Department along with a fee payable to the IID Energy Department. The Contractor and Emergency Power Generator Set Supplier shall assist with the preparation of the application form. The IID Energy Department will initiate the Emergency Power Generator Set and Automatic Transfer Switch interconnection review after the application form is received.
2. The IID Energy Department will prepare an “*Interconnection Agreement*” for review, approval and execution by both the IID and the County of Imperial.
3. The IID Energy Department may require the inspection and testing of the Generator Facility and the installation of any related interconnection facilities *prior to issuing the County of Imperial written authorization to operate the Emergency Power Generator Set.*

EMERGENCY POWER GENERATOR SET

00840-3 2

Questions relative to the processing of the IID Energy Department interconnection application, agreement and permit can be directed to:

Mr. Joel F. Lopez
Senior Project Manager
Customer Project Development
Imperial Irrigation District
Energy Department
333 South Waterman Avenue
El Centro, California 92243
Office Phone: (760) 482-3444
Email: jflopez@iid.com

The following ICAPCD and IID Energy Department forms follow this section of the special conditions.

1. Air Pollution Control District Application for Permit (Page 1 of 1)
2. ICAPCD Internal Combustion Engine Summary Form (Pages 1 and 2)
3. IID Energy Department - Application for Interconnection of Distributed Generation Facility (Customer – Owned Generation) – (Pages 1 through 11)

END SECTION 00840 - 3

EMERGENCY POWER GENERATOR SET

00840-3 3



AIR POLLUTION CONTROL DISTRICT

150 S 9th Street
El Centro, CA 92243
P. 442.265.1800
F. 442.265.1799

APPLICATION FOR

Authority to Construction
 New
 Amendment

Permit to Operate
 Transfer of Ownership
 Relocation
 Name change

Emission Credit Banking
 Change of Permit Conditions
 Equipment Modification or Addition

PERMIT NUMBER (if any) _____

1. Name of Applicant _____ 2. Responsible Person _____
3. Mailing Address _____ 4. Title _____
- | | | | | |
|---------------|-------------|----------------|----------------|------------------|
| 5. City _____ | State _____ | Zip Code _____ | 6. Phone _____ | Cell Phone _____ |
|---------------|-------------|----------------|----------------|------------------|
7. Type of Organization (Corp., Government, Individual, etc.) _____
8. Brief Description of Project/Activity _____
9. Location of Project/Activity _____
10. Property Owner _____
- | | | |
|--|-----------------|------------------------|
| 11. Person in Charge at Location _____ | 12. Title _____ | 13. Phone Number _____ |
|--|-----------------|------------------------|
- | | |
|---|---|
| 14. Anticipated Date of Construction
Start _____ | 15. Anticipated Life of Project
Completion _____ |
|---|---|
- | | | |
|------------------------------------|----------------------|--------------------|
| 16. Estimated Emissions | Uncontrolled lbs/day | Controlled lbs/day |
| For largest single pollutant _____ | | |
| Total for all emissions _____ | | |
17. Other Permits Have Been or Will be Obtained From: _____
18. Plot plans, flow charts, calculations, equipment description and other information required by "List and Criteria" attached.
19. The information previously submitted with _____ is still valid and no changes have been made except as shown on attachment.
20. Request for confidential handling of attached.
21. Total pages attached _____

"I am familiar with the Rules and Regulations of the Imperial County Air Pollution Control District and I certify that the operation of the plant and/or equipment which is subject to the application will comply with said Rules and Regulations."

_____ Date

_____ Signature of Responsible Person

OFFICE USE ONLY All payments must be made by Check or Money Order. Cash will not be accepted. An application fee of \$197.00 is due upon submission of an application for 2021, Thank you.

Date application submitted: _____ Amount paid: _____

Received by: _____ Receipt Number: _____

Staff Comments:



INTERNAL COMBUSTION ENGINE SUMMARY FORM

NOTICE

An application will not be processed unless ALL fields in "Section A" are complete.

Section A

Company/Agency	Phone Number
Equipment Location	Existing Permit # (if any)
Engine Manufacturer	Model Number
Engine Serial Number:	EPA/C.A.R.B. 12-character Engine Family Name
Manufacturer Date:	Is unit equipped with a non-resettable hour meter? <input type="checkbox"/> Yes <input type="checkbox"/> No
Utilization of Engine <input type="checkbox"/> Electrical Generator _____ Kw <input type="checkbox"/> Fire Pump <input type="checkbox"/> Portable <input type="checkbox"/> Compressor Driver _____ cfm <input type="checkbox"/> Rental <input type="checkbox"/> Other _____ <input type="checkbox"/> Pump Driver _____ gpm	
Fuel Information <input type="checkbox"/> Natural Gas <input type="checkbox"/> Gasoline <input type="checkbox"/> LPG <input type="checkbox"/> Other _____ <input type="checkbox"/> Digester Gas <input type="checkbox"/> Landfill Gas <input type="checkbox"/> Diesel Oil	
Engine Size (Manufacturers Rating)	BHP@ _____ RPM
Operating Schedule _____ Hr/Days _____ Days/Week _____ Weeks/Year Maximum Operating Hours _____ Hrs/Days <input type="checkbox"/> Emergency Only (indicate hours operated for testing & maintenance)	

Section B

Is this unit designed to be moved or carried from one location to another, or does it have wheels, skids, <input type="checkbox"/> Yes (Portable) <input type="checkbox"/> No (Stationary)	
---	--



INTERNAL COMBUSTION ENGINE SUMMARY FORM

Page 2 of 2

Section C

Engine Description		Number of Cylinders: _____	
<input type="checkbox"/> Two Cycle	or	<input type="checkbox"/> Four Cycle	
<input type="checkbox"/> Lean Burn	or	<input type="checkbox"/> Rich Burn	
<input type="checkbox"/> Turbocharged	<input type="checkbox"/> Turbocharged/Aftercooled	<input type="checkbox"/> Naturally Aspirated	
Sulfur Content of Disgester Gas, Landfill Gas or Diesel			
Maximum Rated Fuel Consumption (Gas/Hr, Cu. Ft/Hr)			
Average Load Percentage %			
Energy Recovery From Exhaust		<input type="checkbox"/> Yes	<input type="checkbox"/> No If yes, please explain
Emission Control Device		<input type="checkbox"/> Yes	<input type="checkbox"/> No If yes, please explain
Emission Data:			
POLLUTANT	EMISSION BEFORE CONTROL Gr/BHP PPM Lb/Day		EMISSION AFTER CONTROL Gr/BHP PPM Lb/Day
NMHC or TOC			
NOx			
CO			
PM10			
SOx			
<input type="checkbox"/> Manufacturer Data		<input type="checkbox"/> Source Test Data	

Section D

Stationary Engines Only			
Stack Dimensions			
Height Above Grade	Ft	Height Above Building	Ft
Exhaust Cross Section			
Diameter	In	Width	In
		Length	In
Exhaust Temperature	_____ °F	Direction of Stack Outlet	<input type="checkbox"/> Horizontal <input type="checkbox"/> Vertical <input type="checkbox"/> Other
End of the Stack	<input type="checkbox"/> Open <input type="checkbox"/> Capped	<input type="checkbox"/> Flapper Valve	
Stack Serves			
<input type="checkbox"/> Only this equipment	Exhaust Flow	_____	CFM
<input type="checkbox"/> Other equipment also	Total Flow Rate	_____	CFM
	Exhaust Pressure	_____	CFM
Receptor Information. A receptor is a residence or business whose occupants could be exposed to toxic emissions from your facility.			
Nearest offsite receptor _____			
Distance to nearest offsite receptor		_____	feet
Distance to nearest school grounds		_____	feet

Name of preparer _____

Date _____



**APPLICATION FOR INTERCONNECTION
OF DISTRIBUTED GENERATION FACILITY
(CUSTOMER-OWNED GENERATION)**

Part 1 – Introduction and Overview

A. Applicability: This Distributed Generation Facility Interconnection Application (Application) is used to request the interconnection of a Generating Facility to Imperial Irrigation District's (IID) Distribution System (a self-regulated utility). Refer to IID's Regulation 21, Rules for Interconnection of Distributed Generation Facilities (Customer-Owned Generation) [IID's Regulation 21 Rules] to determine the specific requirements for interconnecting a Generating Facility. Capitalized terms used in this Application, and not otherwise defined herein, shall have the same meanings as defined in IID's Regulation 21 Rules.

Except as noted in the next paragraph, this Application may be used for any Generating Facility to be operated by, or for, a Customer and/or Producer to serve part or all of its electric energy requirements that would otherwise be provided by IID, including "distributed generation", "cogeneration", emergency, backup, and stand-by generation, and Net Energy Metered Generating Facilities. A simpler, shorter form is also available from IID for Net Energy Metered Generating Facilities with a nameplate rating of less than 10 kW. While Customers operating Generating Facilities isolated from IID's Distribution System are not obligated to enter into an Interconnection Agreement with IID, parts of this Application will still need to be completed to satisfy IID's notice requirements for operating an isolated Generating Facility.

This Application may not be used to apply for interconnecting Generating Facilities used to participate in transactions where all, or a portion of, the electrical output of the Generating Facility is scheduled with the California Independent System Operator. Such transactions are subject to the jurisdiction of the Federal Energy Regulatory Commission (FERC) and require a different application which is available from IID.

B. Rules and Steps for Interconnection: This Application must be completed and sent to IID along with the additional information indicated in Part 1, Section C, below, to initiate IID's interconnection review of the proposed Generating Facility. An Initial Review fee of \$ 800 (payable by check or money order to IID) must accompany most Applications except those Applications for isolated Generating Facilities, Solar and Net Energy Metering Generating Facilities. Supplemental Review and Interconnection Study fees may be required for large capacity and/or more complex Generating Facility Interconnections (see IID's Regulation 21 Rules).

This document is only an Application. Upon acceptance, IID will prepare an Interconnection Agreement for execution by the "Producer," the party that will be responsible for the Generating Facility. IID may also require the inspection and testing of the Generating Facility and the installation of any related Interconnection Facilities prior to giving the Producer written authorization to operate in parallel. **Unauthorized Parallel Operation may be dangerous and may result in injury to persons and/or may cause damage to equipment and/or property for which a Producer/Customer may be liable!**

Please note, other approvals may need to be acquired, and/or other agreements may need to be formed with IID or regulatory agencies, such as the Air Quality Management Districts and local governmental building and planning commissions prior to operating a Generating Facility. IID's authorization to operate in parallel does not satisfy the need for an Applicant to acquire such other approvals.

C. Required Documents: Four (4) copies of this Application and each of the following documents **must be submitted** before this application will be processed. Drawings must conform to accepted engineering standards and must be legible. 11"x 17" drawings are preferred. All drawings must be approved by the local jurisdiction and stamped by a Professional Engineer.

1. A **Single-line drawing** showing the electrical relationship and descriptions of the significant electrical components such as the primary switchgear, secondary switchboard, protective relays, transformers, generators, circuit breakers, with operating voltages, capacities, and protective functions of the Generating Facility, the Customer's loads, and the interconnection with IID's Distribution System. Please show the location of all required net generation electric output meters and the A.C. manually operated disconnect devices on the single-line drawing.
2. **Site plans and diagrams** showing the physical relationship of the significant electrical components of the Generating Facility such as generators, transformers, primary switchgear/secondary switchboard, and control panels, the Customer's loads and the interconnection with IID's Distribution System. Please show the location of all required net generation electric output meters and the A.C. manually operated disconnect devices on the site plans.
3. If **transformers** are used to interconnect the Generating Facility with IID's Distribution System, please provide transformer nameplate information (voltages, capacity, winding arrangements, connections, impedance, etc.).
4. If a **transfer switch** or scheme is used to interconnect the Generating Facility with IID Distribution System, please provide component descriptions, capacity ratings, and a technical description of how the transfer scheme is intended to operate.
5. If **protective relays** are used to control the interconnection, provide protection diagrams or elementary drawings showing relay wiring and connections, proposed relay settings, and a description of how the protection scheme is intended to function.
6. An Initial Review fee check or money order in the amount of \$800, if applicable, made out to IID referencing the contract account number (Part 2. A.) and "Initial Interconnection Review Fee"

D. Mailing Instructions and Assistance: When the Application has been completed, it may be printed and mailed, along with the required attachments to the address below. The offices can be contacted for assistance in completing the Application or to make arrangements to e-mail or fax copies of the required information with payment of the required fees to follow.

IMPERIAL VALLEY
Superintendent, Customer Operations
Imperial Irrigation District
1699 W. Main Street, Suite A
El Centro, CA 92243
Tel: 482-3400
Fax: 482-3401

COACHELLA VALLEY
Superintendent, Customer Operations
Imperial Irrigation District
81-600 Avenue 58
La Quinta, CA 92253
Tel: 391-5952
Fax: 391-5955



**APPLICATION FOR INTERCONNECTION
OF DISTRIBUTED GENERATION FACILITY
(CUSTOMER-OWNED GENERATION)**

Part 2 – Identifying the Generating Facility’s Location and Responsible Parties

<i>Project Name:</i>	<i>Date Received:</i>	<i>Generating Facility ID:</i>	<i>Application Expiration Date (Refer to Part 2, Section E)</i>

(For IID Use Only)

A. Customer Contract Account Information (To what electric service will the Generating Facility be connected? Please provide the Customer Contract Account and all associated accounts/meter information.)

--	--	--

Name shown on IID Contract Account Contract Account No. Meter Number

NOTE: Customer contract account number must match the customer's utility bill account information.

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Street Address City State Zip

Customer Account Contact Information (Who is the customer contact for progress updates and /or additional information?)

--	--

Contact Person Comp any Name

--	--	--

Phone Fax E-mail

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Mailing Address City State Zip

B. Project Contact Information (Who is the project contact for this Generating Facility?)

--	--

Project Contact Person (optional) Comp any Name

--	--	--

Phone Fax E-mail

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Mailing Address City State Zip

B.1. Will the Generating Facility be owned by a (third) party other than the name appearing on the IID service account in A. above (please check)? Yes No



APPLICATION FOR INTERCONNECTION
OF DISTRIBUTED GENERATION FACILITY
(CUSTOMER-OWNED GENERATION)

Part 2 Cont. – Identifying the Generating Facility’s Location and Responsible Parties

C.1. Customer – Generation Facility Interconnection Agreement (GFIA) Information or the Customer Generation Agreement (CGA) (applicable to third party owner only) (Please identify, if known, the party that will execute the applicable agreement. Not applicable for Net Energy Metering Applicants.)

Person Executing the GFIA/CGA	Title of Person Executing GFIA/CGA

Name of Legal Entity to be entered in signatures section of the GFIA/CGA

C.2. 3rd Party Owner – Generation Facility Interconnection Agreement Information (Please identify the 3rd party, if known, that will execute the GFIA). Not applicable for Net Energy Metering Applicants.

Person Executing the GFIA	Title of Person Executing GFIA

Name of Legal Entity to be entered in signatures section of the GFIA

D. Operating Date (The date this Generating Facility is expected to begin operation.)

--

E. Expiration Date* (The date the status of this Application is changed to “withdrawn” by IID.)

--

* The information submitted in this Application will remain active and valid for a period of 12 months from the date the Application was accepted by IID as a “completed” Application. If the project has not received written authorization to operate in parallel, or reasonable proof that the project is going forward has not been submitted to IID by that time, the Application will be considered “withdrawn”. To the extent that the Initial Review, Supplemental Review, or Detailed Interconnection Study fees have been paid to and the corresponding reviews/study completed by IID, Applicant will only be entitled to a return of one-half (\$400) of the Initial Review fee. All other fees will be forfeited.



**APPLICATION FOR INTERCONNECTION
OF DISTRIBUTED GENERATION FACILITY
(CUSTOMER-OWNED GENERATION)**

Part 3 – Describing the Generating Facility and Host Customer’s Electrical Facilities

A. (MP&I)	Indicate the operating mode of the Generating Facility	Operating mode options: ___1 ___2 ___3 (choose one)
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Instructions and Notes

Choose from the following operating mode options:

1. **Parallel Operation:** The Generating Facility will interconnect and operate "in parallel" with IID's Distribution System for more than one (1) second.
2. **Momentary Parallel (MP) Operation:** The Generating Facility will interconnect and operate on a "momentary parallel" basis with IID's Distribution System for a duration of one (1) second or less through transfer switches or operating schemes specifically designed and engineered for such operation.
3. **Isolated (I) Operation:** The Generating Facility will be "isolated" and prevented from becoming interconnected with IID's Distribution System through a transfer switch or operating scheme specifically designed and engineered for such operation.

If the answer is operating mode option 1, "parallel operation," please supply all of the information requested for the Generating Facility. Be sure to supply adequate information including diagrams and written descriptions regarding the protective relays that will be used to detect faults or abnormal operating conditions on IID's Distribution System.

If the answer is operating mode option 2, "momentary parallel operation," only questions A and E of this Part 3 and questions A, B, E, F, I, L, M, N, and S of Part 4 need be answered. Be sure, however, to supply adequate information including diagrams and written descriptions regarding the switching device or scheme that will be used to limit the parallel operation period to one second or less. Please also describe the backup or protective device and controls that will trip the Generating Facility should the transfer switch or scheme not complete the transfer in one second or less.

If the answer is operating mode option 3, "Isolated Operation," only questions A and E of this Part 3 and questions A, B, F, and S of Part 4 need be answered. Be sure, however, to supply adequate information including diagrams and written descriptions regarding the isolating switching device or scheme that will be used to prevent the Generating Facility from operating in parallel with IID's Distribution System.

B. Parallel Operation Applications Only	If the Answer to Section A. above was operating mode option 1, please indicate the type of agreement that is being requested with this Application. If operating mode option 2 or 3 was selected, please skip to question E. If agreement options 2, 3, 5, 6, 8, 9 or 10 to this Section B are chosen, please provide an estimate of the maximum kW the Generating Facility is expected to export to IID's Distribution System. If IID determines that the amount of power to be exported is significant in relation to the capacity available on its Distribution System, it may request additional information, including time of delivery or seasonal kW/kWh estimates.	Agreement options: ___1 ___2 ___3 ___4 ___5 ___6 ___7 ___8 ___9 ___10 (choose all that apply) _____ Maximum kW
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Instructions and Notes

Choose from the following agreement options:

Customer Owned Generating Facility

1. **A Generating Facility Interconnection Agreement** that provides for parallel operation of the Generating Facility, but does not provide for exporting power to IID's Distribution System.
2. **A Generating Facility Interconnection Agreement (Inadvertent Export)** that provides for parallel operation of the Generating Facility, and the occasional, inadvertent, non-compensated, export of power to IID's Distribution System.
3. **A Power Purchase Agreement** that provides for parallel operation of the Generating Facility, and exporting power to IID's Distribution System for sale to IID. This type of agreement has not yet been developed by IID. Power Purchase Agreements are arranged through IID's Energy Resources Unit.



**APPLICATION FOR INTERCONNECTION
OF DISTRIBUTED GENERATION FACILITY
(CUSTOMER-OWNED GENERATION)**

Part 3 Cont. – Describing the Generating Facility and Host Customer’s Electrical Facilities

Third Party Owned Generating Facility

4. **A Generating Facility Interconnection Agreement** that provides for parallel operation of the third party owned Generating Facility, but does not provide for exporting power to IID’s Distribution System.
5. **A Generating Facility Interconnection Inadvertent Export Agreement** that provides for parallel operation of the third party owned Generating Facility and the occasional, inadvertent, non-compensated, export of power to IID’s Distribution System.
6. **A Power Purchase Agreement** that provides for parallel operation of the third party owned Generating Facility, and exporting power to IID’s Distribution System for sale to IID. This type of agreement has not yet been developed by IID. Power Purchase Agreements are arranged through IID’s Energy Resources Unit.
7. **Other, please describe:** _____
8. **A Customer Generation Agreement** that defines the relationship between IID and the Customer whose name appears on IID’s Customer Account (this agreement must be executed in addition to 4, 5, or 6.)

NEM Generating Facility

9. **A Net Energy Metering Agreement** that provides for parallel operation of the Generating Facility, and exporting power to IID’s Distribution System for credit under the terms of IID’s Net Metering Rate Schedule. This option is available only to eligible generating facilities as defined in IID’s Net Metering Rate Schedule.
10. **A NEM/Non-NEM Eligible Generating Facility Agreement** that provides for the parallel operation of the Generating Facility that uses generators eligible for service under NEM that are electrically connected behind the same Point of Common Coupling with generators that are not eligible to receive service under the Net Metering Rate Schedule. (This type of agreement has not yet been developed by IID. Check with IID for availability).
11. **Other, please describe:** _____

Note: Agreements 3, 6, 7, 9, and 11 have not yet been developed by IID. Check with IID for availability.

<p>C. <i>Parallel Operation Applications Only</i></p>	<p>If the answer to Section B above is agreement option 1 or 4, please indicate the protection option that will be used to prevent energy from being exported to IID’s Distribution System.</p> <p>If protection option 3 to this Section C is selected, please provide the continuous current rating of the host Customer facility’s service entrance equipment (service panel rating).</p> <p>If protection option 4 to this Section C is selected, please provide the minimum load of the host Customer facility.</p>	<p>Protection option: <u> </u> <u> </u> <u> </u> <u> </u> 1 2 3 4 (Choose one)</p> <p>_____</p> <p style="text-align: center;">Amps</p> <p>_____</p> <p style="text-align: center;">kW</p>
---	--	---

Instructions and Notes

Refer to Section I.3.b, screen 2, IID’s Regulation 21 Rules for additional information as to how to answer this question. If the Generating Facility will never export power to IID’s Distribution System, a simpler, lower cost, protection scheme may be used to control the interface between the Generating Facility and IID’s Distribution System. Choose from the following four options:

1. A reverse-power protection device will be installed to measure any export of power and trip the Generating Facility or open an intertie breaker to isolate the Generating Facility if limits are exceeded. Note: Please check with IID before you elect this option. The required relay sensitivity levels are often difficult to achieve.
2. An under-power protection device will be installed to measure the inflow of power and trip or reduce the output of the Generating Facility if limits are not maintained.
3. The Generating Facility Interconnection Facility equipment has been certified as Non-Islanding and the incidental export of power will be limited by the design of the interconnection. If this option is to be used, the continuous ampere rating of the service entrance equipment (service panel rating) that is used by the host Customer facility must be stated in the space provided above.
4. The Gross Nameplate Rating of the Generating Facility will not exceed 50% of the host Customer facility’s minimum electrical load. If this option is to be used, the minimum load of the host Customer facility must be stated in the space provided above.

Note: With the approval of IID, a Producer that wishes to retain the option to export power from a Generating Facility to IID’s



**APPLICATION FOR INTERCONNECTION
OF DISTRIBUTED GENERATION FACILITY
(CUSTOMER-OWNED GENERATION)**

Distribution System may use a different protection scheme that provides for the detection of faults and other abnormal operating conditions.

Part 3 Cont. – Describing the Generating Facility and Host Customer’s Electrical Facilities

<p>D. <i>Parallel Operation Applications Only</i></p>	<p>What is the maximum three-phase fault current that will be contributed by the Generating Facility to a three-phase fault at the Point of Common Coupling (PCC)? (If the Generating Facility is single phase in design, please provide the contribution for a line-to-line fault.)</p> <p>Please indicate the short circuit interrupting rating of the host Customer facility's service panel:</p>	<p>_____ Amps</p> <p>_____ Amps</p>
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Instructions and Notes

Refer to Section D.4.a. and Section I.3.g. of IID's Regulation 21 Rules for significance and additional information. To determine this value, any transformers and/or significant lengths of interconnecting conductor used between each of the Generators (if there are more than one) that make up the Generating Facility and the PCC must be taken into account. The details, impedance, and arrangement of such transformers and interconnecting conductors should be shown on the single-line diagram that is provided. Consult an electrical engineer or the equipment supplier if assistance is needed in answering this question.

It is expected that most Applicants will want to reserve the flexibility to operate any or all of their Generators in parallel. If the design of the proposed Generating Facility limits the amount of generation that may be interconnected at any time to IID's Distribution System, please describe the assumptions used in calculating the maximum fault current contribution value.

<p>E. (MP&I)</p>	<p>Please indicate how this Generating Facility will be operated.</p>	<p>___1___2___3___4___5 (please choose all options that may apply)</p>
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Instructions and Notes

Choose from the following five operation options:

1. **Combined Heat and Power or Cogeneration** – The operation of the Generating Facility will produce thermal energy for a process other than generating electricity.
2. **Peak Shaving/Demand Management** – The Generating Facility will be operated primarily to reduce electrical demands of the host Customer facility during IID's "peak pricing periods".
3. **Primary Power Source** – The Generating Facility will be used as the primary source of electric power and power supplied by IID to the host Customer's loads will be required for supplemental, standby, or backup power purposes only.
4. **Standby / Emergency / Backup** – The Generating Facility will normally be operated only when IID's electric service is not available.
5. **Net Energy Metering** – The Generating Facility qualifies and receives service under IID Net Metering Rate Schedule.

Rest of page left blank intentionally.



**APPLICATION FOR INTERCONNECTION
OF DISTRIBUTED GENERATION FACILITY
(CUSTOMER-OWNED GENERATION)**

Part 4 – Describe each of the Generators (See Instructions). Use additional sheets, if necessary.

	Generator Information	Generator Type 1	Generator Type 2	Generator Type 3	Totals for All Generators
#	Please indicate the number of each "type" of Generator (see instructions)				
A (MP&I)	Generator/Inverter Manufacturer (Name)				
B (MP&I)	Generator/Inverter Model (Name/Number)				
C	Generator/Inverter Software Version (Number)				
D	Is the Generator Certified by a Nationally Recognized Testing Laboratory (NRTL) according to IID's Regulation 21 Rules?	___ Yes ___ No	___ Yes ___ No	___ Yes ___ No	
E (MP)	Generator Type (choose one)	___ Synchronous ___ Induction ___ Inverter	___ Synchronous ___ Induction ___ Inverter	___ Synchronous ___ Induction ___ Inverter	
F (MP&I)	Gross Nameplate Rating (kVA)				
G	Gross Nameplate Rating (kW)				
H	Net Nameplate Rating (kW)				
I (MP)	Operating Voltage (volts or kV)				
J	Power Factor Rating (%)				
K	PF Adjustment Range (%)	_____ Min. _____ Max.	_____ Min. _____ Max.	_____ Min. _____ Max.	
L (MP)	Wiring Configuration (choose one)	___ Single-Phase ___ Three-Phase	___ Single-Phase ___ Three-Phase	___ Single-Phase ___ Three-Phase	



**APPLICATION FOR INTERCONNECTION
OF DISTRIBUTED GENERATION FACILITY
(CUSTOMER-OWNED GENERATION)**

Part 4 Cont. – Describe each of the Generators (See Instructions). Use additional sheets, if necessary.

	Generator Information	Generator Type 1	Generator Type 2	Generator Type 3
M (MP)	Three-Phase Winding Configuration (choose one)	<input type="checkbox"/> 3 Wire Delta <input type="checkbox"/> 3 Wire Wye <input type="checkbox"/> 4 Wire Wye	<input type="checkbox"/> 3 Wire Delta <input type="checkbox"/> 3 Wire Wye <input type="checkbox"/> 4 Wire Wye	<input type="checkbox"/> 3 Wire Delta <input type="checkbox"/> 3 Wire Wye <input type="checkbox"/> 4 Wire Wye
N (NP)	Neutral Grounding System Used (Choose One)	<input type="checkbox"/> Ungrounded <input type="checkbox"/> Solidly Grounded <input type="checkbox"/> Ground Resistor _____ Ohms	<input type="checkbox"/> Ungrounded <input type="checkbox"/> Solidly Grounded <input type="checkbox"/> Ground Resistor _____ Ohms	<input type="checkbox"/> Ungrounded <input type="checkbox"/> Solidly Grounded <input type="checkbox"/> Ground Resistor _____ Ohms
O	<i>For Synchronous Generators Only:</i> Synchronous Reactance: _____ (Xd %) Transient Reactance: _____ (X'd %) Subtransient Reactance: _____ (X''d %)	_____ (Xd %) _____ (X'd %) _____ (X''d %)	_____ (Xd %) _____ (X'd %) _____ (X''d %)	_____ (Xd %) _____ (X'd %) _____ (X''d %)
P	<i>For Induction Generators Only:</i> Locked Rotor Current: _____ (Amps) OR Stator Resistance: _____ (%) Stator Leakage Reactance: _____ (%) Rotor Resistance: _____ (%) Rotor Leakage Reactance: _____ (%)	_____ (Amps) _____ (%) _____ (%) _____ (%) _____ (%)	_____ (Amps) _____ (%) _____ (%) _____ (%) _____ (%)	_____ (Amps) _____ (%) _____ (%) _____ (%) _____ (%)
Q	Short Circuit Current Produced by Generator:	_____ (Amps)	_____ (Amps)	_____ (Amps)
R	For Generators that are Started as a "Motor" Only 1. In-Rush Current: _____ (Amps) 2. Host Customer's Service Entrance Panel (Main Panel) Continuous Current Rating _____ (Amps)	_____ (Amps) _____ (Amps)	_____ (Amps) _____ (Amps)	_____ (Amps) _____ (Amps)
S (MP&I)	Prime Mover Type: (Circle One)	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15



**APPLICATION FOR INTERCONNECTION
OF DISTRIBUTED GENERATION FACILITY
(CUSTOMER-OWNED GENERATION)**

Instructions for Part 4 – Describing the Generators

	Generator Information	Instructions and Comments
#	Please indicate the number of each "type" of Generator being installed:	Please provide the following information for each Generator "type". Be sure all Generators classified as one "type" are identical in all respects. If only one type of Generator is to be used, only one column needs to be completed. Please be sure the information in the "Totals" column is correct and reflects the total number of Generator units to be installed.
A	Generator/Inverter Manufacturer	Enter the brand name of the Generator.
B	Generator/Inverter Model	Enter the model name or number assigned by the manufacturer of the Generator.
C	Generator/Inverter Software Version	If this Generator's control and or protective functions are dependent on a "software" program supplied by the manufacturer of the equipment, please provide the version or release number for the software that will be used.
D	Is the Generator Certified by a Nationally Recognized Testing Laboratory (NRTL) according to IID's Regulation 21 Rules?	Answer "Yes" only if the Generator manufacturer can or has provided certification data. See IID's Regulation 21 Rules, Section J, for additional information regarding Generator certification.
E	Generator Design	Please indicate the designated type of each Generator. Designate "Inverter" anytime an inverter is used as the interface between the Generator and the electric system regardless of the primary power production/storage device used.
F	Gross Nameplate Rating (kVA)	This is the capacity value normally supplied by the manufacturer and stamped on the Generator's "nameplate". This value is not required where the manufacturer provides only a "kW" rating. However, where both kVA and kW values are available, please indicate both.
G	Gross Nameplate Rating (kW)	This is the capacity value normally supplied by the manufacturer and stamped on the Generator's "nameplate". This value is not required where the manufacturer provides only a "kVA" rating. However, where both kVA and kW values are available, please indicate both.
H	Net Nameplate Rating (kW)	This capacity value is determined by subtracting the "Auxiliary" or "Station Service" loads used to operate the Generator or Generating Facility. Applicants are not required to supply this value; but, if it is not supplied, applicable Standby Charges may be based on the higher "gross" values.



**APPLICATION FOR INTERCONNECTION
OF DISTRIBUTED GENERATION FACILITY
(CUSTOMER-OWNED GENERATION)**

Instructions for Part 4 Cont. – Describing the Generators

	Generator Information	Instructions and Comments
I	Operating Voltage (volts or kV)	This value should be the voltage rating designated by the manufacturer and used in this Generating Facility. Please indicate phase-to-phase voltages for three-phase installations. See IID Regulation 21 Rules, Section D.2.b. for additional information.
J	Power Factor Rating	This value should be the nominal power factor rating designated by the manufacturer for the Generator. See IID's Regulation 21, Rules, Section D.2.i. for additional information.
K	PF Adjustment Range	If the power factor of the Generator is adjustable, please indicate the maximum and minimum operating values. See IID's Regulation 21 Rules, Section D.2.i.
L	Wiring Configuration	Please indicate whether the Generator is a single-phase or three-phase device. See IID's Regulation 21 Rules, Section D.3.
M	Three-Phase Winding Configuration	For three-phase generating units, please indicate the configuration of the Generator's windings or inverter systems.
N	Neutral Grounding	Wye connected generating units are often grounded – either through a resistor or directly, depending upon the nature of the electrical system to which the Generator is connected. If the grounding method used at this facility is not listed, please attach additional descriptive information.
O	<i>For Synchronous Generators Only:</i>	If the Generator is of a "synchronous" design, please provide the synchronous reactance, transient reactance, and subtransient reactance values supplied by the manufacturer. This information is necessary to determine the short circuit contribution of the Generator and as data in load flow and short circuit computer models of IID's Distribution System. If the Generator's Gross Nameplate Capacity is 10 MW or greater, IID may request additional data to better model the nature and behavior of the Generator with relation to its Distribution System.
P	<i>For Induction Generators Only:</i>	If the Generator is of an "induction" design, please provide the "locked rotor current" value supplied by the manufacturer. If this value is not available, the stator resistance, stator leakage reactance, rotor resistance, rotor leakage reactance values supplied by the manufacturer may be used to determine the locked rotor current. If the Generator's Gross Nameplate Capacity is 10 MW or greater, IID may request additional data to better model the nature and behavior of the Generator with relation to its Distribution System.
Q	Short Circuit Current Produced by Generator	Please indicate the current each Generator can supply to a three-phase fault across its output terminals. For single-phase Generators, please supply the phase-to-phase fault current.



**APPLICATION FOR INTERCONNECTION
OF DISTRIBUTED GENERATION FACILITY
(CUSTOMER-OWNED GENERATION)**

Instructions for Part 4 (Cont.) – Describing the Generators

	Generator Information	Instructions and Comments
R	<p><i>For Generators that are Started as a "Motor" Only:</i></p> <ol style="list-style-type: none"> 1. In-Rush Current 2. Host Customer's Service Entrance Panel (Main Panel) Continuous Current Rating 	<p>This information is needed only for Generators that are started by "motoring" the generator.</p> <p>See IID's Regulation 21 Rules, Section I.3.e. for significance and additional information.</p> <p>If this question was answered in Part 3, question C of this Application, it need not be answered here.</p>
S	<p>Prime Mover Type</p>	<p>Please indicate the type and fuel used as the "prime mover" or source of energy for the Generator.</p> <ol style="list-style-type: none"> 1 = Internal Combustion Engine – Natural Gas Fueled 2 = Internal Combustion Engine – Diesel Fueled 3 = Internal Combustion Engine - Other Fuel 4 = Microturbine– Natural Gas Fueled 5 = Microturbine – Other Fuel 6 = Combustion Turbine Natural Gas Fueled 7 = Combustion Turbine - Other Fuel 8 = Steam Turbine 9 = Photovoltaic Panels 10 = Solar-Thermal Engine 11 = Fuel Cell– Natural Gas Fueled 12 = Fuel Cell– Other Fuel 13 = Hydroelectric Turbine 14 = Wind Turbine 15 = Other (please describe)

DISPUTE RESOLUTION. Should a legal dispute, claim or controversy arise between the applicant and IID relating to, arising out of, or concerning this Application (the "Dispute"), then the applicant may not initiate any legal claim or action against IID with respect to any such Dispute until the applicant has first complied with Section G of IID's Rules for Interconnection of Distributed Generation Facilities. Applicant agrees that if applicant fails to comply with the requirements of Section G of IID's Rules for Interconnection of Distributed Generation Facilities, applicant will be deemed to have waived any and all rights with respect to said legal controversy, claim or action against IID concerning or relating to any associated Dispute.

Applicant's Signature: _____

Name (print): _____

Date: _____

SPECIAL CONDITIONS – SECTION 00840 – 4

BUILDING AND GRADING PERMITS AND ENVIRONMENTAL HEALTH, LPA APPROVAL

There are two (2) separate permits, a building permit and a grading permit required for the Gateway to the Americas Water Treatment Plant Improvement Project. In addition, a project approval is required by the Imperial County Division of Environmental Health, Local Primacy Agency (LPA).

The project improvement plans will be forwarded with the building permit application to the County of Imperial Planning and Development Services Department - Building Division for plan review during the project design phase. The Building Department will forward the plans to the County of Imperial Public Works Department for the review of the grading plans. Preliminary improvement plans were forwarded to the Imperial County Division of Environmental Health, Local Primacy Agency (LPA) for review and approval. A Notice to Proceed letter dated 8/30/2023 was issued by the County of Imperial Public Health Department authorizing the Gateway Water Treatment Plant improvements to proceed based on the conditions included in the Notice to Proceed letter. The letter is an attachment to this Special Condition Section. The final project improvement plans dated 7/12/2024 comply with the Public Health Department letter conditions except that the continued chlorinating of potable water during bypassing procedures (Item 3c of the letter) and the installation of permanent booster chlorination facilities to be installed and illustrated on the as-built plans (Item 5 of the letter) will be required to be addressed by the Gateway WTP operators and the County of Imperial during and at the conclusion of the project construction period. The contractor shall be responsible to ensure that the temporary pumps, piping and materials are NSF/ANSI 161 compliant and that disinfection procedures for bypassing facilities and the final booster pump station facility are disinfected in accordance with AWWA C651-14 procedures (item 4 of the letter).

Any required fees for the Building Permit, Grading Permit and LPA approval including the inspection of the project shall be paid by the County of Imperial.

The Contractor will not be required to pay for the Building Permit, Grading Permit or LPA related approval fees, however; the Contractor will be responsible to obtain the Building Permit and Grading Permit at the County of Imperial Planning and Development Services Department prior to commencing work at the Gateway to the Americas Water Treatment Plant Site. The contractor will be responsible for providing and paying for the insurance required by the Building Department and forward the associated insurance certificates to the Building Department as a requirement of obtaining the Building and Grading Permits. The contractor may be required to provide other documents to the Building Department such as the contractor's current license and similar documents. The Contractor shall be responsible for maintaining a copy of the permits at the project site. The Contractor shall comply with the permit requirements and be responsible for any costs associated with permit compliance.

PERMITS AND APPROVALS

00840-4 1

Attachment: County of Imperial Public Health Notice to Proceed with Construction Improvements Conditional Letter dated August 30th, 2024.

END OF SECTION 00840-4

PERMITS AND APPROVALS

00840-4 2



COUNTY OF IMPERIAL

PUBLIC HEALTH DEPARTMENT

JANETTE ANGULO, M.P.A.
Director

STEVEN MUNDAY, M.P.H., M.S.
Health Officer

CERTIFIED MAIL # 7018 1830 0000 2361 0109

August 30, 2023

Gateway of the Americas
c/o John Gay, P.E.
155 S. 11th Street
El Centro, CA 92243

James Holt, P.E.
1601 N. Imperial Ave.
El Centro, CA 92243

Subject: Notice to Proceed with Construction Improvements to the Gateway of the Americas Public Water System (No. CA1300018).

Mr. Gay/Mr. Holt:

On August 22, 2023, the Imperial County Environmental Health Division, Local Primacy Agency (LPA), received a Plan Review Application with engineered design specifications for construction improvements to the Gateway of the Americas Public Water System (Gateway) located at 1499 Highway 98, Calexico, CA 92231.

The proposed construction improvements were designed under the direct supervision of Jack Holt, P.E., and include:

1. Installation of a bypass pumping system to convey treated water from the storage tanks to the distribution system during proposed construction activities.
2. Complete the demolition of the existing distribution pumps, piping, and a portion of the existing electrical system.
3. Installation of new distribution pumps including a new variable frequency drive (VFD) booster pumping system, piping, valves, flowmeter and electrical VFD and control panel.
4. Installation of a new standby diesel emergency 350-kw generator with transfer switches.
5. Installation of various electrical improvements. The new electrical system will occupy the location of the existing parking area.

The LPA recommends the following:

1. If bypass pumps are electrical, ensure backup power supply for purpose of ensuring continuous operation of bypass facilities during power outages.

Environmental Health Division, 797 Main Street, Suite B, El Centro, CA 92243
(442) 265-1888 • (442) 265-1903 Fax • icphd.org

2. Contractors/engineers must coordinate with Gateway's water treatment operator 48-hours in advance when the work activities create water pressure losses in the distribution system of 5-psi or below.
3. Contractor/engineer should prepare a temporary bypass plan for approval denoting the pump configuration, piping layout, valve location/type, etc. The temporary bypass facilities must:
 - a. Have sufficient temporary pump capacity to provide minimum required pressure in the distribution system,
 - b. Have sufficient backwash source with sufficient temporary pump capacity to continue backwashing at 18 to 20-gpm/ft², and
 - c. Include booster chlorination appurtenances to continue chlorinating after the storage tanks.
4. Temporary pumps, piping and materials coming in contact with treated water should be NSF/ANSI61 compliant. These should also be disinfected in accordance with AWWA C651-14 procedures prior to being placed in service.
5. Permanent booster chlorination facilities shall be installed, and red-lined in final As-built plans.
6. Start-up activities shall ensure that backwash flow rates are within range of 18 to 20-gpm/ft² to properly fluidize filters' media.

Please note that the temporary bypass system shall have redundancy (duty-standby) pump configuration, as well as alarm features to inform the contractor and water system operators of issues.

Construction may proceed upon obtaining the necessary building permits under the responsibility of a licensed contractor in the State of California. Within 30 days of completing construction activities, please provide the LPA with final As-built plans.

Please maintain record of this LPA approval in your operation records.

If you have any questions or comments, please do not hesitate to contact me by email at danielgutierrez@co.imperial.ca.us or at 442-265-1888.

Sincerely,

Daniel Gutierrez
Local Primacy Agency
Environmental Health Division

cc: Ashley Dummer, P.E., Imperial District Engineer, State Water Resources Control Board
Sergio Rubio, Building Manager, I.C. Planning & Development

SPECIAL CONDITIONS – SECTION 00840-5

LIMITED GEOTECHNICAL REPORT

A Limited Geotechnical Report by Landmark Geo-Engineers and Geologists (LCI Report Number LE21020) dated February 2021 was prepared for this project. The Limited Geotechnical Report primarily addresses the preparation of the Emergency Power Generator Set foundation pad, earthwork requirements and grading in the area surrounding the Generator Set foundation pad and the construction of the parking lot/delivery slab/electrical slab area along the east side of the Gateway to the Americas Water Treatment Plant Operations Building. The contractor shall construct the facilities in compliance with the Limited Geotechnical Report with the stipulation that if more stringent requirements are contained on the plans or specifications that the more stringent requirements shall prevail. Interpretations in regard this this item are to be referred to the Design Engineer during the project bidding phase.

The geotechnical earthwork testing required for this project is contained in Technical Condition Specification Section 02200-3.09 on pages 02200-22 and 02200-23. The geotechnical concrete testing required for this project is contained in Technical Condition Specification Section 03300-1.05-A.4 on page 03300-6. *The contractor shall be responsible for all costs associated with the earthwork and geotechnical testing for this project.*

The Limited Geotechnical Report prepared by Landmark Geo-Engineers and Geologists (LCI Report Number LE21020) dated February 2021 follows this section of the special conditions.

END OF SECTION 00840-5

LIMITED GEOTECHNICAL REPORT

00840-5 1

Limited Geotechnical Report

Gateway Water Treatment Plant Upgrades Calexico, California

Prepared for:

The Holt Group
1601 N. Imperial Ave.
El Centro, CA 92243



Prepared by:



Landmark Consultants, Inc.
780 N. 4th Street
El Centro, CA 92243
(760) 370-3000

February 2021

February 9, 2021

Mr. Jack Holt
The Holt Group
1601 N. Imperial Ave.
El Centro, CA 92243

**Limited Geotechnical Report
Calexico East LPOE WTP Upgrades
Gateway Road
Calexico, CA
*LCI Report No. LE21020***

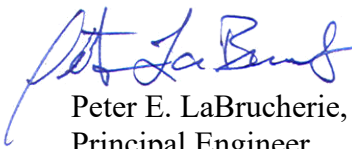
Dear Mr. Holt:

This limited geotechnical report (excludes liquefaction evaluation) is provided for design and construction of the proposed Calexico East LPOE Water Treatment Plant Upgrades in Calexico, California. Our geotechnical exploration was conducted in response to your request for our services. The enclosed report describes our soil engineering site evaluation and presents our professional opinions regarding geotechnical conditions at the site to be considered in the design and construction of the project.

Based on the geotechnical conditions encountered at the points of exploration, the project site appears suitable for the proposed construction provided the professional opinions contained in this report are considered in the design and construction of this project.

We appreciate the opportunity to provide our findings and professional opinions regarding geotechnical conditions at the site. Please provide our office with a set of the foundation plans and civil plans for review to insure that the geotechnical site constraints have been included in the design documents. If you have any questions or comments regarding our findings, please call our office at (760) 370-3000.

Respectfully Submitted,
Landmark Consultants, Inc.


Peter E. LaBrucherie, PE
Principal Engineer





Steven K. Williams, PG, CEG
Senior Engineering Geologist



TABLE OF CONTENTS

	Page
Section 1.....	1
INTRODUCTION	1
1.1 Project Description.....	1
1.2 Purpose and Scope of Work.....	1
1.3 Authorization	2
Section 2.....	3
METHODS OF INVESTIGATION	3
2.1 Field Exploration	3
2.2 Laboratory Testing.....	3
Section 3.....	5
DISCUSSION.....	5
3.1 Site Conditions.....	5
3.2 Geologic Setting.....	5
3.3 Subsurface Soil	6
3.4 Groundwater	6
3.5 Faulting	7
3.6 General Ground Motion Analysis.....	7
3.7 Seismic and Other Hazards.....	9
Section 4.....	10
DESIGN CRITERIA	10
4.1 Site Preparation.....	10
4.2 Foundations and Settlements	11
4.3 Non-Structural Concrete	11
4.4 Concrete Mixes and Corrosivity	12
4.5 Excavations	14
4.6 Utility Trench Backfill.....	14
4.7 Seismic Design.....	15
4.8 Pavements	16
Section 5.....	17
LIMITATIONS AND ADDITIONAL SERVICES	17
5.1 Limitations	17
5.2 Plan Review	18
5.3 Additional Services.....	19
Section 6.....	20
REFERENCES	20

Appendices

APPENDIX A: Vicinity and Site Maps

APPENDIX B: Subsurface Soil Logs and Soil Key

APPENDIX C: Laboratory Test Results

APPENDIX D: Trench Backfill Detail

EXECUTIVE SUMMARY

This executive summary presents *selected* elements of our findings and professional opinions. This summary *may not* present all details needed for the proper application of our findings and professional opinions. Our findings, professional opinions, and application options are *best related through reading the full report*, and are best evaluated with the active participation of the engineer of record who developed them. The findings of this study are summarized below:

- Silty Sand soils (SM) predominate the near surface soils at the project site.
- Design soil bearing pressure = 2,000 psf with standard increases allowed by the California Building Code.
- The native soils are aggressive to concrete and steel. Concrete mixes for concrete placed in contact with native soils shall have a maximum water cement ratio of 0.60 and a minimum compressive strength of 4,000 psi (minimum of 5.5 sacks Type V cement per cubic yard). All concrete should be thoroughly vibrated to remove rock pockets and minimize air voids.
- All reinforcing bars, anchor bolts and hold down bolts shall have a minimum concrete cover of 3.0 inches unless epoxy coated (ASTM D3963/A934). Hold-down straps at the foundation perimeter and pressurized water lines below or within the foundations are not allowed.
- Pavement structural sections should be designed for silty sand subgrade soils (R-Value = 44) and an appropriate Traffic Index (TI) selected by the civil designer.

Section 1

INTRODUCTION**1.1 Project Description**

This report presents the findings of our geotechnical exploration and soil testing for the proposed Calexico East LPOE “Gateway” Water Treatment Plant (WTP) Upgrades project located east of Calexico, California (See Vicinity Map, Plate A-1). The proposed development will consist of a new generator mat foundation and concrete parking area. A site plan for the proposed development was provided by The Holt Group. The generator is planned to be placed on a mat foundation.

1.2 Purpose and Scope of Work

The purpose of this limited geotechnical study was to investigate the subsurface soil at selected locations within the site for evaluation of physical/engineering properties. This study excludes liquefaction potential evaluation during seismic events. Professional opinions were developed from field and laboratory test data and are provided in this report regarding geotechnical conditions at this site and the effect on design and construction. The scope of our services consisted of the following:

- ▶ Field exploration and in-situ testing of the site soils at selected locations and depths.
- ▶ Laboratory testing for physical and/or chemical properties of selected samples.
- ▶ Review of the available literature and publications pertaining to local geology, faulting, and seismicity.
- ▶ Engineering analysis and evaluation of the data collected.
- ▶ Preparation of this report presenting our findings and professional opinions regarding the geotechnical aspects of project design and construction.

This report addresses the following geotechnical parameters:

- ▶ Subsurface soil and groundwater conditions
- ▶ Site geology, regional faulting and seismicity, near source factors, and site seismic accelerations
- ▶ Expansive soil and methods of mitigation
- ▶ Aggressive soil conditions to metals and concrete

Professional opinions with regard to the above parameters are provided for the following:

- ▶ Site grading and earthwork
- ▶ Foundation subgrade preparation
- ▶ Allowable soil bearing pressures and estimated settlements
- ▶ Concrete slabs-on-grade
- ▶ Excavation conditions and buried utility installations
- ▶ Mitigation of the potential effects of salt concentrations in native soil to concrete mixes and steel reinforcement
- ▶ Seismic design parameters
- ▶ Pavement structural sections

Our scope of work for this limited geotechnical report did not include an evaluation of the site for liquefaction during earthquakes or for the presence of environmentally hazardous materials or conditions, storm water infiltration, groundwater mounding, or landscape suitability of the soil.

1.3 Authorization

James G. “Jack” Holt, Principal Engineer for The Holt Group, provided authorization by written agreement to proceed with our work on January 25, 2021. We conducted our work in general accordance with our written proposal dated January 25, 2021.

Section 2

METHODS OF INVESTIGATION**2.1 Field Exploration**

Subsurface exploration was performed on January 29, 2021 using a tow-behind, continuous flight auger to advance two (2) borings to a depth of 5 and 10 feet below existing ground surface at the project site. The approximate boring locations were established in the field and plotted on the site map by sighting to discernible site features. The boring locations are shown on the Site and Exploration Plan (Plate A-2).

A soils technician observed the drilling operations and maintained a log of the soil encountered. Soils were classified during drilling according to the Unified Soil Classification System using the visual-manual procedure in accordance with ASTM D2488. Bulk samples of the subsurface materials were retrieved from selected intervals for laboratory testing.

After logging and sampling the soil, the exploratory borings were backfilled with the excavated material. The backfill was loosely placed and was not compacted to the requirements specified for engineered fill.

The subsurface logs are presented on Plates B-1 and B-2 in Appendix B. A key to the log symbols is presented on Plate B-3. The stratification lines shown on the subsurface logs represent the approximate boundaries between the various strata. However, the transition from one stratum to another may be gradual over some range of depth.

2.2 Laboratory Testing

Laboratory tests were conducted on selected bulk (auger cuttings) soil samples obtained from the soil borings to aid in classification and evaluation of selected engineering properties of the site soils. The tests were conducted in general conformance to the procedures of the American Society for Testing and Materials (ASTM) or other standardized methods as referenced below.

The laboratory testing program consisted of the following tests:

- ▶ Particle Size Analyses (ASTM D422)
- ▶ Moisture-Density Relationship (ASTM D1557)
- ▶ R Value (CAL 301)
- ▶ Chemical Analyses (soluble sulfates & chlorides, pH, and resistivity) (Caltrans Methods)

The laboratory test results are presented on the subsurface logs (Appendix B) and in Appendix C.

Engineering parameters of soil strength, compressibility and relative density utilized for developing design criteria provided within this report were obtained from the field and laboratory testing program.

Section 3

DISCUSSION**3.1 Site Conditions**

The project site is currently an operational water treatment plant that services the Calexico East LPOE “Gateway” commercial businesses. The water treatment facility is approximately square in plan view, bounded by Gateway Road to the north and the Imperial Irrigation District’s South Alamo Canal to the east. Vacant lots are located to the south and west. The north and east portions of the site are elevated approximately 3 to 4 feet above the southwest corner of the site. The proposed location of the generator mat foundation is along the slope near the southern portion of the site. Adjacent properties are flat-lying and are approximately at the same elevation with this site. The Imperial Valley Detention Facility is located to the north across Gateway Road.

The project site lies at an elevation of approximately 35 feet above mean sea level (MSL) (El. 1035 local datum) in the Imperial Valley region of the California low desert. The surrounding properties lie on terrain which is flat (planar), part of a large agricultural valley, which was previously an ancient lake bed covered with fresh water to an elevation of 43± feet above MSL. Annual rainfall in this arid region is less than 3 inches per year with four months of average summertime temperatures above 100 °F. Winter temperatures are mild, seldom reaching freezing.

3.2 Geologic Setting

The project site is located in the Salton Trough region of the Colorado Desert physiographic province of southeastern California. The Salton Trough is a topographic and geologic structural depression resulting extending from the San Geronio Pass to the Gulf of California (Norris & Webb, 1990). The Salton Trough is bounded on the northeast by the San Andreas fault and Chocolate Mountains and the southwest by the Peninsular Range and faults of the San Jacinto Fault Zone. The Salton Trough represents the northward extension of the Gulf of California, containing both marine and non-marine sediments deposited since the Miocene Epoch (Morton, 1977). Tectonic activity that formed the trough continues at a high rate as evidenced by deformed young sedimentary deposits and high levels of seismicity. Figure 1 shows the location of the site in relation to regional faults and physiographic features.

The Imperial Valley is directly underlain by lacustrine deposits, which consist of interbedded lenticular and tabular silt, sand, and clay. The Late Pleistocene to Holocene (present) lake deposits are probably less than 100 feet thick and derived from periodic flooding of the Colorado River which intermittently formed a fresh water lake (Lake Cahuilla). Older deposits consist of Miocene to Pleistocene non-marine and marine sediments deposited during intrusions of the Gulf of California. Basement rock consisting of Mesozoic granite and Paleozoic metamorphic rocks are estimated to exist at depths between 15,000 - 20,000 feet.

3.3 Subsurface Soil

The U. S. Soil Conservation Service compiled a map of surface soil conditions based on a thirteen-year study from 1962-1975 (Zimmerman, 1981). The Soil Survey maps were published in 1981 and indicate that surficial deposits at the project site and surrounding area consist predominantly of loamy very fine sands of the Vint soil group (see Plate A-3). These loams are formed in sediment and alluvium of mixed origin (Colorado River overflows and fresh-water lake-bed sediments).

Subsurface soils encountered during the field exploration conducted on January 29, 2021 consist of silty sands. The subsurface logs (Plate B-1 and B-2) depict the stratigraphic relationships of the subsurface soil encountered at the point of exploration. Variations in subsurface stratigraphy may occur at the project site. The stratification lines shown on the subsurface log represent the approximate boundaries between the various strata. However, the transition from one stratum to another may be gradual over some range of depth.

3.4 Groundwater

Groundwater was encountered in the boring at about 7 feet at the time of exploration. Free flowing water bearing strata are located at 7 feet below ground surface. There is uncertainty in the accuracy of short-term water level measurements, particularly in fine-grained soil. Groundwater levels may fluctuate with precipitation, irrigation canal water level, drainage, and site grading. The referenced groundwater level should not be interpreted to represent an accurate or permanent condition.

3.5 Faulting

The project site is located in the seismically active Imperial Valley of southern California with numerous mapped faults of the San Andreas Fault System traversing the region. The San Andreas Fault System is comprised of the San Andreas, San Jacinto, and Elsinore Fault Zones in southern California. The Imperial fault represents a transition from the more continuous San Andreas fault to a more nearly echelon pattern characteristic of the faults under the Gulf of California (USGS, 1990). We have performed a computer-aided search of known faults or seismic zones that lie within a 41.3 mile radius of the project site (Table 1).

A fault map illustrating known active faults relative to the site is presented on Figure 1, *Regional Fault Map*. Figure 2 shows the project site in relation to local faults. The criterion for fault classification adopted by the California Geological Survey defines Earthquake Fault Zones along Holocene-active or pre-Holocene faults (CGS, 2019b). Earthquake Fault Zones are regulatory zones that address the hazard of surface fault rupture. A Holocene-active fault is one that has ruptured during Holocene time (within the last 11,700 years). A pre-Holocene fault is a fault that has not ruptured in the last 11,700 years. Pre-Holocene faults may still be capable of surface rupture in the future, but are not regulated by the Alquist-Priolo Act (AP).

Review of the current Earthquake Fault Zone maps (CGS, 2019a) indicates that the nearest zoned fault is the Imperial fault located approximately 1.2 miles east of the project site.

3.6 General Ground Motion Analysis

The project site is considered likely to be subjected to moderate to strong ground motion from earthquakes in the region. Ground motions are dependent primarily on the earthquake magnitude and distance to the seismogenic (rupture) zone. Acceleration magnitudes also are dependent upon attenuation by rock and soil deposits, direction of rupture and type of fault; therefore, ground motions may vary considerably in the same general area.

2019 CBC General Ground Motion Parameters: The California Building Code (CBC) requires that a site-specific ground motion hazard analysis be performed in accordance with ASCE 7-16 Section 11.4.8 for structures on Site Class D and E sites with S_1 greater than or equal to 0.2 and Site Class E sites with S_s greater than or equal to 1.0.

This project site has been classified as Site Class D and has a S_1 value of 0.73, which would require a site-specific ground motion hazard analysis. However, ASCE 7-16 Section 11.4.8 provides three exceptions which permit the use of conservative values of design parameters for certain conditions for Site Class D and E sites in lieu of a site specific hazard analysis. The exceptions are:

- Exception 1: Structures on Site Class E sites with S_s greater than or equal to 1.0, provided the site coefficient F_a is taken as equal to that of Site Class C.
- Exception 2: Structures on Site Class D sites with S_1 greater than or equal to 0.2, provided the value of the seismic response coefficient C_s is determined by Equations 12.8-2 for values of $T \leq 1.5T_s$ and taken as equal to 1.5 times the value computed in accordance with either Equation 12.8-3 for $T_L \geq T > 1.5T_s$ or Equation 12.8-4 for $T > T_L$.
- Exception 3: Structures on Site Class E sites with S_1 greater than or equal to 0.2, provided that T is less than or equal to T_s and the equivalent static force procedure is used for design.

The project design engineer should confirm that an exception applies to the project. If none of the exceptions apply, our office should be consulted to perform a site-specific ground motion hazard analysis.

The 2019 CBC general ground motion parameters are based on the Risk-Targeted Maximum Considered Earthquake (MCE_R). The Structural Engineers Association of California (SEAOC) and Office of Statewide Health Planning and Development (OSHPD) Seismic Design Maps Web Application (SEAOC, 2021) was used to obtain the site coefficients and adjusted maximum considered earthquake spectral response acceleration parameters. Design spectral response acceleration parameters are defined as the earthquake ground motions that are two-thirds ($2/3$) of the corresponding MCE_R ground motions. The Maximum Considered Earthquake Geometric Mean (MCE_G) peak ground acceleration adjusted for soil site class effects ($PGAM$) value in accordance with 2019 CBC Section 1803.5.12 ($PGAM = F_{PGA} * PGA$) is estimated at 0.94g for the project site. **Design earthquake ground motion parameters are provided in Table 2.**

3.7 Seismic and Other Hazards

- ▶ **Groundshaking.** The primary seismic hazard at the project site is the potential for strong groundshaking during earthquakes along the Imperial, Brawley, and Superstition Hills faults.
- ▶ **Surface Rupture.** The California Geological Survey (2019b) has established Earthquake Fault Zones in accordance with the 1972 Alquist-Priolo Earthquake Fault Zone Act. The Earthquake Fault Zones consists of boundary zones surrounding well defined, active faults or fault segments. The project site does not lie within an A-P Earthquake Fault Zone; therefore, surface fault rupture is considered to be low at the project site.
- ▶ **Liquefaction and lateral spreading.** Liquefaction is a potential design consideration because of underlying saturated sandy substrata. Although the Imperial Valley has not yet been evaluated for seismic hazards by the California Geological Survey seismic hazards zonation program, liquefaction is well documented in the Imperial Valley after strong seismic events (McCrink, et al, 2011 and Rymer et al, 2011). *The evaluation for the potential for liquefaction induced settlements at the site is not included in the scope of work for this project.*

Other Potential Geologic Hazards.

- ▶ **Landsliding.** The hazard of landsliding is unlikely due to the regional planar topography. No ancient landslides are shown on geologic maps, aerial photographs and topographic maps of the region and no indications of landslides were observed during our site investigation.
- ▶ **Volcanic hazards.** The site is not located proximal to any known volcanically active area and the risk of volcanic hazards is considered low.
- ▶ **Tsunamis and seiches.** Tsunamis are giant ocean waves created by strong underwater seismic events, asteroid impact, or large landslides. Seiches are large waves generated in enclosed bodies of water in response to strong ground shaking. The site is not located near any large bodies of water, so the threat of tsunami, seiches, or other seismically-induced flooding is considered unlikely.
- ▶ **Flooding.** Based on our review of FEMA (2008) FIRM Panel 06025C2100C which encompasses the project site, the project site is located in Flood Zone X, an area determined to be outside the 0.2% annual chance (500-year) floodplain.
- ▶ **Expansive soils.** In general, much of the near surface soils in the Imperial Valley consist of silty clays and clays which are moderate to highly expansive. The expansive soil conditions are discussed in more detail in Section 3.3.

Section 4

DESIGN CRITERIA**4.1 Site Preparation**

Clearing and Grubbing: The planned generator foundation location is currently covered by 7 to 12 inches of Class 2 aggregate base. The surface aggregate base should be removed to three (3) feet beyond the foundation perimeter.

Generator Mat Foundation Pad Preparation: The generator may be placed on a structural mat foundation. The existing surface soil within the mat foundation area should be removed to a minimum 12 inches below the bottom of the mat foundation elevation or existing grade (whichever is lower) extending three feet beyond the mat slab. Exposed subgrade soil shall be moisture condition 2% below to 2% above optimum moisture and compacted to minimum 95% relative compaction.

Structural fill consisting of 12 inches of Class 2 aggregate base shall be placed below the mat foundation. The aggregate base shall be compacted to a minimum of 95% of ASTM D1557 maximum density at 2% below to 4% above optimum moisture.

Sidewalk and Concrete Hardscape Areas: In areas other than the building pad which are to receive sidewalks or area concrete slabs, the ground surface should be scarified to 12 inches, moisture conditioned to a minimum of 2% over optimum, and recompact to a minimum of 90% of ASTM D1557 maximum density just prior to concrete placement.

Observation and Density Testing: All site preparation and fill placement should be continuously observed and tested by a representative of a qualified geotechnical engineering firm. Full-time observation services during the excavation and scarification process is necessary to detect undesirable materials or conditions and soft areas that may be encountered in the construction area. The geotechnical firm that provides observation and testing during construction shall assume the responsibility of "*geotechnical engineer of record*" and, as such, shall perform additional tests and investigation as necessary to satisfy themselves as to the site conditions and the geotechnical parameters for site development.

4.2 Foundations and Settlements

Foundations may be designed using an allowable soil bearing pressure of 2,000 psf when foundations are supported on imported Class 2 aggregate base (extending a minimum of 1.0 feet below foundation). The allowable soil pressure may be increased by one-third for short term loads induced by winds or seismic events. The maximum allowable soil pressure at increased embedment depths shall not exceed 3,000 psf.

Flat Plate Structural Mat: The structural mat shall have a double mat of steel (minimum No. 4's @ 12" O.C. each way – top and bottom) and a minimum thickness of 12 inches. The structural mat may be designed for a modulus of subgrade reaction (Ks) of 250 pci when placed on 12 inches of aggregate base over native silty sands. The mat foundation pad shall be moisture conditioned and recompacted as specified in Section 4.1 of this report.

Resistance to horizontal loads will be developed by passive earth pressure on the sides of footings and frictional resistance developed along the bases of footings and concrete slabs. Passive resistance to lateral earth pressure may be calculated using an equivalent fluid pressure of 300 pcf to resist lateral loadings. The top one foot of embedment should not be considered in computing passive resistance unless the adjacent area is confined by a slab or pavement. An allowable friction coefficient of 0.35 may also be used at the base of the footings to resist lateral loading.

Settlements: Foundation movement under the estimated static (non-seismic) loadings and static site conditions are estimated to not exceed 1 inch with differential movement of about two-thirds of total movement for the loading assumptions stated above when the subgrade preparation guidelines given above are followed. Movement during a maximum considered earthquake seismic event has not been evaluated.

4.3 Non-Structural Concrete

Non-structural Concrete: All non-structural independent flatwork (housekeeping slabs) shall be a minimum of 4 inches thick and should be placed on a minimum of 2 inches of concrete sand or aggregate base, dowelled to the perimeter foundations where adjacent to the building to prevent separation and sloped 2% (sidewalks) or 1 to 2% (patios) away from the building.

A minimum of 12 inches of moisture conditioned (2% minimum above optimum) and compacted subgrade (90% minimum) should underlie all independent flatwork. Flatwork which contains steel reinforcing (except wire mesh) should be underlain by a 10-mil (minimum) polyethylene separation sheet and at least a 2-inch sand cover. All flatwork should be jointed in square patterns and at irregularities in shape at a maximum spacing of 8 feet or the least width of the sidewalk.

4.4 Concrete Mixes and Corrosivity

Selected chemical analyses for corrosivity were conducted on bulk samples of the near surface soil from the project site (Plate C-2). The native soils were found to have S0 (low) levels of sulfate ion concentration (12 ppm). Sulfate ions in high concentrations can attack the cementitious material in concrete, causing weakening of the cement matrix and eventual deterioration by raveling. The following table provides American Concrete Institute (ACI) recommended cement types, water-cement ratio and minimum compressive strengths for concrete in contact with soils:

Concrete Mix Design Criteria due to Soluble Sulfate Exposure

Sulfate Exposure Class	Water-soluble Sulfate (SO ₄) in soil, ppm	Cement Type	Maximum Water-Cement Ratio by weight	Minimum Strength f'c (psi)
S0	0-1,000	—	—	—
S1	1,000-2,000	II	0.50	4,000
S2	2,000-20,000	V	0.45	4,500
S3	Over 20,000	V (plus Pozzolon)	0.45	4,500

Note: From ACI 318-14 Table 19.3.1.1 and Table 19.3.2.1

However, due to the generally corrosive nature of soils in the area, a minimum 5.5 sack concrete (4,000 psi) of Type V Portland Cement with a maximum water/cement ratio of 0.60 (by weight) should be used for concrete placed in contact with native soil on this project (sitework including pavements and foundations).

The native soil has low levels of chloride ion concentration (80 ppm). Chloride ions can cause corrosion of reinforcing steel, anchor bolts and other buried metallic conduits. Resistivity determinations on the soil indicate severe potential for metal loss because of electrochemical corrosion processes. Mitigation of the corrosion of steel can be achieved by using steel pipes coated with epoxy corrosion inhibitors, asphaltic and epoxy coatings, cathodic protection or by encapsulating the portion of the pipe lying above groundwater with a minimum of 3 inches of densely consolidated concrete. ***No metallic water pipes or conduits should be placed below foundations.***

Foundation designs shall provide a minimum concrete cover of three (3) inches around steel reinforcing or embedded components (anchor bolts, etc.) exposed to native soil or landscape water (to 18 inches above grade). If the 3-inch concrete edge distance cannot be achieved, all embedded steel components (anchor bolts, etc.) shall be epoxy coated for corrosion protection (in accordance with ASTM D3963/A934) or a corrosion inhibitor and a permanent waterproofing membrane shall be placed along the exterior face of the exterior footings. ***Hold-down straps should not be used at foundation edges due to corrosion of metal at its protrusion from the slab edge.*** Additionally, the concrete should be thoroughly vibrated at footings during placement to decrease the permeability of the concrete.

Copper water piping (except for trap primers) should not be placed under floor slabs. All copper piping within 18 inches of ground surface shall be sleeved or wrapped with two layers of 10 mil plumbers tape or sleeved with PVC piping to prevent contact with soil. The trap primer pipe shall be completely encapsulated in a PVC sleeve and Type K copper should be utilized if polyethylene tubing cannot be used. Pressurized waterlines are not allowed under the floor slab.

Landmark does not practice corrosion engineering. We recommend that a qualified corrosion engineer evaluate the corrosion potential on metal construction materials and concrete at the site to obtain final design recommendations.

4.5 Excavations

All site excavations should conform to CalOSHA requirements for Type C soil (sands). The contractor is solely responsible for the safety of workers entering trenches. Temporary excavations with depths of 4 feet or less may be no steeper than 1:1 (horizontal:vertical). Sandy soil slopes should be kept moist, but not saturated, to reduce the potential of raveling or sloughing. Excavations deeper than 4 feet will require shoring or slope inclinations in conformance to CAL/OSHA regulations for Type C soil. Surcharge loads of stockpiled soil or construction materials should be set back from the top of the slope a minimum distance equal to the height of the slope. All permanent slopes should not be steeper than 3:1 to reduce wind and rain erosion. Protected slopes with ground cover may be as steep as 2:1. However, maintenance with motorized equipment may not be possible at this inclination.

Groundwater was encountered at a depth of 7 feet on January 29, 2021. The contractor is cautioned to evaluate soil moisture and groundwater conditions at the time of bidding. Running ground conditions should be anticipated below 7 feet. Dewatering (by well points) will be necessary (prior to trenching) to install utilities in trenches greater than 7 feet below ground surface.

4.6 Utility Trench Backfill

Utility Trench Backfill: Prior to placement of utility bedding, the exposed subgrade at the bottom of trench excavations should be examined for soft, loose, or unstable soil. Loose materials at trench bottoms resulting from excavation disturbance should be removed to firm material. If extensive soft or unstable areas are encountered, these areas should be over-excavated to a depth of at least 2 feet or to a firm base and be replaced with additional bedding material.

Backfill Materials: Pipe zone backfill (i.e., material beneath and in the immediate vicinity of the pipe) should consist of a 4 to 8 inch bed of $\frac{3}{8}$ -inch crushed rock, sand/cement slurry (3 sack cement factor), and/or crusher fines (sand) extending to a minimum of 12 inches above the top of pipe. If crushed rock is used for pipe zone backfill for utilities, the crushed rock material should be completely surrounded by a non-woven filter fabric such as Mirafi 140N or equivalent. The filter fabric shall cover the trench bottom, sidewalls and over the top of the crushed rock. The filter fabric is recommended to inhibit the migration of fine material into void spaces in the crushed rock which may create the potential for sinkholes or depressions to develop at the ground surface.

Pipe bedding should be in accordance with pipe manufacturer's recommendations. Recommendations provided above for pipe zone backfill are minimum requirements only. More stringent material specifications may be required to fulfill local codes and/or bedding requirements for specific types of pipes. On-site soil free of debris, vegetation, and other deleterious matter may be suitable for use as utility trench backfill above pipezone, but may be difficult to uniformly maintain at specified moistures and compact to the specified densities. Native backfill should only be placed and compacted after encapsulating buried pipes with suitable bedding and pipe envelope material.

Compaction Criteria: Mechanical compaction is recommended; ponding or jetting should not be allowed, especially in areas supporting structural loads or beneath concrete slabs supported-on-grade, pavements, or other improvements. All trench backfill should be placed and compacted in accordance with recommendations provided above for engineered fill. The pipe zone material (crusher fines, sand) shall be compacted to a minimum of 95% of ASTM D1557 maximum density. Pipe deflection should be checked to not exceed 2% of pipe diameter. Native clay/silt soils may be used to backfill the remainder of the trench. Soils used for trench backfill shall be placed in maximum 6 inch lifts (loose), compacted to a minimum of 90% of ASTM D1557 maximum density at a minimum of 4% above optimum moisture.

Imported granular material is acceptable for backfill of utility trenches. Granular trench backfill used in building pad areas should be plugged with a solid (no clods or voids) 2-foot width of native clay soils at each end of the building foundation to prevent landscape water migration into the trench below the building. Backfill soil of utility trenches within paved areas should be uniformly moisture conditioned to a minimum of 4% above optimum moisture, placed in layers not more than 6 inches in thickness and mechanically compacted to a minimum of 90% of the ASTM D1557 maximum dry density, except that the top 12 inches shall be compacted to 95% (if granular trench backfill).

4.7 Seismic Design

This site is located in the seismically active southern California area and the site structures are subject to strong ground shaking due to potential fault movements along the Imperial fault. Designs should comply with the latest edition of the CBC for Site Class D using the seismic coefficients given in Section 3.6 and Table 2 of this report.

4.8 Pavements

Pavements should be designed according to the 2020 Caltrans Highway Design Manual or other acceptable methods. Traffic indices were not provided by the project engineer or owner; therefore, we have provided structural sections for several traffic indices for comparative evaluation. The public agency or design engineer should decide the appropriate traffic index for the site. Maintenance of proper drainage is necessary to prolong the service life of the pavements.

Based on the current Caltrans method, an estimated R-value of 44 for the subgrade soil and assumed traffic indices, the following table provides our estimates for asphaltic concrete (AC) and Portland Cement Concrete (PCC) pavement sections.

Pavement Structural Sections

R-Value of Subgrade Soil - 44

Design Method - Caltrans 2021

Traffic Index	Flexible Pavements		Rigid (PCC) Pavements	
	Asphaltic Concrete Thickness (in.)	Aggregate Base Thickness (in.)	Concrete Thickness (in.)	Aggregate Base Thickness (in.)
4.0	3.0	4.0	5.0	4.0
5.0	3.0	4.0	5.5	4.0
6.0	3.0	6.5	6.0	6.0
6.5	3.5	7.0	7.0	6.0

Notes:

- 1) Asphaltic concrete shall be Caltrans, Type A HMA (Hot Mix Asphalt), ¾ inch maximum (½ inch maximum for parking areas), with PG64-16 asphalt concrete, compacted to a minimum of 95% of the Hveem density (CAL 308) or a minimum of 92% of the Maximum Theoretical Density (ASTM D2041).
- 2) Aggregate base shall conform to Caltrans Class 2 (¾ in. maximum), compacted to a minimum of 95% of ASTM D1557 maximum dry density.
- 3) Place pavements on 12 inches of moisture conditioned (minimum optimum moisture) native silty sand soil compacted to a minimum of 95% of the maximum dry density determined by ASTM D1557. Prewetting of subgrade soils (to 3.5 feet) may be required depending on moisture of subgrade at time of aggregate base placement.
- 4) Portland cement concrete for pavements should have Type V cement, a minimum compressive strength of 4,000 psi at 28 days, and a maximum water-cement ratio of 0.50.
- 5) Typical Street Classifications (Imperial County).
 - Parking Areas: TI = 4.0
 - Cul-de-Sacs: TI = 5.0
 - Local Streets: TI = 6.0
 - Minor Collectors: TI = 6.5 (trash truck areas)

Section 5

LIMITATIONS AND ADDITIONAL SERVICES**5.1 Limitations**

The findings and professional opinions within this limited geotechnical report are based on current information regarding the proposed Calexico East LPOE “Gateway” WTP Upgrades east of Calexico, California. The conclusions and professional opinions of this report are invalid if:

- ▶ Structural loads change from those stated or the structures are relocated.
- ▶ The Additional Services section of this report is not followed.
- ▶ This report is used for adjacent or other property.
- ▶ Changes of grade or groundwater occur between the issuance of this report and construction other than those anticipated in this report.
- ▶ Any other change that materially alters the project from that proposed at the time this report was prepared.

This limited geotechnical report was prepared according to the generally accepted *geotechnical engineering standards of practice* that existed in Imperial County at the time the report was prepared. No express or implied warranties are made in connection with our services.

Findings and professional opinions in this report are based on selected points of field exploration, geologic literature, limited laboratory testing, and our understanding of the proposed project. Our analysis of data and professional opinions presented herein are based on the assumption that soil conditions do not vary significantly from those found at specific exploratory locations. Variations in soil conditions can exist between and beyond the exploration points or groundwater elevations may change. The nature and extend of such variations may not become evident until, during or after construction. If variations are detected, we should immediately be notified as these conditions may require additional studies, consultation, and possible design revisions.

Environmental or hazardous materials evaluations were not performed by Landmark for this project. Landmark will assume no responsibility or liability whatsoever for any claim, damage, or injury which results from pre-existing hazardous materials being encountered or present on the project site, or from the discovery of such hazardous materials.

The client has responsibility to see that all parties to the project including designer, contractor, and subcontractor are made aware of this entire report within a reasonable time from its issuance. This report should be considered invalid for periods after two years from the date of report issuance without a review of the validity of the findings and professional opinions by our firm, because of potential changes in the Geotechnical Engineering Standards of Practice. This report is based upon government regulations in effect at the time of preparation of this report. Future changes or modifications to these regulations may require modification of this report. Land or facility use, on and off-site conditions, regulations, design criteria, procedures, or other factors may change over time, which may require additional work. Any party other than the client who wishes to use this report shall notify Landmark of such intended use. Based on the intended use of the report, Landmark may require that additional work be performed and that an updated report be issued. Non-compliance with any of these requirements by the client or anyone else will release Landmark from any liability resulting from the use of this report by any unauthorized party and client agrees to defend, indemnify, and hold Landmark harmless from any claim or liability associated with such unauthorized use or non-compliance.

This report contains information that may be useful in the preparation of contract specifications. However, the report is not worded in such a manner that we recommend its use as a construction specification document without proper modification. The use of information contained in this report for bidding purposes should be done at the contractor's option and risk.

5.2 Plan Review

Landmark Consultants, Inc. should be retained during development of design and construction documents to check that the geotechnical professional opinions are appropriate for the proposed project and that the geotechnical professional opinions are properly interpreted and incorporated into the documents. Landmark should have the opportunity to review the final design plans and specifications for the project prior to the issuance of such for bidding.

Governmental agencies may require review of the plans by the geotechnical engineer of record for compliance to the geotechnical report.

5.3 Additional Services

We recommend that Landmark Consultant be retained to provide the tests and observations services during construction. *The geotechnical engineering firm providing such tests and observations shall become the geotechnical engineer of record and assume responsibility for the project.*

Landmark Consultants, Inc. professional opinions for this site are, to a high degree, dependent upon appropriate quality control of subgrade preparation, fill placement, and foundation construction. Accordingly, the findings and professional opinions in this report are made contingent upon the opportunity for Landmark Consultants to observe grading operations and foundation excavations for the proposed construction.

If parties other than Landmark Consultants, Inc. are engaged to provide observation and testing services during construction, such parties must be notified that they will be required to assume complete responsibility as the geotechnical engineer of record for the geotechnical phase of the project by concurring with the professional opinions in this report and/or by providing alternative professional guidance.

Additional information concerning the scope and cost of these services can be obtained from our office.

Section 6

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TABLES

Table 1
Summary of Characteristics of Closest Known Active Faults

Fault Name	Approximate Distance (miles)	Approximate Distance (km)	Maximum Moment Magnitude (Mw)	Fault Length (km)	Slip Rate (mm/yr)
Imperial	1.2	1.9	7	62 ± 6	20 ± 5
Rico *	7.7	12.3			
Brawley *	10.7	17.1			
Cerro Prieto *	13.0	20.8			
Superstition Hills	15.2	24.3	6.6	23 ± 2	4 ± 2
Unnamed 2*	16.5	26.3			
Borrego (Mexico)*	17.7	28.4			
Cucapah (Mexico)*	18.0	28.7			
Pescadores (Mexico)*	18.2	29.1			
Laguna Salada	19.0	30.4	7	67 ± 7	3.5 ± 1.5
Unnamed 1*	20.4	32.6			
Yuha*	21.6	34.5			
Superstition Mountain	21.7	34.7	6.6	24 ± 2	5 ± 3
Shell Beds	25.7	41.1			
Yuha Well *	26.2	41.9			
Algodones *	28.2	45.2			
Vista de Anza*	28.7	45.9			
Painted Gorge Wash*	32.3	51.7			
Ocotillo*	33.8	54.1			
Elmore Ranch	35.2	56.4	6.6	29 ± 3	1 ± 0.5
Elsinore - Coyote Mountain	37.5	60.0	6.8	39 ± 4	4 ± 2
San Jacinto - Borrego	41.3	66.1	6.6	29 ± 3	4 ± 2

* Note: Faults not included in CGS database.

Table 2
2019 California Building Code (CBC) and ASCE 7-16 Seismic Parameters

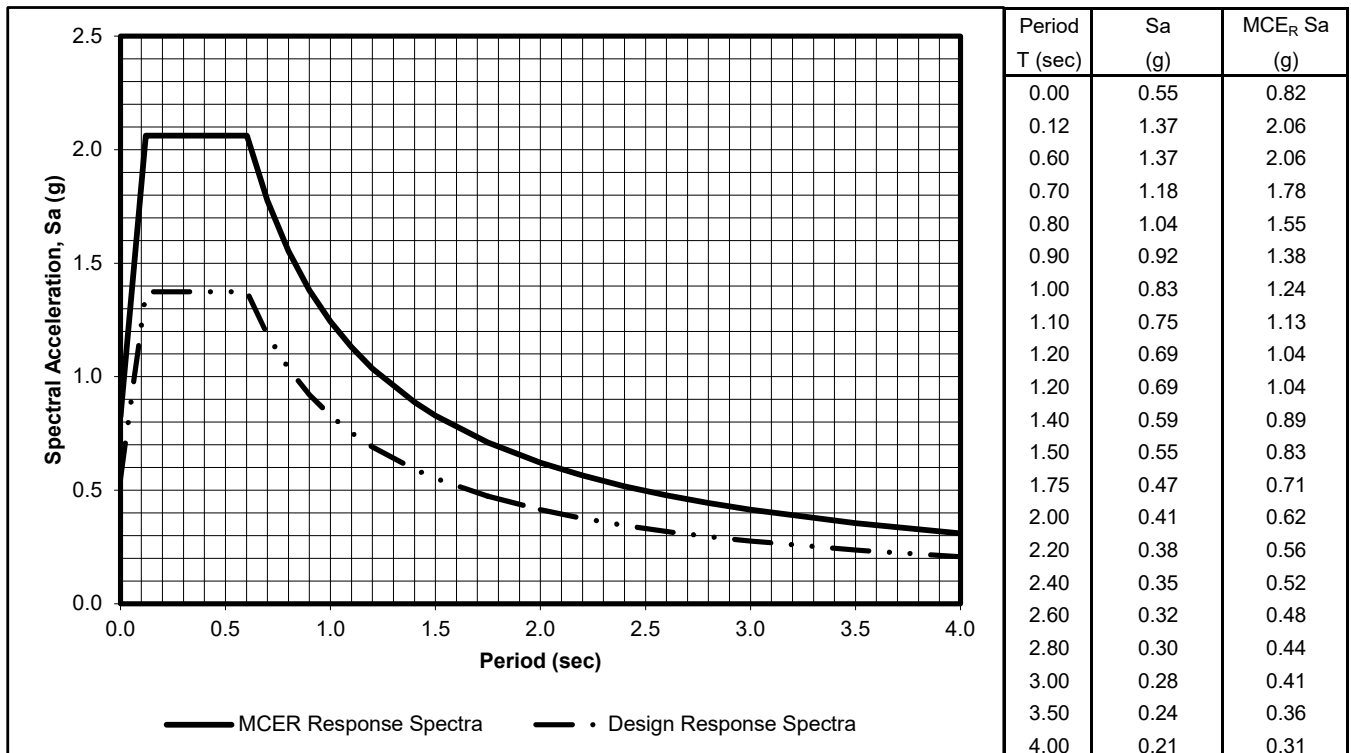
Soil Site Class:	D	<u>ASCE 7-16 Reference</u>
Latitude:	32.6885 N	Table 20.3-1
Longitude:	-115.3959 W	
Risk Category:	II	
Seismic Design Category:	D	

Maximum Considered Earthquake (MCE) Ground Motion

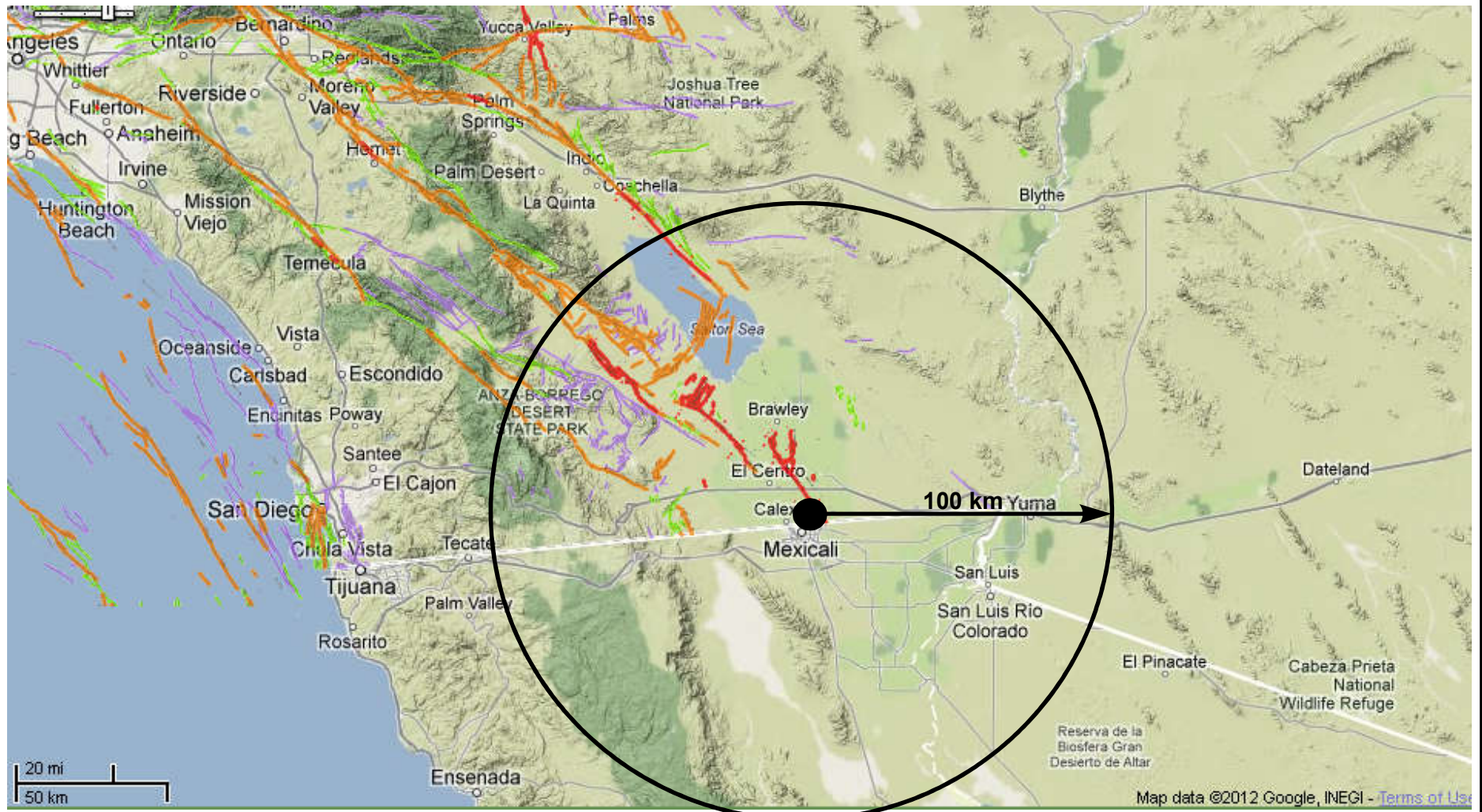
Mapped MCE _R Short Period Spectral Response	S_s	2.062 g	ASCE Figure 22-1
Mapped MCE _R 1 second Spectral Response	S₁	0.731 g	ASCE Figure 22-2
Short Period (0.2 s) Site Coefficient	F_a	1.00	ASCE Table 11.4-1
Long Period (1.0 s) Site Coefficient	F_v	1.70	ASCE Table 11.4-2
MCE _R Spectral Response Acceleration Parameter (0.2 s)	S_{MS}	2.062 g	= F _a * S _s ASCE Equation 11.4-1
MCE _R Spectral Response Acceleration Parameter (1.0 s)	S_{MI}	1.243 g	= F _v * S ₁ ASCE Equation 11.4-2

Design Earthquake Ground Motion

Design Spectral Response Acceleration Parameter (0.2 s)	S_{DS}	1.375 g	= 2/3*S _{MS}	ASCE Equation 11.4-3
Design Spectral Response Acceleration Parameter (1.0 s)	S_{DI}	0.828 g	= 2/3*S _{MI}	ASCE Equation 11.4-4
Risk Coefficient at Short Periods (less than 0.2 s)	C_{RS}	0.908		ASCE Figure 22-17
Risk Coefficient at Long Periods (greater than 1.0 s)	C_{RI}	0.893		ASCE Figure 22-18
	T_L	8.00 sec		ASCE Figure 22-12
	T_O	0.12 sec	= 0.2*S _{DI} /S _{DS}	
	T_S	0.60 sec	= S _{DI} /S _{DS}	
Peak Ground Acceleration	PGA_M	0.94 g		ASCE Equation 11.8-1



FIGURES



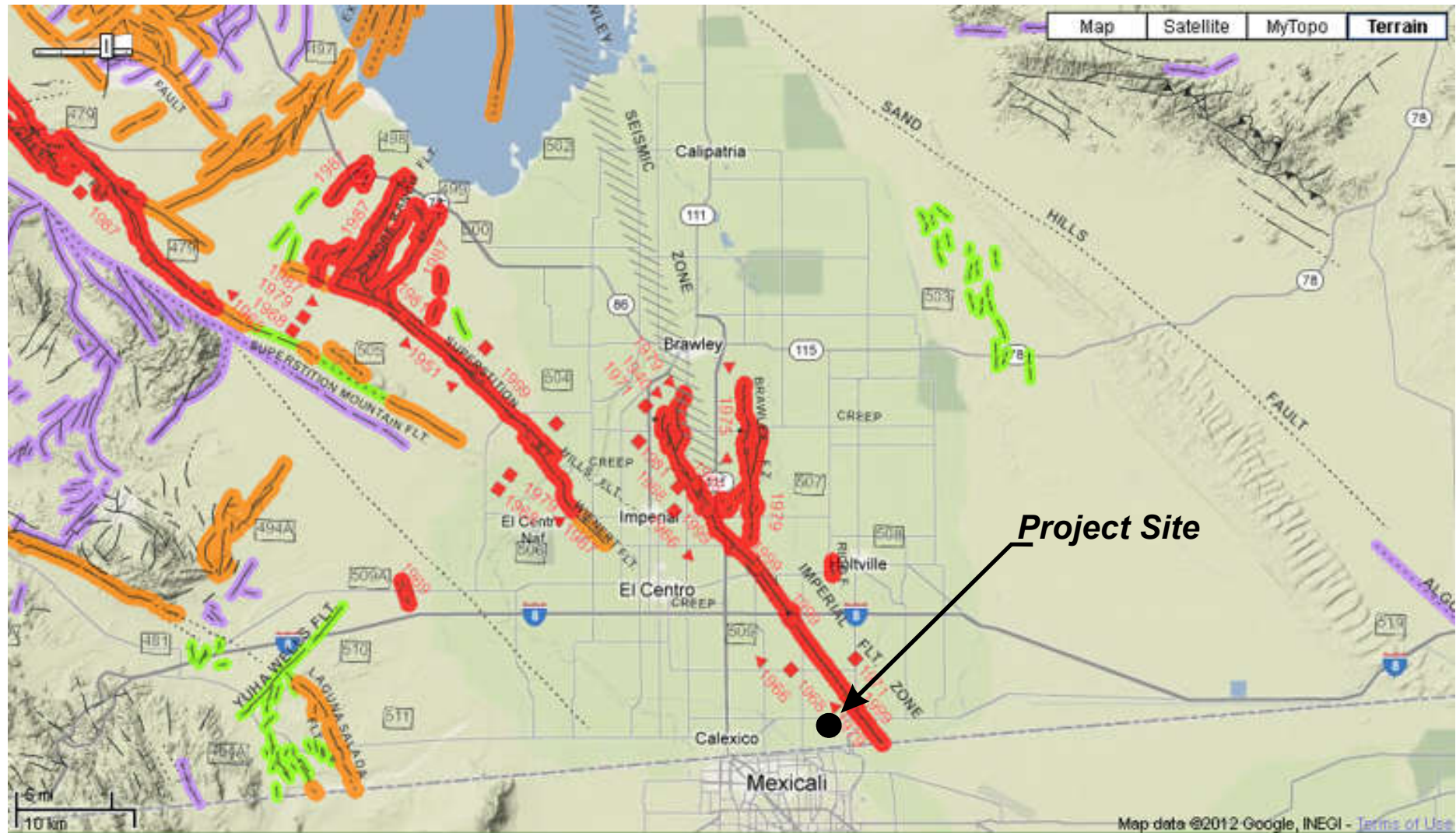
Source: California Geological Survey 2010 Fault Activity Map of California
<http://www.quake.ca.gov/gmaps/FAM/faultactivitymap.html#>

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Regional Fault Map

Figure 1



Source: California Geological Survey 2010 Fault Activity Map of California
<http://www.quake.ca.gov/gmaps/FAM/faultactivitymap.html#>

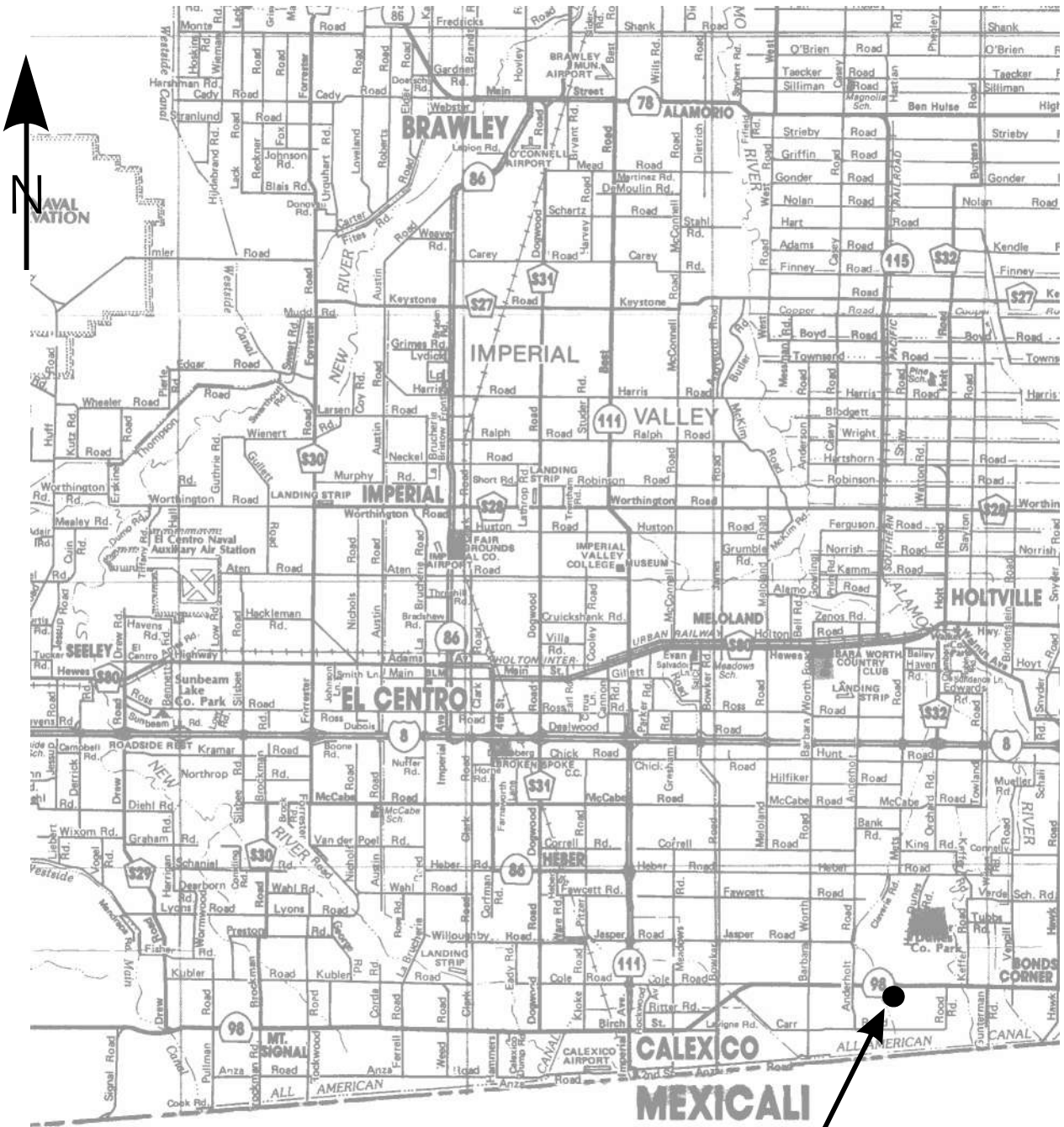
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Map of Local Faults

Figure 2

APPENDIX A

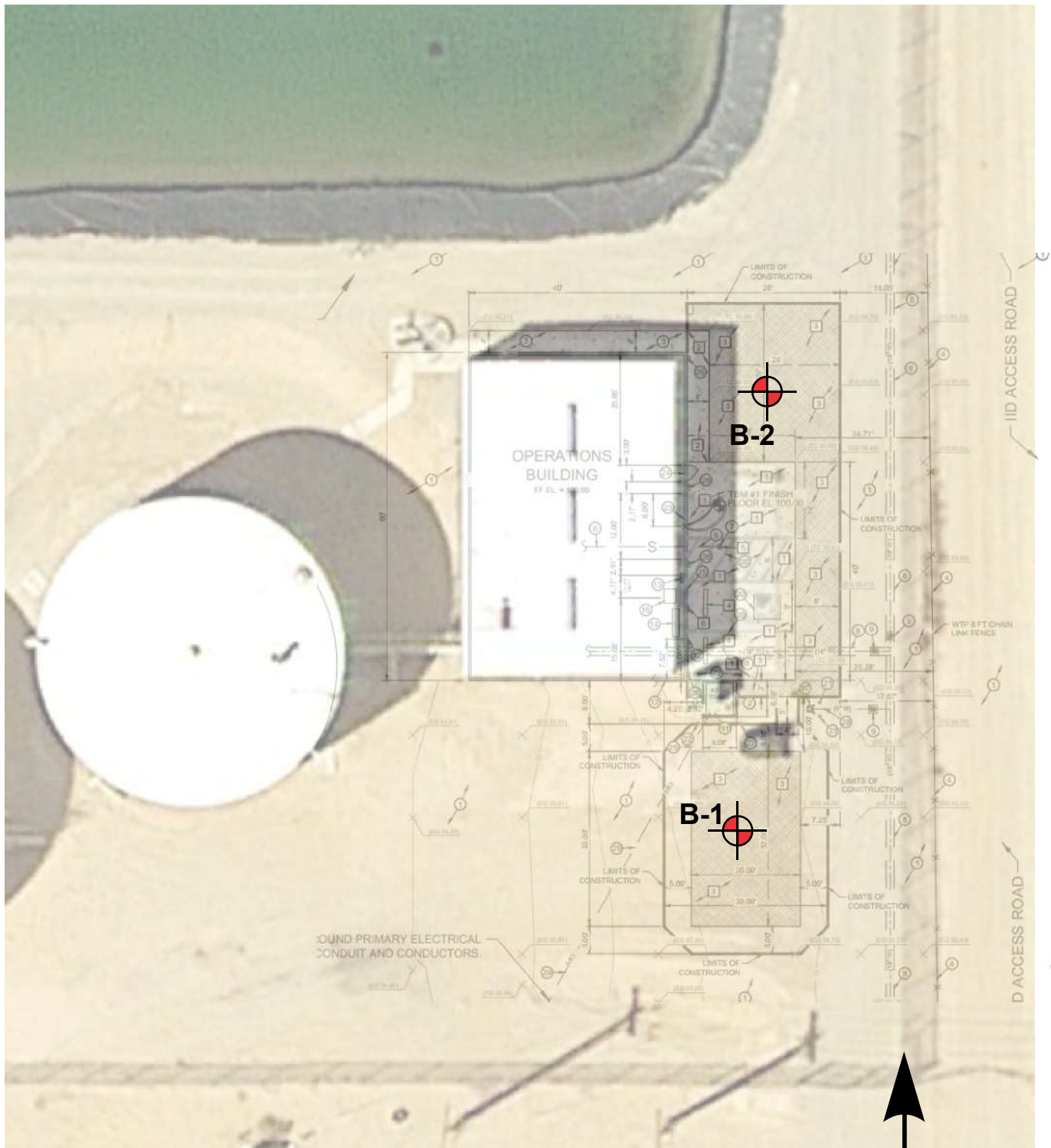


Project Site

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Vicinity Map

Plate
 A-1



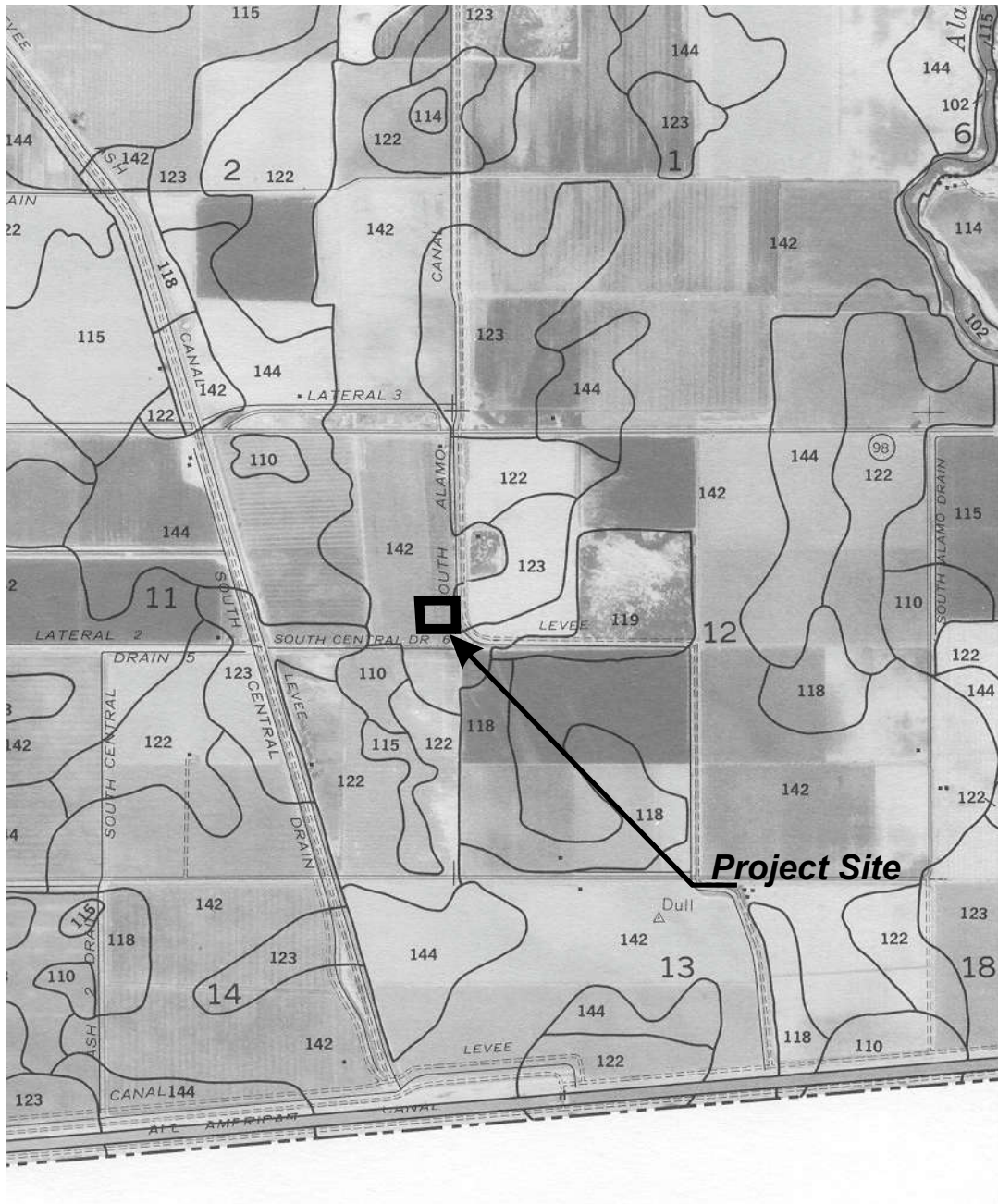
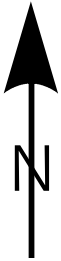
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Site and Exploration Map

Plate
A-2



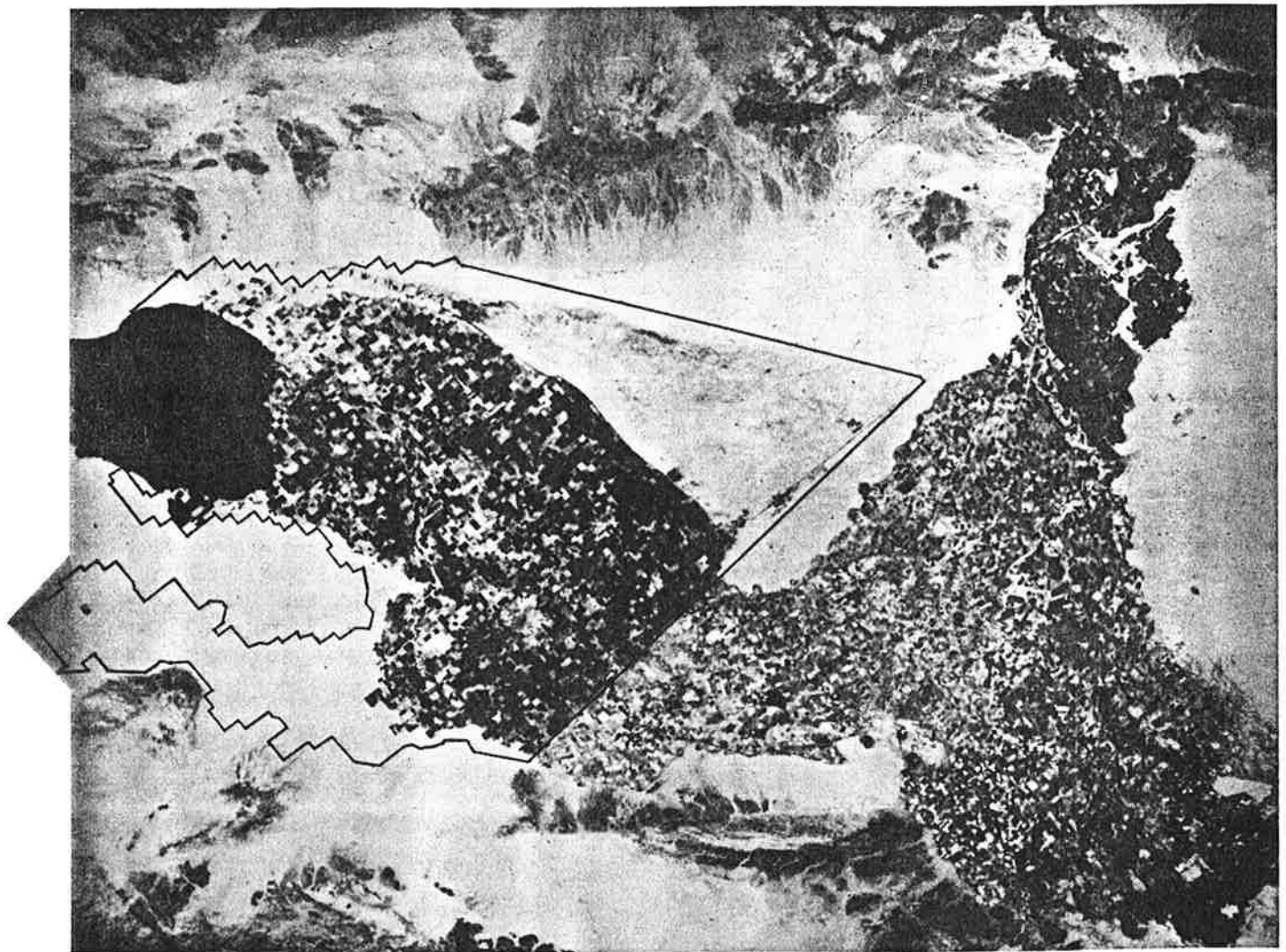
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Soil Survey Map

Plate
A-3

Soil Survey of

**IMPERIAL COUNTY
CALIFORNIA
IMPERIAL VALLEY AREA**



United States Department of Agriculture Soil Conservation Service
in cooperation with
University of California Agricultural Experiment Station
and
Imperial Irrigation District

TABLE 11.--ENGINEERING INDEX PROPERTIES

[The symbol > means more than. Absence of an entry indicates that data were not estimated]

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
100----- Antho	0-13 13-60	Loamy fine sand Sandy loam, fine sandy loam.	SM SM	A-2 A-2, A-4	0 0	100 90-100	100 75-95	75-85 50-60	10-30 15-40	--- ---	NP NP
101*: Antho-----	0-8 8-60	Loamy fine sand Sandy loam, fine sandy loam.	SM SM	A-2 A-2, A-4	0 0	100 90-100	100 75-95	75-85 50-60	10-30 15-40	--- ---	NP NP
Superstition-----	0-6 6-60	Fine sand----- Loamy fine sand, fine sand, sand.	SM SM	A-2 A-2	0 0	100 100	95-100 95-100	70-85 70-85	15-25 15-25	--- ---	NP NP
102*. Badland											
103----- Carsitas	0-10 10-60	Gravelly sand--- Gravelly sand, gravelly coarse sand, sand.	SP, SP-SM SP, SP-SM	A-1, A-2 A-1	0-5 0-5	60-90 60-90	50-85 50-85	30-55 25-50	0-10 0-10	--- ---	NP NP
104* Fluvaquents											
105----- Glenbar	0-13 13-60	Clay loam----- Clay loam, silty clay loam.	CL CL	A-6 A-6	0 0	100 100	100 100	90-100 90-100	70-95 70-95	35-45 35-45	15-30 15-30
106----- Glenbar	0-13 13-60	Clay loam----- Clay loam, silty clay loam.	CL CL	A-6, A-7 A-6, A-7	0 0	100 100	100 100	90-100 90-100	70-95 70-95	35-45 35-45	15-25 15-25
107*----- Glenbar	0-13 13-60	Loam----- Clay loam, silty clay loam.	ML, CL-ML, CL	A-4 A-6, A-7	0 0	100 100	100 100	100 95-100	70-80 75-95	20-30 35-45	NP-10 15-30
108----- Holtville	0-14 14-22 22-60	Loam----- Clay, silty clay Silt loam, very fine sandy loam.	ML CL, CH ML	A-4 A-7 A-4	0 0 0	100 100 100	100 100 100	85-100 95-100 95-100	55-95 85-95 65-85	25-35 40-65 25-35	NP-10 20-35 NP-10
109----- Holtville	0-17 17-24 24-35 35-60	Silty clay----- Clay, silty clay Silt loam, very fine sandy loam. Loamy very fine sand, loamy fine sand.	CL, CH CL, CH ML SM, ML	A-7 A-7 A-4 A-2, A-4	0 0 0 0	100 100 100 100	100 100 100 100	95-100 95-100 95-100 75-100	85-95 85-95 65-85 20-55	40-65 40-65 25-35 ---	20-35 20-35 NP-10 NP
110----- Holtville	0-17 17-24 24-35 35-60	Silty clay----- Clay, silty clay Silt loam, very fine sandy loam. Loamy very fine sand, loamy fine sand.	CH, CL CH, CL ML SM, ML	A-7 A-7 A-4 A-2, A-4	0 0 0 0	100 100 100 100	100 100 100 100	95-100 95-100 95-100 75-100	85-95 85-95 55-85 20-55	40-65 40-65 25-35 ---	20-35 20-35 NP-10 NP

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
111*: Holtville-----	0-10	Silty clay loam	CL, CH	A-7	0	100	100	95-100	85-95	40-65	20-35
	10-22	Clay, silty clay	CL, CH	A-7	0	100	100	95-100	85-95	40-65	20-35
	22-60	Silt loam, very fine sandy loam.	ML	A-4	0	100	100	95-100	65-85	25-35	NP-10
Imperial-----	0-12	Silty clay loam	CL	A-7	0	100	100	100	85-95	40-50	10-20
	12-60	Silty clay loam, silty clay, clay.	CH	A-7	0	100	100	100	85-95	50-70	25-45
112-----	0-12	Silty clay-----	CH	A-7	0	100	100	100	85-95	50-70	25-45
Imperial	12-60	Silty clay loam, silty clay, clay.	CH	A-7	0	100	100	100	85-95	50-70	25-45
113-----	0-12	Silty clay-----	CH	A-7	0	100	100	100	85-95	50-70	25-45
Imperial	12-60	Silty clay, clay, silty clay loam.	CH	A-7	0	100	100	100	85-95	50-70	25-45
114-----	0-12	Silty clay-----	CH	A-7	0	100	100	100	85-95	50-70	25-45
Imperial	12-60	Silty clay loam, silty clay, clay.	CH	A-7	0	100	100	100	85-95	50-70	25-45
115*: Imperial-----	0-12	Silty clay loam	CL	A-7	0	100	100	100	85-95	40-50	10-20
	12-60	Silty clay loam, silty clay, clay.	CH	A-7	0	100	100	100	85-95	50-70	25-45
Glenbar-----	0-13	Silty clay loam	CL	A-6, A-7	0	100	100	90-100	70-95	35-45	15-25
	13-60	Clay loam, silty clay loam.	CL	A-6, A-7	0	100	100	90-100	70-95	35-45	15-25
116*: Imperial-----	0-13	Silty clay loam	CL	A-7	0	100	100	100	85-95	40-50	10-20
	13-60	Silty clay loam, silty clay, clay.	CH	A-7	0	100	100	100	85-95	50-70	25-45
Glenbar-----	0-13	Silty clay loam	CL	A-6, A-7	0	100	100	90-100	70-95	35-45	15-25
	13-60	Clay loam, silty clay loam.	CL	A-6	0	100	100	90-100	70-95	35-45	15-30
117, 118-----	0-12	Loam-----	ML	A-4	0	95-100	95-100	85-100	75-90	20-30	NP-5
Indio	12-72	Stratified loamy very fine sand to silt loam.	ML	A-4	0	95-100	95-100	85-100	75-90	20-30	NP-5
119*: Indio-----	0-12	Loam-----	ML	A-4	0	95-100	95-100	85-100	75-90	20-30	NP-5
	12-72	Stratified loamy very fine sand to silt loam.	ML	A-4	0	95-100	95-100	85-100	75-90	20-30	NP-5
Vint-----	0-10	Loamy fine sand	SM	A-2	0	95-100	95-100	70-80	25-35	---	NP
	10-60	Loamy sand, loamy fine sand.	SM	A-2	0	95-100	95-100	70-80	20-30	---	NP
120*: Laveen-----	0-12	Loam-----	ML, CL-ML	A-4	0	100	95-100	75-85	55-65	20-30	NP-10
	12-60	Loam, very fine sandy loam.	ML, CL-ML	A-4	0	95-100	85-95	70-80	55-65	15-25	NP-10

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

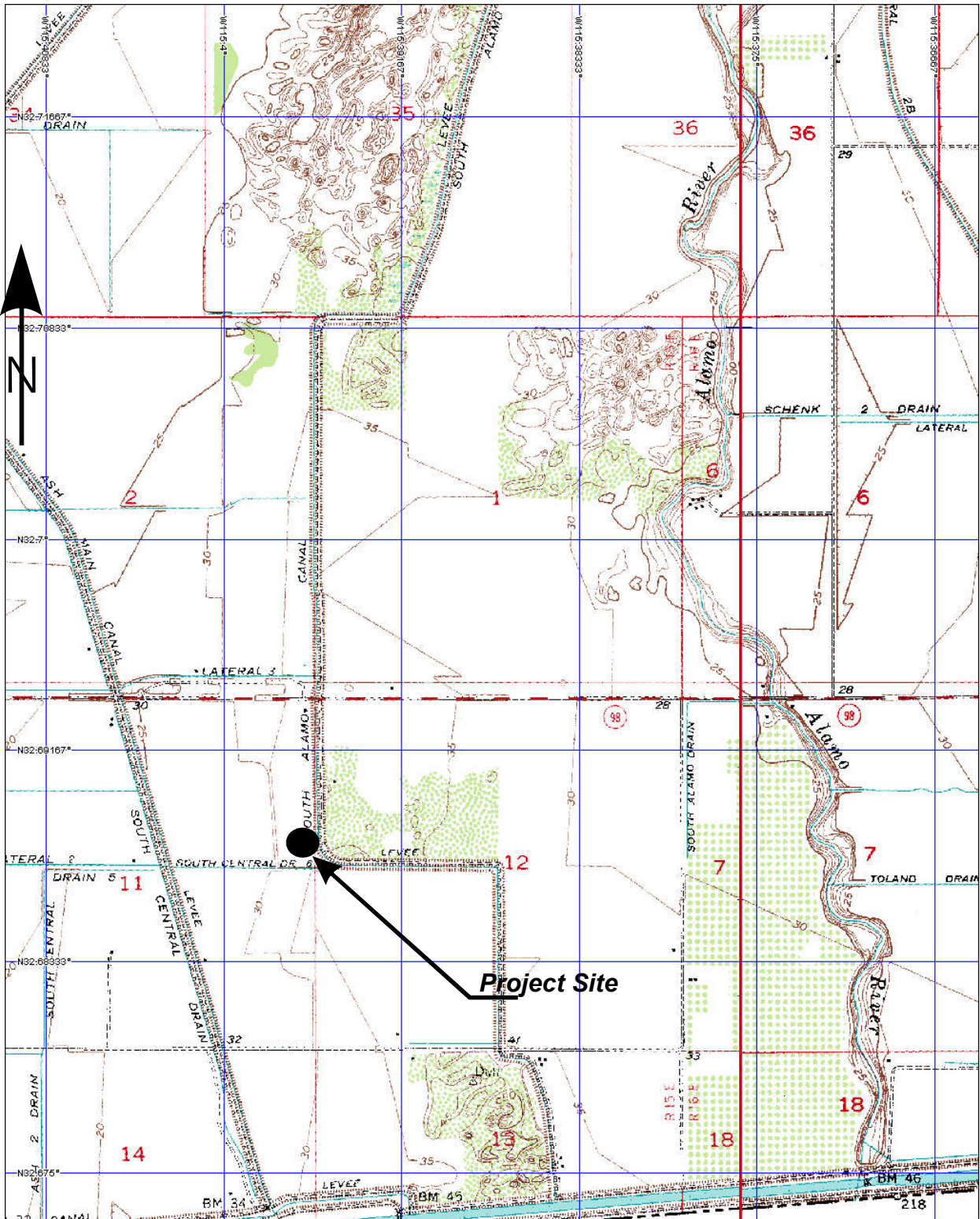
Soil name and map symbol	Depth In	USDA texture	Classification		Frag- ments > 3 inches Pct	Percentage passing sieve number--				Liquid limit Pet	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
121----- Meloland	0-12	Fine sand-----	SM, SP-SM	A-2, A-3	0	95-100	90-100	75-100	5-30	---	NP
	12-26	Stratified loamy fine sand to silt loam.	ML	A-4	0	100	100	90-100	50-65	25-35	NP-10
	26-71	Clay, silty clay, silty clay loam.	CL, CH	A-7	0	100	100	95-100	85-95	40-65	20-40
122----- Meloland	0-12	Very fine sandy loam.	ML	A-4	0	95-100	95-100	95-100	55-85	25-35	NP-10
	12-26	Stratified loamy fine sand to silt loam.	ML	A-4	0	100	100	90-100	50-70	25-35	NP-10
	26-71	Clay, silty clay, silty clay loam.	CH, CL	A-7	0	100	100	95-100	85-95	40-65	20-40
123*: Meloland-----	0-12	Loam-----	ML	A-4	0	95-100	95-100	95-100	55-85	25-35	NP-10
	12-26	Stratified loamy fine sand to silt loam.	ML	A-4	0	100	100	90-100	50-70	25-35	NP-10
	26-38	Clay, silty clay, silty clay loam.	CH, CL	A-7	0	100	100	95-100	85-95	40-65	20-40
	38-60	Stratified silt loam to loamy fine sand.	SM, ML	A-4	0	100	100	75-100	35-55	25-35	NP-10
Holtville-----	0-12	Loam-----	ML	A-4	0	100	100	85-100	55-95	25-35	NP-10
	12-24	Clay, silty clay	CH, CL	A-7	0	100	100	95-100	85-95	40-65	20-35
	24-36	Silt loam, very fine sandy loam.	ML	A-4	0	100	100	95-100	55-85	25-35	NP-10
	36-60	Loamy very fine sand, loamy fine sand.	SM, ML	A-2, A-4	0	100	100	75-100	20-55	---	NP
124, 125----- Niland	0-23	Gravelly sand---	SM, SP-SM	A-2, A-3	0	90-100	70-95	50-65	5-25	---	NP
	23-60	Silty clay, clay, clay loam.	CL, CH	A-7	0	100	100	85-100	80-95	40-65	20-40
126----- Niland	0-23	Fine sand-----	SM, SP-SM	A-2, A-3	0	90-100	90-100	50-65	5-25	---	NP
	23-60	Silty clay-----	CL, CH	A-7	0	100	100	85-100	80-95	40-65	20-40
127----- Niland	0-23	Loamy fine sand	SM	A-2	0	90-100	90-100	50-65	15-30	---	NP
	23-60	Silty clay-----	CL, CH	A-7	0	100	100	85-100	80-95	40-65	20-40
128*: Niland-----	0-23	Gravelly sand---	SM, SP-SM	A-2, A-3	0	90-100	70-95	50-65	5-25	---	NP
	23-60	Silty clay, clay, clay loam.	CL, CH	A-7	0	100	100	85-100	80-100	40-65	20-40
Imperial-----	0-12	Silty clay-----	CH	A-7	0	100	100	100	85-95	50-70	25-45
	12-60	Silty clay loam, silty clay, clay.	CH	A-7	0	100	100	100	85-95	50-70	25-45
129*: Pits											
130, 131----- Rositas	0-27	Sand-----	SP-SM	A-3, A-1, A-2	0	100	80-100	40-70	5-15	---	NP
	27-60	Sand, fine sand, loamy sand.	SM, SP-SM	A-3, A-2, A-1	0	100	80-100	40-85	5-30	---	NP

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
132, 133, 134, 135-Rositas	0-9	Fine sand-----	SM	A-3, A-2	0	100	80-100	50-80	10-25	---	NP
	9-60	Sand, fine sand, loamy sand.	SM, SP-SM	A-3, A-2, A-1	0	100	80-100	40-85	5-30	---	NP
136-----Rositas	0-4	Loamy fine sand	SM	A-1, A-2	0	100	80-100	40-85	10-35	---	NP
	4-60	Sand, fine sand, loamy sand.	SM, SP-SM	A-3, A-2, A-1	0	100	80-100	40-85	5-30	---	NP
137-----Rositas	0-12	Silt loam-----	ML	A-4	0	100	100	90-100	70-90	20-30	NP-5
	12-60	Sand, fine sand, loamy sand.	SM, SP-SM	A-3, A-2, A-1	0	100	80-100	40-85	5-30	---	NP
138*: Rositas-----	0-4	Loamy fine sand	SM	A-1, A-2	0	100	80-100	40-85	10-35	---	NP
	4-60	Sand, fine sand, loamy sand.	SM, SP-SM	A-3, A-2, A-1	0	100	80-100	40-85	5-30	---	NP
Superstition-----	0-6	Loamy fine sand	SM	A-2	0	100	95-100	70-85	15-25	---	NP
	6-60	Loamy fine sand, fine sand, sand.	SM	A-2	0	100	95-100	70-85	15-25	---	NP
139-----Superstition	0-6	Loamy fine sand	SM	A-2	0	100	95-100	70-85	15-25	---	NP
	6-60	Loamy fine sand, fine sand, sand.	SM	A-2	0	100	95-100	70-85	15-25	---	NP
140*: Torriorthents											
Rock outcrop											
141*: Torriorthents											
Orthids											
142-----Vint	0-10	Loamy very fine sand.	SM, ML	A-4	0	100	100	85-95	40-65	15-25	NP-5
	10-60	Loamy fine sand	SM	A-2	0	95-100	95-100	70-80	20-30	---	NP
143-----Vint	0-12	Fine sandy loam	ML, CL-ML, SM, SM-SC	A-4	0	100	100	75-85	45-55	15-25	NP-5
	12-60	Loamy sand, loamy fine sand.	SM	A-2	0	95-100	95-100	70-80	20-30	---	NP
144*: Vint-----	0-10	Very fine sandy loam.	SM, ML	A-4	0	100	100	85-95	40-65	15-25	NP-5
	10-40	Loamy fine sand	SM	A-2	0	95-100	95-100	70-80	20-30	---	NP
	40-60	Silty clay-----	CL, CH	A-7	0	100	100	95-100	85-95	40-65	20-35
Indio-----	0-12	Very fine sandy loam.	ML	A-4	0	95-100	95-100	85-100	75-90	20-30	NP-5
	12-40	Stratified loamy very fine sand to silt loam.	ML	A-4	0	95-100	95-100	85-100	75-90	20-30	NP-5
	40-72	Silty clay-----	CL, CH	A-7	0	100	100	95-100	85-95	40-65	20-35

* See description of the map unit for composition and behavior characteristics of the map unit.

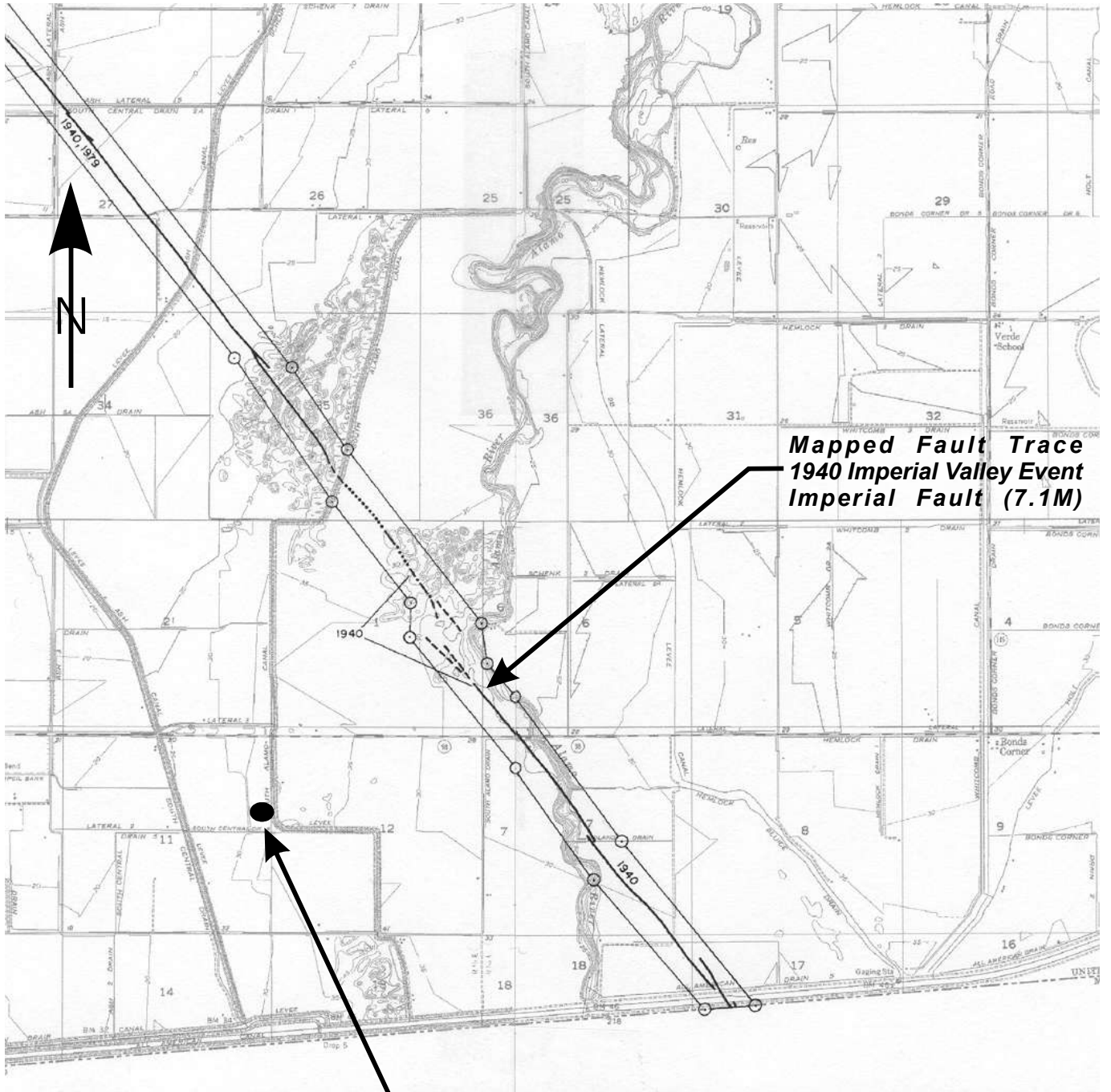


3-D TopoQuads Copyright © 1999 DeLorme Yarmouth, ME 04096 Source Data: USGS 650 ft Scale: 1: 22,400 Detail: 13-2 Datum: WGS84

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 Project No.: LE21020

Topographic Map

Plate
 A-4

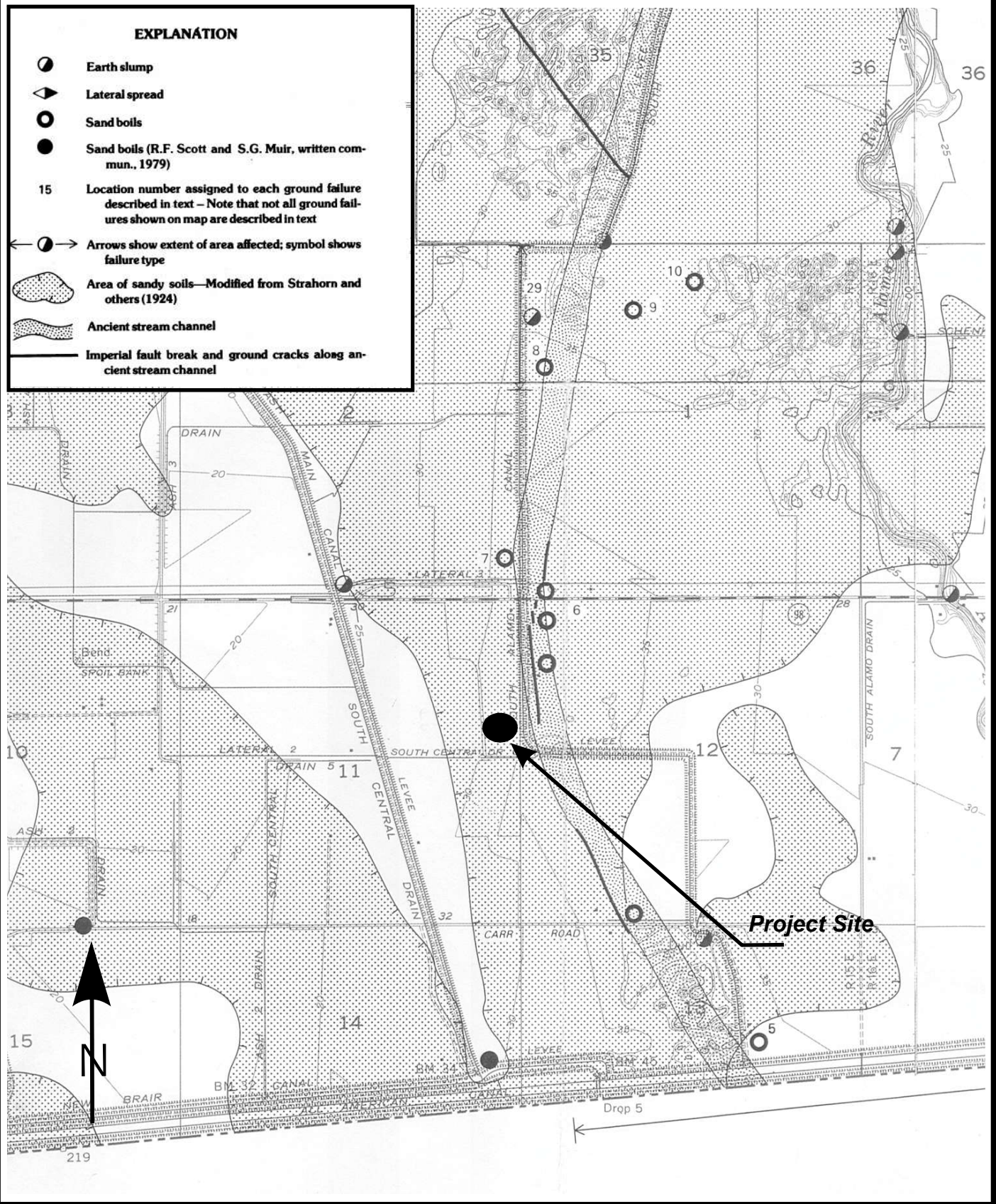


**Mapped Fault Trace
1940 Imperial Valley Event
Imperial Fault (7.1M)**

Project Site

EXPLANATION

- Earth slump
- ◄ Lateral spread
- Sand boils
- Sand boils (R.F. Scott and S.G. Muir, written commun., 1979)
- 15 Location number assigned to each ground failure described in text – Note that not all ground failures shown on map are described in text
- ◄ ● ► Arrows show extent of area affected; symbol shows failure type
- ▨ Area of sandy soils—Modified from Strahorn and others (1924)
- ▧ Ancient stream channel
- Imperial fault break and ground cracks along ancient stream channel




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 Project No.: LE21020

**Earthquake Liquefaction Sites from
 1979 Imperial Valley Earthquake**

**Plate
 A-6**

APPENDIX B

DEPTH	FIELD				LOG OF BORING NO. B-1 SHEET 1 OF 1	LABORATORY		
	SAMPLE	USCS CLASS.	BLOW COUNT	POCKET PEN. (tsf)	DESCRIPTION OF MATERIAL	DRY DENSITY (pcf)	MOISTURE CONTENT (% dry wt.)	OTHER TESTS
	 				GRAVELLY SAND (SP): Tan, moist, fine grained sands.			
	 				SILTY SAND (SM): Tan, moist, fine and very fine grained sands.			
5								
					 SILTY SAND (SM): Tan, sat., fine and very fine grained sands.			
10								
15								
20								
25								
30								

DATE DRILLED: 1/29/21 TOTAL DEPTH: 10 Feet DEPTH TO WATER: 7'
 LOGGED BY: P. LaBrucherie TYPE OF BIT: 6" Auger DIAMETER: 6"
 SURFACE ELEVATION: Approximately 36' HAMMER WT.: N/A DROP: N/A

PROJECT No. LE21020



PLATE B-1

DEPTH	FIELD				LOG OF BORING NO. B-2 SHEET 1 OF 1	LABORATORY		
	SAMPLE	USCS CLASS.	BLOW COUNT	POCKET PEN. (tsf)	DESCRIPTION OF MATERIAL	DRY DENSITY (pcf)	MOISTURE CONTENT (% dry wt.)	OTHER TESTS
					Aggregate Base (GM-GP): Gray, moist, approx 7" thick.			
					SILTY SAND (SM): Tan, moist, fine and very fine grained sands.			
5								
10								
15								
20								
25								
30								

DATE DRILLED: 1/29/21 TOTAL DEPTH: 4 Feet DEPTH TO WATER: NA
 LOGGED BY: P. LaBrucherie TYPE OF BIT: 6" Auger DIAMETER: 6"
 SURFACE ELEVATION: Approximately 36' HAMMER WT.: N/A DROP: N/A

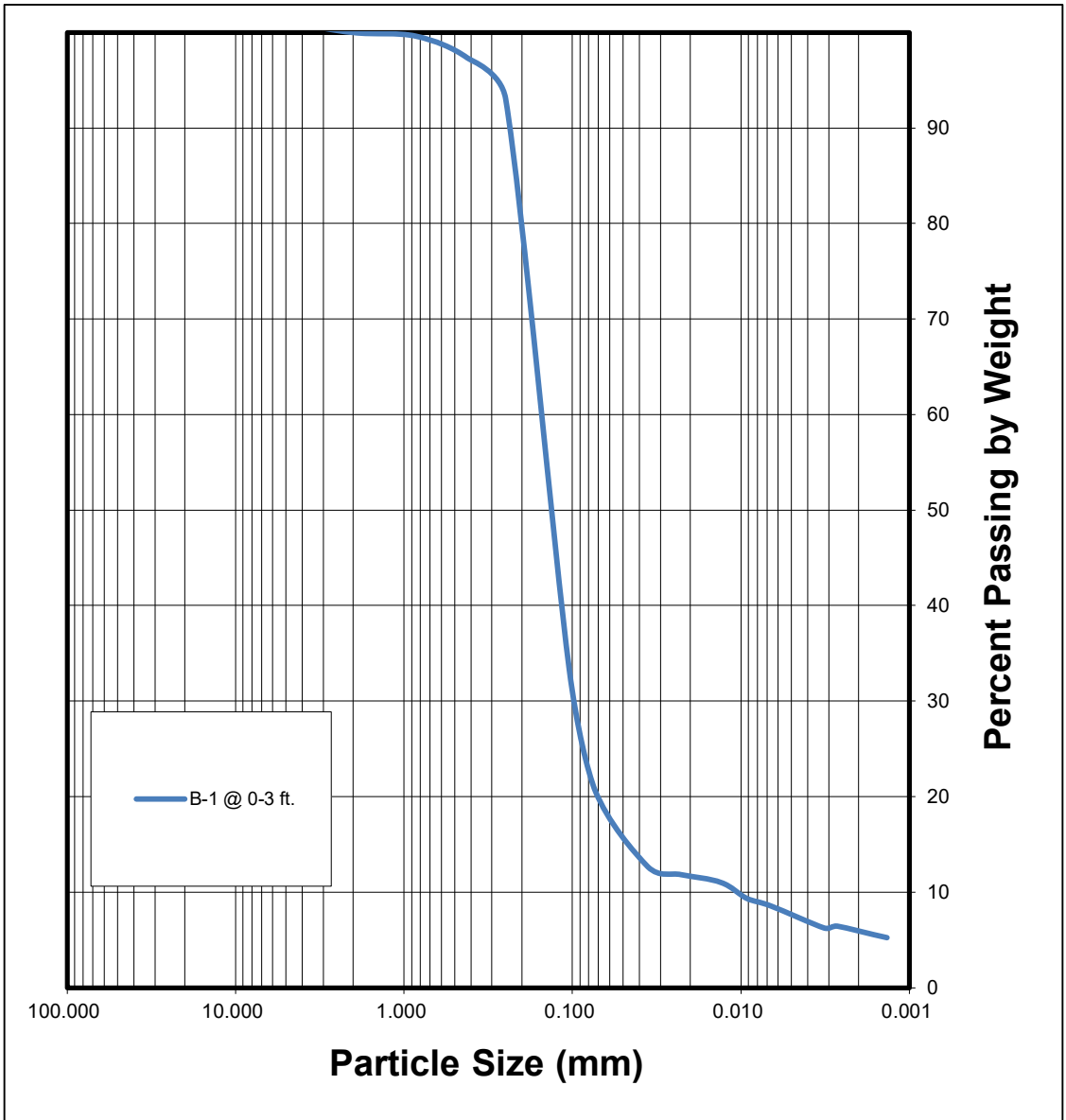
PROJECT No. LE21020



PLATE B-2

APPENDIX C

SIEVE ANALYSIS					HYDROMETER ANALYSIS
Gravel		Sand			Silt and Clay Fraction
Coarse	Fine	Coarse	Medium	Fine	



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Project No.: LE21020

Grain Size Analysis

Plate
C-1

LANDMARK CONSULTANTS, INC.

CLIENT: The Holt Group
PROJECT: Gateway WTP Upgrades
JOB No.: LE21020
DATE: 02/08/21

CHEMICAL ANALYSIS

		Caltrans Method
Boring:	B-1	
Sample Depth, ft:	0-3	
pH:	8.43	643
Electrical Conductivity (mmhos):	--	424
Resistivity (ohm-cm):	1,500	643
Chloride (Cl), ppm:	80	422
Sulfate (SO₄), ppm:	12	417

General Guidelines for Soil Corrosivity

Material Affected	Chemical Agent	Range of Values	Degree of Corrosivity
Concrete	Soluble Sulfates (ppm)	0 - 1,000	Low
		1,000 - 2,000	Moderate
		2,000 - 20,000	Severe
		> 20,000	Very Severe
Normal Grade Steel	Soluble Chlorides (ppm)	0 - 200	Low
		200 - 700	Moderate
		700 - 1,500	Severe
		> 1,500	Very Severe
Normal Grade Steel	Resistivity (ohm-cm)	1 - 1,000	Very Severe
		1,000 - 2,000	Severe
		2,000 - 10,000	Moderate
		> 10,000	Low



Project No.: LE21020

Selected Chemical Test Results

Plate C-2

LANDMARK CONSULTANTS, INC.

Client: The Holt Group
Project: Gateway WTP Upgrades
Project No.: LE21020
Date: 2/3/2021

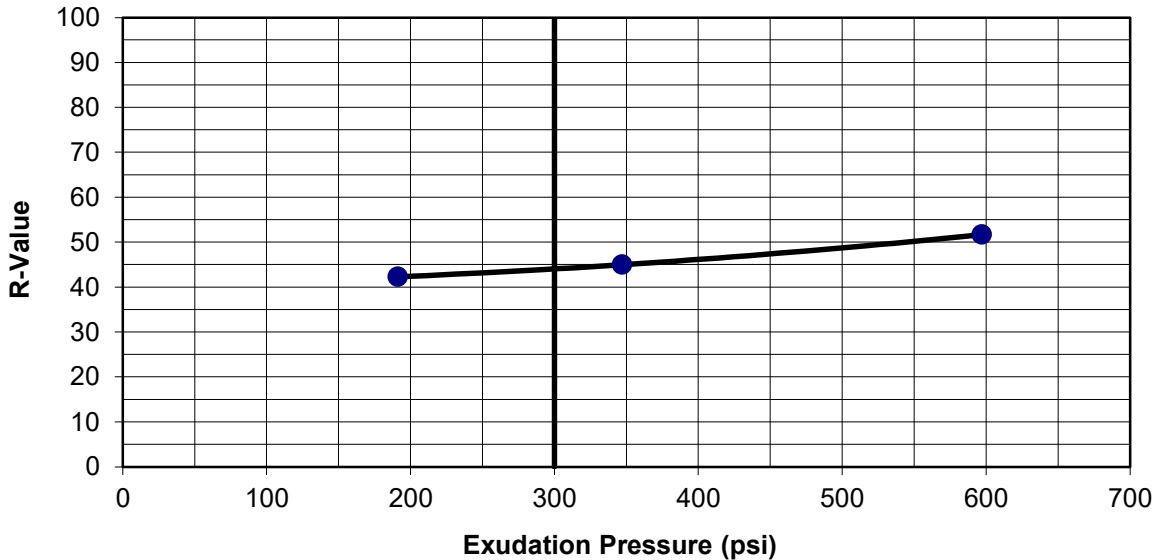
Lab No.: EC21-36

R-Value By Exudation Pressure (ASTM D2844/CAL 301)

Description: Sandy Silt/Silty Sand (ML-SM)
Sample Location: B-2
Sample Depth: 0-3 ft.

Sample	A	B	C
Moisture Content, %:	14.5%	14.0%	13.5%
Dry Density, pcf:	103.3	105.9	106.1
Compaction foot pressure, psi:	140	140	200
Specimen Height, in.:	2.55	2.50	2.45
Stabilometer, Ph @ 1000 lb:	44	41	33
Stabilometer, Ph @ 2000 lb:	60	57	49
Displacement:	5.86	5.42	4.92
Expantion pressure, psf:	0	0	0
Exudation pressure, psi:	191	347	597
Equilibrium R Value:	42	45	52

R-Value 44



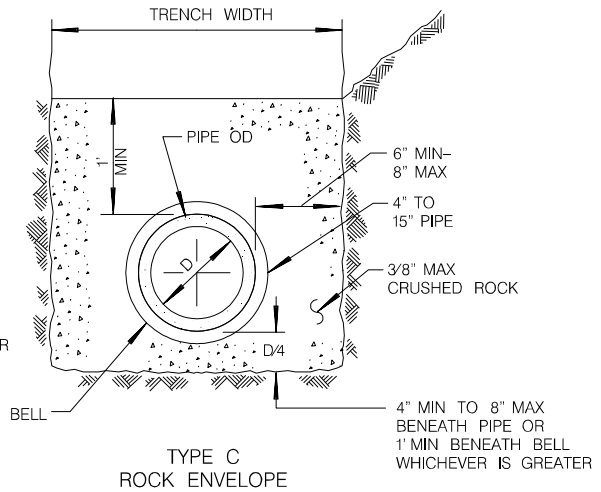
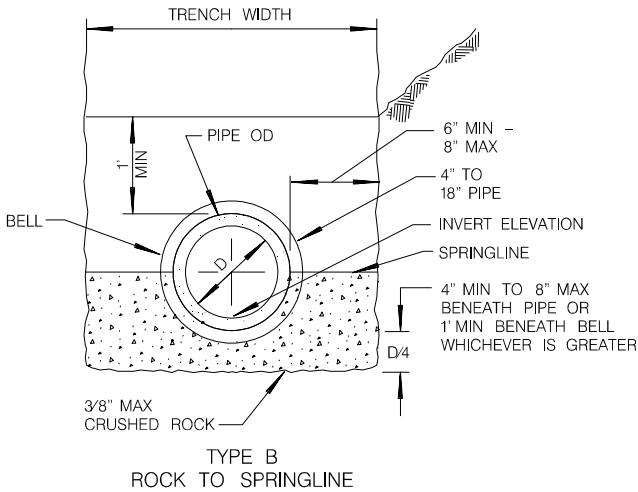
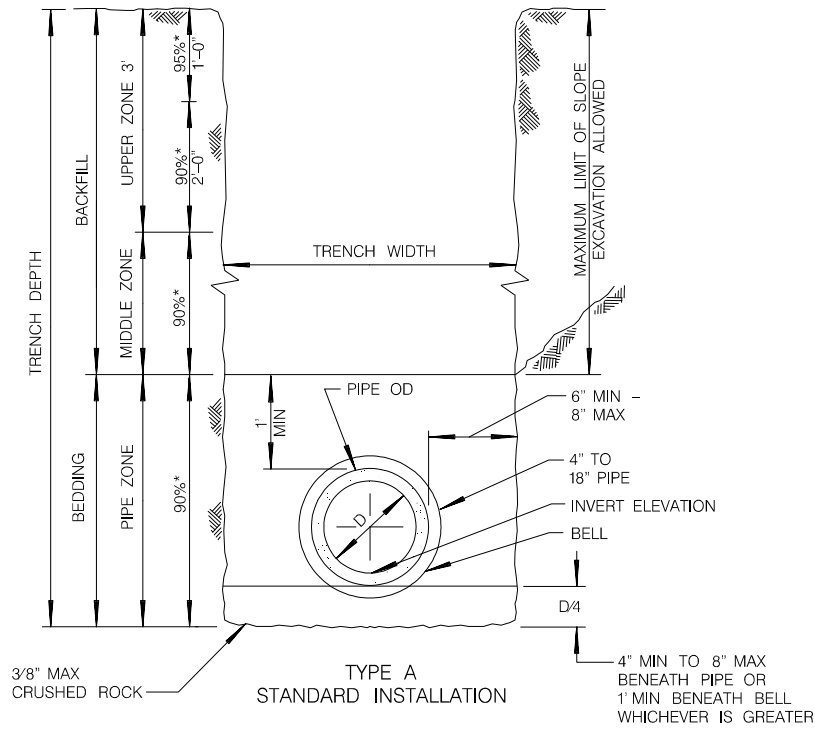
Project No.: LE21020

R-Value Test

Plate

C-3

APPENDIX D



NOTES

1. FOR TRENCH RESURFACING IN IMPROVED STREETS, SEE STANDARD DRAWINGS SDG-107 AND SDG-108.
2. (*) INDICATES MINIMUM RELATIVE COMPACTION.
3. MINIMUM DEPTH OF COVER FROM THE TOP OF PIPE TO FINISH GRADE FOR PVC SDR 35 SEWER MAIN SHALL BE 5'. FOR SHALLOWER DEPTH, SPECIAL DESIGN IS REQUIRED. SEE SDS-101.
4. SEE TYPE A INSTALLATION FOR DETAILS NOT SHOWN FOR TYPES B AND C.
5. FOR PIPE SIZE ENCASEMENT LARGER THAN 15", MAXIMUM SIDE WALL CLEARANCE SHALL BE 12" OR AS SHOWN ON THE PLANS.
6. 6" METAL TAPE SHALL BE INSTALLED ABOVE PIPE 4" BELOW TRENCH CAP AND 12" BELOW FINISH GRADE IN UNIMPROVED STREETS.
7. 1" SAND CUSHION OR A 6" MINIMUM SAND CUSHION WITH 1" NEOPRENE PAD SHALL BE PLACED FOR CROSSINGS UTILITIES WHEN VERTICAL CLEARANCE IS 1' OR LESS. THE NEOPRENE PAD SHALL BE PLACED ON THE MOST FRAGILE UTILITY.

From: City of San Diego Standard Drawing SDS-110 (2016)

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**Pipe Bedding and Trench Backfill
Recommendations**

**Plate
D-1**