



CONTRACT DOCUMENTS FOR CONSTRUCTION

***Bowman WTP
Phase 3
Improvements***

CONTRACT 2022-02

*BOWMAN, CALIFORNIA
July 2023*



Bowman WTP Phase 3 Improvements



CONTRACT NO. 2022-02

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**BOWMAN WTP PHASE 3 IMPROVEMENTS
CONTRACT NO. 2022-02**

**PLACER COUNTY WATER AGENCY
144 FERGUSON ROAD
AUBURN, CA 95603**

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Bowman WTP Phase 3 Improvements

Contract No. 2022-02

DIVISION 0

BIDDING AND CONTRACT DOCUMENTS

July 2023

SECTION 00020

**PLACER COUNTY WATER AGENCY
144 FERGUSON ROAD
AUBURN, CA 95603
NOTICE INVITING BIDS**

NOTICE IS HEREBY GIVEN that Placer County Water Agency, hereafter referred to as "Owner" or "Agency", will receive SEALED BIDS at the Owner's Engineering Division at 144 Ferguson Road, Auburn, California 95603 until **2:00 p.m. local time, on October 25, 2023**, for construction of:

Bowman WTP Phase 3 Improvements
Contract No. 2022-02

At said place and time, and promptly thereafter, all Bids that have been duly received in accordance with the Contract Documents, will be publicly opened and read aloud.

Project Description: In accordance with plans and specifications prepared by Water Works Engineers, LLC, the Work includes the furnishing of all labor, materials, tax, equipment and services for the construction and completion of water treatment plant improvements, including but not limited to the following:

- Remove and dispose of existing 27" raw water piping and existing 30" slide gate.
- Demolition and disposal of existing flocculation basin infrastructure including existing paddle flocculators, rapid mixer, concrete supports, handrail and grating.
- Demolition and disposal of existing influent 18" piping, butterfly valve, and flowmeter
- Supply and install new influent 18" piping, flowmeter, butterfly valve, and chemical injection piping.
- Supply and install new 30" raw water piping and associated chemical injection piping and vault.
- Supply and install of new 30" slide gate
- Supply and install (6) vertical turbine flocculators with motor center addition and (1) rapid mixer.
- Supply and install miscellaneous metals including beams, grating, handrail, and davit bases.
- Construction of intake screen channel, supply and installation of automatic fine screen with controls.
- Appurtenant paving, bollards, grading, yard piping, valving, instrumentation, controls, and electrical work to the improvements described above.

The total Contract Time to achieve Final Completion is 480 calendar days.

The estimated cost of construction is \$1,750,000.

At the time the Contract is bid, awarded and for the duration of the contract, the Owner has determined that the General Contractor shall possess a valid State of California Class A-General Engineering Contractor's License. Failure to possess the specified license shall render the bid as non-responsive. Bidders must comply with the provisions of the Business and Professions Code Section 7028.15 by setting forth their license number and expiration date on their bid.

The Bid Contract Documents may be obtained from the [Public Purchase](http://www.publicpurchase.com/gems/pcwa.ca/buyer/public/home) website at <http://www.publicpurchase.com/gems/pcwa.ca/buyer/public/home>. Registration is required.

The Bidder is required to register with Public Purchase to obtain the Contract Documents and become a listed holder of these documents to be eligible to bid the Project. Bids received from Bidders not following these procedures may, in the discretion of the Owner, be deemed non-responsive. The Owner, in making copies of the Contract Documents available on the above terms, does so only for the purpose of obtaining Bids for the Work and does not confer license or grant for any other use.

Procedural questions regarding the Contract Documents and/or obtain a plan holders list should be directed to the Placer County Water Agency Engineering Division at (530) 823-4886.

Complete sets of Contract Documents must be used in preparing Bids. The Owner does not assume responsibility for errors or misinterpretations resulting from the use of incomplete sets of Contract Documents.

A mandatory pre-bid walk-through meeting will be held on **October 11, 2023 at 2:00 p.m. at the Bowman Water Treatment Plant located at 595 Christian Valley Road, Bowman, CA 95602**. At this meeting, representatives of Owner and the Design Engineer will discuss the bid documents, site constraints, order of work and other items specific to this project. A project walk-through will follow. A sign-in sheet will be available up until 2:15 p.m. only. Attendance at the entire pre-bid meeting and walk-through is mandatory for bidding. Bids received from Bidders who did not sign the sign-in sheet and attend the meeting and walk-through will be returned to the Bidder unopened. Attendance by subcontractors is not mandatory, but all interested prospective subcontractors are encouraged to attend. The Owner will transmit to all recipients complete sets of Contract Documents such Addenda as Owner considers necessary in response to questions raised at the meeting and walk-through. Oral statements not confirmed by Addenda may not be relied upon and are not binding or legally effective. Except for mandatory walk-through, no other access to the project site will be granted pre-bid without the Owner's approval. During all site visits the Bidder must be accompanied full time by an authorized representative of the Owner. No exceptions to this requirement.

Written questions regarding the Contract Documents and/or the proposed Work should be directed to Jordan Jakobsen, Associate Engineer by phone at 530-823-4950, or e-mail at jjakobsen@pcwa.net no later than **October 18, 2023, 4:00 p.m. local time**.

Bidding procedures are prescribed in the Contract Documents. Bids shall be executed upon the Bid Forms bound and made a part of the Bid Documents. All prescribed Bid Forms may be removed from the Contract Documents for submission in a sealed envelope.

A Bid Guaranty in an amount not less than ten percent (10%) of the total aggregate of the bid, including all Additive and/or Alternate Bid Items shall accompany each bid. This Bid Guaranty is to be forfeited should the Bidder, if awarded the contract, fail to enter into the same, or fails to furnish the bonds and/or proof of insurance as stipulated in the Contract Documents. The checks or bond shall be made payable to the Owner.

The successful Bidder will be required to furnish both a Faithful Performance Bond in the amount of one hundred percent (100%) and a Payment Bond in the amount of one hundred percent (100%) of the Contract price.

Pursuant to the provisions of California Labor Code Section 6707, each bid submitted in response to this Invitation to Bid shall contain, as a separate bid item, adequate sheeting, shoring, and bracing, or equivalent method, for the protection of life or limb in trenches and open excavation, exceeding five feet, which shall conform to applicable safety orders. Neither this requirement, nor any payment by Owner for this separate bid item, shall be construed to impose tort liability on Owner, or its employees or agents, for any injury or damage caused by failure of any excavation or protective equipment or methods.

Pursuant to Sections 1770, *et seq.*, of the California Labor Code, the successful Bidder shall pay not less than the prevailing rate of per diem wages as determined by the Director of the California Department of Industrial Relations. Pursuant to the provisions of California Labor Code Section 1773.2, the Contractor is hereby advised that copies of the prevailing rate of per diem wages and a general prevailing rate for holidays, Saturdays and Sundays and overtime work in the locality in which the work is to be performed for each craft, classification, or type of worker required to execute the Contract, are on file in the Owner's office. These rate determinations may also be found on the State of California Department of Industrial Relations' website at <http://www.dir.ca.gov/OPRL/dprevwagedetermination.htm>. This project is subject to compliance monitoring and enforcement by the State Department of Industrial Relations (DIR).

All contractors and subcontractors shall be registered with DIR pursuant to Labor Code Section 1725.5 to be qualified to bid on this project or to be listed as a subcontractor for this project pursuant to Public Contract Code Section 4104. Bidders will be required to submit proof of registration for themselves and all listed subcontractors with their bid.

The successful contractor and its subcontractors shall employ the appropriate number of apprentices, in each apprenticeable craft, on the project site as stipulated in California Labor Code 1777.5.

The successful Bidder must insure that its policies and practices provide equal opportunity to all applicants and employees without regard to race, color, creed, sex, age, religion, ancestry, citizenship, national origin, handicap, mental condition, veteran or marital status. The successful Bidder must comply with the Americans with Disabilities Act.

Pursuant to Public Contract Code Section 3400, Agency finds that a particular product is designated by a particular manufacturer on a "sole-sourced" basis for the following reason:

(1) In order to match other products in use on a particular public improvement either completed or in the course of completion.

Pursuant to Public Contract Code Section 22300, for monies earned by the Contractor and withheld by the Owner to ensure the performance of the Contract, the Contractor, may, at its option, choose to substitute securities meeting the requirements of Public Contract Code Section 22300, or have the retained, earned monies deposited in an escrow account at a federal or state chartered bank.

No bid received and read aloud may be withdrawn for a period of sixty (60) days after the bid opening date, except pursuant to Public Contract Code Section 5101 *et seq.*

Telephones will not be available to Bidders at the Owner's offices for the preparation of bids or for communicating bid results. Bid forms received after the designated time will not be opened and will be returned to the Bidder unopened.

Bidders shall develop and submit bids at their own expense. The Owner will not reimburse any costs associated with the development and submittal of any and all bids.

The Owner reserves the right to award the Contract, to reject any and all Bids, to waive irregularities, and to reject nonconforming, nonresponsive or conditional Bids.

DATED: 9/21/2023


Stephanie Wens
Capital Improvement Program Specialist
Technical Services Department

DATED: 9/21/23


Kelly Shively, P.E.
Engineering Services Manager

SECTION 00100

PLACER COUNTY WATER AGENCY
144 FERGUSON ROAD
AUBURN, CA 95603

INSTRUCTIONS TO BIDDERS

1.0 WORK TO BE DONE

It is the intention of the Owner to construct improvements as shown and set forth in the Contract Documents titled: Bowman WTP Phase 3 Improvements, dated July 2023 as prepared by Water Works Engineers, LLC. All of the work is particularly set forth in the permits, plans and specifications, and all of said work, together with all other work incidental thereto, is included. The work includes the furnishing of all labor, materials, taxes, incidentals and equipment necessary for completion of the project. Codes and standards, definition of words and terms, and abbreviations shall be as specified in Section 01060, **REFERENCES**.

2.0 EXAMINATION OF CONTRACT DOCUMENTS

Each Bidder shall thoroughly examine and be familiar with those Contract Documents and addenda (if any). The submission of a bid shall constitute an acknowledgment upon which the Owner may rely that the Bidder has thoroughly examined and is familiar with the Contract Documents. The failure or neglect of a Bidder to receive or examine any of the Contract Documents shall in no way relieve it from any obligation with respect to its bid or to the Contract. No claim for additional compensation will be allowed which is based upon a lack of knowledge of any Contract Documents.

3.0 INSPECTION OF PROJECT SITE AND PRE-BID ACCESS TO THE SITE

Prior to submitting a bid, it will be the sole responsibility of each bidder to conduct any additional examination, investigation, exploration, test, study or other inquiry and to obtain any additional information pertaining to the physical conditions (including surface, subsurface, and underground utilities) at or near the Project site that may affect the cost, progress, or performance of the Project, and that the bidder deems are necessary to prepare its bid for performance of the Project in accordance with the bid package and contract documents. Bidders seeking any such additional examination or other inquiries or information concerning the Project will do so at the bidder's sole expense.

Bidders seeking to conduct any additional examination or other inquiry at the Project site must request site access from the Owner in writing at least five (5) days in advance. The location of any excavation, boring or other invasive testing will be subject to approval on behalf of the Owner and any other agencies with jurisdiction over such testing. Bidders may not conduct tests at the Project site prior to obtaining Owner approval. Additionally, any such Bidder must deliver an executed Section 00250, **ACCESS, INDEMNITY, AND RELEASE AGREEMENT** and provide an insurance certificate as described therein by noon of the Day prior to Bidder's approved site visit. Once approved testing is complete, Bidders must fill all trenches or holes, restore all pavement to match existing structural section, and otherwise clean up and restore the test site to its pre-test condition.

Bidders who intend only to observe site conditions and not conduct such examinations are not required to provide an executed Indemnity and Release Agreement or insurance information.

If, during the course of its site inspection, a Bidder finds conditions which appear to be in conflict with the letter or spirit of the Contract Documents, the Bidder may apply to the Owner, in writing, for additional information and explanation by 4:00 p.m. local time on October 18, 2023.

Submission of a bid by the bidder shall constitute conclusive evidence that, if awarded the Contract, it has relied upon and is relying on its own examination of (1) the site of the work, (2) access to the site, (3) all other data and matters requisite to the fulfillment of the work and on its own knowledge of existing facilities on and in the vicinity of the site of the work to be constructed under the Contract, (4) the conditions to be encountered, (5) the character, quality and scope of the proposed work, (6) the quality and quantity of the materials to be furnished, and (7) the requirements of the Contract, the plans, the specifications, and other related information made available to Bidders by the Owner (see Section 00200, **INFORMATION AVAILABLE TO BIDDERS**).

The information provided by the Owner is not intended to be a substitute for, or a supplement to the independent verification by the Bidder to the extent such independent investigation of site conditions is deemed necessary or desirable by the Bidder.

4.0 INTERPRETATION OF CONTRACT DOCUMENTS

No oral representations or interpretations will be made to any Bidder as to the meaning of the Contract Documents. Requests for an interpretation shall be made in writing and delivered by e-mail or U.S. Mail by **4:00 p.m. local time on October 18, 2023**, to:

Jordan Jakobsen
Placer County Water Agency
Engineering Division
P.O. Box 6570
Auburn, CA 95604
e-mail: jjakobsen@pcwa.net

All questions submitted via electronic telecommunication (e-mail) shall be submitted in the time set forth herein. For e-mail to be effective, it shall have a date and time receipt acknowledgment from the Owner and shall be clearly identified with the following title in the Subject line:

"Bowman WTP Phase 3 Improvements Project: Bidder Questions."

It is the Bidder's sole responsibility to ensure that the e-mail question is *received* by the Owner in a timely manner. Upon receipt of an e-mail question, the Owner shall provide acknowledgement of receipt within 1 business day. If the Bidder does not receive an acknowledgement of receipt of an e-mail question from the Owner within the above referenced timeframe, Bidder shall assume the e-mail transmission was not received by the Owner, and shall be responsible for resubmitting the same in a timely manner, and if necessary by an alternate allowable method of transmission allowing for confirmation of receipt (e.g., certified mail).

Requests to clarify the source of materials, equipment, suppliers or any other such matter which does not modify, change, increase, or decrease the scope of work requires no action by the Owner other than a response to the Bidder requesting the clarification. Requests to clarify possible ambiguous or incomplete statements or designs, or any other such clarification which modifies, changes, increases or decreases the scope of work, requires issuance of an addendum signed by the Owner and transmitted to all recipients of complete sets of Contract Documents. No other interpretation or information concerning the Contract Documents issued prior to the date specified for opening of bids will be binding.

5.0 POSTPONEMENT OF OPENING

The Owner reserves the right to postpone the date and time for receiving and/or opening of bids at any time prior to the date and time established in the Notice of Invitation to Bid. Postponement notices will be issued in the form of addenda. Addenda shall be posted at <http://www.publicpurchase.com>, registration is required.

6.0 OPENING OF BIDS

All bids, irrespective of any irregularities or informalities, if received on time, will be opened and publicly read aloud at the time and place set forth in the Notice Inviting Bids, **provided that**, if a mandatory pre-bid walk-through is prescribed in Section 00020, **NOTICE INVITING BIDS**, any bid from a Bidder who did not sign the sign-in sheet and attend the meeting and walk-through, will be returned to the Bidder unopened. Bidders, their representatives and other interested persons may be present at the opening and reading of bids.

Any bids received after the time for receiving and opening bids as set forth in the Notice Inviting Bids or as postponed by addenda will not be opened. Any such bids will be returned, unopened, to the Bidder.

The public reading of each bid will include at least the following:

- A. Name and address of bidder.
- B. The total amount of bid.
- C. The nature and amount of the security furnished with the bid.

Provided that if a mandatory pre-bid walk-through is prescribed in Section 00020, **NOTICE INVITING BIDS**, any bid from a Bidder who did not sign the sign-in sheet and attend the meeting and walk-through will be returned to the Bidder unopened.

7.0 PREPARATION OF BID FORMS AND BIDDER'S CHECKLIST

Bids shall be made on the separately bound blank bid forms, Sections 00300 through 00480, and must be submitted at the time and place stated in the Notice of Invitation to Bid. All blanks in the bid forms must be appropriately filled in, in permanent ink or typed, and all prices must be stated in figures.

All bids must be submitted in sealed envelopes bearing on the outside the name of the Bidder, its address, and the name of the project for which the bid is submitted. It is the sole responsibility of the Bidder to see that its bid is received before the time stipulated in the Notice Inviting Bids. A Bid will not be accepted after the date and time designated

in the Notice Inviting Bids. Any Bid received after said date and time designated in the Notice Inviting Bids will be returned to the Bidder unopened. Owner shall not be responsible for errors or omissions in the bid. Bidders shall write their names on each bid form in the space provided.

The checklist shown below has been prepared and furnished to aid Bidders in including all necessary supporting information with their bid. Bidders' submittals should include, but are not limited to, the following:

ITEM	CHECKED
1. Bid Form (Section 00300)	1. _____
2. Bid Guaranty Bond (Section 00410)	2. _____
3. Certification of Bidder's Experience and Qualifications (Section 00420)	3. _____
4. Designation of Subcontractors (Section 00430)	4. _____
5. List of Manufacturers and Suppliers (Section 00440)	5. _____
6. Site Visit Affidavit (Section 00450)	6. _____
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9. Bidders Proof of DIR Registration	9. _____

8.0 BIDDER'S SIGNATURE AND AUTHORITY

If the bid is made by an individual; bidder's name, signature, and post office address must be shown. If the bid is made by a firm or partnership; the name and post office address of the firm or partnership, a list of the partners, and the signature of at least one of the general partners must be shown. If the bid is made by a corporation; the bid shall show the name of the state under the laws of which the corporation is chartered, the name and post office address of the corporation, and the title of the person who signs on behalf of the corporation. If the bid is made by a corporation; a certified copy of the bylaws or resolution of the Board of Directors of the corporation shall be furnished, showing the authority of the officer signing the bid, to execute Contract on behalf of the corporation. If the bid is made by a joint venture, the bid shall be signed by a representative of the sponsoring partner of the joint venture. Additionally, the bid shall include a copy of the resolution or agreement empowering the representative to execute the bid and bind the joint venture.

All signatures on the bid shall be in longhand. Signature stamps are unacceptable and shall not be used.

9.0 DESCRIPTION OF BID ITEMS

See Item 2.0 of Section 01200, **MEASUREMENT AND PAYMENT** for complete description of each Bid Item.

10.0 ERASURES AND CORRECTIONS

The bid submitted must not contain any erasure, interlinear additions, or other corrections unless each such correction is authenticated. Authentication may be made by affixing in the margin, immediately opposite the correction, the signature of the person submitting the bid.

11.0 BID IRREGULARITIES

Changes in or additions to the bid form, recapitulations of the work bid upon, alternative bids, or any other modifications of the bid form which are not specifically called for in Section 00300 may result in rejection of the bid at the Owner's sole discretion. The Owner, at its sole discretion, may treat all such bids as not being responsive to the Invitation to Bid. The Owner will consider no oral, telephonic or email modification of any bid submitted.

12.0 MODIFICATION OF BID

Upon written request, a bid already received may be modified or withdrawn at any time before the time established for receiving bids. The request must be executed by the Bidder or its authorized representative as described in Paragraph 00100-8.0, **BIDDER'S SIGNATURE AND AUTHORITY**. Modifications shall be made in writing, executed, and submitted in the same form and manner as the original bid. Withdrawal of a bid does not prejudice a bidder's right to submit a new bid within the time designated for the submission of bids. No bid may be withdrawn after the time established for receiving bids except as provided in Paragraph 00100-13.0, **WITHDRAWAL OF BIDS**.

13.0 WITHDRAWAL OF BIDS

In accordance with California Public Contract Code 5103, a bidder may withdraw its bid with the consent of the Owner. A Bidder desiring to withdraw its bid, after the time of opening the bids, shall give written notice to the Owner within five (5) days after opening of the Bids (excluding Saturdays, Sundays, or Owner holidays) of the alleged mistake. The Bidder shall provide documentation in accordance with California Public Contract Code 5103. Bids cannot be changed because of a mistake.

14.0 BID PROTEST

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

Any Bid protest must be submitted in writing to the Director of Technical Services of the Placer County Water Agency before 5:00 p.m. on the fifth (5th) working day following Bid opening.

- A. The initial protest document must contain a complete statement of the basis for the protest, and all supporting documentation.
- B. The party filing the protest must have actually submitted a Bid for the Work. A subcontractor of a party submitting a Bid for the Work may not submit a Bid protest. A party may not rely on the Bid protest submitted by another Bidder, but must timely pursue its own protest.
- C. The protest must refer to the specific portion of the Contract Document which forms the basis for the protest.
- D. The protest must include the name, address and telephone number of the person representing the protesting party.
- E. The party filing the protest must concurrently transmit a copy of the initial protest document and any attached documentation to all other parties with a direct financial interest which may be adversely affected by the outcome of the protest. Such parties shall include all other Bidders who appear to have a reasonable prospect of receiving an award depending upon the outcome of the protest.
- F. The Owner will give the protested Bidder five (5) working days after the receipt of the protest to submit a written response. The responding Bidder shall transmit the response to the protesting Bidder concurrent with delivery to the Owner.
- G. The procedure and time limits set forth in this paragraph are mandatory and are the Bidder's sole and exclusive remedy in the event of Bid protest. The Bidder's failure to comply with these procedures shall constitute a waiver of any right to further pursue the Bid protest, including filing a Government Code Claim or legal proceedings. A Bidder may not rely on a protest submitted by another Bidder, but must timely pursue its own protest.
- H. If the Owner determines that a protest is frivolous, the protesting bidder may be determined to be non-responsible and that bidder may be determined to be ineligible for future contract awards.

15.0 ADDENDA

Addenda issued during the time of bidding shall become a part of the documents furnished bidders for the preparation of bids, shall be covered in the bids, and shall be made a part of the Contract. Each bid shall include specific acknowledgment in the space provided of receipt of all Addenda issued during the bidding period. Failure to so acknowledge may result in the bid being rejected as not responsive. Failure of any bidder to receive such Addenda shall not be grounds for non-compliance with the terms of the instructions.

Addenda will be issued such that they should be received by each recipient of a complete set of Contract Documents no later than three (3) working days prior to the specified bid date. Addenda withdrawing the request for bids or postponing the bid deadline may be issued anytime prior to the specified bid deadline.

16.0 BID GUARANTY

The bid form shall be accompanied by a bid guaranty bond provided by a surety company authorized to carry on business in the State of California with a minimum "A" rating with Best's Rating Guide for payment to the Owner in the sum of at least ten percent (10%) of the total amount of the bid price, or, alternatively, by a certified or cashier's check, payable to the Owner in the sum of at least ten percent (10%) of the total amount of the bid price. The bid guaranty bond shall be provided on the form included in Section 00410, **BID GUARANTY BOND**, of this Project Document. The amount payable to the Owner under the bid guaranty bond, or the certified or cashier's check and the amount thereof, as the case may be, shall be forfeited to the Owner as liquidated damages in case of a failure or neglect of the bidder to furnish, execute, and deliver to the Owner the required performance and payment bonds, evidences of insurance; and to enter into, execute, and deliver to the Owner the Agreement on the form provided herewith, within ~~ten~~ (10) calendar days after receiving written notice from the Owner that the award has been made and the Agreement is ready for execution.

The bid guarantees of the three lowest Bidders will be retained until the Agreement is signed, evidence of insurance provided, and satisfactory bonds furnished or other disposition made thereof. The bid guarantees will be returned to all but the lowest three responsive bidders upon written request from the Bidder. The bid guarantees from the lowest three bids will be available for return at the time they are considered null and void per terms of the Bid Guaranty Bond.

17.0 QUALIFICATION OF BIDDER

Each bidder shall complete and submit with their bid Section 00420, **CERTIFICATION OF BIDDER'S EXPERIENCE AND QUALIFICATIONS**.

Upon the request of Owner, any bidder whose bid is under consideration for the award of the Contract shall promptly submit satisfactory evidence showing the bidder's financial resources, its construction experience, and its organization's availability for the performance of the Contract.

The bidder may be required to establish to the satisfaction of the Owner the reliability and responsibility of the persons or entities proposed to furnish and perform the work described in the Documents.

18.0 LOCAL BUSINESS LICENSE

If required by the County, the Contractor shall have a local business license for the work contemplated before the Contract can be executed. All subcontractors will be required to secure the appropriate local business license before they commence work on the project.

19.0 WORK PERCENTAGES

The Contractor shall perform at least fifty percent (50%) of the Contract Bid Amount. This portion of work shall encompass the performance of work by the Contractor's forces and equipment, the procurement of materials and equipment by the Contractor and field related general conditions required to support and supervise the construction effort. Subcontractors shall not be responsible for the performance of any work or procurement of materials or equipment within the above Contractor's work percentage allotment.

The value of the work subcontracted shall be determined by summing all of the percentages identified for the subcontractors listed in Section 00430, **DESIGNATION OF SUBCONTRACTORS**. If the sum of such percentages exceeds fifty percent (50%), the Owner may treat the bid as nonresponsive and reject it on that basis.

20.0 SUBCONTRACTORS

In accordance with California Public Contract Code Section 4100, *et seq.*, "*Subletting and Subcontracting Fair Practices Act*," each general bid shall have listed in Section 00430, **DESIGNATION OF SUBCONTRACTORS**, the name, California contractor license number, location of the place of business and the portion of work to be performed by each subcontractor who will perform work or labor or render service to the bidder in or about the construction of the work or improvement, or of any subcontractor licensed by the State of California who, under subcontract to the bidder, will specially fabricate and install 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 bidder's total bid.

Failure to list subcontractors may render the bid non-responsive and may be grounds for rejection of the bid. Failure to comply with the provisions of the California "Subletting and Subcontracting Fair Practices Act" shall make the Contractor subject to the sanctions as set forth in the Act.

Alternate subcontractors shall not be listed for the same work.

21.0 MAJOR EQUIPMENT ITEMS

Certain items of major equipment to be provided under this Contract may be tabulated in Section 00440, **LIST OF MANUFACTURERS AND SUPPLIERS**. The Bidder shall write in the name of the manufacturer of the equipment to be provided for each major equipment item and submit this form with its bid. By so indicating, the Bidder warrants that equipment manufactured and/or supplied by the named manufacturer will be provided on the project unless review of submittal information or performance under tests reveals that the equipment does not meet the Contract requirements. Failure to indicate a manufacturer for any single item of the equipment listed in the schedule may render the bid unresponsive to the Invitation to Bid and may be a basis for rejection of the bid.

22.0 OWNER FURNISHED EQUIPMENT

There will be no owner-furnished equipment for this project.

23.0 CONTRACTS TO BE TRANSFERRED

There will be no contracts transferred from the Owner to the Contractor for this project.

24.0 SOLE-SOURCED ITEMS AND SUBSTITUTIONS DURING BIDDING

Bidders are advised that, in accordance with Public Contract Code Section 3400, the Owner has made a finding that particular materials, products, things or services are designated by specific brand or trade names in order to match other materials, products, things or services in use or to obtain necessary items available only from one source. By listing a sole-source vendor, Owner has only identified a particular product the supply of which will conform to the Contract. Owner does not warrant in any respect the performance of any designated sole-source vendor. Owner shall not be responsible for, and Contractor shall not be excused for, any failure of a sole-source vendor to supply a conforming product in a timely fashion. Bidders shall refer to individual specification sections for specific requirements.

Contractors, manufacturers or suppliers of materials and equipment may offer an alternative product and request the alternatives to specified products be considered equal unless the Owner has sole-sourced a product in accordance with Public Contract Code 3400. Inclusion of such alternatives in the bid is the sole responsibility of the Contractor. Inclusion of the proposed alternative should only be considered if it is the Contractor's sole belief the offered alternative is equal in quality and performance to the specified product. After award of the Contract, such offers of alternative products will be reviewed and processed as a substitution as provided under Section 01330-11.0, **SUBSTITUTES OR "OR EQUAL" ITEMS AND PRODUCT OPTIONS**. If the material, equipment, process or article offered by the contractor is not, in the Owner's sole opinion, substantially equal or better in respect to that specified, then the contractor shall furnish that material, process or article specified or one that in the Owner's opinion is substantially equal or better in every respect at no additional cost to the Owner.

25.0 BIDDERS INTERESTED IN MORE THAN ONE BID

No person, firm, or corporation, under the same or different name, shall make, file, or be interested in more than one bid for the same work unless alternate bids are called for. A person, firm, or corporation may, however, submit sub-proposals or quote prices on materials to more than one bidder.

Pursuant to Public Contract Code Section 7106, Bidders shall execute and furnish with their bids Section 00480, **BIDDERS' AFFIDAVIT OF NON-COLLUSION DECLARATION**. Reasonable grounds to believe that any individual, partnership, corporation, or combination is interested in more than one bid for the proposed work may cause rejection of all bids in which that individual, partnership, corporation, or combination is interested.

26.0 SHEETING, SHORING AND BRACING

Pursuant to the provisions of California Labor Code Section 6707, each bid submitted shall contain, in the bid item indicated, the amount included in its bid for adequate sheeting, shoring, and bracing, or equivalent method, for the protection of life and limb in trenches and open excavation, which shall conform to applicable safety orders. By listing this sum, the Bidder warrants that its action does not convey tort liability to the

Owner, the Design Consultant, the Construction Manager, and their employees, agents, and subconsultants.

27.0 WAGE RATES

Pursuant to provisions of the Labor Code Section 1770, *et seq.*, of the State of California, the Director of the Department of Industrial Relations has ascertained the prevailing rate of per diem wages of the locality in which the Work is to be performed and applicable to the work to be done.

Bidders shall promptly notify the Owner, in writing, of any and all classifications of labor not listed in the prevailing wage determinations but necessary for the performance of the Work, before bids are submitted.

28.0 OFFER OF ASSIGNMENT OF ANTITRUST ACTIONS

As provided by Section 4552, *et. seq.*, of the California Government Code, in submitting a bid to the Owner, the Bidder offers and agrees that if the bid is accepted, it will assign to the Owner 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, materials, or services by the Bidder for sale to the Owner pursuant to the bid. Such assignment shall be made and become effective at the time the Owner tenders final payment to the Bidder.

29.0 ASSIGNMENT OF CONTRACT

Any attempted assignment by the Contractor of any contract to be entered into hereunder, or any part thereof, or of funds to be received thereunder by the Contractor, is void unless such assignment has prior written approval of Owner, and the Surety has been given due notice of such assignment in writing and has consented thereto in writing.

30.0 REJECTION OF BIDS

The Owner reserves the right to reject any and all bids and further reserves the right to reject any bids which are nonresponsive, incomplete, obscure, or irregular; any bids which omit a bid on any one or more items on which the bids are required; any bids in which unit prices are unbalanced in the opinion of the Owner; any bids accompanied by insufficient or irregular bid guaranty; bids from Bidders who failed to perform properly or complete on time past Agency projects; and bids from Bidders who fail to meet the experience and qualification requirements set for in the Contract Documents as determined by the Owner.

The Owner also reserves the right to waive irregularities in a bid or bidding procedure.

31.0 EVALUATION OF BIDS AND AWARD OF CONTRACT

After the Proposals have been opened and read, they will be checked for accuracy and compliance with the Contract Documents. If a Contract is awarded, it will be to the lowest responsive, responsible, qualified Bidder whose bid complies with the specified requirements, as it may best serve the interests of the Owner. All bids will be compared

on the basis of the Engineer's estimate of the quantities of work to be done. The selection of any or all alternates or bid schedules shall be at the sole discretion of the Owner. The Owner reserves the right to reject an unbalanced bid which is a bid having nominal prices for some bid items and enhanced prices for other bid items.

The criteria which will be used to determine the lowest responsive and responsible Bidder are as follows:

Responsive Bidder: Means a Bidder who has submitted a Bid which conforms in all material respects to the Bidding Documents.

Responsible Bidder: Means a Bidder who has the capacity and capability in all respects to perform fully the contract requirements and who has the integrity and reliability to assure good faith performance. Among factors to be considered in determining whether the Bidder meets these standards, are:

- A. Financial, material, equipment, facility, and personnel resources and expertise necessary to meet contractual requirements;
- B. A record of integrity;
- C. A record of Successful Project Completions defined as:
 - 1. Completion of project on time and without liquidated damages.
 - 2. Completion of project without excessive defective work issues.
 - 3. Completion of project without excess claims or disputes issues;
- D. Qualified legally to contract with the OWNER, and;
- E. Has not failed to supply any necessary information in connection with the inquiry concerning responsibility.

In the evaluation of any bid, the Owner shall have the right to consider information provided by sources other than Bidder.

Within sixty (60) days after the time of opening of the bids, the Owner will act either to accept a bid, to reject all bids or with the consent of the Bidders and their sureties to extend the time in which the Owner may act. The acceptance of a bid will be evidenced by a Notice of Award of Contract in writing, delivered in person or by mail to the Bidder whose bid is accepted. No other act of Owner will constitute acceptance of a bid. The Award of Contract shall obligate the Bidder whose bid is accepted to furnish performance and payment bonds and evidences of insurance, and to execute the Agreement in the form set forth in the Contract Documents. The Contract will require the completion of the work according to the Contract Documents.

Only one Contract will be awarded.

32.0 EXECUTION OF CONTRACT

The Agreement shall be executed by the successful bidder and returned, together with the Contract bonds and evidences of insurance, within fifteen (15) calendar days after

receiving written Notice of Award of the Contract. Time is of the essence in this regard. After execution by Owner, one copy of the Agreement shall be returned to Contractor.

The failure to execute the Contract Documents or to furnish the bonds or insurance required by these instructions within fifteen (15) calendar days after receiving written notice of the Award of the Contract constitutes default. In case of default, the Owner may, at its sole discretion, award the Contract to the next lowest Bidder or may re-advertise the project for new bids. If a more favorable bid is received by re-advertising, the defaulting Bidder shall have no claim against the Owner for a refund.

If a Bidder to whom an award is made fails or refuses for any reason to execute the Contract or fails to furnish any or all of the required insurance or Contract Bonds in proper form, within the time stated, it is agreed and stipulated between Owner and the Bidder to whom any award is made that damage has been and will be sustained by the Owner. It is further agreed by the Owner and any and all Bidders that it will be impractical and extremely difficult to fully ascertain and determine the actual damage that the Owner will sustain by such delay. Therefore, the Owner and all parties who submit a Bid under the Notice Inviting Bids shall be deemed to have jointly studied and attempted to estimate the damages suffered by the Owner by such delay under these circumstances and agree that the amount of the Bidder's bond or check is agreed to as the liquidated damages payable by such Bidder(s). This Bidder's bond or check will be collected and held by the Owner as the sole property of the Owner for full compensation for the damages suffered by the Owner as a result of the Bidder's failure to execute the Contract and furnish the Bonds and Insurance as required.

33.0 CONTRACT AND BONDS

The successful Bidder, simultaneously with the execution of the Agreement, will be required to furnish a Payment Bond equal to one hundred percent (100%) of the Contract Price, a Faithful Performance Bond equal to one hundred (100%) of the Contract Price, the **WORKERS' COMPENSATION INSURANCE CERTIFICATE** in Section 00645 and evidences of required insurance. Said insurance and bonds shall be secured from a surety company satisfactory to Owner with a minimum "A" rating with Best's Rating Guide.

The form of Agreement, as provided in Section 00510, **AGREEMENT FOR CONSTRUCTION** which the successful Bidder as Contractor will be required to execute, and the forms of bonds as provided in Sections 00610 and 00620, which it will be required to furnish, shall be carefully examined by the Bidder. The Faithful Performance Bond is to secure the faithful performance of the Contract, and the Payment Bond is to secure payment for those to whom the Bidder may become legally indebted for labor, materials, tools, equipment, or services of every kind used or employed by the Bidder in performing the work.

34.0 ESCROW BID DOCUMENTS – NOT USED

35.0 LIST OF RECIPIENTS OF FULL SETS OF CONTRACT DOCUMENTS

Bidders may obtain a current Plan Holder List of from the Public Purchase website at <http://www.publicpurchase.com/gems/pcwa,ca/buyer/public/home>. Registration is

required. Procedural questions regarding the Contract Documents and/or plan holders list should be directed to the Placer County Water Agency Engineering Division at (530) 823-4886.

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

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SECTION 00200

**PLACER COUNTY WATER AGENCY
144 FERGUSON ROAD
AUBURN, CA 95603**

INFORMATION AVAILABLE TO BIDDERS

1.0 SUBSURFACE CONDITIONS

A subsurface investigation has been conducted at the site of the Work. The subsurface investigation and geotechnical report were developed for planning and design purposes only, and as such may not include necessary information for, any or all, construction related activities including, but not limited to, excavations, sheeting, shoring, bracing, boring and dewatering. The Contractor may not make claim against Owner or any of Owner's Consultants with respect to the completeness of this investigation and geotechnical report for Contractor's purposes with respect to the means, methods, techniques, sequences and procedures employed by Contractor, and safety precautions and programs incident thereto.

The resulting geotechnical report with the records of borings made at the work site is entitled:

Geotechnical Report – PCWA Bowman WTP PAC Facility Building, dated March 25, 2019, prepared by Blackburn Consulting.

A copy of the Geotechnical Report is included in Appendix A of the Technical Specifications. The Geotechnical Report is not part of the Contract Documents and is made available solely for the convenience of the Bidder and Contractor.

It is expressly understood and agreed by Bidder or Contractor that neither the Owner nor the Consulting Engineers assume any responsibility whatsoever with respect to the sufficiency or accuracy of the investigations thus made, the records thereof, or of the interpretation set forth therein or made by the Consulting Engineers in their use thereof and there is no representation, warranty or guarantee, either express or implied, that the conditions indicated by such investigations or records thereof are correct or representative of those existing throughout such areas or any part thereof, or that unanticipated developments may not occur or that materials other than, or in proportions different from, those indicated may not be encountered.

When a log of test borings showing a record of the data obtained by the Consulting Engineers' investigation of the subsurface conditions is made available to the Bidders and Contractor, it is expressly understood and agreed by Bidders and Contractor that said log of test borings does not constitute a part of the Contract, represents only the opinion of the Consulting Engineers as to the character of the materials encountered in the test borings, is made available only for the convenience of Bidders and its use is subject to all of the conditions and limitations set forth in this Section. Water levels that may be shown on a log of test borings are valid only for the stated date of observation. The water level may change from season to season and from year to year.

The Owner disclaims responsibility for the Bidder's or Contractor's interpretation of data, such as, projecting or extrapolating from the test holes to other locations on the site of the Work, soil bearing values and profiles, and soil stability, as well as the presence, level, and extent of underground water for subsurface conditions during construction operations.

2.0 RECORD DRAWINGS AND ADDITIONAL INFORMATION

Previous construction activities have occurred at portions of the Site. The following record drawings have been used by the Design Consultant in preparing the Contract Documents and are available for review during regular business hours at the Owner's Engineering Department, upon 48 hours' notice to Owner. The Owner makes no warranty as to the accuracy of this information.

- A. Placer County Water Agency – Water Treatment Plant Facilities and Transmission Distribution Pipelines for Zone No. 1; prepared by Clendenen & Associates, dated 1977.
- B. Bowman Water Treatment Plant Air Scour and Filter to Waste Systems, Contract No. 99-02; prepared by Brown and Caldwell, dated August 1999.
- C. Bowman Water Treatment Electrical Upgrade Project, Contract No. 2016-08; prepared by ATEEM, dated March 2016.
- D. Bowman Water Treatment Plant Phase 2 Improvements Project, Contract No. 2019-09, prepared by Water Works Engineers, dated November 2020.

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

SECTION 00250

**PLACER COUNTY WATER AGENCY
144 FERGUSON ROAD
AUBURN, CA 95603**

ACCESS, INDEMNITY AND RELEASE AGREEMENT

POTENTIAL BIDDER: _____

OWNER: Placer County Water Agency

SITE: Bowman Water Treatment Plant

PROJECT: Bowman WTP Phase 3 Improvements

CONTRACT NO.: 2022-02

In consideration of the Placer County Water Agency, (PCWA), permitting the undersigned potential bidder ("Bidder") to have access to, and to conduct investigations, tests and/or inspections on, the Site, the Bidder hereby agrees as follows:

1. To the greatest extent permitted by law, Bidder hereby releases, and shall defend, indemnify and hold harmless PCWA, and their respective officers, employees, consultants, representatives, and agents, and all other parties having any other interest in the Site, against any claim or liability, including attorney's fees, arising from or relating to any Site-related access, investigation, test, inspection and/or other activity conducted by Bidder or any of Bidder's officers, employees, consultants, representatives, and/or agents, regardless of whether claim or liability is caused in part by the negligence of PCWA or by any released and indemnified party.
2. Bidder hereby waives the provisions of California Civil Code Section 1542 which provides as follows:

A general release does not extend to claims which the creditor does not know or suspect to exist in his favor at the time of executing the release, which if known by him, must have materially affected his settlement with the debtor.
3. Bidder shall repair any damage to the Site or adjacent property resulting from activities authorized hereunder, and comply with and be subject to all other requirements and obligations described or referenced in Contract Documents.
4. Attached hereto (or to be delivered separately to PCWA before Bidder's visit to the Site) is a certificate for comprehensive general liability insurance satisfying the requirements of Document 00800-2.0, **LIABILITY AND INSURANCE** of the Supplementary General Conditions.
5. Although this Access, Indemnity and Release Agreement is not a Contract Document, it shall be fully effective and binding regardless of whether Bidder submits a Bid for the subject Project, is awarded a contract for the Project, or otherwise.

INDEMNITY AND RELEASE AGREEMENT (continued)

Name of Bidder: _____

Signed By: _____

Name: _____

Title: _____

Note: If a Corporation, this Indemnity Agreement must be signed by either the Corporation's Chairman, President or Vice-President.

Address: _____

Telephone: _____

California Contractors License #: _____

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

Name of Bidder: _____

SECTION 00300

**PLACER COUNTY WATER AGENCY
144 FERGUSON ROAD
AUBURN, CA 95603**

BID FORM

NAME OF PROJECT: Bowman WTP Phase 3 Improvements

CONTRACT NO.: 2022-02

THIS BID IS SUBMITTED BY:

Name of Bidder: _____

THIS BID IS SUBMITTED TO:

THE BOARD OF DIRECTORS OF THE PLACER COUNTY WATER AGENCY

c/o PLACER COUNTY WATER AGENCY ENGINEERING DIVISION

144 FERGUSON ROAD

AUBURN, CA 95603

IF BID IS SUBMITTED BY U.S. MAIL IT MUST BE MAILED TO P.O. BOX 6570, AUBURN, CA 95604

THE BID IS SUBMITTED ON: _____, 2023

Date

1.0 ENTER INTO AGREEMENT

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 within the specified time and for the price indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

2.0 BIDDER ACCEPTS

The undersigned Bidder accepts all of the terms and conditions of the Invitation to Bid and Instructions to Bidders, including without limitation those dealing with the disposition of Bid

Name of Bidder: _____

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

3.0 BIDDER'S REPRESENTATIONS

In submitting this Bid, the undersigned Bidder represents that:

- A. Bidder has purchased a complete set of Contract documents and carefully examined and studied the Contract Documents, all information available to Bidders as defined in Section 00200, **INFORMATION AVAILABLE TO BIDDERS**, and the following Addenda, receipt of all of which is hereby acknowledged.

Addendum Number	Addendum Date	Signature of Bidder

- B. Bidder has visited the site and become familiar with and satisfied itself as to the general, local, and site conditions that may affect cost, progress, and performance of the Work.
- C. Bidder is familiar with and has satisfied itself as to all Federal, state, and local Laws and Regulations and Permits that may affect cost, progress, and performance of the Work.
- D. Bidder and all named subcontractors have registered with DIR pursuant to Labor Code Section 1725.5.
- E. Bidder has carefully studied all reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site which have been identified in the Section 00200, **INFORMATION AVAILABLE TO BIDDERS**.

Name of Bidder: _____

- F. Bidder has obtained and carefully studied (or assumes responsibility for having done so) all additional or supplementary examinations, investigations, explorations, tests, studies and data concerning conditions (surface, subsurface and Underground Facilities) at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying the specific means, methods, techniques, sequences, and procedures of construction expressly required by the Contract Documents to be employed by Bidder, and safety precautions and programs incident thereto.
- G. Bidder does not consider that any further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price(s) bid and within the times and in accordance with the other terms and conditions of the Bidding Documents.
- H. 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.
- I. Bidder has correlated the information known to Bidder, information and observations obtained from visits to the Site, reports and drawings identified in the Bidding Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Contract Documents.
- J. Bidder has given Owner written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Contract Documents, and the written resolution thereof by Owner is acceptable to Bidder, and where said conflicts, etc., have not been resolved through the interpretations or clarifications by Owner because of insufficient time or otherwise, Bidder has included in the Bid the greater quantity or better quality of Work, or compliance with the more stringent requirement resulting in a greater cost.
- K. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work for which this Bid is submitted.

4.0 BID SCHEDULE

The undersigned Bidder proposes and agrees to contract with the Placer County Water Agency to perform all of the above work, including subsidiary obligations as defined in the Contract Documents for the prices indicated in the BID SCHEDULE below.

Further in submitting its bid, the undersigned Bidder understands and agrees that the Total Base Bid amount is determined by the sum total of all bid item amounts in the Bid Schedule shown below. Bid Items include all work as defined in Section 01200, **MEASUREMENT AND PAYMENT**. No base bid items will be excluded from the awarded contract.

Name of Bidder: _____

BASE BID SCHEDULE

Item	Description	Quantity	Units	Unit Price	Total Price
1	Mobilization / Demobilization	1	LS		
2	Work Protection, Safety/Shoring, Site Security	1	LS		
3	27" Pipeline Excavation and Demolition	1	LS		
4	Flocculators, Rapid Mixer, and Miscellaneous Metals Demolition	1	LS		
5	Influent Flowmeter Vault Piping, Valve, and Flowmeter Replacement	1	LS		
6	Furnish and Install 30" Raw Water Piping and Valves	1	LS		
7	Construct Intake Screen Channel Excavation, Concrete, and Miscellaneous Metals	1	LS		
8	Furnish and Install Intake Fine Screen	1	LS		
9	Furnish and Install (6) Vertical Flocculators and (1) Rapid Mixer	1	LS		
10	Furnish and Install Flocculation Basin Miscellaneous Metals and Redwood Baffles	1	LS		
11	Demolish Canal Intake Slide Gate, and Furnish and Install (1) Slide Gate	1	LS		
12	Civil Site Improvements	1	LS		
13	Electrical, Instrumentation, and Controls	1	LS		
14	Installation Certification, Testing, and Startup	1	LS		
15	Final Documentation	1	LS		
16	All Other Items of Work	1	LS		

TOTAL BASE BID PRICE (Items 1 through 16) \$ _____

TOTAL BASE BID PRICE (in words) _____

The Bid amount of each of the above Bid items must be filled in and completed.

Name of Bidder: _____

Bid prices shall include everything necessary for the completion of the work stipulated in the Contract Documents, including but not limited to providing the materials, equipment, tools, plant and other facilities, and the management, superintendence, labor and services. Bid prices shall include all federal, state and local taxes.

In the event that the product of a unit price and an estimated quantity does not equal the extended amount stated, the unit price will govern and the correct product of the unit price and the estimated quantity shall be deemed to be the amount bid. In the event the addition of the bid item extended amounts does not equal the Total Base Bid Price, the corrected addition of all bid item extended amounts will govern and the Owner will correct the Total Base Bid Price accordingly.

Should the Bid Schedule contain only a total price for an item and the item price is omitted, the Owner shall determine the item price by dividing the total price for the item by estimated quantity of work to be performed.

If the Bid Schedule contains neither the item price nor the total price for an item, then it shall be deemed incomplete and the Bid shall be deemed non-responsive by the Owner.

In case of discrepancy between words and figures, words will prevail.

Total Bid Price:

The Total Bid Price (the summation of the Base Bid Items 1-16)

For \$ _____ (amount in figures)

(amount in words)

In the event the Total Base Bid Price is incorrect, the corrected addition will govern and the Owner will correct the Total Bid Price accordingly. In case of discrepancy between words and figures, words will prevail.

5.0 COMPLETION

In accordance with the Specifications, the undersigned Bidder agrees to plan the work and to prosecute it with such diligence that said work shall be commenced within ten days after the date of Notice to Proceed and shall be substantially completed within the time specified in Section 00800-1.1, **Time Allowed for Completion**. Furthermore, the undersigned Bidder accepts the provisions of Section 00800-1.2, **Damages for Delays** in the event of failure to complete the work within the specified times.

6.0 ATTACHED DOCUMENTS

The undersigned Bidder agrees that the following Contract Documents are attached to and made a condition of this bid:

Name of Bidder: _____

<u>SECTION</u>	<u>TITLE</u>
00410	Bid Guaranty Bond
00420	Certification of Bidder's Experience and Qualifications
00430	Designation of Subcontractors
00440	List of Manufacturers and Suppliers
00450	Site Visit Affidavit
00460	Material Delivery Affidavit
00480	Bidders' Non-Collusion Declaration Submitted with Bid

7.0 BIDDER'S PROOF OF DIR REGISTRATION

The undersigned Bidder agrees that its Proof of DIR Registration pursuant to Labor Code Section 1725.5 is attached hereto and made a condition of this bid:

8.0 SUPPLEMENTAL INFORMATION TO BE SUBMITTED AFTER BID OPENING AND MADE A CONDITION OF THE BID

A. The undersigned Bidder understands that a Bidder will be ineligible for an award of Contract unless the Bidder has furnished the required financial credit rating information required in Item D of Section 00420- CERTIFICATION OF BIDDER'S EXPERIENCE AND QUALIFICATIONS within three (3) business days after the receipt of bids.

9.0 BIDDER'S CALIFORNIA CONTRACTOR'S LICENSE INFORMATION

The undersigned Bidder is licensed in accordance with Chapter 9, Division 3 of California Business and Professions Code and section 3300 of the California Public Contract Code, and the laws of the State of California.

Bidder's Valid California Contractor's License No. _____ Class _____

Expiration Date: _____

Bidder has contracted under this license number for _____ years.

The undersigned hereby states that all representations made herein are made under penalty of perjury.

Name of Bidder: _____

If Bidder is:

An Individual

Name (typed or printed): _____

By: _____ (SEAL)

(Individual's signature)

Doing business as: _____

Business Address: _____

Phone Number: () _____ FAX Number: () _____

Email Address of Authorized Representative: _____

A Partnership

Partnership Name: _____ (SEAL)

By: _____

(Signature of general partner -- attach evidence of authority to sign)

Name (typed or printed): _____

Business address: _____

Phone Number: () _____ FAX Number: () _____

Email Address of Authorized Representative: _____

A Corporation

Corporation Name: _____ (SEAL)

State of Incorporation: _____

Type (General Business, Professional, Service, Limited Liability): _____

By: _____

(Signature – attach evidence of authority to sign)

Name (typed or printed): _____

Name of Bidder: _____

Title: _____

(CORPORATE SEAL)

Attest: _____

(Signature of Corporate Secretary)

Business address: _____

Date of Qualification to do business is _____

Phone Number: () _____ FAX Number: () _____

Email Address of Authorized Representative: _____

A Joint Venture

Joint Venturer Name: _____ (SEAL)

By: _____

(Signature of joint venture partner – attach evidence of authority to sign)

Name (typed or printed): _____

Title: _____

Business address: _____

Phone Number: () _____ FAX Number: () _____

Email Address of Authorized Representative: _____

Joint Venturer Name: _____ (SEAL)

By: _____

(Signature of joint venture partner – attach evidence of authority to sign)

Name of Bidder: _____

Name (typed or printed): _____

Title: _____

Business address: _____

Phone Number: () _____ FAX Number: () _____

Email Address of Authorized Representative: _____

(Each joint venturer must sign. The manner of signing for each individual, partnership, and corporation that is a party to the joint venture should be in the manner indicated above.)

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

Name of Bidder: _____

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SECTION 00410

**PLACER COUNTY WATER AGENCY
144 FERGUSON ROAD
AUBURN, CA 95603**

BID GUARANTY BOND

PROJECT NAME: Bowman WTP Phase 3 Improvements

CONTRACT NO: 2022-02

BIDDER (Name and Address):

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

BID

Bid Due Date: _____, 2023

Project Name: _____

Contract No.: _____

Project Location: _____

BOND

Bond Number: _____ Bond Date: _____
(Not later than Bid Due Date)

Penal Sum: Ten percent (10%) of the Total Bid Price

IN WITNESS WHEREOF, 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: _____

Attest: _____

Note: (1) Above addresses are to be used for giving required notice.

(2) Any singular reference to Bidder, Surety, OWNER or other party shall be considered plural where applicable.

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to pay to the **Placer County Water Agency, Auburn, CA, (hereinafter called "Owner ")** upon default of Bidder the penal sum of **10% of the Bidder's Total Bid Price.**
2. Default of Bidder shall occur upon the failure of Bidder to deliver within the time required by the Contract Documents the executed Agreement required by the Contract Documents and any performance and payment bonds required by the Contract Documents.
3. This obligation shall be null and void if:
 - a. Owner accepts Bidder's Bid and Bidder delivers within the time required by the Contract Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Contract Documents and 100% Performance and Payment bonds and certificates of insurance coverage required by the Contract Documents, or
 - b. All Bids are rejected by Owner, or
 - c. Owner fails to issue a Notice of Award to Bidder within the time specified in the Contract Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by paragraph 5 hereof).
4. Payment under this Bond will be due and payable upon default of Bidder and within 30 calendar days after receipt by Bidder and 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. Surety waives notice of and any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by Owner and Bidder, provided that the time for issuing Notice of Award including extensions shall not in the aggregate exceed 120 days from Bid due date without Surety's written consent.

6. No suit or action shall be commenced under this Bond prior to 30 calendar days after the notice of default required in paragraph 4 above is received by Bidder and Surety, and in no case later than one year after the Bid due date.
7. Any suit or action under this Bond shall be commenced in a court of competent jurisdiction located in Placer County, CA.
8. Notice required hereunder shall be in writing and sent to Bidder and 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. 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 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 the Bond conflicts with any applicable provision of 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.
12. In no event shall Bidder's and Surety's obligation as defined above exceed 10% of the Bidder's Total Bid Price.

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

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SECTION 00420

PLACER COUNTY WATER AGENCY 144 FERGUSON ROAD AUBURN, CA 95604

CERTIFICATION OF BIDDER'S EXPERIENCE AND QUALIFICATIONS

PROJECT: Bowman WTP Phase 3 Improvements

CONTRACT NO.: 2022-02

The undersigned Bidder represents that it is competent, knowledgeable and has the special skills to perform the work required for this project. The Bidder further represents that it has evaluated and recognizes the requirements of the Project and the conditions and circumstances under which the Project is to be performed. The Bidder further acknowledges that these inherent conditions existent in the construction of particular facilities may create, during construction, unusual or unsafe conditions hazardous to persons and property. The Bidder expressly acknowledges that it is aware of such risks and that it has the skill and experience to foresee and to adopt protective measures to adequately and safely perform the construction work with respect to such hazards.

A. COMPANY EXPERIENCE- To be filled in and submitted with Bid.

The Agency will evaluate the Bidder's responsibility based on information included in or otherwise required by this Section 00420 and such additional information as the Agency may receive. The Agency will evaluate the Bidder's length and depth of experience with comparable Qualifying Projects. For the Agency to consider the Bidder properly experienced in work of similar nature to this project, the Bidder must list at least three (3) and not more than six (6) Qualifying Projects, with at least two (2) being public works contracted directly with the public entity as the owner, completed since 2014 meeting all of the following Qualifying Criteria:

1. The Project involved as the primary work potable water treatment plant construction or improvements.
2. The Prime Contractor self-performed at least fifty percent (50%) of the work on the Project.
3. The Total Project Cost (Prime Contract) exceeded \$1,000,000.

The Agency may investigate and independently determine whether the listed Qualifying Projects meet the Qualifying Criteria. The Bidder may include only project(s) for which it was Prime Contractor and projects completed by its Project Manager, named below, working for other companies as Prime Contractor. For projects completed for other companies to be eligible to be Qualifying Projects, the Project Manager shall have worked on them in a capacity similar to that of this Project. The Agency may accept as a Qualifying Project a Bidder's listed project that does not meet all the Qualifying Criteria, provided that the Bidder adequately demonstrates with its Bid that the Qualifying Projects it has listed are sufficient to give it the necessary experience to be a responsible Bidder. The Agency's decisions as to responsibility will be based on an overall evaluation of all information received.

If the Bidder is a Joint Venture of two or more companies, each participant in the Joint Venture shall identify at least the minimum number of Qualifying Projects and provide project information for each Joint Venture participant in the format found below.

Qualifying Project # 1 Name: _____

Prime Contractor: _____

Project Manager: _____

Owner: _____

Construction Cost: \$ _____

Construction Time: _____ Calendar Days

Owner's Representative: _____

Owner's Representative Telephone No.: _____

Engineer or On-Site Construction Mgr.: _____

Engineer or On-Site CM's Telephone No.: _____

Date of Substantial Completion: _____

Qualifying Project # 2 Name: _____

Prime Contractor: _____

Project Manager: _____

Owner: _____

Construction Cost: \$ _____

Construction Time: _____ Calendar Days

Owner's Representative: _____

Owner's Representative Telephone No.: _____

Engineer or On-Site Construction Mgr.: _____

Engineer or On-Site CM's Telephone No.: _____

Date of Substantial Completion: _____

Qualifying Project # 3 Name: _____

Prime Contractor: _____

Project Manager: _____

Owner: _____

Construction Cost: \$ _____

Construction Time: _____ Calendar Days

Owner's Representative: _____

Owner's Representative Telephone No.: _____

Engineer or On-Site Construction Mgr.: _____

Engineer or On-Site CM's Telephone No.: _____

Date of Substantial Completion: _____

Qualifying Project # 4 Name: _____

Prime Contractor: _____

Project Manager: _____

Owner: _____

Construction Cost: \$ _____

Construction Time: _____ Calendar Days

Owner's Representative: _____

Owner's Representative Telephone No.: _____

Engineer or On-Site Construction Mgr.: _____

Engineer or On-Site CM's Telephone No.: _____

Date of Substantial Completion: _____

Qualifying Project # 5 Name: _____

Prime Contractor: _____

Project Manager: _____

Owner: _____

Construction Cost: \$ _____

Construction Time: _____ Calendar Days

Owner's Representative: _____

Owner's Representative Telephone No.: _____

Engineer or On-Site Construction Mgr.: _____

Engineer or On-Site CM's Telephone No.: _____

Date of Substantial Completion: _____

Qualifying Project # 6 Name: _____

Prime Contractor: _____

Project Manager: _____

Owner: _____

Construction Cost: \$ _____

Construction Time: _____ Calendar Days

Owner's Representative: _____

Owner's Representative Telephone No.: _____

Engineer or On-Site Construction Mgr.: _____

Engineer or On-Site CM's Telephone No.: _____

Date of Substantial Completion: _____

Total Construction Cost of listed Qualifying Project(s) above: \$ _____

The Agency further requires disclosure of, and will evaluate, all instances of incomplete projects and pending disputes involving the Bidder. For this purpose, Bidder hereby discloses the following projects for which it was terminated for default at any time in the past five (5) years:

Bidder shall identify on a separate sheet any claims filed in court or arbitration against Bidder in the past five years which concerned Bidder's work on a construction project. For each claim, if any, the Bidder shall provide the project name, date of the claim, name of the claimant, a brief description of the nature of the claim, the court in which the case was filed and a brief description of the status of the claim (pending or, if resolved, a brief description of the resolution). If there are any pending claims against Bidder that, should Bidder lose the claim(s), would adversely affect Bidder's financial position or its ability to meet its obligations if awarded the contract for this Project, such claims shall also be disclosed on a separate sheet.

Bidder shall also identify on a separate sheet any claims filed in court or arbitration by Bidder against a project owner in the past five years concerning work on a project or payment for a contract. For each claim, if any, the Bidder shall provide the project name, date of the claim, name of the claimant, a brief description of the nature of the claim, the court in which the case was filed and a brief description of the status of the claim (pending or, if resolved, a brief description of the resolution). If there are any pending claims filed by Bidder against a project owner that, should Bidder lose the claim(s), would adversely affect Bidder's financial position or ability to meet its obligations if awarded the contract for this Project, such claims shall also be disclosed on a separate sheet.

B. PROJECT MANAGER EXPERIENCE- To be filled in and submitted with Bid.

The Bidder shall name below the Project Manager who will be assigned to this project and submit past related project experience of this person which must include successfully completing at least two (2) Qualifying Projects meeting the above Qualifying Criteria where this person held the role of Project Manager. The demonstrated experience of the Project Manager must have been within the last five (5) years. The Project Manager must be assigned to the Project site and be personally present on site full-time during Construction.

Name of Project Manager: _____

Number of Years of Total Construction experience as a Project Manager assigned to the types of projects as defined above: _____ years

Number of Years as a Project Manager for your Company: _____ years

List up to three Qualifying Projects as defined above where the individual named above held the position of Project Manager. At least one (1) of these projects shall have been public works contracted directly with the public entity as the owner.

Qualifying Project # 1 Name: _____

Prime Contractor: _____

Owner: _____

Construction Cost: \$ _____

Construction Time: _____ Calendar Days

Owner's Representative: _____

Owner's Representative Telephone No.: _____

Engineer or On-Site Construction Mgr.: _____

Engineer or On-Site CM's Telephone No.: _____

Date of Substantial Completion: _____

Qualifying Project # 2 Name: _____

Prime Contractor: _____

Owner: _____

Construction Cost: \$ _____

Construction Time: _____ Calendar Days

Owner's Representative: _____

Owner's Representative Telephone No.: _____

Engineer or On-Site Construction Mgr.: _____

Engineer or On-Site CM's Telephone No.: _____

Date of Substantial Completion: _____

Qualifying Project # 3 Name: _____

Prime Contractor: _____

Owner: _____

Construction Cost: \$ _____

Construction Time: _____ Calendar Days

Owner's Representative: _____

Owner's Representative Telephone No.: _____

Engineer or On-Site Construction Mgr.: _____

Engineer or On-Site CM's Telephone No.: _____

Date of Substantial Completion: _____

This form is to be fully completed and submitted by the Bidder with the bid. Bidder is not allowed to provide a substitute form of similar information.

The Agency will check project references listed to verify information provided along with skills and capacity represented by Bidder. It is very important that the Bidder verify that all contact information is current for each name listed above.

Failure of the Bidder to provide current and valid project contact information and/or failure of the Bidder to meet both the pre-requisite Company and Project Manager experience may be grounds for the Agency to determine the Bidder as non-responsible and ineligible for contract award.

C. SAFETY QUALIFICATION INFORMATION- To be filled in and submitted with Bid.

Has CAL OSHA cited and assessed penalties against your firm for any "serious," "willful" or "repeat" violations of its safety or health regulations in the past five years?

NOTE: If you have filed an appeal of a citation, and the Occupational Safety and Health Appeals Board has not yet ruled on your appeal, you need not include information about it.

☐ Yes ☐ No

If "yes," attached a separate signed page describing the citations, including information about the dates of the citations, the nature of the violation, the project on which the citation(s) was or were issued, the amount of penalty paid, if any. If the citation was appealed to the Occupational Safety and Health Appeals Board and a decision has been issued, state the case number and the date of the decision.

Has the federal Occupational Safety and Health Administration cited and assessed penalties against your firm in the past five years?

NOTE: If you have filed an appeal of a citation and the Appeals Board has not yet ruled on your appeal, or if there is a court appeal pending, you need not include information about the citation.

Experience Modification Rate (EMR).

Enter your firm's EMR for the last three complete years (this information is provided by your workers' comp. insurance carrier).

Year	EMR
1-	
2-	
3-	
Three Year Average=	

Are the above rates interstate or intrastate? _____

If intrastate, which state? _____

Is your firm Self-Insured for Workers' Compensation Insurance in California?

☐ Yes ☐ No

If YES, Self-Insurance No. _____ and attach certification to Bid.

Name of Workers' Comp. Insurance Carrier(s):

Address: _____

Agent Name: _____ Telephone No.: _____

If the Bidder's Three Year Average EMR is greater than 1.00 (100%), Bidder is required to furnish the following additional information to the EMR information listed above:

Calculate your firm's LWIR for the past three (3) complete years. The lost workday information is listed on your OSHA forms no. 300 and 300A and is available from your workers' comp. insurance carrier.

LWIR =
$$\frac{\text{Total number of lost workday incidents} \times 200,000}{\text{Total employee hours worked}}$$

Year	Lost Workday Incidents	Total Employee Hours Worked	Lost Workday Incident Rate
1-			
2-			
3-			
Totals			

Average Recordable Incident Rate (RIR). Calculate your firm's RIR for the past three (3) complete years. The Incident Rate information is listed on your OSHA forms no. 300 and 300A and is available from your workers' comp. insurance carrier.

$$\text{RIR} = \frac{\text{Total number of recordable incidents} \times 200,000}{\text{Total employee hours worked}}$$

Year	Recordable Incidents	Total Employee Hours Worked	Recordable Incident Rate
1-			
2-			
3-			
Totals			

D. FINANCIAL INFORMATION- To be submitted by the three lowest bidders within three (3) business days following the bid opening date.

Provide evidence that the Bidder has sufficient financial resources to provide all work necessary to complete the project including construction, start-up, and warranty services.

A. Bidder must provide one or more of the following to assist the Agency in determining the Bidder's financial condition:

1. Copy of a reviewed or audited financial statement with accompanying notes and supplemental information. A financial statement that is not either reviewed or audited is not acceptable.
2. A certified Credit Report, current within 30 days of the date proposals are due. This credit report shall show a Dun & Bradstreet, or equal, credit risk category rating.
3. A letter from the Bidder's bank certifying their opinion of the Bidder's credit risk category rating and Bidder's current available line of credit.

B. Bidder must provide a letter from its Surety or Surety Broker which certifies that Bidder's current bonding capacity is sufficient for this Project based on the Bidder's Bid.

All financial information provided by Bidder that is marked "Confidential" or "Proprietary" shall be handled by the Agency in accordance with Section 00700- 4.5.12, **Public Records Act**.

The undersigned hereby states that all representations regarding the Bidder's Company Experience, Project Manager Experience and Safety Qualification Information are correct and true.

Signed this _____ day of _____, 2022

Bidder's Name

Authorized Signature

Date

Title of Signator

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

Name of Bidder: _____

SECTION 00430

**PLACER COUNTY WATER AGENCY
144 FERGUSON ROAD
AUBURN, CA 95603**

DESIGNATION OF SUBCONTRACTORS

PROJECT NAME: Bowman WTP Phase 3 Improvements

CONTRACT NO.: 2022-02

In accordance with California Public Contract Code Section 4100, et. seq., the undersigned Bidder certifies that the following licensed Subcontractors will perform work or labor or render service to the Bidder in or about the construction of the work or improvement, or will specifically fabricate and install a portion of the work or improvement according to detailed drawings contained in the Contract Documents, in an amount in excess of one-half of one percent of the Bidder's Total Bid Price. **The Bidder's attention is directed to the provisions found in Document 00100 - INSTRUCTIONS TO BIDDERS, Item 19. which stipulates the percent of the Work to be performed with the Bidder's own forces.**

Work to be Performed	Contractor License No. and Classification	DIR Registration No.	Percent of Total Bid Price	Subcontractor's Name and Address
1.				
2.				
3.				
4.				

Name of Bidder: _____

Work to be Performed	Contractor License No. and Classification	DIR Registration No.	Percent of Total Bid Price	Subcontractor's Name and Address
5.				
6.				
7.				
8.				

Add additional sheets, if necessary.

BIDDER

(Signature)

(Date)

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

SECTION 00440

**PLACER COUNTY WATER AGENCY
144 FERGUSON ROAD
AUBURN, CA 95603**

LIST OF MANUFACTURERS AND SUPPLIERS

PROJECT NAME: Bowman WTP Phase 3 Improvements

CONTRACT NO.: 2022-02

Bidder shall list the manufacturer and supplier that will furnish the respective item of equipment for the Work. Bidder shall list only one manufacturer and supplier for each piece of equipment identified. When applicable, the Owner has written in all sole-sourced manufacturers and suppliers which must be furnished by Bidder.

In the event any listed manufacturer and supplier differs from those manufacturers and suppliers specifically named in the specifications, Bidder shall submit complete information demonstrating that such manufacturer and supplier is capable of providing equipment that meets the requirements of the Contract Documents. Acceptance of a manufacturer and supplier listed by the Bidder shall not constitute a waiver of any provision of the Contract Documents.

Where manufacturer's and supplier's names are listed by the Bidder next to the specific item of equipment listed, this shall be interpreted to mean that such manufacturers and suppliers shall not be changed by the Bidder after the Bid opening, except as follows:

1. The manufacturer or supplier cannot provide equipment that meets the requirements of the Contract Documents, or
2. The manufacturer or supplier is unable to meet the delivery requirements necessary to maintain progress of the Project based upon the accepted construction schedule.

In the event Bidder changes the listed manufacturer or supplier due to reasons outlined above, Bidder shall propose an alternate manufacturer or supplier and submit complete information to demonstrate the alternative equipment meets the requirements of the Contract Documents.

Failure by Bidder to list names of manufacturers and suppliers for every item of equipment in the space provided may be cause for rejection of the Bid.

Detailed shop drawings shall be required for all items of equipment identified in the Contract Documents.

Section	Equipment	Manufacturer	Supplier
11600	Fine Screen	Hydro-Dyne	
13310	Flowmeter and Transmitter	Siemens	

BIDDER

(Signature)

(Date)

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

SECTION 00450

**PLACER COUNTY WATER AGENCY
144 FERGUSON ROAD
AUBURN, CA 95603**

**SITE VISIT AFFIDAVIT
(To Accompany Bid)**

Project Name: Bowman WTP Phase 3 Improvements

Contract No.: 2022-02

State of California

County of _____

_____, **being first duly sworn**, deposes he or she is
(Contractor's Authorized Representative)

_____ of _____, the party making the
(Title of Representative) (Contractor's Name)

bid, has visited the Site of the Work as described in the Contract Documents and has examined and familiarized themselves with the existing conditions, as well as all other conditions relating to the construction which will be performed. The submitting of a bid shall be considered an acknowledgement on the part of the Bidder of familiarity with conditions at the site of Work. The Bidder further acknowledges that the site examination has provided adequate and sufficient information related to existing conditions which may affect cost, progress or performance of the Work.

Signed this _____ day of _____, 2023

Bidder's Name

Authorized Signature

Date

Title of Signator

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

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SECTION 00460

**PLACER COUNTY WATER AGENCY
144 FERGUSON ROAD
AUBURN, CA 95603**

**MATERIAL DELIVERY AFFIDAVIT
(To Accompany Bid)**

Project Name: Bowman WTP Phase 3 Improvements

Contract No.: 2022-02

State of California

County of _____

_____, **being first duly sworn**, deposes he or she is
(Contractor's Authorized Representative)

_____ of _____, the party making the
(Title of Representative) (Contractor's Name)

bid, acknowledges they have reviewed Section 00700-6.3 Delays and Section 00800-1.1 Time Allowed for Completion and has examined and familiarized themselves with the terms of the contract including time allowed for completion of the work and requirements for establishing justification for an excusable delay. The submitting of a bid shall also be considered an acknowledgement on the part of the Bidder of familiarity with current material delivery and supply chain challenges which may affect cost, progress or performance of the Work, and that, while a material delivery delay may constitute an excusable delay, it shall not constitute a compensable delay.

PCWA acknowledges that supply chain challenges may exist and may result in a non-compensable delay or suspension of the work, subject to the above referenced contract terms.

Signed this _____ day of _____, 20____

Bidder's Name

Authorized Signature

Date

Title of Signator

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

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SECTION 00480

**PLACER COUNTY WATER AGENCY
144 FERGUSON ROAD
AUBURN, CA 95603**

BIDDER'S NON-COLLUSION DECLARATION SUBMITTED WITH BID

Project Name: Bowman WTP Phase 3 Improvements

Contract No.: 2022-02

The undersigned declares:

I am the _____ of _____, the party making the foregoing bid.

The bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation. The bid is genuine and not collusive or sham. The bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid. 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 to refrain from bidding. 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. All statements contained in the bid are true. 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, to any corporation, partnership, company, association, organization, bid depository, or to any member or agent thereof, to effectuate a collusive or sham bid, and has not paid, and will not pay, any person or entity for such purpose.

Any person executing this declaration on behalf of a bidder that is a corporation, partnership, joint venture, limited liability company, limited liability partnership, or any other entity, hereby represents that he or she has full power to execute, and does execute, this declaration on behalf of the bidder.

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

Public Contract Code Section 7106

Code of Civil Procedure Section 2015.5

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

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SECTION 00500

**PLACER COUNTY WATER AGENCY
144 FERGUSON ROAD
AUBURN, CA 95603**

NOTICE OF AWARD

Date: _____

To: _____
(Name of Bidder)

Address: _____

Project: Bowman WTP Phase 3 Improvements

Contract No.: 2022-02

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 construction of the Bowman WTP Phase 3 Improvements Project.

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

Two (2) copies of the proposed Section 00510, **AGREEMENT FOR CONSTRUCTION** and one (1) copy of the Agency's Substance Abuse Policy accompany this Notice of Award.

You must comply with the following conditions precedent within fifteen (15) days of the date you receive this Notice of Award.

1. Deliver to Placer County Water Agency two (2) signed copies of the Agreement, as found in Section 00510, leaving the date blank. Deliver to the attention of Stephanie Wens, Administrative Aide, Technical Services Department. If mailed, please mail to P.O. Box 6570, Auburn, CA 95604.
2. Deliver with the Agreement the appropriate Certificate of Authorization found in Sections 00515, 00520 or 00525.
3. Deliver with the Agreement the Contract Bonds as specified in Section 00100, **INSTRUCTIONS TO BIDDERS** and Section 00700, **GENERAL CONDITIONS** found in Sections 00610 and 00620.
4. Deliver with the Agreement a signed Certification of Drug-Free Workplace found in Section 00640.

5. Deliver with the Agreement a signed Workers' Compensation Insurance Certificate found in Section 00645.
6. Deliver with the Agreement all required original Insurance Certificates and endorsements as required in Section 00800, **SUPPLEMENTARY GENERAL CONDITIONS** found in Sections 00650 and 00660.
7. Deliver with the Agreement a complete and signed Public Works Contractor Registration & Prevailing Wage Monitoring Program form.
8. Other conditions precedent:

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

Within ten (10) calendar days after you comply with the above conditions, Owner will return to you one fully executed Agreement for your records.

PLACER COUNTY WATER AGENCY

By: _____

Its: _____

Copy to: Owner's Representative
 Construction Manager
 Engineer

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

SECTION 00510

**PLACER COUNTY WATER AGENCY
144 FERGUSON ROAD
AUBURN, CA 95603**

AGREEMENT FOR THE CONSTRUCTION OF

Bowman WTP Phase 3 Improvements, Contract No. 2022-02

(Document will be retyped after Contract Award)

THIS AGREEMENT, made and concluded, in duplicate, this ____ day of _____, 2023, by and between the Placer County Water Agency, a public entity in Placer County (hereinafter referred to as "Owner"), and _____, doing business as a (Name of State) Corporation/Partnership/Sole Proprietor, (hereinafter referred to as "Contractor").

RECITALS

WHEREAS, the Owner gave notice inviting bids to be submitted by 2:00 p.m. local time on October 25, 2023 for the Bowman WTP Phase 3 Improvements, Contract No. 2022-02, by published notice and/or posting in accordance with California Public Contract Code Section 20804 and other applicable law.; and

WHEREAS, Contractor, pursuant to the provisions of said Notice Inviting Bids submitted a Bid to the Owner and such Bid is attached hereto in its entirety and made a part hereof as Exhibit A; and

WHEREAS, the Owner, by a majority vote of its Board of Directors on Insert Date here awarded to Contractor the Bowman WTP Phase 3 Improvements, Contract No. 2022-02; and

WHEREAS, Contractor is ready, willing and able to complete all Work specified in the Contract Documents, in accordance with the Specifications, Drawings and all other terms and conditions of the Contract Documents; and

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

ARTICLE 1- WORK

1.1 The Work. The Contractor shall furnish all labor, materials, tools, apparatus, equipment, insurance, bonds, special services and skill to construct and complete in good workmanlike and substantial manner the project entitled: the Bowman WTP Phase 3 Improvements, Contract No. 2022-02 ("Work") as specified or indicated in the Contract Documents.

1.2 Location of Work. The Work will be performed at the following location:
595 Christian Valley Road, Bowman, CA 95602

ARTICLE 2- OWNER'S REPRESENTATIVE(S) AND OWNER'S CONSULTANTS

2.1 Owner's Representative. The Owner has designated Kelly Shively to act as Owner's Representative, who will represent Owner in performing duties and responsibilities and exercising Owner's rights and authorities in the Contract Documents. Owner may change the individual(s) acting as Owner's Representative(s), or delegate one or more specific functions to one or more specific Owner's Representative at any time with notice and without liability to Contractor. Each Owner's Representative is a beneficiary of all Contractor obligations to Owner, including without limitation, all releases and indemnities.

2.2 Engineer. The Owner has designated Water Works Engineers, LLC to act as Engineer. Engineer will assume all duties and responsibilities and have the rights and responsibilities assigned to the Engineer in the Contract Documents in connection with the completion of the Work. The Owner may assign all or part of the Owner's Representative's duties, rights and responsibilities to the Engineer. The Engineer is a beneficiary of all Contractor obligations to Owner, including without limitation, all releases and indemnities.

2.3 Construction Manager. The Owner has designated Jordan Jakobsen to act as Construction Manager. Construction Manager will assume all duties and responsibilities and have the rights and responsibilities assigned to the Construction Manager in the Contract Documents in connection with the completion of the Work. The Owner may assign, upon mutual agreement, all or part of the Owner's Representative's duties, rights and responsibilities to the Construction Manager. The Construction Manager is a beneficiary of all Contractor obligations to Owner, including without limitation, all releases and indemnities.

ARTICLE 3- CONTRACT TIMES

3.1 Time is of the Essence. All time limits for Milestones, if any, Substantial Completion, and completion and readiness for final payment as stated in the Contract Documents are of the essence of this Agreement.

3.2 Commence Work. Contractor shall commence execution of the Work on the date established in the Notice to Proceed. Owner reserves the right to modify or alter the Commencement Date of the Work.

3.3 Days to Achieve Contract Times. The Contractor shall diligently prosecute the work so that it shall be completed within the contract times specified in Section 00800-1.1, **Time Allowed for Completion**.

3.4 Liquidated Damages. The Owner and Contractor recognize that time is of the essence of this Agreement and that Owner will suffer financial loss if the Work is not completed within the contract times specified in Section 00800-1.1, **Time Allowed for Completion**. Accordingly, Owner and Contractor agree that as liquidated damages for delay, Contractor will forfeit and pay to the Owner liquidated damages in the amount set forth in Section 00800-1.2, **Damages for Delays**, per day for each and every calendar day that expires after the time for completion specified in Section 00800-1.1 **Time Allowed for Completion**, except as otherwise provided by extension of time pursuant to Section 00700-6.4, **Time Extensions** of the General Conditions.

ARTICLE 4- CONTRACT PRICE

4.1 Contract Price Breakdown. The Owner will pay Contractor the Contract Price for completion of the Work in accordance with the Contract Documents as follows:

BASE BID ITEMS					
ITEM	DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Mobilization / Demobilization	1	LS		
2	Work Protection, Safety/Shoring, Site Security	1	LS		
3	27" Pipeline Excavation and Demolition	1	LS		
4	Flocculators, Rapid Mixer, and Miscellaneous Metals Demolition	1	LS		
5	Influent Flowmeter Vault Piping, Valve, and Flowmeter Replacement	1	LS		
6	Furnish and Install 30" Raw Water Piping and Valves	1	LS		
7	Construct Intake Screen Channel Excavation, Concrete, and Miscellaneous Metals	1	LS		
8	Furnish and Install Intake Fine Screen	1	LS		
9	Furnish and Install (6) Vertical Flocculators and (1) Rapid Mixer	1	LS		
10	Furnish and Install Flocculation Basin Miscellaneous Metals and Redwood Baffles	1	LS		
11	Demolish Canal Intake Slide Gate, and Furnish and Install (1) Slide Gate	1	LS		
12	Civil Site Improvements	1	LS		
13	Electrical, Instrumentation, and Controls	1	LS		
14	Installation Certification, Testing, and Startup	1	LS		
15	Final Documentation	1	LS		
16	All Other Items of Work	1	LS		

TOTAL CONTRACT AMOUNT	\$

Compensation for Unit Price Items shall be based upon the unit prices stated in above schedule times the actual quantities or units of work and materials performed or furnished. Unit prices paid by Owner may change depending on actual quantities or units or work completed in accordance with Section 01350- 4.0, **Increased or Decreased Quantities**.

The Contractor may substitute securities for the amounts retained by the Owner to ensure performance of the work in accordance with the provisions of Section 22300 of the Public Contract Code.

ARTICLE 5- CONTRACTOR'S REPRESENTATIONS

5.1 Representations and Warranties. In order to induce Owner to enter into this Agreement, Contractor makes the following representations and warranties:

- A. Contractor has visited the Site and has examined thoroughly and understood the nature and extent of the Contract Documents, Work, Site, locality, actual conditions, as-built conditions, and all local conditions, and federal, state and local laws and regulations that in any manner may affect cost, progress, performance or furnishing of Work or which relate to any aspect of the means, methods, techniques, sequences or procedures of construction to be employed by Contractor and safety precautions and programs incident thereto.
- B. Contractor has examined thoroughly and understood all reports of exploration and tests of subsurface conditions, record drawings, drawings, products specifications or reports, available for bidding purposes, of physical conditions, including Underground Facilities, which are identified in Section 00200, **INFORMATION AVAILABLE TO BIDDERS**, or which may appear in the Drawings. Contractor accepts the determination set forth in these Contract Documents of the limited extent of the information contained in such materials upon which Contractor may be entitled to rely.
- C. Contractor has correlated its knowledge and the results of all such observations, examinations, investigations, explorations, tests, reports and studies with the terms and conditions of the Contract Documents.
- D. Contractor has given Agency prompt written notice of all conflicts, errors, ambiguities, or discrepancies that it has discovered in or among the Contract Documents and as-built drawings and actual conditions and the written resolution thereof through Addenda issued by Agency is acceptable to Contractor.
- E. Contractor is duly organized, existing and in good standing under applicable state law, and is duly qualified to conduct business in the State of California.
- F. Contractor has duly authorized the execution, delivery and performance of this Agreement, the other Contract Documents and the Work to be performed herein. The Contract Documents do not violate or create a default under any instrument, agreement, order or decree binding on Contractor.
- G. Contractor has listed the following Subcontractors pursuant to the Subcontractor Listing Law, California Public Contract Code §4100 *et seq.*:

Name of Subcontractor and Location of Mill or Shop	Description of Subcontractor's Work	Subcontractor's License No.

ARTICLE 6- CONTRACT DOCUMENTS

6.1 Contract Documents.

The Contract Documents consist of the following documents:

Notice Inviting Bids (Section 00020);
 Instructions to Bidders (Section 00100);
 Bid Form (Section 00300);
 Designation of Subcontractors (Section 00430);
 Material Delivery Affidavit (Section 00460);
 Agreement (Section 00510);
 Faithful Performance Bond (Section 00610);
 Payment Bond (Section 00620);
 Certification of Drug-Free Workplace (Section 00640)
 General Conditions (Section 00700);
 Supplementary General Conditions (Section 00800);
 General Requirements (Sections 01000 through 01999);
 Technical Specifications (Section 02300 and all other Sections following);
 Contract Drawings;
 Addenda (numbers ____ to____, inclusive);
 Permits from other agencies as may be required by law;

Exhibits to this Agreement (enumerated as follows):

- Contractor's signed Statement of Qualifications Affidavit attached as Exhibit A;
- Accepted Contractor's Bid attached hereto as Exhibit B;

The following which may be delivered or issued on or after the Effective Date of the Agreement and are not attached hereto:

- Notice to Proceed (Section 00550);
- Field Directive(s);
- Change Order(s);
- Construction Change Directive;
- Field Order(s).

6.2 Not Contract Documents. There are no Contract Documents other than those listed in this Section 00510- Article 6, **Contract Documents.** Section 00200, **INFORMATION AVAILABLE TO BIDDERS** and the information supplied therein, are not Contract Documents. The Contract Documents may only be amended, modified or supplemented as provided for in Section 00700, **GENERAL CONDITIONS.**

ARTICLE 7- MISCELLANEOUS

7.1 Terms. Terms used in this Agreement will have the meanings indicated in the General Conditions.

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

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

7.4 Severability. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon Owner and Contractor, who agree that the Contract Documents shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

7.5 Prevailing Wage Rates. Pursuant to the provisions of California Labor Code, Sections 1770 to 1780, inclusive thereof, the Contractor and any subcontractor under him shall pay not less than the prevailing rate of per diem wages as determined by the Director of the California Department of Industrial Relations. Pursuant to the provisions of California Labor Code Section 1773.2, the Contractor is hereby advised that copies of the prevailing rate of per diem wages and a general prevailing rate for holidays, Saturdays and Sundays and overtime work in the locality in which the work is to be performed for each craft, classification, or type of worker required to execute the Contract, are on file in the Owner's office. The Contractor agrees that not less than said prevailing rates shall be paid to workers employed on this public works contract as required by Labor Code Section 1774 of the State of California.

7.6 Governing Law. This Agreement and the Contract Documents shall be deemed to have been entered into in the County of Placer, State of California, and governed by California law. By entering into this Agreement, the Contractor consents and submits to the jurisdiction of Courts of the State of California, County of Placer, over any action of law, suit in equity, and/or other proceeding that may arise out of the Contract Documents.
IN WITNESS WHEREOF, Owner and Contractor have caused this Agreement to be executed the day and year first above written.

PLACER COUNTY WATER AGENCY
A Public Entity

By _____
Chairman of the Board
Placer County Water Agency

ATTEST:

By _____
Clerk, Board of Directors
Placer County Water Agency

CONTRACTOR'S NAME

STATE OF CALIFORNIA
CONTRACTOR'S LICENSE No.
and CLASSIFICATION

By _____
(Authorized Signature)

LICENSE EXPIRATION DATE

Name

FEDERAL TAX I.D. No.

Title

TYPE OF ORGANIZATION

ATTEST:

STATE OF INCORPORATION

By _____

(SEAL)

Name

Title
(If Corporation, must be attested by Corp Secretary)

Notices to the Parties shall be given at the following addresses:

OWNER:

Placer County Water Agency
P.O. Box 6570
Auburn, CA 95604

CONTRACTOR:

CONTRACTOR'S NAME

STREET ADDRESS

CITY, STATE & ZIP

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

SECTION 00515

**PLACER COUNTY WATER AGENCY
144 FERGUSON ROAD
AUBURN, CA 95603**

CERTIFICATE OF AUTHORIZATION

(If Contractor is a Corporation)

STATE OF CALIFORNIA

COUNTY OF PLACER

I HEREBY CERTIFY that at a meeting of the Board of Directors of the _____
_____, a corporation existing under the
laws of the State of California, held on _____, 2023, the following resolution duly
passed and adopted:

"RESOLVED, that _____,
as _____ President of the Corporation, be and is hereby authorized to execute the
Agreement dated _____, 2023, to the Placer County Water Agency and this
Corporation and that his/her execution thereof, attested by the Secretary of the
Corporation, and with the Corporate seal fixed, shall be the official act and deed of this
Corporation."

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

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the official seal of the
Corporation this _____ day of _____, 2023.

(seal)

Secretary

Corporate Officer

Company Address:

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

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SECTION 00520

**PLACER COUNTY WATER AGENCY
144 FERGUSON ROAD
AUBURN, CA 95603**

CERTIFICATE OF AUTHORIZATION

(If Contractor is a Partnership)

STATE OF CALIFORNIA

COUNTY OF PLACER

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

_____, a Partnership existing under the laws of the State of California, held on _____, 2023, the following resolution duly passed and adopted:

"RESOLVED, that _____,
as _____ of the Partnership, be and is hereby
authorized to execute the Agreement dated _____, 2022, to the Placer County Water
Agency and this Corporation and that his/her execution thereof, attested by the
_____, shall be the official act and deed of this Partnership."

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

IN WITNESS WHEREOF, I have hereunto set my hand this _____ day
of _____, 2022.

Managing Partner

Company Address:

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

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SECTION 00525

**PLACER COUNTY WATER AGENCY
144 FERGUSON ROAD
AUBURN, CA 95603**

CERTIFICATE OF AUTHORIZATION

(If Contractor is a Joint Venture)

STATE OF CALIFORNIA

COUNTY OF PLACER

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

_____, a Joint Venture existing under the
laws of the State of California, held on _____, 2023, the following resolution duly
passed and adopted:

"RESOLVED, that _____,
as _____ of the Joint Venture, be and is hereby
authorized to execute the Agreement dated _____, 2023, to the Placer County Water
Agency and this Corporation and that his/her execution thereof, attested by the
_____, shall be the official act and deed of this Joint Venture."

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

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the official seal of the
Joint Venture this _____ day of _____, 2023.

Managing Principal

Joint Venture Address:

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

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SECTION 00550

**PLACER COUNTY WATER AGENCY
144 FERGUSON ROAD
AUBURN, CA 95603**

NOTICE TO PROCEED

Date: _____

To: _____
(Name of Contractor)

Address: _____

Project: Bowman WTP Phase 3 Improvements

Contract No.: 2022-02

You are notified that the Contract Times under the above contract will commence to run on _____. On that date, you are to start performing your obligations under the Contract Documents. In accordance with Section 00800-1.1, **Times Allowed for Completion**, the date of Final Completion is _____.

Before you may start any Work at the Site, you must:

1. Submit certified Safety Program as required by California Code of Regulations, Title 8, General Industry Safety Orders and other related regulatory requirements.
2. Attend Pre-Construction conference.

PLACER COUNTY WATER AGENCY

By: _____

Its: _____

Copy to: Construction Manager
Engineer
Owner's Representative

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

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SECTION 00610

**PLACER COUNTY WATER AGENCY
144 FERGUSON ROAD
AUBURN, CA 95603**

FAITHFUL PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS:

That, WHEREAS, the Board of Directors of the Placer County Water Agency, Placer County, State of California, has awarded to _____, hereinafter designated as the "Principal," a Contract, the terms and provisions of which Contract are incorporated herein by reference, for constructing the Bowman WTP Phase 3 Improvements Project, Contract No. 2022-02, and

WHEREAS, said Principal is required under the terms of said Contract to furnish a bond for the faithful performance of said Contract;

NOW, THEREFORE, we the Principal, and _____, as surety, are held and firmly bound unto the Placer County Water Agency, Placer County, California, in the penal sum of _____ Dollars (\$_____), lawful money of the United States, being one hundred percent (100%) of the Contract amount, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that if the above bounden Principal, Principal's heirs, executors, administrators, successors or assigns, shall in all things stand to and abide by, and well and truly keep and faithfully perform the covenants, conditions and agreements in the said Contract and any alterations made as therein provided, on the Principal's part, to be kept and performed at the time and in the manner therein specified, and in all respects according to their true intent and meaning, and shall indemnify and save harmless the Placer County Water Agency, its officers and agents, as therein stipulated, then this obligation shall be null and void; otherwise it shall be and remain in full force and virtue.

As a condition precedent to the satisfactory completion of the said Contract, the above obligation shall hold good for a period on one (1) year after the completion and acceptance of the said work, during which time, if the above bounden Principal, Principal's heirs, executors, administrators, successors or assigns shall fail to make full, complete and satisfactory repair and replacements or totally protect the said the Placer County Water Agency from loss or damage made evident during said period of one (1) year from the date of acceptance of said work, and resulting from or caused by defective materials or faulty installation, in the prosecution of the work done, the above obligation shall be and remain in full force and virtue.

And the said Surety, for value received, hereby stipulates and agrees to waive the benefits of California Civil Code Sections 2819 and 2845.

1. In the event the Placer County Water Agency, or its successors or assigns, shall be the prevailing party in an action brought upon this bond, then, in addition to the penal sum hereinabove specified, we agree to pay to the said the Placer County Water Agency, or

its successors or assigns, a reasonable sum on account of attorney's fees in such action, which sum shall be fixed by the court.

In WITNESS THEREOF, the above bounden parties have executed this instrument under their seals this _____ day of _____, 2023, the name and corporate seal of each corporate party being hereto affixed, and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

ATTEST:

Principal Secretary

Principal

(SEAL)By _____

Witness as to Principal

Address

Address

Witness to Surety

Surety

Address

Address

Telephone

Attorney-in-Fact

Address

If CONTRACTOR is partnership, all partners must execute BOND.
The signature of the Surety on this bond must be acknowledged before a Notary Public.

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

SECTION 00620

**PLACER COUNTY WATER AGENCY
144 FERGUSON ROAD
AUBURN, CA 95603**

PAYMENT BOND

KNOW ALL PERSONS BY THESE PRESENTS:

That we, _____, as Principal, and _____, organized and existing under the laws of the State of _____, and authorized to execute bonds and undertaking as sole surety, as Surety, are held and firmly bound unto any and all persons named in California Civil Code Section 3181, whose claim has not been paid by the Contractor, company or corporation in the aggregate total of _____ Dollars (\$_____) (being 100% of the Contract amount) for payment whereof, well and truly to be made, said Principal and Surety bond themselves, their heirs, administrators, successors and assigns, jointly and severally, firmly by these presents.

The condition of the foregoing obligation is such that, whereas the above bounden Principal has entered into a Contract dated _____, 2023, with the Placer County Water Agency to do the following work, to wit: Construct the Bowman WTP Phase 3 Improvements, Contract No. 2022-02.

NOW, THEREFORE, if the above bounden Principal or his/her subcontractors fail to pay any of the persons named in Section 3181 of the Civil Code of the State of California, or amounts due under the Unemployment Insurance Code with respect to work or labor performed under the Contract, or for any amounts required to be deducted, withheld and paid over to the Employment Development Department from the wages of employees of the Contractor or his/her subcontractor pursuant to Section 13020 of the Unemployment Insurance Code of the State of California, with respect to such work and labor, the surety will pay for the same, in the amount not exceeding the sum specified in this bond, and also, in case suit is brought upon this bond, a reasonable attorney's fee, to be fixed by the court.

This bond shall inure to the benefit of any person named in Section 3181 of the Civil Code of the State of California so as to give a right of action to them or their assignees in suit brought upon this bond.

This bond is executed and filed to comply with the provisions of the act of Legislature of the State of California as designated in Civil Code Sections 9550 to 9566, inclusive, and all amendments thereto.

And the said Surety, for value received, hereby stipulates and agrees to waive the benefits of California Civil Code Sections 2819 and 2845.

IN WITNESS WHEREOF, the above bounden parties have executed this instrument under their seals this _____ day of _____, 2023, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

ATTEST:

_____	_____
Principal Secretary	Principal

(SEAL)By _____

_____	_____
Witness as to Principal	

_____	_____
Address	Address

_____	_____
Witness to Surety	Surety

_____	_____
Address	Address

Telephone

Attorney-in-Fact

Address

If CONTRACTOR is partnership, all partners must execute BOND.
The signature of the Surety on this bond must be acknowledged before a Notary Public.

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

SECTION 00630

**PLACER COUNTY WATER AGENCY
144 FERGUSON ROAD
AUBURN, CA 95604**

ESCROW AGREEMENT FOR SECURITY DEPOSITS IN LIEU OF RETENTION

Project Name: Bowman WTP Phase 3 Improvements Project

Contract No.: 2022-02

This Escrow Agreement is made and entered into by and between; the Placer County Water Agency, whose mailing address is P.O. Box 6570, Auburn, CA 95604; hereinafter called "Owner", and

CONTRACTOR'S NAME

whose address is _____

hereinafter called "Contractor", and

ESCROW AGENT'S NAME

whose address is _____

hereinafter called "Escrow Agent."

For the consideration hereinafter set forth, the Owner, Contractor, and Escrow Agent agree as follows:

1. Pursuant to Section 22300 of the Public Contract Code of the State of California, Contractor has the option to deposit securities which meet the requirements set forth in said Section 22300, with Escrow Agent, as a substitute for retention earnings required to be withheld by Owner pursuant to the Construction Contract entered into between Owner and Contractor for _____ in the amount of _____ dated _____ after referred to as the "Contract"). Alternatively, on written request of the Contractor, the Owner shall make payments of the retention earnings directly to the Escrow Agent. When Contractor deposits the securities as a substitute for Contract earnings, the Escrow Agent shall notify the Owner within ten (10) days of the deposit. The market value of the securities at the time of the substitution shall be at least equal to the cash amount then required to be withheld as retention under the terms of the Contract between the Owner and Contractor. Securities shall be held in the name of Owner, and shall designate the Contractor as the beneficial Owner.

2. Owner shall make progress payments to Contractor for such funds which otherwise would be withheld from progress payments pursuant to the Contract provisions, provided that the Escrow Agent holds securities in the form and amount specified above.
3. When the Owner makes payment of retentions earned directly to the Escrow Agent the Escrow Agent shall hold them for the benefit of the Contractor until such time as the escrow created under this Contract is terminated. The Contractor may direct the investment of the payments into securities. All terms and conditions of this agreement and the rights and responsibilities of the parties shall be equally applicable and binding when the Owner pays the Escrow Agent directly.
4. Contractor shall be responsible for paying all fees for the expenses incurred by Escrow Agent in administering the Escrow Account, and all expenses of the Owner. These expenses and payment terms shall be determined by the Owner, Contractor, and Escrow Agent.
5. The interest earned on the securities or the money market accounts held in escrow and all interest earned on that interest shall be for the sole account of Contractor and shall be subject to withdrawal by Contractor at any time and from time to time without notice to the Owner.
6. Contractor shall have the right to withdraw all or any part of the principal in the Escrow Account only by written notice to Escrow Agent accompanied by written authorization from Owner to the Escrow Agent that Owner consents to the withdrawal of the amount sought to be withdrawn by Contractor.
7. The Owner shall have a right to draw upon the securities in the event of default by the Contractor. Upon seven (7) days written notice to the Escrow Agent from the Owner of the default, the Escrow Agent shall immediately convert the securities to cash and shall distribute the cash as instructed by the Owner.
8. Upon receipt of written notification from the Owner certifying that the Contract is final and complete, and that the Contractor has complied with all requirements and procedures applicable to the Contract, Escrow Agent shall release to Contractor all securities and interest on deposit less escrow fees and charges of the Escrow Account. The escrow shall be closed immediately upon disbursement of all moneys and securities on deposit and payments of fees and charges.
9. Escrow Agent shall rely on the written notifications from the Owner and the Contractor pursuant to Sections (5) to (8), inclusive, of this Agreement, and Owner and Contractor shall hold Escrow Agent harmless from Escrow Agent's release and disbursement of the securities and interest as set forth above.
10. The names of the persons who are authorized to give written notice or to receive written notice on behalf of the Owner and on behalf of Contractor in connection with the foregoing, and exemplars of their respective signatures are as follows:

On Behalf of Owner:

Title

Name

Signature

Address

Phone Number

On Behalf of Contractor:

Title

Name

Signature

Address

Phone Number

On Behalf of Escrow Agent:

Title

Name

Signature

Address

Phone Number

At the time the Escrow Account is opened, Owner and Contractor shall deliver to the Escrow Agent a fully executed counterpart of this Agreement.

IN WITNESS WHEREOF, the parties have executed this Agreement by their proper officers on the date first set forth above.

Owner:

Contractor:

Title

Title

Name

Name

Signature

Signature

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

SECTION 00640

**PLACER COUNTY WATER AGENCY
144 FERGUSON ROAD
AUBURN, CA 95604**

CERTIFICATION OF DRUG-FREE WORKPLACE

PROJECT: Bowman WTP Phase 3 Improvements Project

CONTRACT NO.: 2022-02

KNOW ALL PERSONS BY THESE PRESENTS:

_____ has reviewed and understands the Substance
(Contractor)

Abuse Policy of the Placer County Water Agency (PCWA) and hereby expressly agrees, pursuant to and in furtherance of PCWA's policy, to maintain a Substance Abuse Policy at the site and take such necessary acts and/or measures to maintain a Drug-Free Workplace at the site. It is further agreed that the use, manufacture, distribution, dispensing or possession of illegal drugs by the Contractor or any person under the control of the Contractor (including, but not limited to subcontractors, their employees, mechanics and suppliers entering PCWA's premises) or while conducting business with PCWA shall constitute a breach of contract between PCWA and Contractor and shall give rise to any and all remedies available to PCWA in the event of a breach of Contract, including the termination thereof.

SIGNED AND SEALED this _____ day of _____, 2023.

SEAL

Principal

Signature of Principal

Title of Signator

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

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SECTION 00645

**PLACER COUNTY WATER AGENCY
144 FERGUSON ROAD
AUBURN, CA 95603**

WORKERS' COMPENSATION INSURANCE CERTIFICATE

Project Name: Bowman WTP Phase 3 Improvements Project

Contract No.:2022-02

In accordance with California Labor Code Section 1861, prior to commencement of work on the Contract, the Contractor shall sign and file with the Owner the following certification:

"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."

Name of Contractor

Signature

Title of Signator

Date (month/day/year)

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

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SECTION 00650

**PLACER COUNTY WATER AGENCY
144 FERGUSON ROAD
AUBURN, CA 95603**

GENERAL LIABILITY ENDORSEMENT (Form A-1)

Project Name: Bowman WTP Phase 3 Improvements Project

Contract No.: 2022-02

A. POLICY INFORMATION.

1. Insurance Company_____
- Policy No._____
2. Policy Term (From)_____(To)_____
- Endorsement Effective Date_____
3. Named Insured_____
4. Address of Named Insured_____
5. Limit of Liability Any One Occurrence/Aggregate
- \$_____
6. Deductible or Self-Insured Retention (Nil unless otherwise specified):
- \$_____

B. POLICY AMENDMENTS.

This endorsement is issued on consideration of the policy premium. Notwithstanding any inconsistent statement in the policy to which this endorsement is attached or any other endorsement attached thereto it is agreed as follows:

1. **INSURED.** The Owner, the Design Consultant, the Construction Manager, and each of their officers, partners, employees, and agents are included as additional insurers with regard to damages and defense of claims arising from (a) activities performed by or on behalf of the Named Insured, (b) products and completed operations of the Named Insured, or (c) premises owned, leased or used by the Named Insured.
2. **CONTRIBUTION NOT REQUIRED.** As respects: (a) work performed by the Named Insured for or on behalf of the Owner; or (b) products sold by the Named

Incidents and claims are to be reported to the insurer at:

Attn:

(Title) (Department)

(Company)

(Street Address)

(Agency) (State) (Zip Code)

(Telephone Number)

D. SIGNATURE OF INSURER OR AUTHORIZED REPRESENTATIVE OF THE INSURER.

I, _____ (print/type name), warrant that I have authority to bind the below listed insurance company and by my signature hereon do so bind this company. By signature below, the surety warrants that if requested by the Owner, it will furnish a certified copy of the certificate of authority issued by the Insurance Commissioner of the State of California.

Signature of: _____
Authorized Representative
(original signature required on endorsement furnished to the Owner)

ORGANIZATION: _____ TITLE: _____

ADDRESS: _____ TELEPHONE: _____

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

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SECTION 00660

PLACER COUNTY WATER AGENCY
144 FERGUSON ROAD
AUBURN, CA 95603

AUTO LIABILITY ENDORSEMENT (Form B-1)

Project Name: Bowman WTP Phase 3 Improvements Project

Contract No.: 2022-02

A. POLICY INFORMATION.

1. Insurance Company _____
Policy No. _____
2. Policy Term (From) _____ (To) _____
Endorsement Effective Date _____
3. Named Insured _____
4. Address of Named Insured _____
5. Limit of Liability Any One Occurrence/Aggregate
\$ _____
6. Deductible or Self-Insured Retention (Nil unless otherwise specified):
\$ _____

B. POLICY AMENDMENTS.

This endorsement is issued on consideration of the policy premium. Notwithstanding any inconsistent statement in the policy to which this endorsement is attached or any other endorsement attached thereto it is agreed as follows:

1. **INSURED.** The Owner, the Design Consultant, the Construction Manager, and each of their officers, partners, employees, and agents are included as additional insureds with regard to damages and defense of claims arising from ownership, operation, maintenance, use, loading or unloading of any auto owned, leased, hired or borrowed by the Named Insured, regardless of whether liability is attributable to the Named Insured or a combination of the Named Insured and the Owner, the Design Consultant and the Construction Manager and each of its officers, employees, and agents.

2. CONTRIBUTION NOT REQUIRED. As respects work performed by the Named Insured for or on behalf of the Owner, the insurance afforded by this policy shall: (a) be primary insurance as respects the Owner, the Design Consultant, the Construction Manager, and each of their officers, employees, and agents; or (b) stand in an unbroken chain of coverage excess of the Named Insured's primary coverage. In either event, any other insurance maintained by the Owner, the Design Consultant, the Construction Manager, and each of their officers, employees, and agents shall be excess of this insurance and shall not contribute with it.
3. SCOPE OF COVERAGE. The policy affords coverage to the Named Insured, which is at least as broad as Insurance Services Office form number CA 0001 (Ed 1/87) covering automobile liability, Code 1 ("any auto").
4. SEVERABILITY OF INTEREST. The insurance afforded by this policy applies separately to each insured who is seeking coverage or against whom a claim is made or a suit is brought, except with respect to the Company's limit of liability.
5. PROVISIONS REGARDING THE INSURED'S DUTIES AFTER ACCIDENT OR LOSS. Any failure to comply with reporting provisions of the policy shall not affect coverage provided to the Owner, the Design Consultant, the Construction Manager, and each of their officers, employees, and agents.
6. CANCELLATION NOTICE. The Insurance afforded by this policy shall not be suspended, voided, canceled, reduced in coverage or in limits except after thirty (30) days' prior notice by certified mail return receipt requested has been given to the Owner. Such notice shall be addressed as shown in the heading of this endorsement.

C. INCIDENT AND CLAIM REPORTING PROCEDURE.

Incidents and claims are to be reported to the insurer at:

Attn: _____
(Title) (Department)

(Company)

(Street Address)

(Agency) (State) (Zip Code)

(Telephone Number)

D. SIGNATURE OF INSURER OR AUTHORIZED REPRESENTATIVE OF THE INSURER.

I, _____ (print/type name), warrant that I have authority to bind the below listed insurance company and by my signature hereon do so bind this company. By signature below, the surety warrants that if requested by the Owner, it will furnish a certified copy of the certificate of authority issued by the Insurance Commissioner of the State of California.

Signature of: _____
Authorized Representative
(original signature required on endorsement furnished to the Owner)

ORGANIZATION: _____ TITLE: _____
ADDRESS: _____ TELEPHONE: _____

*** END OF SECTION ***

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SECTION 00680

**PLACER COUNTY WATER AGENCY
144 FERGUSON ROAD
AUBURN, CA 95603**

AGREEMENT AND RELEASE OF ANY AND ALL CLAIMS

NOTICE TO CLAIMANT: THIS DOCUMENT WAIVES AND RELEASES LIEN, STOP PAYMENT NOTICE, AND PAYMENT BOND RIGHTS UNCONDITIONALLY AND STATES THAT YOU HAVE BEEN PAID FOR GIVING UP THOSE RIGHTS. THIS DOCUMENT IS ENFORCEABLE AGAINST YOU IF YOU SIGN IT, EVEN IF YOU HAVE NOT BEEN PAID. IF YOU HAVE NOT BEEN PAID, USE A CONDITIONAL WAIVER AND RELEASE FORM.

Identifying Information

Name of Claimant: _____
Name of Customer: _____
Job Location: _____
Owner: Placer County Water Agency
Through Date: _____

Unconditional Waiver and Release

This document waives and releases lien, stop payment notice, and payment bond rights the claimant has for labor and service provided, and equipment and material delivered, to the customer on this job. Rights based upon labor or service provided, or equipment or material delivered, pursuant to a written change order that has been fully executed by the parties prior to the date that this document is signed by the claimant, are waived and released by this document, unless listed as an Exception below. The claimant has been paid in full:

Exceptions

This document does not affect any of the following:

Disputed Claims for extras in the amount of:

\$ _____

Signature

Claimant's

Signature: _____

Claimant's Title: _____

Date of Signature: _____

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SECTION 00700

PLACER COUNTY WATER AGENCY
144 FERGUSON ROAD
AUBURN, CA 95603

GENERAL CONDITIONS

1.0 GENERAL

1.1 Contract Agreement

A Bidder to whom award is made shall execute a written Agreement and required supplementary documents and submit them to the Owner within fifteen (15) calendar days after the Notice of Award has been mailed to the Bidder at the address given in Section 00300, **BID FORM**. The Agreement shall be made in the form adopted by the Owner and incorporated in the Section 00510, **AGREEMENT**.

If the lowest responsive, responsible Bidder to whom award is made fails to enter into the Agreement, as herein provided, the Bidder's Bond will become the property of the Owner, and an award may be made to the next lowest responsive, responsible Bidder, and such Bidder shall fulfill every stipulation embraced herein as if it were the party to whom the first award was made. A corporation, partnership, or joint venture to which an award is made will be required, before the Agreement is finally executed, to furnish evidence of its corporate existence and evidence that the officer signing the Agreement and bonds for the corporation is duly authorized to do so in the form of a **CERTIFICATE OF AUTHORIZATION** provided in Sections 00515, 00520 and 00525.

In the event the Contractor is a joint venture of two or more contractors, the grants, covenants, provisos and claims, rights, power, privileges and liabilities of the Contract shall be construed and held to be several as well as joint. Any notice, order, direct request or any communication required to be or that may be given by the Owner or the Construction Manager to the Contractor under this Contract, shall be well and sufficiently given to all persons being the Contractor if given to any one or more of such persons. Any notice, request or other communication given by any one of such persons to the Owner or the Construction Manager under this Contract shall be deemed to have been given by and shall bind all persons being the Contractor.

If any part of the work to be done under this Contract is subcontracted, the subcontract shall be in writing and shall provide that all work to be performed thereunder shall be performed in accordance with the terms of the Contract Documents. The subcontracting of any or all of the work to be done will in no way relieve the Contractor of any part of its responsibility under the Contract. Certified copies of subcontract agreements will be provided by the Contractor to the Owner upon request.

The Contractor shall not assign, transfer, convey, or otherwise dispose of the Contract in whole or in part, or its right, title, or interest therein, or its power to execute such Contract, to any other person, firm, or corporation without previous consent in writing of the Owner. Any proposed assignment, transfer, convey and or other disposition without such written consent of this owner will be void.

1.2 Written Notice and Service Thereof

All notices, requests, claims, demands, and other communications between the parties shall be in writing. All notices shall be given (i) by delivery in person (ii) by an overnight delivery service, (iii) by first class, registered or certified mail, postage prepaid, (iv) by facsimile or (v) by electronic mail to the address of the party specified in this contract or such other address as either party may specify in writing.

All notices shall be deemed to have been duly given (a) when delivered in person, (b) upon confirmation of receipt when transmitted by facsimile transmission or by electronic mail (but, in the case of electronic mail, only if followed by transmittal by an overnight delivery service specified for delivery on the next business day, unless electronic communication is allowed in the Contract Documents), (c) upon receipt after dispatch by registered or certified mail, postage prepaid or (d) on the next business day if transmitted by overnight delivery service (with confirmation of delivery)."

Any party to the Agreement may notify any other party of any changes to the address or any of the other details specified in this section; provided, however, that such notification shall only be effective on the date specified in such notice or five (5) business days after the notice is given, whichever is later.

1.3 Rights of Action

No right of action shall accrue upon or by reason of this Agreement to or for the use or benefit of anyone other than the parties to this Agreement. The parties to this Agreement are the Contractor and the Owner.

1.4 Plans and Specifications

The Contract Documents are complementary; what is called for by one is as binding as if called for by all. It is the intent of the Drawings and Specifications to describe a functionally complete and operable Project (and all parts thereof) to be constructed in accordance with the requirements of the Contract Documents. Any work, materials or equipment that may reasonably be inferred from the requirements of the Contract Documents or from prevailing custom or trade usage as being required to produce this intended result will be furnished and performed whether or not specifically called for. When words or phrases that have a well-known technical or construction industry or trade meaning are used to describe Work, materials or equipment, such words or phrases shall be interpreted in accordance with that meaning. The intent of the Drawings specifically includes the intent to depict construction that complies with all applicable laws, codes and standards. Subject to applicable law, including but not limited to California Public Contract Code Section 4100 et seq., and the terms of this Contract governing subcontracting, the Divisions and Sections of the Specifications and 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.

Reasonably implied parts of the Work shall be performed as "incidental work" even though absent from the Drawings and Specifications. "Incidental" work shall be performed by Contractor without extra cost to Owner. Incidental work includes any work not shown on Drawings nor described in Specifications, but which is necessary or normally or customarily required as a part of the Work shown on the Drawings or described in the Specifications, or is necessary or required to make each installation satisfactory, legally operable, functional, consistent with the intent of the Drawings

and Specifications or the requirements of the Contract Documents. Incidental work shall be treated as if fully described in Specifications and shown on Drawings, and expense thereof shall be included in price bid. Incidental work includes, but is not limited to, tasks required to be performed under Division 1 **GENERAL REQUIREMENTS** of Specifications.

Upon Notice to Proceed, the Contractor may obtain from the Owner, free of charge, three (3) of the Plans and Specifications. Additional sets of the Plans and Specifications may be procured at the cost of printing and binding. The Owner will also provide one electronic copy of the plans and specifications upon receipt of an executed **CAD WAIVER** Form 01999-01 from the Contractor. The Owner will furnish the release form at the Contractor's request.

The Contractor shall keep on the Project site a complete copy of the Specifications and Drawings and shall at all times give the Construction Manager and Agency staff access thereto. Any Drawings included in the Specifications shall be regarded as part thereof and of the Contract. Anything mentioned in these Specifications and not shown on the Drawings, or shown on the Drawings and not mentioned in these Specifications, shall be of like effect as though shown or mentioned in both. The Construction Manager will furnish from time to time such drawings, plans, profiles, and information as it may consider appropriate for the Contractor's guidance. Unless otherwise provided in the Contract Documents, it shall be the duty of the Contractor to see that all provisions are complied with in detail irrespective of the inspections of the Work during its progress by the authorized official or its representatives. Any failure on the part of the Contractor to observe the Contract Documents will be sufficient cause for the rejection of the Work at any time before its acceptance.

Wherever reference specifications (ANSI, ASTM, AASHTO, AWWA, and others) are referred to in these Specifications without designation of year, the reference is to the current or revised specification effective at the time of the Owner receiving bids, unless otherwise referenced in Section 01090, **REGULATORY REQUIREMENTS AND PERMITS**.

1.5 Applicability of all Paragraphs of Specifications

The technical specifications are presented in paragraphs for convenience. However, this presentation does not necessarily delineate trades or limits of responsibility. All paragraphs of the Specifications and Plans are interdependent and applicable to the Project as a whole.

The Specifications and all notes on the Drawings are directed to the Contractor and all work shall be performed by the Contractor even though phrases such as "the Contractor shall" or "shall be done by the Contractor" are omitted. Where terms such as "approved," "acceptable," "favorably reviewed," "review," "selected," "directed," "equivalent," "equal," or "satisfactory" are used, it shall mean by or to the Construction Manager and/or Engineer.

1.6 Contract Interpretation by the Construction Manager

Notwithstanding any omission from these Specifications or the Drawings it shall be the duty of the Contractor to call the Construction Manager's attention to apparent errors or omissions and request instructions before proceeding with the work. The Contractor shall not take advantage of any errors or omissions found by Contractor. It is also the duty of the Contractor to promptly notify the Construction Manager in writing of any design, materials, or specified method that the Contractor believes may prove defective or insufficient. If the Contractor believes that a defect or insufficiency exists in design, materials or specified method and fails to promptly notify the

Construction Manager in writing of this belief, the Contractor thereby waives any right to assert that a defect or insufficiency in design, materials or specified method at any later date in any legal or equitable proceeding against the Owner, or in any subsequent arbitration or settlement conference between the Owner and the Contractor. The Construction Manager may, by appropriate instructions correct errors and supply omitted information, which instructions shall be as binding upon the Contractor as though contained in the original Specifications or Drawings.

Any discrepancies found between the Contract Documents and Project site conditions or any inconsistencies or ambiguities in the Contract Documents shall be immediately reported, in writing, to the Construction Manager. Questions regarding the meaning and intent of the Contract Documents shall be referred in writing by the Contractor to the Construction Manager with a Request for Information (RFI). The Construction Manager shall respond to the Contractor in writing with a decision within fifteen (15) days of receipt of the request, or if it is necessary to extend this period, the Construction Manager shall notify the Contractor in writing as to when a decision will be provided. RFI procedures are further prescribed in Section 01340, **REQUESTS FOR INFORMATION AND CLARIFICATIONS**.

Work done by the Contractor after its discovery of such discrepancies, inconsistencies or ambiguities without such notice and prior to response from the Construction Manager shall be done at the Contractor's risk.

1.7 Order of Precedence

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

- (1) Permits from other agencies as may be required by law
- (2) Addenda, Supplemental Agreements and Change Orders, the one dated later having the precedence over another dated earlier.
- (3) Agreement (Section 00510)
- (4) Contractor's accepted Bid Proposal
- (5) General Requirements (Sections 01000 through 01999)
- (6) Supplementary General Conditions (Section 00800)
- (7) General Conditions (Section 00700)
- (8) Notice Inviting Bids (Section 00020)
- (9) Instructions to Bidders (Section 00100)
- (10) Contract Drawings
- (11) Technical Specifications (Section 02000 and all other Sections following)
- (12) Reference/Standard Specifications
- (13) Reference/Standard Plans

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

- (1) Enumerated dimensions govern over scaled dimensions
- (2) Detail drawings govern over general drawings
- (3) Specific notes, descriptions or schedules on drawings over graphical representations
- (4) Addenda/Change Order drawings govern over any other drawings
- (5) Contract Drawings govern over standard drawings/plans

Higher quality takes precedence over lower quality, and greater number, amount, or size takes precedence over lesser number, amount, or size.

The provisions of the Contract Documents shall take precedence over 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 a violation of such Law or Regulation.

1.8 Bonds

The Contractor shall provide, on the execution of the Section 00500, **AGREEMENT**, a good and sufficient corporate surety bond in the penal sum of one hundred percent (100%) of the amount bid and shall be on the forms provided by the Owner in Section 00610, **FAITHFUL PERFORMANCE BOND**, and be conditioned upon the faithful performance of all work and payment of all the Contractor's obligation under the Contract Documents. The surety on said bond shall be liable for any and all penalties and obligations which may be incurred by Contractor under this Agreement. The corporate surety bond shall be issued by a corporate surety approved by the Owner. The corporate surety shall be authorized to conduct business in California. At its discretion, the Owner may request that a certified copy of the Certificate of Authority of the insurer issued by the Insurance Commissioner of the State of California be submitted by the Surety to the Owner. At its discretion, the Owner may also require the insurer to provide copies of its most recent annual statement and quarterly statement filed with the Department of Insurance pursuant to Article 10 (commencing with Section 900) of Chapter 1 of Part 2 of Division 1 of the Insurance Code. This bond shall remain in effect at least until one year after the Date of Completion, except as otherwise provided by Law or Regulation or by the Contract Documents.

In addition to the required Faithful Performance Bond noted above, hereof, Contractor shall furnish a good and sufficient corporate surety bond in the penal sum of one hundred percent (100%) of the amount bid, which bond shall be on the form provided by the Owner in Section 00620, **PAYMENT BOND**, and conform strictly with the provisions of Chapter 7, Title 15, Part 4, Division 3, of the Civil Code of the State of California, and all amendments thereto. The corporate surety bond shall be issued by a corporate surety approved by the Owner. The corporate surety shall be authorized to conduct business in California. At its discretion, the Owner may request that a certified copy of the certificate of authority of the insurer issued by the Insurance Commissioner of the State of California be submitted by the surety to the Owner. At its discretion, the Owner may also require the insurer to provide copies of its most recent annual statement and quarterly statement filed with the Department of Insurance pursuant to Article 10 (commencing with Section 900) of Chapter 1 of Part 2 of Division 1 of the Insurance Code

(a) Only such bond forms provided by the Owner are acceptable and shall be executed by corporate sureties who are admitted surety insurers in the state of California in accordance with applicable law and acceptable to the Owner. All Bonds signed by an agent must be accompanied by a certified copy of such agent's authority to act.

(b) If the surety on any Bond furnished by the Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Work is located, the Contractor shall within seven (7) days thereafter substitute another Bond and surety, which must be acceptable to the Owner.

(c) All bonds required by the Contract Documents to be purchased and maintained by Contractor shall be obtained from surety companies that are duly licensed or authorized in the

State of California to issue Bonds for the limits so required. Subject to applicable law, such surety companies shall also meet such additional requirements and qualifications as provided in this section.

Attorneys-in-fact, who sign bid bonds or contract bonds, must file with each bond a notarized and effectively dated copy of their power of attorney as required on bond forms supplied by the Owner for Contractor use in Sections 00610 and 00620.

The surety company shall familiarize itself with all of the conditions and provisions of this Contract, and it waives the right of special notification of any change or modification of this Contract or of extension of time, or of decreased or increased work, or of the cancellation of the Contract, or of any other act or acts by the Owner or its authorized agents under the terms of this Contract; and failure to so notify the aforesaid surety companies of changes shall not relieve the surety companies of their obligations under this Contract.

1.9 Penalty for Collusion

If, at any time, it is found that the person, firm, or corporation to whom the Contract has been awarded has, in presenting any bid or bids, colluded with any other party or parties, then the Contract shall be null and void, and the Contractor and its sureties shall be liable for loss or damage which the Owner may suffer thereby, and the Owner may advertise for new bids.

1.10 Rights and Remedies

The duties and obligations imposed by the Contract Documents and the rights and remedies available thereunder shall be in addition to, and not a limitation of, any duties, obligations, rights, and remedies otherwise imposed or available by law.

No action or failure to act by the Owner, the Engineer, the Owner's Representative, or the Construction Manager shall constitute a waiver of any right or duty afforded any of them under the Contract, nor shall any such action or failure to act constitute an approval of or acquiescence in any breach thereunder, except as may be specifically agreed in writing.

2.0 CONTRACT ADMINISTRATION

2.1 Administration of the Contract

The Owner's Representative, the Construction Manager, and the Engineer will provide administration of the Contract as hereinafter described. These parties are designated in Section 00800-1.4, **Contract Administration**. If the status of any of the above parties should change, the Owner will provide written notice to the Contractor of such change.

In case of the termination of the employment of the Engineer or the Construction Manager, the Owner shall appoint an Engineer or a Construction Manager whose status under the Contract Documents shall be that of the former Engineer or Construction Manager, respectively.

2.2 Owner's Representative

2.2.1 General -The Owner's Representative shall be the person designated by the Agency's Director of Technical Services as indicated in Section 00800, **SUPPLEMENTARY GENERAL CONDITIONS**.

2.2.2 Change Orders/Field Orders -The Owner's Representative has the authority to reject proposed change orders, and cost proposals submitted by the Contractor or as recommended by the Construction Manager. The Owner's Representative has the authority to recommend acceptance and execution of Change Orders by the Agency. The Agency's Director of Technical Services has the authority to sign change orders on the Agency's behalf, after such recommendation or concurrent therewith, with approval by the Agency Board when required by Agency policies and procedures.

2.2.3 Progress Payments - The Owner's Representative has the authority to approve or disapprove requests for progress payments which have been submitted by the Contractor and recommended by the Construction Manager. In the event of approval and recommendation, the Progress Payments will be forwarded to the Director of Technical Services and, as appropriate, the Agency Board when required by Agency policies and procedures.

2.2.4 Contract Decisions - Should the Contractor disagree with the Construction Manager's decision with respect to the Contract, the Contractor may appeal to the Owner's Representative in accordance with the provisions of the Contract.

2.2.5 Acceptability of Work - The Owner's Representative has the authority to make the final determination of the acceptability of the Work. The Owner's Representative also has the authority to accept or reject the Engineer's recommendations regarding retention of defective work as provided.

2.3 Construction Manager

2.3.1 General - The Construction Manager is a representative of the Owner employed to act as advisor and consultant to the Owner in construction matters related to the Contract. The term Construction Manager may include more than one individual to perform contract administration and construction observation. Hereinafter, the term Construction Manager includes any and all representatives working under the direction of the Construction Manager.

All instructions to the Contractor and all communications from the Contractor to the Owner or the Engineer shall be forwarded through the Construction Manager. The Construction Manager will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents. The Owner has delegated its authority to the Construction Manager to make initial decisions regarding questions which may arise as to the quality or acceptability of materials furnished and work performed, and as to the manner of performance and rate of progress of the work under the Contract. The Construction Manager shall interpret the intent and meaning of the Contract and shall make initial decisions with respect to the Contractor's fulfillment of the Contract and the Contractor's entitlement to compensation. The Contractor shall look initially to the Construction Manager in matters relating to the Contract.

The Construction Manager's authority to act under Section 00700-2.1, **Administration of the Contract**, and any decision made by it in good faith either to exercise or not to exercise such

authority, shall not be interpreted or construed as control or responsibility of any of the work performed under this Contract.

2.3.2 On-Site Representative - The Construction Manager will periodically observe the progress, quality, and quantity of the Work to determine, in general, if the Work is proceeding in accordance with the provisions of the Contract Documents. The Construction Manager shall not be responsible for construction means, methods, techniques, sequences, or procedures, or for safety precautions and programs in connection with the Work.

In accordance with the provisions detailed elsewhere in these General Conditions, the Construction Manager will make decisions relative to all matters of interpretation or execution of the Contract Documents.

2.3.3 Observation and Inspections of Construction - The Construction Manager shall periodically observe the construction and shall have the authority to reject work and materials which do not conform to the Contract Documents, and to require special inspection or testing.

Observation and inspection is not an authorization to revoke, alter, or waive any requirements of the Specifications. Observation and inspection is the authorization to call the attention of the Contractor to any failure of the Work, materials or workmanship to conform to the Contract Documents. The inspector shall have this authority including the ability to reject materials or, in any emergency, suspend the Work. The Contractor may appeal any such issue which it disagrees with to the Construction Manager for decision. If the decision of the Construction Manager is not satisfactory to the Contractor, the Contractor may appeal such decision to the Owner's Representative.

2.3.4 Acceptability of the Work - The Construction Manager has the authority to make a recommendation as to the acceptability of the Work.

2.3.5 Change Orders - The Construction Manager has the authority to initiate change orders; to reject change orders proposed by the Contractor or Engineer; to negotiate and recommend acceptance of change orders; or to order minor changes in the Work at no cost to the Owner.

2.3.6 Construction Schedule - The Construction Manager has the authority to review and recommend acceptance of the progress schedule submitted by the Contractor at the start of the Work and subsequent significant revisions for conformance to the specified sequence of work and logic.

2.3.7 Progress Payments - The Construction Manager has the authority to recommend acceptance or rejection of requests for progress payments which have been submitted by the Contractor.

2.3.8 Completion - The Construction Manager, with the assistance of the Engineer and Owner's Representative(s), will conduct inspections to determine the dates of substantial completion of the Work and final completion of the Work, and will receive and forward to the Owner, for the Owner's review, written warranties, and related documents required by the Contract and assembled by the Contractor.

2.4 Engineer

2.4.1 General - The Engineer will have the authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

2.4.2 Interpretations - The Engineer has the authority to be the initial interpreter of the technical requirements of the Contract Documents. Either party to the Contract may make written request to the Construction Manager for interpretations necessary for the proper execution or progress of the Work. The Construction Manager shall refer such written requests to the Engineer, who will render such interpretations. Where the Contractor has requested an interpretation from the Construction Manager, or been notified by the Construction Manager that such interpretation has been requested by the Owner, any work done before receipt of such interpretations, if not in accordance with same, shall be removed and replaced or adjusted as directed by the Construction Manager without additional expense to Owner.

2.4.3 Acceptability of the Work - The Engineer has the authority to make a recommendation as to the acceptability of the Work. The Engineer has the authority to recommend acceptance regarding the remediation or retention of defective work.

2.4.4 Submittal - The Engineer shall receive, through the Construction Manager, shop drawings, product data and samples for review in accordance with Section 01330, **SUBMITTAL PROCEDURES**.

The Engineer has the authority to review and take other appropriate action upon the Contractor's submittal such as shop drawings, product data and samples, but only for conformance with the design concept of the Work and the information given in the Contract Documents.

3.0 OWNER

3.1 General

The Owner, acting through the Owner's Representative or the Construction Manager, shall have the authority to act as the sole judge of the Work and materials with respect to both quantity and quality as set forth in the Contract.

3.2 Attention to Work

The Owner's, Construction Manager's and Engineer's representatives are designated in Section 00800-1.4, **Contract Administration**. The Construction Manager's designated representative will normally be available at the Project site of the Work. An alternate representative will be designated when the designated Construction Manager's representative is not available at the Project site of the Work. The Engineer may assign a representative to be available at the Project Site of the Work.

3.3 Observation and Inspection

In addition to the Construction Manager's designated representative, the Owner may provide one or more inspectors to the Construction Manager to observe the work and with the same authority as provided for in Section 00700-2.3.3, **Observation and Inspections of Construction**.

Separate and independent from the observations and inspections above, the project may be inspected by Building Officials or Fire Officials for code compliance. Such inspectors shall have the authority provided to them by local jurisdiction.

3.4 Owner's Right to Use or Occupy

The Owner reserves the right, prior to Substantial Completion, to occupy, or use, any completed part or parts of the Work, providing these areas have been approved for occupancy by the Owner. The exercise of this right shall in no way constitute an acceptance of such parts, or any part of the Work, nor shall it in any way affect the dates and times when progress payments shall become due from the Owner to the Contractor or in any way prejudice the Owner's rights in the Contract, or any bonds guaranteeing the same. The Contract shall be deemed completed only when all the Work contracted has been duly and properly performed and accepted by the Owner.

Prior to such occupancy or use, the Owner and Contractor shall agree in writing regarding the responsibilities assigned to each of them for payments, security, maintenance, heat, utilities, damage to the Work, insurance, the period for correction of the Work, and the commencement of warranties required by the Contract Documents.

In exercising the right to occupy or use completed parts of the Work prior to the Substantial Completion thereof, the Owner shall not make any use which will materially increase the cost to the Contractor, without increasing the Contract Amount, nor materially delay the completion of the Contract, without extending the time for completion.

The part or parts of the Work, if any, which the Owner anticipates the use or occupancy of prior to Substantial Completion are noted in Section 01140, **WORK RESTRICTIONS**. Failure to include a part of the Work in the above referenced Section, shall not limit the Owner's right to use or occupy parts of the Work not listed.

3.5 Owner's Right to Carry Out the Work

If the Contractor should neglect to prosecute the work properly or fail to perform any provision of the Contract, and fails within five (5) days after receipt of written notice from the Owner to commence and continue correction of such neglect or deficiency with diligence and promptness, the Owner may, and without prejudice to any other remedy, make good such default, neglect or failure.

The Owner also reserves the right to perform any portion of the work due to an emergency threatening the safety of the Work, public, Owner, and any property or equipment.

In either case, a Change Order shall be issued unilaterally deducting from the payments then or thereafter due the Contractor the cost of correcting such deficiencies and/or for performing such work, including compensation for the Engineer's, the Construction Manager's, and Owner's additional services made necessary by such default, neglect, failure or emergency.

3.6 Owner's Right to Perform Work and to Award Separate Contracts

The Owner reserves the right to perform work related to the Project with the Owner's own forces, and to award separate contracts in connection with the Project or other work on the Project site. If the Contractor claims that delay, damage, or additional cost is involved because of such action by

the Owner, the Contractor shall make such claim as provided elsewhere in the Contract Documents.

When separate contracts are awarded for different portions of the Project or other work on the Project site, the term "Contractor" in the Contract Documents in each case shall mean the contractor who executes each separate Agreement.

The Owner will provide for the coordination of the work of the Owner's own forces and of each separate contractor with the Work of the Contractor, who shall cooperate therewith as provided in Section 00700-4.10, **Cooperation with Other Contractors**.

3.7 Responsibility of the Owner

The Owner shall not be held responsible for the care or protection of any material or parts of the work prior to the final acceptance, except as expressly provided in these Contract Documents.

4.0 CONTRACTOR

4.1 Status of Contractor and Subcontractors

4.1.1 It is stipulated and agreed that the Contractor shall be an independent contractor in the performance of this Contract and shall have complete charge of persons engaged in performance of the Work. The Contractor shall perform the Work in accordance with its own means and methods, subject to compliance with the requirements of the Contract.

4.1.2 Subcontractors will not be recognized as having a direct relationship with the Owner. The persons engaged in the work, including employees of subcontractors and suppliers, will be considered employees of the Contractor and their work shall be subject to the provisions of the Contract. References in the Project Manual to actions required of subcontractors, manufacturers, suppliers, or any person other than the Contractor, the Owner or the Construction Manager shall be interpreted as requiring that the Contractor shall require such subcontractor, manufacturer, supplier or person to perform the specified action.

The Contractor shall not employ any subcontractors that are not properly licensed in accordance with State law. Prior to commencement of any work by a subcontractor, the Contractor shall submit verification to the Construction Manager that the subcontractor is properly licensed for the work it will perform.

Contractor shall be fully responsible to Owner for the performance, acts, and omissions of its subcontractors, and of persons directly or indirectly employed by them. Each subcontract shall expressly incorporate by reference the terms of this Agreement, including the following provisions:

- a. Each subcontractor shall carry insurance as required by this Agreement, and provide evidence of such insurance, as provided in Section 00800-2.0, **Liability & Insurance**.
- b. Each subcontractor shall be obligated to defend, indemnify, and hold harmless the Owner and additional insureds listed in Section 00800-2.0 from all claims arising from the subcontractor's portion of the Work in the same manner as Contractor.

- c. Each subcontractor shall grant Owner a license to use its drawings and design materials as provided in the Agreement.
- d. Each subcontract shall acknowledge the Owner's right to suspend or terminate the Agreement, and waive any right to anticipate profits in the event of such termination.
- e. Each subcontract shall include language assigning the subcontract to the Owner in the event Owner terminates Contractor. The assignment shall be effective at Owner's discretion. The Contractor hereby assigns to the Owner each Subcontract entered into by Contractor for performance of any part of the Work provided that:
 - i. The assignment is effective only after: the Owner's termination of the Contractor's right to proceed under the Contract Documents (or portion thereof relating to that Subcontract) Section 6.7 (Right to Terminate);
 - ii. The assignment is effective only for the Subcontracts which the Owner expressly accepts by notifying the Subcontractor in writing;
 - iii. The assignment is subject to the prior rights, if any, of the Surety, where the Surety exercises its rights to complete the Contract;
 - iv. After the effectiveness of an assignment, the Contractor shall, at its sole cost and expense, sign all instruments and take all actions reasonably requested by the Owner to evidence and confirm the effectiveness of the assignment to the Owner;
 - v. Nothing in this paragraph shall modify or limit any of the Contractor's obligations to the Owner arising from acts or omissions occurring before the effectiveness of any Subcontract assignment, including but not limited to all defense, indemnity and hold harmless obligations arising from or related to the assigned Subcontract; and
 - vi. The Owner may accept the assignment at any time during the course of the Work and prior to Final Completion in the event of a suspension or termination of Contractor's rights under the Contract Documents. Such assignment is part of the consideration to the Owner for entering into the Contract with the Contractor and may not be withdrawn.

The removal and/or substitution of any subcontractor listed in Section 00430, **DESIGNATION OF SUBCONTRACTORS**, shall be made by the Contractor and Owner as provided for in Public Contract Code Section 4100 et. seq. The Contractor attention is directed to Public Contract Code Section 6109 which prohibits an ineligible subcontractor from bidding and working on a public works project, and to Labor Code Section 1771.1 which requires that all subcontractors be registered with the California Department of Industrial Relations pursuant to Labor Code section 1725.5 as a precondition for bidding on, or being awarded a contract for public work.

4.2 Contractor's Representative

Only the Project Manager named in the Contractor's Bid Section 00420-B, **CERTIFICATION OF BIDDER'S EXPERIENCE AND QUALIFICATIONS**, or an equally qualified alternate approved by the Owner, will be permitted as the Contractor's on-site authorized representative. The Contractor shall confirm in writing, before starting work, the authorized representative who shall be qualified for the duties required and have complete authority to represent and to act for the Contractor. Said authorized representative has the authority to act in matters relating to the Contract, shall be personally present at the Project site at all times while work is actually in progress on the Contract.

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During periods when the Work is suspended, arrangements acceptable to the Construction Manager shall be made for any emergency work that may be required. The Contractor's authorized representative shall be fluent and proficient in the English language in order to understand, receive, and carry out oral and written communications or instructions relating to all job functions and responsibilities. All communications to and from the Contractor's authorized representative shall be binding as if given to or by the Contractor.

Contractor shall provide their authorized representative's contact information which shall include the representative's name, office street address, office telephone number, mobile phone number, home phone number, email address and the office mailing address if different from the street address.

The Contractor's authorized representative shall give its personal attention to and shall supervise the Work to the end that it shall at all reasonable times be prosecuted faithfully; and when the authorized representative is not personally present on the Work, the representative shall at all reasonable times be represented by a competent designated alternate, superintendent or foreman who shall receive and obey all instructions or orders given under this Contract, and who shall have full authority to supply materials, tools, and labor without delay, and who shall be the legally appointed representative of the Contractor. The Contractor shall be liable for the faithful observation of any instructions delivered to the Contractor or to its authorized representative.

The Contractor's authorized representative shall not be replaced without the Owner's express written permission. Furthermore, the Owner shall have the authority to remove the Contractor's authorized representative from the Project at any time.

4.3 Use and Protection of Owner's Site and Adjacent Property

4.3.1 With the approval of the Construction Manager, the Contractor may use portions of the Owner's site for storage of construction equipment, materials and field offices provided the Contractor does not interfere with Agency operations. The Contractor will not be allowed to unreasonably encumber the Site or adjacent areas with its materials and/or equipment. The Owner will not accept any responsibility for damage to or loss of the Contractor's equipment or materials stored on any Project related site caused by vandalism, nature, or otherwise, suffered by the Contractor. Protection of all construction equipment, stores, and supplies shall be the sole responsibility of the Contractor. Where additional work space is desired by the Contractor or where the Owner cannot provide the space to the Contractor, it shall be the Contractor's sole responsibility and expense to obtain such a space for its use.

4.3.2 All workers or representatives of the Contractor, subcontractors or suppliers are admitted to the Site only for the proper execution of the Work and have no tenancy without the express written permission of the Owner. Furthermore, no persons may occupy property owned by the Owner outside the limit of the Work, as indicated on the drawings, without the express written permission of the Owner.

4.3.3 The Contractor shall enforce any instructions from the Owner or Construction Manager regarding combustible materials, placement of signs, danger signals, barricades, radios, noise, dust, and smoking. Upon completion of the Work, the Contractor shall remove all temporary barricades, signs and related materials.

4.3.4 The Contractor shall determine safe loading capacities and shall not overload any structure, building, pipe or other existing facility beyond its safe capacity during construction. In addition to any requirements imposed by law, the Contractor shall shore up, brace, underpin and protect as may be necessary all foundations and other parts of all existing structures, facilities and improvements on the Site or adjacent to the Site which are in any way affected by the Contractor's excavations or other operations connected with the Work. Prior to commencing any work which in any way affects adjoining or adjacent land or buildings thereon, or public utilities, the Contractor shall notify the Construction Manager to discuss responsibilities for properly notifying the owners/occupants of adjacent land and the protective measures taken by the Contractor. Upon request of the Construction Manager, the Contractor shall meet with the recipient of any notice or attend local public meetings as proper public outreach on local impacts caused by completion of the Work.

4.3.5 The Contractor shall take all necessary precautions to protect existing facilities against the effects of all weather and environmental elements and Contractor shall be strictly liable for failure to protect any facility.

4.3.6 All existing improvements and facilities shall be protected from any damage resulting from the operations, equipment or workers of the Contractor during the entire Contract Time.

4.3.7 The Contractor shall take all steps necessary to protect all structures, buildings, land and other facilities from fires and sparks originating from the Work. The Contractor shall comply with all laws and regulations regarding fire protection and shall comply with all instructions given by the fire department with jurisdiction.

4.3.8 Any damage to existing conditions, or to any other improvement or property above or below the ground surface, whether public or private, arising from the Contractor's operations or performance of the Work shall be repaired within forty-eight (48) hours by the Contractor without expense to the Owner, unless disruption of the Owner's operations or creation of a safety hazard has occurred, in which case damage will be repaired immediately. Any delays to the project completion times caused by such repairs shall be considered non-compensable and no further extension of the Contract Time will be granted therefor. Should the Contractor not be timely in repairing damage caused by its operations or performance, the Owner shall take steps to protect property and life, in its sole discretion, and deduct entire cost of such work from the next payment due the Contractor. No prior notice to the Contractor shall be necessary for the Owner to take such action.

4.4 Fees and Permits

The California Environmental Quality Act (CEQA) (Public Resources Code, Sections 21000 and following), may be applicable to permits, licenses and other authorizations which the Contractor must obtain from local agencies in connection with performing the Work. The Contractor shall comply with the provision of those statutes in obtaining such permits, licenses, and other authorizations, and they shall be obtained in sufficient time to prevent delays in the Work. In the event that the Owner has obtained permits, licenses, or other authorization applicable to the work in conformance with the requirements of CEQA, the Contractor shall comply with the provisions of these permits, licenses, and other authorizations. The requirements for fees and permits are specified in Section 01090-2.0, **Fees and Permits**.

4.5 Compliance with Laws

The Owner is a public agency in the State of California and is subject to the provisions of law relating to public contracts. It is agreed that all provisions of law applicable to public contracts are a part of these Contract Documents to the same extent as though set forth herein and will be complied with by the Contractor.

The Contractor shall, at its own cost and expense, observe and keep itself and its subcontractors fully informed of all existing and future legislated State and Federal Laws and City and County ordinances and regulations which in any manner affect those engaged or employed in the Work, or the materials and equipment used in the Work, or which in any way affect the conduct of the Work, and all such orders and decrees of bodies or tribunals having any jurisdiction or authority over the same. If any discrepancy or inconsistency is discovered in the Drawings, Specifications, or in any other part of this Contract, in relation to any such law, ordinance, regulation, order or decree, the Contractor shall immediately report the same to the Construction Manager in writing. The Contractor shall at all times observe and comply with all such existing and future laws, ordinances, regulations, orders and decrees; and shall protect, indemnify, and defend the Owner, the Construction Manager, the Engineer, and all of their officers, officials, employees, agents, volunteers, and servants against any claim or liability arising from or based upon the violation of any such law, ordinance, regulation, order, or decree, whether by the Contractor itself, employees, or its subcontractors.

Attention is directed to the following specific regulations and requirements that are included in the Contract Documents. This list of regulations is not warranted to be complete and the burden of ascertaining legal requirements that must be satisfied shall rest solely with the Contractor.

4.5.1 Prevailing Wage Rates- Pursuant to the provisions of California Labor Code, Sections 1770 to 1780, inclusive thereof, the Contractor and any subcontractor under him shall pay not less than the prevailing rate of per diem wages as determined by the Director of the California Department of Industrial Relations. Pursuant to the provisions of California Labor Code Section 1773.2, the Contractor is hereby advised that copies of the prevailing rate of per diem wages and a general prevailing rate for holidays, Saturdays and Sundays and overtime work in the locality in which the work is to be performed for each craft, classification, or type of worker required to execute the Contract, are on file in the Owner's office, which copies shall be made available to any interested party on request. These rate determinations may also be found on the State of California Department of Industrial Relations' (DIR) website. The Contractor shall post a copy of said prevailing rate of per diem wages at each job site.

The Contractor shall comply with the provisions of Section 1775 of the California Labor Code and shall, as a penalty to the Owner, forfeit up to two hundred dollars (\$200) for each calendar day, or portion thereof, for each worker paid less than the prevailing rate of per diem wages for each craft, classification, or type of worker needed to execute the contract. The Contractor shall pay each worker an amount equal to the difference between the prevailing wage rates and the amount paid worker for each calendar day or portion thereof for which a worker was paid less than the prevailing wage rate. Contractor is required to pay all applicable penalties and back wages in the event of violation of prevailing wage law, and Contractor and any subcontractor shall fully comply with California Labor Code Section 1775, which is incorporated by this reference as though fully set forth herein.

Contractor and any subcontractor shall maintain and make available for inspection by the Owner's Representative payroll records as required by California Labor Code Section 1776, which is incorporated by this reference as though fully set forth herein. Contractor is responsible for ensuring compliance with this Document. Contractor and each subcontractor shall keep an accurate payroll record, showing the name, address, social security number, work classification, and 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 Project. Each payroll record shall contain or be verified by a written declaration that it is made under penalty of perjury stating that the information contained in the payroll record is true and correct. Penalties for non-compliance with the requirements of Section 1776 may be deducted from project payments per the requirements of Section 1776.

Pursuant to Labor Code Section 1771.4(a)(2) and California Code of Regulations title 8, section 16451, the Contractor shall post the job site notices as required by Section 16451 and the DIR.

4.5.2 Travel and Subsistence Payments- Each worker needed to execute the Work must be paid travel and subsistence payments as defined in the applicable collective bargaining agreements filed in accordance with Section 1773.1 of the California Labor Code.

4.5.3 Workday- In accordance with the provisions of Division 2, Part 7, Chapter 1, Article 3 of the Labor Code, State of California, and in particular Sections 1810 to 1815 inclusive, thereof, eight (8) hours labor shall constitute a days' work and no laborer, worker, or mechanic in the employ of said Contractor, or any subcontractor doing or contracting to do any part of the Work contemplated by this Contract, shall be required or permitted to work more than eight (8) hours in any one calendar day, and forty (40) hours in any one calendar week unless compensated at not less than time and a half as set forth in California Labor Code Section 1815. However, if the prevailing wage determination requires a higher rate of pay for overtime than is required under said Section 1815, then the overtime rate must be paid, as specified in California Code of Regulation Title 8, Group 3, Section 16200(a)(3)(F). The Contractor and each subcontractor shall also keep an accurate record showing the names and actual hours worked of all workers employed by them in connection with the work contemplated by this Contract, which record shall be open at all reasonable hours for the inspection of the Owner or its officers or agents and by the Division of Labor Standards Enforcement of the Department of Industrial Relations, their deputies or agents; and it is hereby further agreed that said Contractor shall forfeit as a penalty to the Owner, the sum of Twenty-Five and No/100 Dollars (\$25.00) for each laborer, worker or mechanic employed in the execution of this Contract by the Contractor or by any subcontractor for each calendar day during which such laborer, worker or mechanic is required or permitted to labor more than eight (8) hours in any one calendar day and forty (40) hours in one calendar week in violation of these provisions.

4.5.4 Apprentices- Prior to commencing the Work, Contractor shall comply with the provisions of Labor Code Section 1777.5, including but not limited to the submission of contract award information to an applicable apprenticeship program that can supply apprentices to the site of the Work. Such information shall include an estimate of journeyman hours to be performed under this Contract, the number of apprentices proposed to be employed, and the approximate dates the apprentices would be employed. A copy of this information shall be submitted to the Owner if requested by the Owner's Representative.

A determination by the Chief of the Division of Apprenticeship Standards that Contractor or its subcontractors have knowingly violated Labor Code Section 1777.5 shall forfeit as a civil penalty

an amount not exceeding one hundred dollars (\$100) for each full calendar day of noncompliance. Contractor or its subcontractor, who knowingly commits a second or subsequent violation of Labor Code Section 1777.5 within a three-year period, where the noncompliance results in apprenticeship training not being provided as required, shall forfeit as a civil penalty the sum of not more than three hundred dollars (\$300) for each full calendar day of noncompliance. Upon the receipt of a determination that a civil penalty has been imposed by the Chief of the Division of Apprenticeship Standards, the Owner shall withhold the amount of the civil penalty from the next progress payment then due or to become due Contractor.

4.5.5 Certified Electricians- Workers performing work for an electrical contractor installing, constructing, or maintaining any electrical system covered by the National Electrical Code shall be certified as a General Electrician per California Labor Code Section 3099.

4.5.6 Receipt of Workers' Wages, Fee for Registering or Placing Persons In Public Works- Attention is directed to the provisions of Sections 1778 and 1779 of the California Labor Code, which reads as follows:

Section 1778. "Every person, who individually or as a representative of an awarding or public body or officer, or as a contractor or subcontractor doing public work, or agent or officer thereof, who takes, receives or conspires with another to take or receive, for its own use or the use of any other person any portion of the wages of any workman or working subcontractor, in connection with services rendered upon any public work is guilty of a felony."

Section 1779. "Any person or agent or officer thereof who charges, collects, or attempts to charge or collect, directly or indirectly, a fee or valuable consideration for registering any person for public work, or for giving information as to where such employment may be procured, or for placing, assisting in placing, or attempting to place, any person in public work, whether the person is to work directly for the state, or any political subdivision or for a contractor or subcontractor doing public work is guilty of a misdemeanor."

4.5.7 Labor Discrimination. Contractor shall abide by all federal and state laws preventing discrimination in the employment of persons upon public works and shall ensure by appropriate contract provisions that all subcontractors are similarly obligated to comply with all such laws. These laws include, but are not limited to the following. California Labor Code Section 1735 which provides that "A contractor shall not discriminate in the employment of persons upon public works on any basis listed in subdivision (a) of Section 12940 of the Government Code, as those bases are defined in Sections 12926 and 12926.1 of the Government Code, except as otherwise provided in Section 12940 of the Government Code. Every contractor for public works who violates this section is subject to all the penalties imposed for a violation of this chapter.."

Likewise, Contractor and all of its subcontractors shall abide by the provisions of California Labor Code Section 1777.6 prohibiting discrimination in the acceptance of otherwise qualified apprentices; and California Labor Code Section 3095 which declares unlawful the discrimination in any recruitment or apprenticeship program on stated grounds. City shall be entitled to retain and withhold all penalties as authorized pursuant to California Labor code, Division 2, Part 7, Chapter 1, commencing with Section 1720 and following, in accordance with the provisions of that Chapter, and the regulations established by the Director of Industrial Relations pursuant to the statutory authority of such chapter.

4.5.8 Workers' Compensation Insurance - The provisions of Section 00800-2.1.2, **Workers' Compensation Insurance**, shall be considered as repeated herein.

4.5.9 Certified Electricians – Workers performing work for an electrical contractor installing, constructing, or maintaining any electrical system covered by the National Electrical Code shall be certified as a General Electrician per California Labor Code Section 108.

4.5.10 Lateral and Subjacent Supports - Attention is directed to Section 832 of the Civil Code of the State of California relating to lateral and subjacent supports, and wherever structures or improvements adjacent to the excavation may be damaged by such excavation, the Contractor shall comply with this law. As provided in Labor Code Section 6707, a separate bid item is provided for costs of shoring and bracing of excavations five feet or more in depth.

4.5.11 Safety Standards - The Contractor shall comply with all applicable provisions of the Safety and Health Regulations of Construction, promulgated by the Secretary of Labor under Section 107 of the Contract Work Hours and Safety Standards Act (40 USC 327 et. seq.) as set forth in Title 29, C.F.R., CAL/OSHA, and the regulations issued thereunder. Compliance shall be the Contractor's sole responsibility, and neither the Owner, the Construction Manager nor the Engineer shall have any liability for non-compliance. See Section 00700-4.7, **Safety**, for additional safety requirements.

4.5.12 Asbestos Related Work- All work involving asbestos containing material must be performed in accordance with California Labor Code, Sections 6501.5 through 6510, inclusive, and California Administrative Code, Title 8, Section 5208 and all other pertinent laws, rules, regulations, codes, ordinances, decrees and orders.

4.5.13 Public Records Act- Except as otherwise provided herein, all records, documents, drawings, plans, specifications, and all other information relating to the conduct of Owner's business, including information submitted by the Contractor ("Records"), shall become the exclusive property of Owner and shall be deemed public records. Said Records are subject to the provisions of the California Public Records Act (Government Code § 6250 et. seq.). The Owner's use and disclosure of its records are governed by this Act. The Owner will use its best efforts to inform the Contractor of any request for any financial records or documents marked "Trade Secret", "Confidential" or "Proprietary" provided by the Contractor to Owner.

Contractor, at its sole expense and risk, shall be fully responsible for any and all fees for prosecuting or defending any action brought or instituted by Contractor opposing disclosure of Records and shall indemnify and hold Owner harmless from all costs and expenses including attorney's fees and costs of litigation in connection with any such action.

Owner will have no liability to Contractor or Contractor's privity concerning disclosure of records in accordance with the California Public Records Act or other applicable law or in accordance with the direction of any competent authority, and Contractor, on behalf of itself, and its privities waives, releases and fully discharges such liability.

4.5.14 Audit and Examination of Records - The Owner may examine and audit at its own cost and expense all books, estimates, records, contracts, documents, bid documents, bid cost data, subcontract job cost reports and other Work related data of the Contractor,

subcontractors engaged in performance of the Work, and suppliers providing supplies, equipment and other materials required for the Work, including computations and projections related to bidding, negotiating, pricing or performing the Work or Contract modifications and other materials concerning the Work, including, but not limited to, Contractor daily logs, in order to evaluate the accuracy, completeness, and currency of cost, pricing, scheduling and any other Work related data. The Contractor will make available all such Work related data at all reasonable times for examination, audit, or reproduction at the Contractor's business office at or near the Work site, and at any other location where such Work related data may be kept until three years after final payment under the Contract. Pursuant to California Government Code Section 8546.7, if the amount of public funds to be expended is in excess of \$10,000, this Contract will be subject to the examination and audit of the State Auditor, at the request of the Owner, or as part of any audit of the Owner, for a period of three (3) years after final payment under the Contract.

4.6 Compliance with Environmental Laws

During construction, the Contractor shall comply with all pertinent requirements of Federal, State, and local environmental laws and regulations, including, but not limited to, the Federal Clean Air Act, State and local air pollution and noise ordinances, construction site erosion control regulations. Specific requirements are further specified in Section 01090, **REGULATORY REQUIREMENTS AND PERMITS**, and Section 01360, **ENVIRONMENTAL CONTROLS**.

4.7 Safety

4.7.1 Contractor's Safety Responsibility - The Contractor shall be solely and completely responsible for conditions of the jobsite, including safety of all persons and property during performance of the Work. This requirement shall apply continuously and not be limited to normal working hours. Safety provisions shall conform to U.S. Department of Labor (OSHA), the California Occupational Safety and Health Act (CalOSHA), and all other applicable Federal, State, County, and local laws, ordinances, codes, including but not limited to the requirements set forth below, and any regulations that may be detailed in other parts of these Contract Documents. In the event of conflicting requirements, the most stringent requirement as it pertains to the Contractor's safety responsibility shall be followed by the Contractor.

No provision of the Contract Documents shall act to make the Owner, the Construction Manager, Engineer or any other party than the Contractor responsible for safety. The Contractor agrees that for purposes of California Labor Code Section 6400 and related provisions of law the Contractor, the Contractor's privities and any other entities acting pursuant to this contract will be "employers" responsible for furnishing employment and a place of employment that is safe and healthful for the employees, if any, of such entities acting pursuant to this contract and that neither the Owner nor the Construction Manager, Engineer or their respective officers, officials, employees, agents or volunteers or other authorized representatives will be responsible for having hazards corrected and /or removed at the location(s) where the work is to be performed. The Contractor agrees that neither the Owner nor the Construction Manager, Engineer or their respective officers, officials, employees, agents or volunteers or other authorized representatives will be responsible for taking steps to protect the Contractor's employees from such hazards, or for instructing the Contractor's employees to recognize such hazards or to avoid the associated dangers. The Contractor agrees that with respect to the work to be performed under this contract and the location(s) where such work is to be performed, the Contractor will be responsible for not creating hazards, and for having

hazards corrected and/or removed. The Contractor agrees that through the safety obligations contained in this contract and the Contractor's own inspection of the site(s) where the contract work is to be performed, the Contractor is aware and has been notified of the hazards to which the Contractor's employees may be exposed in the performance of contract work. The Contractor has taken and/or will take appropriate, feasible steps to protect the Contractor's employees from such hazards, and has instructed and/or will instruct its employees to recognize such hazards and how to avoid the associated dangers. The Contractor agrees that neither the Owner nor the Construction Manager, Engineer or their respective officers, officials, employees, agents or volunteers or other authorized representatives will be "employers" pursuant to California Labor Code Section 6400 and related provisions of law with respect to the Contractor, the Contractor's privities or other entities acting pursuant to this contract.

The Contractor shall indemnify, defend and hold Owner and Construction Manager, Engineer and their respective officers, officials, employees, agents and volunteers or other authorized representatives harmless to the full extent permitted by law concerning liability related to the Contractor's safety obligations in accordance with Section 00800-2.1.6, **Indemnification**.

If death or serious injuries or serious damages are caused, the accident shall be reported immediately by telephone or messenger to both the Construction Manager and the Owner. In addition, the Contractor shall furnish the Construction Manager with a copy of the Employer's Report of Injury immediately following any incident requiring the filing of said report during the prosecution of the Work under this Contract. The Contractor shall also furnish the Construction Manager with a copy of the Employer's Report of Injury involving any subcontractors on this Project. The Contractor shall make all reports as are, or may be, required by any authority having jurisdiction, and permit all safety inspections of the Work being performed under this Contract.

If a claim is made by anyone against the Contractor or any subcontractor on account of any accident, the Contractor shall promptly report the facts in writing to the Construction Manager, giving full details of the claim.

4.7.2 Safety Program - The Contractor shall establish, implement, and maintain a written injury prevention program as required by Labor Code Section 6401.7. Before beginning the Work, the Contractor shall file with the Construction Manager a written Contractor Safety Program that provides for the implementation of all of the Contractor's safety responsibilities in connection with the Work at the Project site and the coordination of that program and its associated procedures and precautions with safety programs, precautions and procedures of each of its subcontractors and other Contractors performing work at the Project site. The Contractor shall be solely responsible for initiating, maintaining, monitoring, coordinating, and supervising all safety programs, precautions, and procedures in connection with the Work and for coordinating its programs, precautions, and procedures of the other contractors and subcontractors performing the Work at the Project site. The Safety Program should contain all the necessary elements for the Contractor to administer its program on the Project site. At a minimum, this written Safety Program shall address the elements required by Labor Code Section 6401.7.

The Contractor's compliance with requirements for safety and/or the Construction Manager's acceptance for filing of the Contractor's Safety Program shall not relieve or decrease the liability of the Contractor for safety. The Construction Manager's review of the Contractor's Safety Program is only to determine if the above listed elements are included in the program.

4.7.3 Safety Supervisor - The Contractor shall appoint an employee as safety supervisor who is qualified and authorized to supervise and enforce compliance with the Safety Program. The Contractor shall notify the Construction Manager in writing prior to the commencement of work of the name of the person who will act as the Contractor's safety supervisor and furnish the safety supervisor's resume to the Construction Manager.

The Contractor will, through and with its Safety Supervisor, ensure that all of its employees and its subcontractors of any tier, fully comply with the Project Safety Policies. The Safety Supervisor shall be a full-time employee of the Contractor whose responsibility shall be for supervising compliance with applicable safety requirements on the Project site and for developing and implementing safety training classes for all job personnel. The Owner shall have the authority to require removal of the Contractor's Safety Supervisor if the representative is judged to be improperly or inadequately performing the duties; however, this authority shall not in any way affect the Contractor's sole responsibility for performing this work safely, nor shall it impose any obligation upon the Owner to ensure the Contractor performs its work safely.

4.7.4 Safety and Protection - The Contractor shall take all necessary precautions to prevent damage, injury, and loss to:

- A. All employees on the Project, employees of all subcontractors, and other persons and organizations who may be affected thereby;
- B. All the Work and materials and equipment to be incorporated therein, whether in storage on or off the site; and
- C. Other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, wetlands, pavements, roadways, structures, utilities, and underground facilities not designated for removal, relocation, or replacement in the course of construction.

The Contractor shall comply with all applicable laws and regulations of any public body having jurisdiction for the safety of persons or property or to protect them from damage, injury or loss and shall erect and maintain all necessary safeguards for such safety and protection. The Contractor shall notify owners of adjacent property and of underground facilities and utility districts when prosecution of the Work may affect them and shall cooperate with them in the protection, removal, relocation, and replacement of their property. All injury or loss to any property caused, directly or indirectly, in whole or in part, by the Contractor, any subcontractor, supplier or any other person or organization directly or indirectly employed by any of them to perform or furnish any of the Work or anyone for whose acts any of them may be liable, shall be remedied by the Contractor.

4.7.5 Construction Activity Permits- The Contractor must submit a copy of its respective current DOSH permit before beginning work on any the following construction activities:

- A. Construction of trenches or excavations which are five feet or deeper and into which a person is required to descend.
- B. Construction of any building, structure, scaffolding or falsework more than three stories high or the equivalent height (36 feet).
- C. Demolition of any building or structure, or dismantling of scaffolding or falsework more than three stories high or the equivalent height (36 feet).

- D. Erection or dismantling of vertical shoring systems more than three stories high, or the equivalent height (36 feet).

4.7.6 Excavation Safety - In accordance with the provisions of Section 6705 of the Labor Code, the Contractor shall submit, in advance of excavation of any trench or trenches five feet or more in depth, a detailed plan showing the design of shoring, bracing, sloping, or other provisions to be made for worker protection from the hazard of caving ground during the excavation of such trench or trenches. If such plans vary from the shoring system standards set forth in the Construction Safety Orders of the Division of Industrial Safety in Title 8, Subchapter 4, Article 6, California Code of Regulations, the plans shall be prepared and signed by a registered civil or structural engineer employed by the Contractor, and all costs therefore shall be included in the price named in the Contract for completion of the work as set forth in the Contract Documents. Nothing in this Section shall be deemed to allow the use of a shoring, bracing, sloping, or other protective system less effective than that required by the Construction Safety Orders. Nothing in this Section shall be construed to impose a tort liability on the Owner, the Engineer, the Construction Manager, nor any of their officers, officials, employees, agents, consultants or volunteers. The Owner's review of the Contractor's excavation plan is only for general conformance to the Construction Safety Orders.

Prior to commencing any excavation, the Contractor shall designate in writing to the Construction Manager the "competent person(s)" with the authority and responsibilities designated in the Construction Safety Orders.

4.7.7 Safety Emergencies - In emergencies affecting the safety or protection of persons or the Work or property at the Project site or adjacent thereto, the Contractor, without special instruction or authorization from the Construction Manager, is obligated to act to prevent threatened damage, injury or loss. The Contractor shall give the Construction Manager prompt written notice if the Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby.

4.7.8 Safety Violations - Should the Contractor fail to correct an unsafe condition, the Owner shall have the right to notify the Contractor through the Construction Manager that an unsafe condition may exist and must be corrected or the work in question can be stopped in accordance with Section 00700-6.6.1, **Suspension of Work** until the condition is corrected to the satisfaction of the Owner. No extension of time or additional compensation will be granted as a result of any stop order so issued. The notification and suspension of such work or the failure to provide such notification and suspension by the Owner shall not relieve the Contractor of its sole responsibility and liability for safety and the correction of any unsafe conditions.

The Owner shall have the authority to require the removal from the project of any worker and the foreman and/or superintendent in responsible charge of the work where safety violations occur.

4.7.9 Equipment Safety Provisions - The completed Work shall include all necessary permanent safety devices, such as machinery guards and similar safety items, required by the State and Federal (OSHA) industrial authorities and applicable local and national codes. Further, any features of the Work, including Owner-selected equipment, subject to such safety regulations shall be fabricated, furnished, and installed in compliance with these requirements. All equipment furnished shall be grounded and provided guards and protection as required by safety codes. Where vapor-tight or explosion-proof electrical installation is required by safety codes, this shall be provided. Contractors and manufacturers of equipment shall be held responsible for compliance

with the requirements included herein. The Contractor shall notify all equipment suppliers and subcontractors of the provisions of this paragraph.

4.7.10 Confined Spaces – The Project requires work in confined spaces and requires compliance with CAL/OSHA and Federal OSHA requirements. Confined spaces for the purposes of this Section shall be as defined by the Division of Industrial Safety. Work within confined spaces of this project is subject to the definitions and applicable provisions of Section 5156 et. seq., Title 8, Division 1, Chapter 4, Subchapter 7, Group 16, Article 108 of California Code of Regulations, and Title 29 Part 1926 of the Code of Federal Regulations.

In addition the Owner classifies the following existing facilities as confined space: the interior of pipelines, vaults, manholes, reservoirs and any other such structure or space which is similarly surrounded by confining surfaces as to permit the accumulation of dangerous gases or vapors. The confined spaces are “permit” confined spaces as defined by OSHA and Cal/OSHA and therefore entry is allowed only through compliance with a confined space entry permit program by the contractor that meets the requirements of 8 C.C.R. Section 5157. While the above mentioned locations have been identified as permit confined spaces, other permit confined spaces may exist. It shall be the responsibility of the Contractor to identify and classify these confined spaces.

It is anticipated that the Contractor may encounter hazardous conditions within these permit confined spaces which include, but are not limited to the following:

- A. Exposure to hydrogen sulfide, methane, carbon dioxide and other gases and vapors commonly found in municipal sewers which could have or has the potential of having Immediate Danger to Life or Health Conditions (IDLH).
- B. Exposure to atmosphere containing insufficient oxygen to support human life.
- C. Exposure to combustible, flammable and/or explosive atmosphere.
- D. Exposure to sewage which may contain bacteriological, chemical and other constituents harmful to humans.
- E. Work in conditions where engulfment or entrapment may occur.
- F. Work in environments which may be slippery and/or have uneven work surfaces.
- G. Work in structures which have limited and/or restricted access and egress.
- H. Work in structures where workers may trip, slip and/or fall several feet.

4.7.11 Public Safety and Convenience - The Contractor shall conduct his work so as to ensure the least possible obstruction to traffic and inconvenience to the general public and the residents in the vicinity of the Work and to ensure the protection of persons and property. No road or street shall be closed to the public except with the permission of the Construction Manager and the written approval by the proper governmental authority. Fire hydrants on or adjacent to the Work shall be accessible to fire fighting equipment. Temporary provisions shall be made by the Contractor to ensure the use of sidewalks, private and public driveways and proper functioning of gutters, sewer inlets, drainage ditches and culverts, irrigation ditches and natural water courses.

4.7.12 Hot Work – For the purposes of this section "Hot Work" means any riveting, welding, flame cutting or other fire- or spark-producing operation, as well as any Work involving burning, welding, grinding, or similar operations having the potential to cause sparks or overheating.

Any Work performed by the Contractor that involves Hot Work requires the Contractor to have a Fire Prevention and Hot Work Procedures plan in place prior to performing the Work. The Contractor's plan shall be in accordance with the Agency's Hot Work Program ("Agency Plan"), attached hereto as Appendix B and also found at <https://thesplash.pcwa.net/splash/Pages/Safety.aspx>, and consistent with Cal/OSHA requirements. The plan shall address potential fire hazards, potential ignition sources and their control, and the types of fire protection equipment to be used to control a fire. The Contractor shall include its Fire Prevention and Hot Work Procedures plan in their submitted Safety Plan, or may indicate that the Contractor will adopt the Agency's Plan and follow the it in its entirety.

The Agency also utilizes a Hot Work permitting system to ensure appropriate safety precautions are taken prior to beginning Work that involves Hot Work. This applies to any Work that has the potential to start a facility or structure fire or a wildland fire. All Work performed under an issued Hot Work permit will require the Contractor to assign a specific person to ensure that errant sparks do not cause a fire or explosion. This person will be responsible for observing the Work and Work area, will be trained and equipped to respond to any start of small fires, and can call for help in an emergency should a fire start. This person shall also remain at the site for the entire duration of time that Hot Work is being performed, shall not be assigned to any other duties, and shall be required to remain at the Work location for at least thirty (30) minutes beyond the completion of Hot Work.

The appropriate checklists included in the Agency Plan shall be completed by the Contractor prior to starting the Work. The Contractor will not be permitted to start the Work until the Agency Construction Manager has issued the required Hot Work permit. It is the Contractor's responsibility to coordinate the issuance of the permit at least twenty-four (24) hours in advance of the planned start of the associated Work. The necessary checklists and permit forms are included in Appendix B, the Agency Plan.

Hot Work permits that have been issued will be cancelled under any of the following conditions:

- A. The operation has been completed.
- B. An unsafe condition develops during the operation causing stoppage of the work.
- C. An inactive period of more than two (2) hours elapses.
- D. The end of the work shift.

4.7.13 Final Safety Inspection of Completed or Partially Completed Facility- Prior to the Owner accepting any area of the Work for the Owner's beneficial use, the Contractor shall employ a safety consultant and/or use CalOSHA safety consultation services to inspect the completed facility for safe operation. The safety inspection costs shall be borne by the Contractor and included in Contractor's bid. The Contractor is to submit a copy of the safety inspection report to the Construction Manager for review. Upon review, the Construction Manager will issue the Contractor a Field Directive to address safety deficiencies or recommendations outlined in the report. If the Contractor is satisfied with Field Directive and does not request change in Contract Sum or Contract Time, then Field Directive shall be executed without a Change Order. Depending on the findings found in the safety inspection report, the Owner may not accept the area of the

Work for beneficial use until the Contractor has completed or corrected the items listed in the Construction Manager's Field Directive for safe operation by the Owner.

4.8 Provisions for Handling Emergencies

It is possible that emergencies may arise during the progress of the Work, which may require special treatment or make advisable extra shifts of labor forces to continue the Work for twenty-four (24) hours per day. These emergencies may be caused by damage or possible damage to nearby existing structures or property by reason of the work under construction, or by storm, accidents, or leakage. The Contractor shall be prepared in case of such emergencies to make all necessary repairs and shall promptly execute such work when required.

Upon start of the Work, Contractor shall provide means for immediate emergency notification of Contractor's designated representative and designated emergency alternates.

4.9 Nonstandard Working Hours

The Contractor may be required to prosecute the Work at night or outside of the normal working hours defined in Section 01140-3.1, **Work Hours**. Such work may be required due to project and/or operational constraints as defined in Section 01110, **SUMMARY OF WORK**, or if emergencies arise as provided for in Section 00700-4.8, **Provisions for Handling Emergencies**. When required, ordered, or permitted to work at night, the Contractor shall provide sufficient and satisfactory lighting and other facilities therefore. For work outside of the normal working hours, the Contractor shall receive no extra payment, but compensation shall be considered as having been included in the price stipulated for the Work, except for authorized work performed outside of the Contract requirements.

4.10 Cooperation with Other Contractors

This Subsection shall serve as notice to the Contractor that the Owner may let other contracts for other work at or near the site of this work. The Contractor shall afford other contractors reasonable opportunity for the delivery and storage of their materials and the execution of their work, and shall properly connect and coordinate its work with theirs.

Should construction be under way by other forces or by other contractors within or adjacent to the limits of the work or in the vicinity of the work to be done under this Contract, the Contractor shall so conduct its operations as to interfere to the least possible extent with the work of such other forces or contractors.

Any difference or conflicts which may arise between the Contractor and any other forces or contractors, creating delays or hindrance to each other, shall be adjusted as determined by the Construction Manager.

Section 01140-2.4, **Work By Others**, indicates anticipated other potential construction activities within or adjacent to work to be performed in this Contract.

5.0 CONTROL OF WORK AND MATERIAL

5.1 Means and Methods

The means and methods adopted by the Contractor shall be planned and executed to produce the highest grade quality of work and will enable the Contractor to complete the Work in the time agreed upon. The Owner and Construction Manager shall not supervise, direct, or have control over, or be responsible for, Contractor's means and methods of construction or for the safety precautions and programs incident thereto, or for any failure of Contractor to comply with laws and regulations applicable to the furnishing or performance of Work. However, if at any time the means and methods appear inadequate or of inferior quality, the Construction Manager may order the Contractor to improve their character or efficiency, and the Contractor shall conform to such order; failure of the Construction Manager to order such improvement of methods of efficiency will not relieve the Contractor from its obligation to perform satisfactory work and to finish the Work in the time agreed upon.

Subject to the Contract Times specified in the Contract Documents, the Contractor is solely responsible for planning and scheduling the means, methods, and appliances to address weather conditions that may occur during the course of the Work. The Contractor is solely responsible for all costs to address such means, methods, and appliances and for the direct and indirect costs resulting from weather conditions.

5.2 Contractor's Responsibility for Work

Until the formal acceptance of the work by the Agency, the Contractor shall have the charge and care and shall bear the risk of injury or damage to any part thereof by the action of the elements or from any other cause, whether arising from the execution or non-execution of the work.

The Contractor shall rebuild, repair, restore and make good all injuries or damages to any portion of the work occasioned by any of the above causes before final acceptance and shall bear the expense, except such injuries or damages occasioned by the acts of the Federal government or acts of war.

In case of suspension of work from any cause whatsoever, the Contractor shall be responsible for the work as previously specified and shall also be responsible for all materials delivered to the work. Where necessary to protect the work from damage, the Contractor shall, at his own expense, provide suitable drainage of the worksite and erect such temporary structures as necessary to protect the work from damage during any period of suspension of work.

The Contractor shall provide twenty-four (24) hour emergency service for all maintenance and operations of the work specified and shall supply the Agency with the name and phone number of the responsible person. Emergency service shall be within thirty (30) minutes from the time of notification. If the Contractor fails to provide this service, the Agency shall perform such emergency service and the cost thereof shall be deducted from the next Progress Pay Estimate due the Contractor.

5.3 Character of Workers

Only competent superintendents, forepersons and workers shall be employed on the Work by the Contractor and its Subcontractors at all tier levels. The Contractor shall remove from the Work any person who commits trespass, possesses firearms or other weaponry, is under the influence or is in the possession of alcohol or other illegal drugs/controlled substance, or is, in the opinion of the Contractor or Construction Manager, unfaithful, disorderly or profane, dangerous, abusive,

insubordinate, incompetent, or otherwise objectionable. Such discharge shall not be the basis of any claim for compensation or damages against the Owner, its officers, officials, employees, agents, and volunteers, the Engineer, the Construction Manager, and their partners, officers, employees, agents or any of its officers or representatives.

5.4 Supply of Sufficient Workers

The Contractor shall at all times employ qualified workers sufficient to prosecute the Work at a rate and in a sequence and manner necessary to complete the Work within the Contract Time(s). This obligation shall remain in full force and effect notwithstanding disputes or claims of any type. At any time during the progress of Work, should Contractor directly or indirectly (through subcontractors), refuse, neglect, or be unable to employ a sufficient number of qualified workers to prosecute the Work as required, then the Owner may require the Contractor to accelerate the Work and/or furnish additional qualified workers as Owner may consider necessary, at no cost to Owner.

If Contractor does not comply with the notice within five (5) days of date of service thereof. Owner shall have the right (but not a duty) to provide qualified workers to finish the Work or any affected portion of Work, as Owner may elect. Owner may at its discretion, exclude Contractor from the Site, or portions of the Site or separate Work elements during the time period that Owner exercises this right. Owner will deduct from moneys due or which may thereafter become due under the Contract Documents, the sums necessary to meet expenses thereby incurred and paid to persons doing Work. Owner will deduct from funds or appropriations set aside for purposes of Contract Documents, the amount of such payments and charge them to Contractor as if paid to Contractor. Contractor shall remain liable for resulting delay, including liquidated damages and indemnification of Owner from claims of others.

Exercise by Owner of the rights conferred upon Owner in this Section 00700, **GENERAL CONDITIONS** is entirely discretionary on the part of Owner. Owner shall have no duty or obligation to exercise the rights referred to in Section 00700-5.4, **Supply of Sufficient Workers** and its failure to exercise such rights shall not be deemed an approval of existing Work progress or a waiver or limitation of Owner's right to exercise such rights in other concurrent or future similar circumstances. The rights conferred upon Owner under Section 00700-5.4, **Supply of Sufficient Workers** are cumulative to Owner's other rights under any provision of the Contract Documents.

5.5 Materials and Workmanship

Unless otherwise indicated in these Specifications, or favorably reviewed by the Engineer, materials and equipment for the construction work shall be the best grade in quality of a manufacturer regularly engaged in the production of such materials and equipment or materials and equipment of comparable character. All materials must be of the specified quality and equal to approved samples, if samples have been submitted. All work shall be done and completed in the best workmanlike manner, obtainable in the local market. All permanent materials and equipment shall be new unless otherwise specified.

All defective work or materials shall be promptly removed from the premises by the Contractor, whether in place or not, and shall be replaced or renewed in such manner as the Construction Manager may direct. All materials and workmanship of whatever description shall be subjected to the inspection of, and rejection by, the Construction Manager if not in conformance with the Contract Documents.

Unless otherwise stipulated in the Contract Documents, any defective material or workmanship, or any unsatisfactory or imperfect work which may be discovered before the final acceptance of the work or within one (1) year thereafter, shall be corrected immediately upon the receipt of notice from the Owner, without extra charge, notwithstanding that it may have been overlooked in previous inspections and estimates. Failure to inspect work shall not relieve the Contractor from any obligation to perform sound and reliable work as herein described.

5.6 Use of Materials Found on the Project Site

The Owner does not warrant the suitability of any native material on the Project Site for use in the Project. The Contractor, with the approval of the Engineer, may use in the proposed construction such stone, gravel, sand or other material as may be found on the Project Site and deemed suitable in the opinion of the Engineer. The Contractor shall replace at his own expense all of that portion of the material so removed and used with other suitable material. No charge for native materials so used will be made against the Contractor. The Contractor shall not excavate or remove any material from any roadway location that is not within the excavation, as indicated by the slope and grade lines shown on the Contract Drawings, without written authorization from the Engineer.

5.7 Existing Utilities

5.7.1 General - The location of known existing utilities and pipelines are shown on the Drawings in their approximate locations. However, nothing herein shall be deemed to require the Owner to indicate the presence of existing service laterals or appurtenances whenever the presence of such utilities on the site of the Project can be inferred from the presence of other visible facilities, such as buildings, cleanouts, meter and junction boxes, on or adjacent to the site of the Project.

The Owner will assume the responsibility for the timely removal, relocation, or protection of existing main or trunkline utility facilities located on the Project site if such utilities are not identified by the Owner in the Contract Documents or which cannot reasonably be inferred from the presence of other visible facilities.

5.7.2 Utility Location - It shall be the Contractor's responsibility to determine the exact location and depth of all utilities, including service connections, which have been marked by the respective utility owners and which the Contractor believes may affect or be affected by the Contractor's operations. The Contractor shall not be entitled to additional compensation or time extensions for work necessary to avoid interferences nor for repair to damaged utilities if the Contractor does not expose all such existing utilities as required by this section.

The locating of utilities shall be in conformance with Government Code Section 4216 et seq. except for the Owner's utilities located on the Owner's property and not on public right-of-way.

A "High Priority Subsurface Installation" is defined in Section 4216 (e) as "high-pressure natural gas pipelines with normal operating pressures greater than 415kPA gauge (60 psig) or greater than six inches nominal pipe diameter, petroleum pipelines, pressurized sewage pipelines, high-voltage electric supply lines, conductors, or cables that have a potential to ground of greater than or equal to 60kv, or hazardous materials pipelines that are potentially hazardous to workers or the public if damaged."

A "Subsurface Installation" is defined in Section 4216 (l) as "any underground pipeline, conduit, duct, wire, or other structure, except non-pressurized sewer lines, non-pressurized storm drains, or other non-pressurized drain lines."

Pursuant to Government Code Section 4216.2 the Contractor shall contact the appropriate regional notification center at least two (2) working days but not more than fourteen (14) calendar days before performing any excavation. The Contractor shall request that the utility owners conduct a utility survey and mark or otherwise indicate the location of their service. The Contractor shall furnish to the Construction Manager written documentation of its contact(s) with the regional notification center prior to commencing excavation at such locations.

After the utility survey is completed, the Contractor shall commence "potholing" or hand digging to determine the actual location of the pipe, duct, or conduit. The Construction Manager shall be given notice prior to commencing potholing operations. The Contractor shall uncover all piping and conduits, to a point one (1) foot below the pipe when required by the Owner, where crossings, interferences, or connections are shown on the Drawings, prior to trenching or excavating for any pipe or structures, to determine actual elevations. New pipelines shall be laid to such grade as to clear all existing facilities, which are to remain in service for any period subsequent to the construction of the run of pipe involved.

The Contractor's attention is directed to the requirements of Government Code Section 4216.2 (a)(2) which provides: "When the excavation is proposed within 10 feet of a high priority subsurface installation, the operator of the high priority subsurface installation shall notify the excavator of the existence of the high priority subsurface installation prior to the legal excavation start date and time, as such date and time are authorized pursuant to paragraph (1) of subdivision (a) of 4216.2. The excavator and the operator or its representative shall conduct an onsite meeting at a mutually-agreed-on time to determine actions or activities required to verify the location of the high priority subsurface installation prior to start time." The Contractor shall notify the Construction Manager in advance of this meeting.

5.7.3 Utility Relocation and Repair - If interferences occur at locations other than those indicated in the Contract Documents with reasonable accuracy, the Contractor shall notify the Construction Manager in writing. The Construction Manager will supply a method for correcting said interferences in accordance with the responsibilities of this Section and Government Code Section 4215.

Care shall be exercised by the Contractor to prevent damage to adjacent existing facilities and public or private works; where equipment will pass over these obstructions, suitable planking shall be placed. If high priority subsurface installations are damaged and the operator cannot be contacted, the Contractor shall call 911 emergency services.

The Owner shall compensate the Contractor for the costs of locating and repairing damage not due to the failure of the Contractor to exercise reasonable care, and for removing or relocating such main or trunkline utility facilities not indicated in the Contract Documents with reasonable accuracy, and for the cost of equipment on the Project necessarily idled during such work. The payment for such costs will be made as provided in Section 00700-7.1, **Change Orders**. The Contractor shall not be assessed liquidated damages for delay in completion of the Project, when such delay is caused by the failure of the Owner or utility company to provide for removal or relocation of such utility facilities. Requests for extensions of time arising out of utility relocation or repair delays shall be filed in accordance with Section 01325-5.0, **TIME IMPACT ANALYSIS**.

The public utility, where they are the owner of the affected utility, shall have the sole discretion to perform repairs or relocation work or permit the Contractor to do such repairs or relocation work at a reasonable price. The right is reserved to the Owner and the owners of utilities or their authorized agents to enter upon the Work area for the purpose of making such changes as are necessary for the rearrangement of their facilities or for making necessary connections or repairs to their properties. The Contractor shall cooperate with forces engaged in such work and shall conduct its operations in such a manner as to avoid any unnecessary delay or hindrance to the work being performed by such forces and shall allow the respective utilities time to relocate their facility.

When the Contract indicates that a utility is to be relocated, altered or constructed by others, the Owner will conduct all negotiations with the utility company and the work will be done at no cost to the Contractor, unless otherwise stipulated in the Contract.

Temporary or permanent relocation or alteration of utilities desired by the Contractor for its own convenience shall be the Contractor's responsibility and it shall make arrangements and bear all costs for such work.

All Underground Services Alert (USA) markings on concrete or asphaltic pavement or other structures shall be removed by the Contractor when they are no longer required. Acceptable means of removal include sand blasting or high pressure water blasting.

5.8 Surface Restoration

Surface restoration shall be defined as that work necessary to restore the excavated area above backfill and the scarred surrounding work areas to a condition equivalent to or better than existed prior to the construction. This may include pavement replacement, seeding, shrub and plant replacement, and restoration of ditches and drainage areas.

The replacement of grass and/or wild flowers shall be accomplished by seeding. The kind and type of seed is to be determined by the Engineer. Replacement of plants and shrubs shall be required where the easement travels through a developed parcel. In this case the Agency or Developer and Contractor shall agree before proceeding as to which plants and shrubs shall be saved or replaced.

The restoration of excavation areas shall include measures to prevent surface erosion of the area. This shall include seeding, cutoff walls, surface header boards, water bars, interceptor dikes, gravel filter dikes, or rip rap energy dissipaters. These measures shall be used as required to prevent surface erosion.

5.9 Disposal of Materials

Unless otherwise specified in the Contract Documents, the Contractor shall make arrangements for disposing of materials. Excess excavated material not required for backfill or other uses under the Contract Documents shall be disposed of legally by the Contractor.

When any materials, including excess of unsuitable excavated earth or other roadway materials are to be disposed of outside the right-of-way, the Contractor shall first obtain a written permit from the property owner on whose property the disposal is to be made and shall file said permit or certified copy together with a written release from the property owner absolving the Agency from any and all responsibility in connection with the disposal of material on said property. Before any material is disposed of on said property, the Contractor shall obtain permission from the Engineer to dispose of the material at the location designated in said permit.

Unless otherwise provided in the Supplementary General Conditions, full compensation for all cost involved in disposing of materials as above specified, including all costs of overhaul, shall be considered as included in the prices paid for the various Contract items of work and no additional allowance will be made.

6.0 PROGRESS OF THE WORK

6.1 Commencement of Work

Within thirty (30) calendar days after receipt of the required bonds and evidences of insurance and the executed Agreement from the Contractor, written Notice to Proceed will be given by the Owner to Contractor. Notwithstanding other provisions of the Contract, the Contractor shall not be obligated to perform work, and the Owner shall not be obligated to accept or pay for work performed by the Contractor, prior to Notice to Proceed. The Contractor shall provide the required Contract bonds and evidences of insurance prior to Notice to Proceed and commencing work at the site.

The Contractor shall commence execution of the Work covered by this Contract within ten (10) calendar days after the date established in the Notice to Proceed for the commencement of Contract Time.

The Contractor shall give the Construction Manager written notice not less than two (2) working days in advance of the actual date on which the work will be started. The Contractor shall be entirely responsible for any delay in the work which may be caused by its failure to give such notice.

6.2 Contract Time

All time limits for Milestones, if any, Substantial Completion, and completion and readiness for final payment as stated in the Contract Documents are of the essence of the Contract. The counting of Working or Calendar Days shall begin three (3) Calendar Days from the Notice to Proceed date. The Contractor shall prosecute the work so that the various portions of the project shall be complete and ready for use within the times specified in Section 00800-1.1, **Times Allowed for Completion**. It is expressly understood and agreed by and between the Contractor and the Owner

that the Contract Time for completion of the work described herein is a reasonable time taking into consideration the average climatic and economic conditions and other factors prevailing in the locality and the nature of the work.

6.3 Delays

6.3.1 Notice of Delays - When the Contractor foresees a delay in the prosecution of the Work and, in any event, immediately upon the occurrence of a delay, the Contractor shall notify the Construction Manager in writing of the probability of the occurrence and the estimated extent of the delay, and its cause. The Contractor shall take immediate steps to prevent, if possible the occurrence or continuance of the delay. The Contractor agrees that no claim shall be made for delays which are not called to the attention of the Construction Manager at the time of their occurrence.

6.3.2 Non-Excusable Delays - Non-excusable delays in the prosecution of the Work shall include delays which could have been avoided by the exercise of care, prudence, foresight, and diligence on the part of the Contractor or its subcontractors, at any tier level, or suppliers to protect the Work. The Contractor shall receive no compensation or time extension for such delay.

6.3.3 Excusable Delays - Excusable delays in the prosecution or completion of the Work shall include delays which result from causes beyond the control of the Contractor and Owner and which could not have been avoided by the exercise of care, prudence, foresight, and diligence on the part of the Contractor or its subcontractors, at any tier level, or suppliers to protect the Work. The Contractor shall receive no compensation for such delay unless such delay also qualifies for compensable dollars.

- A. Abnormal Delays - Delays caused by fire, unusual storms, floods, tidal waves, earthquakes, strikes, labor disputes, freight embargoes, and shortages of materials shall not be considered as excusable delays except insofar as they prevent the Contractor from proceeding with at least seventy-five (75) percent of the normal labor and equipment force for at least five (5) hours per day toward completion of the current critical activity item(s) on the latest favorably reviewed progress schedule.
- B. Weather Delays - Inclement weather conditions or the conditions resulting from weather shall not be considered as excusable delays unless they prevent the Contractor from proceeding with seventy-five (75) percent of the normal labor and equipment force engaged in the current critical activity item for a period of at least five (5) hours per day toward completion of such operation or operations, and the crew is dismissed as a result thereof, and unless such delays exceed the monthly Weather Days Allowance as defined in Section 00800, **SUPPLEMENTARY GENERAL CONDITIONS**, and Section 01325, **PROGRESS SCHEDULES AND REPORTS**.
- C. Material Shortages – Upon the submission of satisfactory proof to the Owner by the Contractor, shortages of material may be acceptable as grounds for granting a time extension. In order that such proof may be satisfactory and acceptable to the Construction Manager, it must be demonstrated by the Contractor that the Contractor has made every effort to obtain such materials from all known sources within reasonable reach of the proposed Work. Only the physical shortage of material, caused by unusual circumstances, will be considered under these provisions as a cause for extension of time, and no

consideration will be given to any claim that material could not be obtained at a reasonable, practical, or economical cost or price, unless it is shown to the satisfaction of the Owner that such material could have been obtained only at exorbitant prices entirely out of line with current rates, taking into account the quantities involved and usual practices in obtaining such quantities. A time extension for shortage of material will not be considered for material ordered or delivered late or whose availability is affected by virtue of the mishandling of procurement. The above provisions apply equally to equipment to be installed in the work.

6.3.4 Compensable Delays - Compensable delays in the prosecution or completion of the Work shall include delays that occur through no fault of the Contractor or its subcontractors and prevent the Contractor from proceeding with at least seventy-five (75) percent of the normal labor and equipment force for at least five (5) hours per day toward completion of the current critical activity item(s) on the latest favorably reviewed progress schedule due to the following cause(s):

- A. Delays due solely to the actions and/or inactions of the Owner.
- B. Delays due to differing site conditions as defined in Section 00700-7.2, **Differing Site Conditions**.
- C. Delays due to other Contractors employed by the Owner who interfere with the Contractor's prosecution of the Work as defined above.

6.3.5 Concurrent Delays - Concurrent delays are those delay periods when the prosecution of the Work is delayed during the same period of time due to causes from a combination of the delays defined in Sections 00700-6.3.2, **Non-Excusable Delays**, 00700-6.3.3, **Excusable Delays**, or 00700-6.3.4, **Compensable Delays**. During such concurrent delay periods, time extensions will be granted in accordance with Section 00700-6.4, **Time Extensions**; however, the Contractor will be granted a non-compensable time extension, and the Owner shall not assess its actual costs as defined in Section 00700-6.4.1, **Non-Excusable Delays**.

6.4 Time Extensions

6.4.1 Non-Excusable Delays - The Owner, at its sole option, may grant an extension to milestone or completion dates for non-excusable delays. If the Owner grants an extension of time for non-excusable delays, the Contractor agrees to pay the Owner's actual costs, including charges for engineering, inspection and administration incurred during the extension.

6.4.2 Excusable or Compensable Delays - If the Contractor is delayed in the performance of its work as defined in Sections 00700-6.3.3, **Excusable Delays**, or 00700-6.3.4, **Compensable Delays**, then milestone and Contract completion dates may be extended by the Owner for such time that, in the Owner's and Construction Manager's determination, the Contractor's completion dates will be delayed, provided that the Contractor strictly fulfills the following:

- A. The Contractor shall provide notification, in accordance with Section 00700-6.3.1, **Notice of Delays**, and submit in writing a request for an extension of time to the Construction Manager stating at a minimum the probable cause of the delay and the number of days being requested. The time extension request shall be submitted in accordance with the requirements of *Section 01325- 5.0, **TIME IMPACT ANALYSIS***.

- B. If requested by the Construction Manager, the Contractor shall promptly provide sufficient information to the Construction Manager to assess the cause or effect of the alleged delay, or to determine if other concurrent delays affected the work.
- C. Weather Delays. The Contractor will be granted a non-compensable time extension for weather caused delays, pursuant to Section 00700-6.3.3.B, Weather Delays, over and above the Weather Day Allowances provided for in Section 00800-1.3, **Weather Days**. No time extensions for weather delays will be granted until the total number of weather days exceeds this allowance. The provisions of articles A and B above also apply to Weather Delays. Both the use of the Weather Day allowance and the granting of additional days to the Contract due to weather require an actual impact to the critical path as defined below and in Section 01325, **PROGRESS SCHEDULES AND REPORTS**

Should the Contractor fail to fulfill any of the foregoing, which are conditions precedent to the right to receive a time extension, the Contractor waives the right to receive a time extension.

During such extension of time, neither extra compensation for engineering, inspection and administration nor damages for delay will be charged to the Contractor. It is understood and agreed by the Contractor and Owner that time extensions due to excusable or compensable delays will be granted only if such delays involve controlling operations which would prevent completion of the whole Work within the specified Contract time.

Should the Contractor fail to complete the Work within the time specified in the Contract, as extended in accordance with this clause if appropriate, the Contractor shall pay to the Owner liquidated damages in accordance with Section 00700-6.5, **Liquidated Damages**.

6.4.3 **Extended Overhead**

The Contractor shall be reimbursed for extended overhead expenses for periods of time when the Work is delayed as defined in Section 00700-6.3.4, **Compensable Delays**. However, no reimbursement for extended overhead shall be made for compensable delays which occur during a concurrent delay as defined in Section 00700-6.3.5, **Concurrent Delays**. No reimbursement for extended overhead shall be made for delays caused by the performance of work compensated as extra work under Section 01350-2.4; **Force Account**. Delays caused by the performance of force account work shall be understood as days when performance of force account work is on the Project Critical Path. As to such delays, it is understood and agreed that the Force Account Markups set forth in Section 01350 shall constitute full and complete compensation for all extended overhead costs (site and home office overhead) incurred as a result of said Force Account work.

Payment to the Contractor for extended overhead expenses will be made only if the extended Contract period granted for the compensable delay(s) is required to complete the work following the expiration of the original Contract period and any time extensions granted other than compensable time extensions.

6.4.3.1 **Extended Field Overhead** – For those allowable delay periods as defined in Section 00700-6.4.3, **Extended Overhead**, the Contractor shall be reimbursed for its extended field overhead based on:

- A. Actual invoice costs for on-site field offices and temporary utilities as described in Section 01500, **TEMPORARY FACILITIES AND CONTROLS**.
- B. Actual labor costs, as determined consistent with Section 01350-3.0, **COST DETERMINATION**, for field office staff.
- C. Fair rental values acceptable to the Construction Manager as described in Section 01350-3.0, **COST DETERMINATION**, for construction equipment idled due to the delay.

6.5 Liquidated Damages

6.5.1 Owner and the Contractor recognize that time is of the essence of this Agreement and that the Owner will suffer financial loss if the Work is not completed within the times specified in Section 00800-1.1, **Time Allowed for Completion** plus any extensions thereof allowed in accordance with Section 00700-6.4, **Time Extensions**. It is hereby understood and agreed that it is and will be difficult and/or impossible to ascertain and determine the actual damage which the Owner will sustain in the event of and by reason of the Contractor's failure to fully perform the Work or to fully perform all of its contract obligations that have accrued by the times for completion as specified in Section 00800-1.1, **Time Allowed for Completion** herein.

6.5.2 It is, therefore, agreed in accordance with California Government Code Section 53069.85 that the Contractor will forfeit and pay to the Owner liquidated damages in the amount set forth in Section 00800-1.2, **Damages for Delays**, per day for each and every calendar day that expires after the times for completion specified in 00800-1.1 herein and/or as specified for completion of any scheduled operations or works described in Section 00800-1.2 except as otherwise provided by extension of time pursuant to Section 00700-6.4, **Time Extensions**. It is further understood and agreed in accordance with California Government Code Section 53069.85 that the liquidated damages sum specified in this provision is not manifestly unreasonable under the circumstances existing at the time this Contract was made, and that the Owner may deduct liquidated damages sums in accordance with this provision from any payments due or that may become due the Contractor.

6.5.3 Liquidated damages will continue to accrue at the stated rate until the completion of any milestones, scheduled operations, substantial completion of total project and final completion of total project, all as set forth in Section 00800-1.1, **Time Allowed for Completion**. Accrued liquidated damages may be deducted by the Owner from amounts due or that become due to the Contractor for performance of the Work. Liquidated damages may not be waived or reduced by the Owner unless expressly waived or reduced in writing by the Construction Manager.

6.6 Owner Suspension of Work

6.6.1 If the Contractor fails to correct defective work as required by Section 00700-5.5, **Materials and Workmanship**, or fails to carry out the Work in accordance with the Contract Documents or any other applicable rules and regulations, the Owner, by a written order of the Owner's representative or signed personally by an agent specifically so empowered by the Owner, in writing, may order the Contractor to stop the work, in its entirety or any portion thereof. In the event of a suspension of only a portion of the work, the Contractor is obligated to perform the portion of the work not suspended. The Suspension of Work shall remain in effect until the condition or

cause for such order has been eliminated. The Owner's concurrence that the condition or cause has been eliminated will be provided to the Contractor in writing. This right of the Owner to stop and suspend the Work shall not give rise to any duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity. All delays in the Work occasioned by such stoppage shall not relieve the Contractor of any duty to perform the Work or serve to extend the time for its completion. Any and all necessary corrective work done in order to comply with the Contract Documents shall be performed at no cost to the Owner.

6.6.2 In the event that a suspension of Work is ordered, as provided in this paragraph, the Contractor, at its expense, shall perform all work necessary to provide a safe, smooth, and unobstructed passageway through construction for use by public, pedestrian, and vehicular traffic, during the period of such use by suspension. Should the Contractor fail to perform the Work as specified, the Owner may perform such work and the cost thereof may be deducted from partial payments and/or final payment due the Contractor under the Contract.

6.6.3 The Owner shall also have authority to suspend the Work wholly or in part, for such period as the Owner may deem necessary, due to unsuitable weather, or to such other conditions as are considered unfavorable for the suitable prosecution of the Work. Such temporary suspension of the Work will be considered justification for time extensions to the Contract in an amount equal to the period of such suspension if such suspended work includes the current critical activity on the latest favorably reviewed progress schedule. The Contractor as directed by the Owner shall comply with the provisions in Section 00700-6.6, **Owner Suspension of Work**, above. Such additional work shall be compensated as provided for in Section 00700-7.0, **CHANGES IN THE WORK**.

6.7 Owner's Right to Terminate Contract

6.7.1 Termination for Default- If the Contractor refuses or fails to prosecute the Work or any separable part thereof with such diligence as will ensure its completion within the time specified herein, or any authorized extension thereof, or fails to perform the Work in a manner required by the Contract Documents and/or industry standards, or fails to complete such Work within such time as required under the Contract Documents or, if the Contractor should be adjudged as bankrupt, or is otherwise deemed insolvent by the Owner based on good cause and is unable to proceed with the Work, or if the Contractor should make a general assignment for the benefit of creditors, or if a receiver should be appointed on account of insolvency, or if the Contractor files a petition to take advantage of any debtor's act, or should any Subcontractor violate any of the provisions of the Contract, or if the Contractor should persistently or repeatedly refuse or fail, except in cases for which an authorized extension of time is provided, to supply enough properly skilled workers or proper materials to complete the Work in the time specified, or if the Contractor should fail to make prompt payment to Subcontractors for material or labor, or if the Contractor should persistently disregard laws, or instructions given by Owner, or if the Contractor otherwise substantially fails to fulfill its obligations under the Contract Documents, the Owner may, without prejudice to any other right or remedy, serve written notice upon the Contractor and Sureties of the Owner's intention to terminate the Contractor's performance under the Contract. Said notice shall contain the reasons for such intention to terminate the Contractor's performance under the Contract, and unless, within ten (10) days after the service of such notice, such violations cease and/or satisfactory arrangements for the corrections thereof have been made, the Owner may terminate Contractor's performance under the Contract and the

Contractor shall not be entitled to receive any further payment until the Work is finished.

In the event of any such termination, The Owner shall serve written notice thereof upon the Surety and Contractor, and the Surety shall have the right to take over and perform the Contract. However, if the Surety, within five (5) days after the service of a notice of termination, does not give the Owner written notice of its intention to take over and perform the Contract, and if it serves such notice of its intent to take over and perform the Contract and does not begin performance thereof within fifteen (15) days from the date of serving said notice, The Owner may take over the Work and prosecute the same to completion by contract or by any other method it may deem advisable for the account and at the expense of the Contractor, and the Sureties and/or Contractor shall be liable to the Owner for any excess cost or other damage incurred by the Owner thereby. In such an event, the Owner may without liability for so doing, take possession of and utilize such materials, tools, equipment, supplies and other property belonging to the Contractor and/or assume assignment of any and all subcontracts for Subcontractors and/or Suppliers that may be on the worksite and be necessary to complete the Work. For any portion of such Work that Owner elects to complete by furnishing its own employees, materials, tools, and equipment, The Owner shall be compensated in accordance with the schedule of compensation for force account work as stated in Section 01350-**CONTRACT MODIFICATION PROCEDURES.**

If the Surety assumes the Contractor's terminated Work, it shall take the Contractor's place in all respects for that part and shall be paid by Owner for all Work performed by it in accordance with the terms of the Contract Documents. If the Surety assumes the entire Contract, all money due the Contractor at the time of its default shall be payable to the Surety as the Work progresses, subject to the terms of the Contract.

Contractor hereby consents to assigning to the Owner and/or Owner's replacement contractor all subcontracts and other agreements of any and all subcontractors and/or Suppliers that may be on the worksite and/or may be necessary to complete the Work in the event of Termination for Default or Termination for Convenience, as set forth below. Contractor agrees to obtain, by way of a subcontract provision, the consent of each and every Subcontractor and/or Supplier for such assignment prior to the commencement of each such Subcontractor's and/or Supplier's work on the Project.

In the event of such termination, the Contractor will be paid the actual amount due based on unit prices or lump sums Bid and the quantity of Work completed at the time of termination, less damages caused to the Owner by acts of the Contractor causing the termination, including but not limited to, all costs to the Owner arising from professional services and attorneys' fees and all costs generated to insure or bond the work of substituted Contractors or subcontractors utilized to complete the Work, such excess shall be paid to the Contractor. If such costs exceed the unpaid balance, the Contractor shall pay the difference to the Owner promptly upon demand. On failure of the Contractor to pay, the Surety shall pay on demand by Owner. Any portion of such difference not paid by the Contractor or Surety within thirty (30) days following the mailing of a demand for such costs shall earn interest at the maximum rate authorized by California law.

The Contractor and the Owner agree that nothing in this section is intended to create a right of either party to recover attorney fees as prevailing party in any lawsuit on this Contract.

The foregoing provisions are in addition to and not in limitation of any other rights or remedies under law or in equity available to Owner.

If it is later determined by the Owner that the Contractor had an excusable reason for not performing, such as a fire, flood, or other event which was not the fault of or was beyond the control of the Contractor, the Owner, after setting up a new performance schedule, may allow the Contractor to continue Work, or treat the termination as a termination for convenience, and the rights and obligations of the parties shall be the same as if the termination had been issued for the convenience of the Owner.

6.7.2 Termination for Convenience-

The Owner may terminate the Contractor's performance under the Contract, either in whole or in part, at its own discretion or when conditions encountered during the Work make it impossible or impracticable to proceed, or when the Owner is prevented from proceeding with the Contract by act of God, by law, or by official action of a public authority, or upon a determination that such termination is in the best interest and convenience of the Owner, or whenever the Owner is prohibited from completing the Work for any reason. The Owner shall provide no less than ten (10) days written notice of its intent to terminate the Contract for convenience, and shall provide the Contractor with consultation with the Owner prior to termination.

A. Upon receipt of such written notice of termination, the Contractor shall:

1. Stop Work as specified in the written notice;
2. Terminate all orders and Subcontractors except as necessary to complete Work which is not terminated;
3. If directed in writing by the Owner to do so, assign all right, title and interest in subcontracts and materials in progress, in which case the Owner will have the right at its discretion to settle, or pay any or all Claims arising out of the termination of such Subcontractors, but in no event shall recovery by any Contractor include lost profits for uncompleted portions of Work;
4. Deliver or otherwise make available to the Owner all data, drawings, specifications, reports, estimates, summaries and such other information and material as may have been accumulated by the Contractor in performing this Contract whether completed or in process;
5. Settle outstanding liabilities and Claims with the approval of Owner;
6. Complete performance of such part of the Work as has not been terminated; and
7. Take such other actions as may be necessary, or as may be directed by the Owner for the protection and preservation of the Project and/or property related to the Contract.

B. Upon receipt of Owner's written notice of termination for convenience, and within a period of 30 to 60 days, as determined by the Owner at the time of termination, the Contractor shall submit to the Construction Manager a Termination Proposal which shall include, but is

not limited to, the Contractor's estimated costs to be incurred by the Contractor as a result of the termination for convenience, and as allowed by the Contract Documents, including all documentation to support such costs; the status of the Work at time of termination; the status of termination of the Contractor's Subcontractor(s) and Supplier(s) agreement(s) including the amount of each said agreement, amount paid under each agreement up to the date of termination, and the amount that currently remains due and owing under each agreement for Work completed as of the date of termination, if any; a list, certified as to quantity and quality, of termination inventory not previously disposed of, excluding items authorized for disposition by the Construction Manager; and any other information and/or documentation as required by Owner.

Upon receipt of Owner's written notice of termination for convenience, the Contractor shall submit to the Construction Manager a request for final payment pursuant to the contract document requirements. Such request shall be submitted promptly, but no later than sixty (60) days from the effective date of termination.

C. The final payment to the Contractor after termination for convenience shall be limited to amounts due and owing under the Contract at time of termination, including the following:

1. Any actual costs incurred by the Contractor for restocking charges;
2. The agreed upon price of protecting the Work in any manner, if any, as directed by the Owner;
3. The cost of settling and paying Claims arising out of the termination of the Work under subcontract agreements or orders with the Owner's approval, as specified above, exclusive of the of the amounts paid or payable on account of goods delivered or Work furnished by Subcontractor prior to the effective date of the termination; and
4. The Contract price allocable to the portion of the Work properly performed or goods supplied by the Contractor as of the date of termination, as determined in accordance with the Contract Documents, reduced by any sums previously paid to the Contractor.

D. The Owner shall have the right to withhold any portion or the whole of the Final Payment under this provision in the event there are any outstanding Claims for compensation asserted by the Owner against the Contractor, or by any third party against the Owner which arises out of the Contractor's Work.

6.8 Contractor's Right to Stop Work or Terminate

6.8.1 Upon seven (7) days written notice to the Owner, the Contractor may terminate this Agreement for any of the following reasons:

A. If the Work has been stopped for a one hundred eighty (180) consecutive day period due to:

- 1) A court order or order of other governmental authorities having jurisdiction; or

- 2) As a result of the declaration of a national emergency or other governmental act during which, through no act or fault of the Contractor, materials are not available; or

- B. If the Work is suspended by the Owner, without cause attributable to the wrongful acts of Contractor, for one hundred eighty (180) days.

6.8.2 The Contractor's exclusive remedy in the event of termination under Section 6.8 shall be to recover from Owner payment on the same terms as provided in Section 6.7.2 above resulting from a properly noticed termination for the specific reasons allowed for in this Section 6.8, **Contractor's Right to Stop Work or Terminate.**

6.8.3 The provisions of this Section 6.8 are not intended to preclude the Contractor from making a Claim as provided for in the Contract Documents for an adjustment in Contract Price or Contract Time or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this Section 6.8.

7.0 CHANGES IN THE WORK

7.1 Change Orders

7.1.1 Without invalidating the Contract and without notice to sureties or insurers, the Owner through the Construction Manager, may at any time or from time to time, order additions, deletions, or revisions in the Work; these will be authorized by Field Directive, Field Order, or Change Order. A Change Order will not be issued for a Field Directive unless the Construction Manager concurs with an appeal by the Contractor that such Field Directive is a change in the scope of the Contract. The Contractor shall comply promptly with the requirements for all Change Orders, Field Orders, or Field Directives. The work involved in Change Orders shall be executed under the applicable conditions and requirements of the Contract Documents. If any Field Order causes an increase or decrease in the Contract Amount or an extension or shortening of the Contract Time, an equitable adjustment will be made by issuing a Change Order. By the acceptance of a Change Order, the Contractor waives any claim for additional time, not included in the Change Order, for the work covered by that Change Order. Additional or extra work performed by the Contractor without written authorization of a Field Order or Change Order will not entitle the Contractor to an increase in the Contract Amount or an extension of the Contract Time.

7.1.2 Compensable extra work shall be that work required for the completed project, but not shown, detailed or specified in the Contract Documents and not constituting "incidental work " as defined in sub-section 00700-1.4, **Plans and Specifications**. Such work shall be governed by all applicable provisions of the Contract Documents. In giving instructions, the Construction Manager shall have authority to make minor changes in the Work, not involving extra cost, and not inconsistent with the purposes of the Work; but otherwise, except in an emergency endangering life or property, no extra work or change shall be made unless in pursuance of a written order by the Owner through the Construction Manager, and no claim for an addition to the Contract Amount and/or Contract Time shall be valid unless so ordered.

7.1.3 In case any change increases or decreases the work shown, the Contractor shall be paid for the work actually done at a mutually agreed upon adjustment to the Contract Price, based upon the provisions of Section 01350, **CONTRACT MODIFICATION PROCEDURES**.

7.1.4 If the Contractor refuses to accept a Change Order, the Owner may issue it unilaterally. The Contractor shall comply with the requirements of the Change Order. The Owner shall provide for an equitable adjustment to the Contract Price and/or Contract Time, and compensate the Contractor accordingly. If the Contractor does not agree that the adjustment is equitable, it may submit a claim in accordance with Section 00700-7.3, **Resolution of Disputes**.

7.2 Differing Site Conditions

Pursuant to Public Contract Code Section 7104, the Contractor shall promptly, and before such conditions are disturbed, notify the Construction Manager in writing, of any:

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

The Owner shall promptly investigate the conditions, and if it finds that the conditions do materially differ, or do involve hazardous waste, and cause a decrease or increase in the Contractor's cost of, or the time required for, performance of any part of the Work the Owner shall cause to be issued a change order under the procedures provided in Section 00700-7.1, **Change Orders**.

In the event that a dispute arises between the Owner and the Contractor whether the conditions materially differ, or involve hazardous waste, or cause a decrease or increase in the Contractor's cost of, or time required for, performance of any part of the work the Contractor shall not be excused from any scheduled completion date provided for by the Contract, but shall proceed with all work to be performed under the Contract. The Contractor shall retain any and all rights provided either by Contract or by law which pertain to the resolution of disputes and protests between the contracting parties, Section 00700-7.3, **Resolution of Disputes**.

No claim of the Contractor under this clause shall be allowed unless the Contractor has given the notice required.

7.3 Resolution of Disputes

It is the intent of this Contract that disputes regarding the Contract be resolved promptly and fairly between the Owner and Contractor. However, it is recognized that some disputes will require detailed investigation and review by one or both parties before a determination and resolution can be reached. For the protection of the rights of both the Contractor and Owner the following provisions are provided for the resolution of disputes which cannot be resolved by the Contractor and Construction Manager.

7.3.1 Notice and Contract Claim – Either party shall provide verbal or written notice of disputed or potentially disputed work to the other parties' attention prior to the commencement of and sufficiently in advance of performing the disputed work to allow both parties joint initial review of the disputed work. If there is disagreement subsequent to the initial review, the Contractor shall formally request a Contract Interpretation by the Construction Manager in accordance with 00700-1.6. If the Contractor disagrees with the Construction Manager's decision in accordance with Section 00700-1.6, **Contract Interpretation by the Construction Manager**, or in any case where the Contractor deems additional compensation or a time extension to the Contract Time is due the Contractor for work or materials not covered in the Contract or which the Construction Manager has not recognized as extra work, the Contractor may file a written "Contract Claim" with the Construction Manager within ten (10) days of receipt of the Construction Manager's contract interpretation such decision or, if the claim does not involve a Construction Manager contract interpretation decision, within ten (10) days after the date of the occurrence, event or circumstance giving rise to the claim. s Additionally, if the claim relates to extra, additional or unforeseen work for which the Contractor intends to demand additional compensation, a time extension, or both, notice shall be given to the Construction Manager prior to the time that the Contractor commences performance of the work giving rise to the potential claim for additional compensation or time extension, and Contractor shall not proceed with that work until so directed by the Construction Manager. A Contract Claim must (a) be in writing, (b) be labeled or clearly indicated as a claim under the Contract, (c) set forth in detail the reasons why the Contractor believes additional compensation or a time extension is or may be due, the nature of the costs involved, and, insofar as possible, the amount of the claim, and (d) include (or reference earlier provided) documents that support and substantiate the claim as to both entitlement and quantification of time, money, or both. A claim for purposes of this section 7.3 means a separate demand by the Contractor for (a) a time extension (including a demand for relief from damages or penalties for delay assessed by the Owner under the Contract), (b) payment of money or damages arising from work done by, or on behalf of, the Contractor pursuant to the Contract and payment of which is not otherwise expressly provided for or the Contractor is not otherwise entitled to, or (c) an amount the payment of which is disputed by the Owner.

Additionally, no claim for additional compensation or extension of time for a delay will be considered unless the provisions of Sections 00700-6.3, **Delays**, and 6.4, **Time Extensions**, are complied with. No claim filed after the date of final payment will be considered.

Unless a timely Contract Claim is properly given, the Contractor shall not recover costs incurred by it as a result of the alleged extra work, changed work or other situation which had proper notice been given would have given rise to a right for additional compensation. The Contractor should understand that timely notice of a Contract Claim is of great importance to the Construction Manager and Owner, and is not merely a formality. Such notice allows the Owner to consider preventative action, to monitor the Contractor's increased costs resulting from the situation, to marshal facts, and to plan its affairs. Such notice by the Contractor, and the fact that the Construction Manager has kept account of the work in question, shall not in any way be construed as proving the validity of the claim.

7.3.2 Resolution of Claims

7.3.2.1 All Claims will be processed and resolved pursuant to Public Contract Code sections 9204 and 20104, as follows:

(a) Owner Review of Claim. Within 45 days after receiving a complete Contract Claim, Owner shall review the claim and provide the Contractor a written statement identifying what portion of the claim is disputed and what portion is undisputed. Owner will pay any undisputed portion of the claim within 60 days from the date of the written statement. If Owner fails to timely issue a written statement, then the claim shall be deemed rejected in its entirety.

(b) Meet and Confer Conference. If the Contractor disputes the Owner's written statement or if the Contract Claim is deemed rejected, the Contractor may demand and the parties will conduct an informal conference to meet and confer regarding settlement in accordance with section 9204, subsection (d)(2). Within 10 business days following the conclusion of the meet and confer conference, Owner shall provide Contractor a written statement identifying the portion (if any) of the claim remaining in dispute and any undisputed portion will be paid by Owner within 60 days after this written statement.

(c) Non-Binding Mediation. Any remaining disputed portion of the claim shall be submitted to nonbinding mediation in accordance with section 9204, subsection (d)(2).

(d) Interest. Any amount not paid in a timely manner as required by this subsection shall bear interest at a rate of 7 percent per annum until paid.

The foregoing is a summary of section 9204. In the event of any conflict between the summary and section 9204, the statute will govern.

7.3.2.2 Lawsuit and Reference. If mediation is unsuccessful and all or parts of the Contract Claim remain in dispute, then the Contractor may pursue a lawsuit (with judicial reference) in accordance with the procedures set forth at sections 7.3.4.4 through 7.3.4.5. Any lawsuit under this section 7.3.5 will be subject to judicial reference in the same manner as under section 7.3.4.

7.3.3 Contract Work Pending Claim Resolution. Unless otherwise directed in writing by the Construction Manager, pending resolution of a claim under this section 7.3, the Contractor shall continue to diligently prosecute the Work in accordance with the Contract Documents and the instructions of the Construction Manager.

7.3.4 Records of Disputed Work - In proceeding with a disputed portion of the Work, the Contractor shall keep accurate records of all costs, including a summary of the hours and classification of equipment and labor utilized on the disputed work, as well as a summary of any materials or any specialized services which are used. Such information shall be submitted to the Construction Manager on a daily basis, receipt of which shall not be construed as an authorization for or acceptance of the disputed work.

7.3.5 Submission of Claim Costs - Within thirty (30) days after the last cost of work for which the Contractor contends it is due additional compensation is incurred, but if costs are incurred over a span of more than thirty (30) days, then within fifteen (15) days after the thirtieth day and every month thereafter, the Contractor shall submit to the Construction Manager, as best the Contractor is able, its costs incurred for the claimed matter. Claims shall be made in itemized detail, and should the Construction Manager be dissatisfied with the format or detail of presentation, upon request for more or different information, the Contractor will promptly comply, to the satisfaction of the Construction Manager. If the additional costs are in any respect not knowable with certainty, they shall be estimated as best can be done. The Construction Manager shall have the right as

provided in Section 01350-5.0, **COST PRICING DATA AND ACCESS TO RECORDS**, to review the Contractor's records pertaining to a submitted claim. In case the claim is found to be just, it shall be allowed and paid for as provided in Section 01350, **CONTRACT MODIFICATION PROCEDURES**.

7.3.6 Claim Meetings - From time to time the Contractor may request or the Construction Manager may call a special meeting to discuss outstanding claims should it deem this a means of possible help in the resolution of the claim. The Contractor shall cooperate and attend prepared to discuss its claims, making available the personnel, subcontractors and suppliers necessary for resolution, and all documents which may reasonably be requested by the Construction Manager.

7.3.10 Tort Claims. The provisions of this section 7.3 apply only to contract-based claims and they shall not apply to tort claims, and nothing in this section 7.3 is intended nor shall be construed to change the time periods for filing tort claims or actions specified by Government Code title 1, division 3.6, part 3, chapters 1 (commencing with section 900) and 2 (commencing with section 910).

8.0 PAYMENT

8.1 Basis of Payment

8.1.1 General - The Contractor shall accept the compensation, as herein provided, as full payment for furnishing all labor, materials, tools, equipment, and incidentals necessary to the completed Work and for performing all work contemplated and embraced under the Contract; also for loss or damage arising from the nature of the Work, or from the action of the elements, or from any unforeseen difficulties which may be encountered during the prosecution of the Work, also for all expenses incurred in consequence of the suspension or discontinuance of the Work as herein specified; and for completing the Work according to the Contract Documents. Neither the payment of any estimate nor of any retained percentage shall relieve the Contractor of any obligation to make good any defective work or material.

No compensation will be made in case of loss of anticipated profits. Increased or decreased work involving supplemental agreements will be paid for as provided in such agreements.

Full compensation for conforming to all of the provisions of the Contract Documents shall be considered as included in the prices paid for the various Contract items of work and no additional compensation will be allowed therefor.

8.1.2 Payment for Patents and Patent Infringement - All fees or claims for any patented invention, article, or arrangement that may be used upon, or in, any manner connected with the performance of the Work or any part thereof shall be included in the price bid for doing the work, and the Contractor and its sureties shall defend, protect, and hold the Owner, the Construction Manager, and Engineers, together with all their officials, officers, volunteers, agents, and employees harmless from and any and all suits and claims including claims for attorneys' fees, expert's fees and costs brought or made by the holder of any invention or patent, or on account of any patented or unpatented invention, process, article, or appliance manufactured for or used in the performance of the Contract, including its use by the Owner, unless otherwise specifically stipulated in the Contract. Before final payment is made on the Contract, the Contractor shall furnish an affidavit to the Owner regarding patent rights for the Project. The affidavit shall state that all fees and payments due as a result of the work incorporated into the Project or methods

utilized during construction have been paid in full. The Contractor shall certify in the affidavit that no other fees or claims exist for work in this Project.

8.1.3 Payment of Taxes - The Contractor shall pay and shall assume exclusive liability for all taxes levied or assessed on or in connection with its performance of this Contract, whether before or after acceptance of the work, including, but not limited to, State and local sales and use taxes, Federal and State payroll taxes or assessments, and excise taxes, including any taxes or assessments levied or increased during the performance period of the work. No separate allowance will be made therefor, and all costs in connection therewith shall be included in the total amount of the Contract price.

8.2 Partial Payments

8.2.1 General - In consideration of the faithful performance of the Work prosecuted in accordance with the Contract Documents, the Owner will pay the Contractor for all such work installed on the basis of unit prices and/or percentage completion of lump sum Bid Items. Amounts earned for lump sum work will be based on accepted Cost Breakdown (See Section 01200, **MEASUREMENT AND PAYMENT**).

Payments will be made by the Owner to the Contractor on estimates duly certified by the Contractor and recommended for payment by the Construction Manager, based on the Lump Sum or unit price value of equipment installed and tested, labor and materials incorporated into said permanent work by the Contractor during the preceding month, and acceptable materials and equipment on hand (materials and equipment furnished and delivered to the site by the Contractor and not yet incorporated into the work accompanied by an approved invoice). Payments will not be made for temporary construction unless specifically provided for in the Contract Documents.

Partial payments will be made monthly based on work accomplished as of a day mutually agreed to by the Owner and the Contractor.

The Contractor shall submit a completed and signed progress payment request form with its estimate of the work completed during the prior month and the work completed to date in a format corresponding to the unit price schedule and accepted cost breakdown. Additionally, the Contractor shall submit a detailed statement of the Contractor's request for payment of acceptable materials and equipment on hand in compliance with Section 00700-8.2.2, **Partial Payments - Inclusion of Materials on Hand**. Each payment request shall list each Change Order executed prior to date of submission, including the Change Order Number.

Upon receipt of Contractor's requests for payment, the Owner shall act in accordance with the following:

- A. The Construction Manager shall review the submitted estimates, as soon as practicable after receipt for the purpose of determining that the estimates are a proper request for payment, and shall prepare an estimate of the total amount of work done and acceptable materials and equipment on hand.
- B. Any request for payment determined not to be a proper payment request suitable for payment shall be returned to the Contractor as soon as practicable, but not later than seven (7) days after receipt. A request for payment returned pursuant to this paragraph shall be

accompanied by a document setting forth in writing the reasons why the request for payment is not proper.

- C. The number of days available to the Owner to make a payment without incurring interest pursuant to this Section shall be reduced by the number of days by which the Owner exceeds the seven (7) day return requirement set forth in subdivision above.

If requested, the Contractor shall provide such additional data as may be reasonably required to support the partial payment request. The Construction Manager will be available to meet and discuss the partial payment request prior to its resubmittal(s). When the Contractor's estimate of amount earned conforms to the Construction Manager's evaluation, the Contractor shall submit to the Construction Manager a properly completed and signed progress payment request. The Construction Manager will submit the recommended progress payment request for the Owner's approval and processing. Payment will be made by the Owner to the Contractor in accordance with Owner's normal accounts payable procedures; the Owner shall retain amounts in accordance with Section 00700-8.3, **Right to Withhold Amounts**.

No such estimate or payment shall be required to be made, when in the judgement of the Construction Manager, the Work is not proceeding in accordance with the provisions of the Contract, or when in the Construction Manager's judgement the total value of the Work done since the last estimate amounts to less than One Thousand Dollars (\$1,000).

Subject to the provisions of this Section, the Owner shall pay the Contractor within thirty (30) days after receipt of undisputed and properly submitted requests for payment from the Contractor. In accordance with Public Contract Code Section 20104.50, if the Owner fails to pay an undisputed request for payment within the allotted thirty (30) days, the Owner shall pay interest to the Contractor equivalent to the legal rate set forth in subdivision (a) of Section 685.010 of the Code of Civil Procedure.

Each progress payment request and the final payment request shall be deemed "proper" only if it is submitted on the form approved by the Owner, with all of the requested information completely and accurately provided by the Contractor and such completed progress payment request form or final payment request form is accompanied by: (i) certified payrolls of the Contractor and all Subcontractors, of any tier, for laborers performing any portion of the Work for which a progress payment or final payment is requested; (ii) duly completed and executed Conditional Waiver and Release Upon Progress Payment or Final Payment forms in accordance with California Civil Code sections 8132-8138 for all Subcontractors of any tier, and Material Suppliers covering the progress payment or final payment requested; (iii) duly completed and executed Unconditional Waiver and Release Upon Progress Payment forms in accordance with California Civil Code sections 8132-8138 for all Subcontractors of any tier, and Material Suppliers covering the Progress Payment received by the Contractor under the prior progress payment request.

8.2.2 Partial Payments - Inclusion of Materials on Hand - Materials, as used herein, shall be considered to be those items which are fabricated and manufactured material and equipment. Only those materials for which the Contractor can transfer clear title to the Owner will be qualified for partial payment. The Contractor may request payment of ninety percent (90%) of the actual net cost of these materials. The request for partial payment will be subject to retention as provided elsewhere in the Contract Documents.

To receive partial payment for materials and equipment not incorporated in the Work, it shall be necessary for the Contractor to submit to the Construction Manager a list of such materials, at least seven (7) days prior to submitting the monthly estimate of amount earned for work completed. At the Construction Manager's sole discretion, it will approve items for which partial payment is to be made subject to the following:

- A. Equipment and materials will only be eligible if given conditional or final acceptance by the Design Consultant and are in apparent compliance with favorably reviewed shop drawings.
- B. Only equipment or materials which have received favorable review of shop drawings will qualify. The Operation and Maintenance Manuals for equipment must be submitted in accordance with Section 01782, **OPERATION AND MAINTENANCE DATA**, prior to payment for stored materials.
- C. Eligible equipment or materials must be delivered and properly stored, protected, and maintained in a manner favorably reviewed by the Construction Manager and in accordance with the accepted Operation and Maintenance Manuals, at the job site or at a bonded and insured warehouse in the vicinity, a maximum of 30 miles, of the Work. In addition to the requirements noted herein, equipment or materials stored offsite are subject to the following:
 - 1. Contractor will immediately, permanently, and prominently label all of the materials with the following notice: "THIS MATERIAL IS THE PROPERTY OF THE PLACER COUNTY WATER AGENCY".
 - 2. Contractor will, concurrent with payment, execute and deliver to the Owner a Bill of Sale.
 - 3. Contractor warrants to the Owner that no third party has a lien against any of the Materials, and that Contractor has full power and authority to convey clear title to the Materials to the Owner by Bill of Sale. If the Owner so requests, Contractor will cooperate in the filing of a UCC-1 notification or other documentation placing notice of the Owner's title in applicable state records.
 - 4. Contractor to store all of the Materials in a climate controlled and secured facility protected from adverse weather conditions in accordance with the Operations and Maintenance Manuals. The Owner has the right to inspect and approve the proposed facility.
 - 5. Contractor shall provide access to the facility when requested by the Owner.
 - 6. All warranty periods for the Materials will commence as described in the Contract Documents.
 - 7. Risk of loss as to the Material shall remain with the Contractor until Substantial Completion of the Work under the Contract.

8. Contractor shall keep the Material fully insured for the benefit to the Owner, and provide the Owner with a satisfactory certificate of insurance showing such coverage.
 9. Any Material warranties under the Contract shall commence only upon Substantial Completion or beneficial occupancy as provided in the Contract.
 10. The Owner reserves the right that if the above conditions are not met by the Contractor, the Owner shall adjust future monthly progress payments to reduce previously-paid materials on hand to zero or an amount the Owner deems appropriate.
- D. The Contractor's actual net cost for the materials must be supported by paid invoices of suppliers, or other documentation requested by the Construction Manager.
 - E. Materials or equipment delivered to the Site less than thirty (30) days prior to their scheduled incorporation in the Work shall not qualify for partial payment, unless approved by the Owner's Representative.
 - F. Final payment shall be made only for materials actually incorporated in the Work and, upon acceptance of the Work, all materials remaining for which advance payments had been made shall revert to the Contractor, unless otherwise agreed, and partial payments made for these items shall be deducted from the final payment for the Work.
 - G. Partial payments for materials and equipment on hand shall not be deemed to be final payment for the material nor relieve the Contractor of its obligations under the Contract.
 - H. Partial payments for materials and equipment on hand shall not be construed or considered as acceptance of any portion of the Work.
 - I. Partial payments for materials and equipment on hand shall be subject to retention in accordance with Section 00700-8.3, **Right to Withhold Amounts**.
 - J. Any Material warranties under the Contract shall commence only upon Substantial Completion or beneficial occupancy as provided in the Contract.
 - K. The Contractor is responsible for the risk of damage, theft, vandalism, or loss.
- 8.2.3 **Effect of Payment** – Payment will be made by Owner based on the Construction Manager's observations at the site and the data comprising the progress payment request. Payment will not be a representation that the Owner has:
- A. made exhaustive or continuous on-site inspections to check the quality or quantity of Work;
 - B. reviewed construction means, methods, techniques, sequences or procedures;

- C. reviewed copies of requisitions received from subcontractors and material suppliers and other data requested by Owner to substantiate Contractor's right to payment;
- D. made examination to ascertain how or for what purpose Contractor has used money previously paid on account of the Contract Sum; or
- E. accepted all or part of the Work.

8.2.4 Cash Flow Projection – A cash flow projection covering the entire construction period shall be included with the monthly contract earnings estimate report. The time increment shall be monthly and shall be revised monthly to show actual earnings and changes to projected cash flows. If there is a difference in the percent complete of the Work as measured by the CPM schedule and the percent complete of the Work as measured by the monthly contract earnings estimate, the Contractor shall explain the reason for the difference.

8.2.5 False Claims Act - All claims for payment from the Contractor to the Owner shall in all respects be a true and correct representation of services rendered and/or materials delivered to the Owner. It is a violation of both the federal and California False Claims Acts to knowingly present or cause to be presented to the Owner a false claim for payment or approval. The term "knowingly" includes either actual knowledge of the information, deliberate ignorance of the truth or falsity of the information, or reckless disregard for the truth or falsity of the information. Proof of specific intent to defraud is not necessary under the False Claims Acts. The penalties under the Federal False Claims Act and State of California False Claims Act are non-exclusive, and are in addition to any other remedies which the Owner may have either under contract or law.

8.3 Right to Withhold Amounts

8.3.1 Retention - The Owner will withhold from each of the partial payments and retain as part security, five (5) percent of the amount earned until final completion and acceptance of all of the Work. The amount retained will be kept by the Owner through completion of one hundred (100) percent of the Work. The full amount of retention will be paid to the Contractor in the final payment, except as dictated below.

8.3.2 Other Withholds - In addition to the amount which the Owner may otherwise retain under the Contract, the Owner may withhold a sufficient amount or amounts of any payment or payments otherwise due the Contractor, as in its judgment may be necessary to cover:

- A. For defective work not remedied, irrespective of when any such work be found to be defective.
- B. A reasonable doubt that the Contract can be completed for the balance then unpaid.
- C. A reasonable doubt that the Contractor will complete the Work within the agreed upon time limits.
- D. Damage to another contractor or third party, or to property.
- E. Failure of the Contractor to maintain Record Documents current as required in Section 01770, **PROJECT RECORD DOCUMENTS**.

F. Cost of insurance arranged by the Owner due to cancellation or reduction of the Contractor's insurance.

G. Failure to submit, revise, resubmit or otherwise conform to the requirements herein for preparing and maintaining a construction schedule as required in Section 01325, **PROGRESS SCHEDULES AND REPORTS**.

H. Failure to make proper submissions, as specified herein.

I. Payments due the Owner from the Contractor as provided for in the Contract Documents.

J. Failure to comply with environmental and other regulatory requirements.

K. The Contractor's neglect or unsatisfactory prosecution of the Work including additional engineering and administrative costs related to construction and/or shop drawing errors and the failure to clean up.

L. Provisions of law that enable or require the Owner to withhold such payments in whole or in part.

M. Stop Notice claims filed by Contractor's subcontractors, of any tier, or its material suppliers.

N. Failure of Contractor to submit Operation and Maintenance Manuals as required in Section 01782, **OPERATION AND MAINTENANCE MANUALS**.

When the above reasons for withhold amounts are removed, payment will be made to the Contractor for amount withheld because of them.

The Owner, in its discretion, may apply any withheld amount or amounts to the payment of valid claims. In so doing, the Owner shall be deemed the agent of the Contractor, and any payment so made by the Owner shall be considered as a payment made under the Agreement by the Owner to the Contractor and the Owner shall not be liable to the Contractor for such payment made in good faith. Such payments may be made without prior judicial determination of the claim or claims. The Owner will render to the Contractor a proper accounting of such funds disbursed on behalf of the Contractor.

8.4 Security Substitution for Withholds

For any retention of amount earned by the Contractor under Sections 00700-8.3.1 **Retention**. The Contractor may substitute securities as provided in Section 22300 of the Public Contract Code, as amended, which states in part as follows:

"Provisions shall be included in any invitation for bid and in any contract documents to permit the substitution of securities for any moneys withheld by a public agency to ensure performance under a contract, provided that substitution of securities provisions shall not be required where federal regulations or policies, or both, do not allow the substitution of securities. At the request

and expense of the contractor, securities equivalent to the amount withheld shall be deposited with the public agency, or with a state or federally chartered bank as the escrow agent, who shall then pay those monies to the contractor. Upon satisfactory completion of the contract, the securities shall be returned to the contractor."

Alternatively, the Contractor may request and the Owner shall make payment of retentions earned directly to the escrow agent at the expense of the Contractor. At the expense of the Contractor, the contractor may direct the investment of the payments into securities and the contractor shall receive the interest earned on the investments upon the same terms provided for in this Section for securities deposited by the Contractor. Upon satisfactory completion of the Contract, the contractor shall receive from the escrow agent all securities, interest and payments received by the escrow agent from the Owner, pursuant to the terms of this Section. The Contractor shall pay to each subcontractor, not later than twenty (20) days of receipt of the payment, the respective amount of interest earned, net of costs attributed to retention withheld from each subcontractor, on the amount of retention withheld to insure the performance of the Contractor."

"The contractor shall be the beneficial owner of any securities substituted for money withheld and shall receive any interest thereon."

Securities eligible for investment under Section 22300 shall be limited to those listed in Section 16430 of the Government Code and to bank or savings and loan certificates of deposit, interest-bearing demand deposit accounts, standby letters of credit, or any other security mutually agreed to by the Contractor and the Owner.

The escrow agreement used hereunder shall be null, void, and unenforceable unless it is substantially similar to the form in Section 00630, **ESCROW AGREEMENT FOR SECURITY DEPOSITS IN LIEU OF RETENTION**.

8.5 Warranty of Title

No material, supplies, or equipment for the Work under this Contract shall be purchased subject to any chattel mortgage, security agreement, or under a conditional sale or other agreement by which an interest therein or any part thereof is retained by the seller or supplier. The Contractor warrants good title to all material, supplies, and equipment installed or incorporated in the work and agrees upon completion of all work to deliver the premises, together with all improvements and appurtenances constructed or placed thereon by the Contractor, to the Owner free from any claims, liens, security interests, or charges. The Contractor further agrees that neither the Contractor nor any person, firm, or corporation furnishing any materials or labor for any work covered by this Contract shall have any right to a lien upon the premises or any improvement or appurtenances thereon, provided that this shall not preclude the Contractor from installing metering devices and other equipment of utility companies or of municipalities, the title of which is commonly retained by the utility company or the municipality. In the event of the installation of any such metering device or equipment, the Contractor shall advise the Owner as to the legal owner thereof.

Nothing contained in this paragraph, however, shall defeat or impair the right of such persons furnishing materials or labor under any bond given by the Contractor for their protection or any rights under any law permitting such persons to look to funds due the Contractor in the hands of

the Owner. The provisions of this paragraph shall be inserted in all subcontracts and material contracts, and notice of its provisions shall be given to all persons furnishing materials for the work when no formal Contract is entered into for such materials.

8.6 Substantial Completion

When the Contractor considers that the Work or portion of the Work as defined in Section 01110-7.0, **EARLY OCCUPANCY OF PORTIONS OF WORK**, is substantially complete, the Contractor shall notify the Construction Manager in writing. Upon receipt of the notification, the Construction Manager, the Owner, the Engineer and/or their authorized representatives will make inspection, to determine if the Work and administrative requirements are sufficiently complete in accordance with the Contract Documents so the Owner can occupy or utilize the Work for its intended use. If items are found which prevent such use or occupancy, the Construction Manager shall notify the Contractor in writing of such items by issuing a Corrective Work Item List.

Upon the completion of such corrective work, the Contractor shall so notify the Construction Manager in writing. The Construction Manager, the Owner and/or the Engineer shall inspect the Work to determine its acceptability for Substantial Completion and for determination of other items which do not meet the terms of the Contract. Upon verification that the Work is substantially complete the Construction Manager shall prepare a Certificate of Substantial Completion and the Punch List (see Form 01999-16, **CERTIFICATE OF SUBSTANTIAL COMPLETION**). The Certificate shall establish the date of Substantial Completion and the responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, commencement of warranties required by the Contract Documents, and shall fix the time, not to exceed sixty (60) days, within which the Contractor shall finish all items on the Punch List or remaining work or administrative requirements accompanying the Certificate. When the preceding provisions have been approved by both the Owner and the Contractor, they shall sign the Certificate to acknowledge their written acceptance of the responsibilities assigned to them in such Certificate. By such acknowledgment, the Owner has the right to retain withheld monies due the Contractor to pay the Owner's actual costs including, but not limited to, charges for engineering, inspection and administration incurred due to the failure to complete the Punch List within the time period provided in the Certificate of Substantial Completion, which costs the Owner may deduct from amounts due or that may become due the Contractor under the Contract.

8.7 Final Inspection and Payment

Upon completion of the Work, including all items on the Punch List, and upon completion of final cleaning, the Contractor shall so notify the Construction Manager in writing. Upon receipt of the notification, the Construction Manager, the Owner's Representative(s) and the Engineer will make the final inspection, to determine the actual status of the Work in accordance with the terms of the Contract. If materials, equipment, workmanship or administrative requirements are found which do not meet the terms of the Contract, the Construction Manager shall prepare a Final Inspection List of such items and submit it to the Contractor. Following completion of the work to correct all items in the Final Inspection List the Contractor shall notify the Construction

Manager. The Construction Manager shall, in turn, notify the Owner that the Work has been completed in accordance with the Contract. Final determination of the acceptability of the Work shall be made by the Owner. After completion of the work, but prior to its acceptance by the Owner, the last partial payment will be made to the Contractor in accordance with Section 00700-8.2, **Partial Payments**.

Final payment to the Contractor in accordance with the approved final estimate is contingent upon the Contractor furnishing the Owner with a signed written waiver and release of all claims against the Owner arising out of or in any way connected to the Contract. Disputed Contract claims in stated amounts may be specifically excluded by the Contractor from the operation of the waiver and release. The waiver and release shall be substantially in the form provided in Civil Code section 8136 (conditional waiver and release on final payment) or 8138 (unconditional waiver and release in exchange for final payment). In the event the Contractor fails to furnish the Owner with a signed written waiver and release of all claims against the Owner arising out of or in any way connected to the Contract, Contractor's acceptance of final payment is Contractor's release of all claims against the Owner to the fullest extent permitted by law.

Following receipt of all required submittals and the Construction Manager's written statement that construction is complete and recommendation that the Owner accept the Work, the Owner will take formal action on acceptance.

Within ten (10) days of the acceptance by the Owner's Governing Board of the completed Work embraced in the Contract, the Owner will cause to be recorded in the office of the County Recorder a Notice of Completion.

The final payment shall not be due and payable until the expiration of thirty-five (35) days from the date of recording the Notice of Completion by the Owner.

The Owner will pay the Contractor in lawful money such sums of money as may be due the Contractor including all sums retained but excluding such sums as have previously been paid the Contractor and as may be needed to cover outstanding stop notices. This payment will constitute the final payment to the Contractor under this Contract.

In the event of a dispute between the Owner and the Contractor, the Owner may in accordance with California Public Contract Code Section 7107 withhold from the final payment an amount of 150 percent of the disputed amount.

Contractor acknowledges that this Contract, and performance and payments under this Contract, are subject to examination and audit by the State Auditor General for three years following final payment under this Contract pursuant to California Government Code section 8546.7.

8.8 Warranties and Bonds

The Contractor hereby agrees to make, at its own expense, all repairs or replacements necessitated by defects in materials or workmanship, supplied under terms of this Contract, and pay for any damage to other works resulting from such defects, which becomes evident within one (1) year after the date of acceptance of the project or the Substantial Completion date

whichever is applicable or within such longer period of time as may be prescribed by law or by the terms of any applicable special guarantee required by the Contract Documents. The Contractor further assumes responsibility for a similar guarantee for all work and materials provided by subcontractors or manufacturers of packaged equipment components. The Contractor also agrees to indemnify, defend, and hold the Owner harmless from liability of any kind arising from damage due to said defects.

The Contractor shall execute and submit a completed **Warranty Form** 01999-07 found in Section 01999, **REFERENCE FORMS** for the Work, and any portion of the Work possessed in accordance with Section 00700-3.4, **Owner's Right to Use or Occupy**. The Warranty Form shall be submitted prior to the Substantial Completion date or the final acceptance of the project or within five (5) days of the occupancy or use of a portion of the Work, whichever is applicable.

The Contractor shall, upon the receipt of notice in writing from the Owner, promptly make all repairs arising out of defective materials, workmanship, or equipment. The Owner is hereby authorized to make such repairs, and the Contractor and its Surety shall be liable for the cost thereof, if ten (10) days after giving of such notice to the Contractor, the Contractor has failed to make or undertake the repairs with due diligence. In case of emergency, where in the opinion of the Owner delay could cause serious loss or damage, repairs may be made without notice being sent to the Contractor, and the expense in connection therewith shall be charged to the Contractor, and its Surety shall be liable for the cost thereof.

Prior to the expiration of the Warranty period, the Owner reserves the right to hold a meeting and require the attendance of the Contractor. The purpose of the meeting is to review warranties, bonds and maintenance requirements and determine required repair or replacement of defective items.

For the purpose of this paragraph, acceptance of the Work or a portion of the Work by the Owner, shall not extinguish any covenant or agreement on the part of the Contractor to be performed or fulfilled under this Contract which has not, in fact, been performed or fulfilled at the time of such acceptance. All covenants and agreements shall continue to be binding on the Contractor until they have been fulfilled.

The Owner and the Contractor agree that warranty on the parts of the work possessed and used by the Owner in accordance with Section 00700-3.4, **"Owner's Right to Use or Occupy,"** shall commence on the date that the Owner takes possession of such work and so notifies the Contractor in writing. The Owner and Contractor further agree that such possession, and use of the work shall not be deemed as Substantial Completion or acceptance of any other part of the Work.

If, after installation, the operation or use of the materials or equipment furnished under this Contract proves to be unsatisfactory to the Construction Manager or Owner, the Owner shall have the right to operate and use such materials or equipment until it can, without damage to the Owner, be taken out of service for correction or replacement. Such period of use of the defective materials or equipment pending correction or replacement shall in no way decrease Warranty Period. Warranty Period for equipment shall be extended by the number of days from the date the equipment is found by the Owner to be non-functional or defective to the date the contractor repairs and makes fully operational the same equipment.

Nothing in this Document shall be construed to limit, relieve or release the Contractor's, subcontractor's and/or equipment supplier's liability to the Owner for damages sustained as the result of latent defects in the equipment furnished or work performed. Further, nothing in this Document shall be deemed to be a waiver by the Owner of any rights or remedies, or time limits in which to enforce such rights or remedies, it may have against the Contractor, subcontractors, suppliers of the equipment and work performed under these Specifications.

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SECTION 00800

**PLACER COUNTY WATER AGENCY
144 FERGUSON ROAD
AUBURN, CA 95603**

SUPPLEMENTARY GENERAL CONDITIONS

1.0 MODIFICATIONS TO THE GENERAL CONDITIONS

1.1 Time Allowed for Completion

In accordance with the provisions of Section 00700-6.2, **Contract Time**, the following Substantial Completion and Final Completion contract times shall be completed within the number of consecutive calendar days from the date established in the Notice to Proceed for the commencement of Contract Time.

Substantial Completion – Completion of the Work as described in Section 00800 - 4.0
Substantial Completion

Contractual Completion Event	Completion Time (# of calendar days from <u>Notice to Proceed</u> date)
1. Substantial Completion	450
2. Final Completion	480

1.2 Damages for Delays

In accordance with the provisions of Section 00700-6.5, **Liquidated Damages**, for the period of time that any portion of the work remains unfinished after the time fixed for Substantial Completion and/or Final Completion in Section 00800-1.1, **Time Allowed for Completion**, as modified by extensions of time granted by the Owner, it is understood and agreed by the Contractor and the Owner that the Contractor shall pay the Owner the damages listed below.

Milestone	Dollars Per Day Liquidated Damages (Amount in Dollars)
1. Substantial Completion	\$2,000
2. Final Completion	\$500

1.3 Weather Days

In accordance with the provisions of Paragraph 00700-6.4.2.C, Weather Delays, an allowance of forty-five (45) working days of weather caused delay have been included in the time allowed for completion. This allowance represents a reasonable assessment of anticipated lost working days based on historical weather patterns. These weather days shall be included in the Contractor's schedule as specified in Section 01325-3.0, **WEATHER CONDITIONS**.

1.4 Contract Administration

The following project representatives are hereby designated by the Owner:

- A. Name of Owner Representative: Kelly Shively, PCWA
- B. Name of Engineer: Joe Ziemann, Water Works Engineers
- C. Name of Construction Manager: Jordan Jakobsen, PCWA

All communications to and from the Contractor shall be routed through the Construction Manager. Wherever the Contract Documents indicate that the Contractor shall contact or notify the Engineer, Architect, Soils Engineer, Structural Engineer, etc., the Contractor shall route such communication through the Construction Manager except when otherwise explicitly approved by the Construction Manager.

2.0 LIABILITY AND INSURANCE

2.1 Insurance

Within ten (10) days after notice of award of the Contract, the Contractor shall promptly obtain, at its own expense, all the insurance required by Section 00800-2.0, **LIABILITY AND INSURANCE**, and submit coverage verification for approval by the Owner prior to the Owner's execution of the Contract. The insurance shall provide the minimum coverage and limits set forth below. Providing coverage in these stated minimum limits shall not be construed to relieve the Contractor from liability in excess of such limits. All deductibles and self-insured retentions must be disclosed and are subject to approval by the Contracting Agency. The cost of any claim payments falling within the deductible shall be the responsibility of the Contractor.

The Notice to Proceed with the Work under this Contract will not be issued, and the Contractor shall not commence work, until such insurance has been approved by the Owner. Such insurance shall remain in full force and effect at all times during the prosecution of the Work and until the final completion and acceptance thereof. The Contractor's obligation to indemnify shall survive the termination or completion of this agreement for the full period of the time allowed by law and shall not be restricted by the insurance requirements of this Contract or to insurance proceeds, if any received by the Owner, or its directors, officers, employee's and/or authorized volunteers. Unless otherwise stated, insurance shall be kept in force for two years following the Acceptance. The Notice to Proceed does not relieve the Contractor of the duty to obtain such insurance as required herein.

The Contractor shall not allow any subcontractor to commence work on its subcontract until all similar insurance required of the subcontractor has been obtained and verified by the Contractor or upon request submitted to the Construction Manager for the Owner's review and records. Subcontractors shall furnish original certificates and required endorsements as verification of insurance coverage. The insurance liability limits specified in Section 00800-2.1.1. b(2), **LIABILITY AND INSURANCE**, shall also apply for all subcontractors listed in Section 00430, **DESIGNATION OF SUBCONTRACTORS**. The Contractor shall designate the required insurance liability limits for all other subcontractors.

Companies writing the insurance under this article shall be licensed to do business in the State

of California or be permitted to do business under the Surplus Line Law of the State of California. Insurance is to be placed with insurers with a current A.M. Best's rating of no less than A - VIII. The Bid/Contract shall be inclusive of all costs and overhead including insurance.

The Contractor shall provide the Owner and Construction Manager with updated insurance information including any change to policies, carrier, coverage, policy limits, cancelation or other material changes within two days of receipt or notice. A failure to provide updated insurance information can cause a temporary stop in the project being ordered by the Owner until such time as the Owner has accepted a revised/new insurance.

Nothing contained in these insurance requirements is to be construed as limiting the extent of the Contractor's responsibility for payment of damages resulting from its operations under this Contract. For any claims related to this project, the Contractor's insurance coverage shall be primary insurance as respects the Owner, the Engineer and the Construction Manager, and their officers, officials, employees, agents and volunteers. Any insurance or self-insurance maintained by the Owner, its officers, officials, employees, agents or volunteers shall be in excess of the Contractor's insurance and shall not contribute with it.

Any failure of the Contractor to comply with reporting or other provisions of the policies including breaches of warranties shall not affect indemnification required to be provided to the Owner, the Engineer and the Construction Manager and their officers, officials, employees, agents or volunteers.

The Contractor shall take out, pay for, and maintain throughout the duration of this Contract and for such additional periods as more specifically required herein the following insurance against claims for injuries to persons or damages to property which may arise from or in connection with the performance of the work hereunder by the Contractor, the Contractor's agents, representatives, employees, subcontractors, suppliers, vendors or materialmen, of any tier.

2.1.1 Commercial General Liability and Automobile Liability Insurance - This insurance shall protect the Contractor from claims for bodily injury, personal injury and property damage which may arise because of the nature of the work or from operations under this Contract. The Commercial General Liability Insurance shall be maintained for two (2) years after final completion and shall provide coverage on an occurrence basis. Coverage shall be at least as broad as ISO forms CG 0001 10 93 and CA 0001 12 93.

- a. **Additional Insureds** - The Commercial General Liability and Automobile Policies of insurance shall include as additional insureds or be endorsed to contain the following provisions: the Placer County Water Agency, the Engineer and Construction Manager, and their officers, officials, employees, agents and volunteers are to be covered as insureds as respects: liability arising out of activities performed by or on behalf of the Contractor; products and completed operations of the Contractor; premises owned, occupied or used by the Contractor and or automobiles owned, leased, hired or borrowed by the Contractor. The coverage shall contain no special limitation on the scope of protection afforded to the Placer County Water Agency, its officers, officials, employees, agents or volunteers; the Engineer, the Construction Manager and each of their partners, officers, officials, employees, agents and/or volunteers or the coverage provided to such additional insureds. This policy shall provide coverage to each of the said insureds with respect to said work. Said policy shall provide primary coverage to the full limit of liability stated in the policy declarations. If an additional insured endorsement is used, it shall provide coverage as least as broad as either (1) ISO form CG 20 10 11

85, or (2) the combination of CG 20 10 10 01 plus CG 20 37 10 01.

- b. (1) Minimum Amount of Coverage (General Contractor) - The Commercial General Liability insurance shall provide coverage in the following limits of liability at a minimum: \$2,000,000 per occurrence and \$4,000,000 in the aggregate for bodily injury, property damage, personal and advertising injury. Products/completed operations coverage shall have a separate aggregate with either ISO form CG2503 or ISO form CG2504, or provide twice the occurrence limit of the CGL. The Automobile Liability insurance policy shall provide minimum limits of \$1,000,000 per accident for bodily injury and property damage arising out of the ownership, maintenance, or use of any owned or non-owned or hired vehicles. The Commercial General Liability Coverage shall include per project aggregates in the above amounts equivalent to (1) ISO form CG 25 03 11 85, or (2) both CG 20 10 10 01 and CG 20 37 04 13.
- b.(2) Minimum Amount of Coverage (SUBCONTRACTORS LISTED IN SECTION 00430) - The bodily injury, personal injury and property damage liability of the Commercial General Liability insurance shall provide coverage in the following limits of liability, at a minimum: \$2,000,000 per occurrence and \$4,000,000 aggregate for bodily injury, property damage, personal and advertising injury. Products/completed operations coverage shall have a separate aggregate with either ISO form CG2503 or ISO form CG2504, or provide twice the occurrence limit of the CGL. The Automobile Liability insurance policy shall provide minimum limits of \$1,000,000 per accident for bodily injury and property damage arising out of the ownership, maintenance, or use of any owned or non-owned vehicles. The Commercial General Liability shall include per project aggregates in the above amounts equivalent to (1) ISO form CG 25 03 11 85, or (2) both CG 20 10 10 01 and CG 20 37 04 13.
- c. Subcontractors – The bodily injury and property damage liability insurance shall not be deemed to require the Contractor to have its subcontractors named as insureds in the Contractor's policy, but the policy shall protect the Contractor from contingent liability which may arise from operations of its subcontractors. Insurance for Subcontractors shall be endorsed to contain the following provisions: the Placer County Water Agency, the Engineer and Construction Manager, and their officers, officials, employees, agents and volunteers are additional insured.
- d. Included Coverage - The above Commercial General Liability insurance shall also include the following coverages:
- Premises - Operations
- Independent Contractors
- Products - Completed Operations
- Personal Injury - (False Arrest, Libel, Wrongful Eviction, etc.)
- Advertising Injury
- Broad Form Property Damage, Including, Completed Operations
- Separation of Insureds/Cross-Liability Provision

Duty to Defend all Insureds

Blanket Contractual Liability

Waiver of Subrogation

Deletion of any Limitation on Coverage for Bodily Injury or Property Damage Arising out of Subsidence or Soil or Earth Movement

Separate Aggregate - A provision that the annual general aggregate and the products and completed operations annual aggregate shall apply separately to each project for which Contractor provides services away from premises owned by or rented to Contractor.

- e. Explosion, Collapse & Underground Hazard Insurance – Not Used
- f. Umbrella Policy - Contractor may use an umbrella or excess policy to meet the limits requirement of Section 2.1.1.b(1). However, any such umbrella/excess policy must be approved by the Owner and maintain a A.M. Best Rating of no less than A - VIII. In addition, the policy must follow form and afford no less coverage than the primary policy.
- g. Professional Liability Coverage - If Errors and Omissions (also called Professional Liability) coverage has been excluded from the Liability Policy, an endorsement or separate coverage is required for the entire duration of this contract. Some form of coverage for errors and omissions shall protect from claims based on negligent errors, acts, mistakes, faulty work, or omissions which may arise from operations under this contract, whether such operations be by the Contractor or by its employees, subcontractors, consultants or anyone else directly or indirectly employed by any of the foregoing. The amount of this insurance shall not be less than \$1,000,000 per occurrence. Any claims-made policies shall include tail coverage for a minimum of five (5) years and shall have a retroactive date that is equal to the Project start or earlier. Any such policy shall be endorsed to include a waiver of subrogation in favor of the Owner.

2.1.2 Workers' Compensation Insurance - The Contractor is advised of the provisions of Section 3700 of the California Labor Code, which require every employer to be insured or legally self-insured against liability for Workers' Compensation in accordance with the provisions of that code.

The Contractor shall maintain Workers' Compensation with statutory limits for injury/disease, and \$1,000,000 for each occurrence in Employers' Liability insurance covering work-related liability not otherwise protected by workers' compensation insurance or statute, before commencing the performance of the Work of this Contract. The Contractor shall require each subcontractor maintain Workers' Compensation insurance for all of the latter's employees as prescribed by California State Law.

Before the Notice to Proceed with the Work under this Contract is issued, the Contractor shall submit written evidence that the Contractor has obtained Workers' Compensation and Employer's Liability Insurance as required for all persons whom it employs or who will carry out the Work under this Contract. Evidence of current Workers' Compensation Insurance shall be

maintained throughout the duration of this agreement. Such evidence of coverage shall be accompanied by an endorsement from the insurer agreeing to waive all rights of subrogation against the Owner, its officers, officials, employees, agents and volunteers, the Engineer, the Construction Manager and their agents, consultants and employees which might arise by reason of any payment under the policy. This insurance shall be in accordance with the requirements of the most current and applicable State Workers' Compensation Insurance Laws.

Any self-insured Workers' Compensation Program shall provide evidence of a State license to self-insure, declare self-insured retentions and provide evidence of reinsurance. A statement of current actuarially rated funding requirements and reserves may be requested. Such self-insurance programs shall be accepted at the will of the Owner.

2.1.3 Railroad Protective Liability Insurance – Not Used

2.1.4 Responsibility for Work and Builder's Risk Insurance – Until the completion and final acceptance by the Owner of all the Work under and implied by the Contract, the Work shall be under the Contractor's responsible care and charge. The Contractor shall rebuild, repair, restore and make good all injuries, damages, re-erections and repairs occasioned or rendered necessary by cause of any nature whatsoever.

Builder's Risk: An "All Risk or Special Form" Builder's Risk Insurance in an amount equal to the full replacement cost shall be issued on a completed value basis, without deduction for depreciation and shall also provide coverage for boiler & machinery and "soft costs" such as, but not limited to, design and engineering fees and inspection costs caused by an insured peril. This insurance shall name the Owner, the Engineer, the Construction Manager and the Contractor as insureds, as their interests may appear and shall include coverage, but not by way of limitation, for all damages of loss to the Work and to appurtenances, to materials and equipment to be incorporated into the Project while the same are in transit, stored on or off the Project Site, to construction plant and temporary structures. The policy shall separately cover the costs of debris removal, including demolition as may be made reasonably necessary by the application of any law, ordinance, or regulation.

Pursuant to Section 7105 of the Public Contract Code, the Owner requires full value of contract for any damage to the Work caused by an Act of God, as defined by Section 7105(b)(2) of that Code. The insurance premium for such coverage is listed as a separate bid item.

Builder's Risk Insurance policies shall contain the following provisions:

- (1) The Owner shall be named as an insured.
- (2) The insurer shall waive all rights of subrogation against the Owner.

The Builder's Risk Insurance may contain sub-limits not less than the following: Debris removal no less than twenty-five percent (25%) of full project value; Pollution Cleaning, no less than twenty-five percent (25%) of full project value. No other sub-limits will be allowed except as declared to the Agency prior to Bid and approved by addendum to the Bid documents.

Builder's Risk Insurance may have a deductible clause not to exceed the following limits:

- (1) The deductible for coverage for any damage to the Work caused by an Act of God, as defined by Section 7105(b)(2) of the Public Contract Code, shall not exceed five percent (5%) of the value at risk at the time of the loss. The Owner shall be named as an insured.
- (2) All Other Perils: \$10,000

The Contractor shall be responsible for paying any and all deductible costs. The policy shall provide the Owner the right to occupy the premises without termination of the policy until acceptance of the Project. In the event of a covered loss, proceeds of builder's risk insurance shall be applied first to reimburse actual costs of demolition, debris removal, reconstruction, and repair or replacement incurred in the discharge of the Contractor's obligations of repair or replacement under this contract. Insurance proceeds shall be deposited in a separate account in a local bank satisfactory to the Agency and shall be withdrawn only with the Agency's written approval to reimburse such actual costs as the builder's risk carrier has agreed to reimburse. The Agency shall have no liability for failure of the builder's risk carrier to pay for any particular cost of repairs. In the event of the termination of the Contractor for default, the Contractor shall forfeit all rights to builder's risk insurance proceeds and Agency may expend such proceeds to complete the Project as if they were unpaid contract monies.

2.1.5 Contractor's Pollution Liability – Not Used

2.1.6 Proof of Coverage - Before the Notice to Proceed with the Work under this Contract is issued, the Contractor shall furnish the Owner with certificate(s) evidencing issuance of all insurance mentioned herein, copies of the policy declaration or information page(s) and additional insured endorsements. The certificate(s) and endorsements for each insurance policy are to be signed by a person authorized by that insurer to bind coverage on its behalf. The endorsements are to be on general liability and automobile liability endorsement forms acceptable to the Owner. The certificate(s), policy declaration or information page(s), and endorsements are to be received and approved by the Owner before work commences. Except for the waiver of subrogation rights endorsements, as required under Sections 00800-2.1.2 and 00800-2.1.3, no other endorsements are required for Workers Compensation or Builder's Risk Insurance. Such certificates of insurance shall provide that the insurance policy shall be endorsed to state that coverage shall not be suspended, voided, cancelled by either party, reduced in coverage or limits except after thirty (30) days prior written notice by certified mail, return receipt requested, has been given to the Owner. Contractor shall also provide certificate(s) evidencing renewals of all insurance required herein, at least thirty (30) days prior to the expiration date of any such insurance.

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

In the event of the breach of any provision of this paragraph, or in the event of any notices received which indicates any required insurance coverage will be diminished or canceled, Owner, at its option, may, notwithstanding any other provisions of this Agreement to the contrary, immediately declare a material breach of this Agreement and suspend all further work pursuant to this Contract.

2.1.7 Indemnification

- A. Contractor shall indemnify, defend with counsel acceptable to Owner and hold harmless to the full extent permitted by law, Owner, the Engineer and the Construction Manager, and their officers, officials, employees, agents and volunteers, (collectively "the Indemnified Parties"), and each of them from and against any and all liability, loss,

damage, claims, expenses and costs (including, without limitation, attorney fees and costs and fees of litigation) (collectively, "Liability") of every nature arising out of or in connection with Contractor's performance of the Work or its failure to comply with any of its obligations contained in this Agreement, except such Liability caused by the sole negligence, active negligence or willful misconduct of the Indemnified Parties. Such indemnification by the Contractor shall include, but not be limited to, the following:

1. Liability or claims resulting directly or indirectly from the negligence or carelessness of the Contractor, its subcontractors, employees, or agents in the performance of the Work, or in guarding or maintaining the same, or from any improper materials, implements, or appliances used in its construction, or by or on account of any act or omission of the Contractor, its employees, or agents;
2. Liability or claims arising directly or indirectly from bodily injury, occupational sickness or disease, or death of the Contractor's, or Supplier's own employees, or agents engaged in the Work resulting in actions brought against the Indemnified Parties;
3. Liability or claims arising directly or indirectly from or based on the violation of any Laws or Regulations, whether by the Contractor, its subcontractors, employees, or agents;
4. Liability or claims arising directly or indirectly from the use or manufacture by the Contractor, its subcontractors, employees, or agents in the performance of this Agreement of any copyrighted or un-copyrighted composition, secret process, patented or unpatented invention, article, or appliance, unless otherwise specified stipulated in this Agreement.
5. Liability or claims arising directly or indirectly from the breach of any warranties, whether express or implied, made to the Owner or any other parties by the Contractor, its subcontractors, employees, or agents;
6. Liability or claims arising directly or indirectly from the willful misconduct of the Contractor, its subcontractors, employees, or agents;
7. Liability or claims arising directly or indirectly from any breach of the obligations assumed in this Agreement by the Contractor;
8. Liability or claims arising directly or indirectly from, relating to, or resulting from a hazardous condition created by the Contractor, Subcontractors, Suppliers, or any of their employees or agents, and;
9. Liability or claims arising directly, or indirectly, or consequentially out of any action, legal or equitable, brought against the Indemnified Parties, their consultants, sub-consultants, and the officers, directors, employees, agents and volunteers of each or any of them, to the extent caused by the Contractor's use of any premises acquired by permits, rights of way, or easements, the Site, or any land or area contiguous hereto or its performance of the Work thereon;
10. Liability arising directly or indirectly from exposure to hazards in violation of the California Labor Code that may be asserted by any person or entity,

including, but not limited to, the Contractor, arising out of or in connection with the negligent activities of the Contractor, its agents, employees or privities pursuant to this Contract, whether or not there is concurrent negligence on the part of the Indemnified Parties;

11. Liability arising from alleged defects in the content or manner of submission of the Contractor's Bid for the Contract.

- B. The Contractor shall reimburse the Indemnified Parties for all costs and expenses, (including but not limited to fees and charges of engineers, architects, attorneys, and other professionals and court costs of appeal) incurred by said Indemnified Parties in enforcing the provisions of this Paragraph.
- C. The indemnification obligation under this Section 00800-2.1.7 shall not be limited in any way by any limitation on the amount or type of insurance carried by Contractor or by the amount or type of damages, compensation, or benefits payable by or for the Contractor or any Subcontractor or other person or organization under workers' compensation acts, disability benefit acts, or other employee benefit acts.
- D. Pursuant to California Public Contract Code Section 9201, Owner shall timely notify Contractor of receipt of any third-party claim relating to this Agreement.
- E. The Contractor's obligations pursuant to this provision will survive the expiration or earlier termination of this Contract.

2.1.8 Injury or Illness Reports - The Contractor shall furnish the Construction Manager with a copy of the Employer's Report of Injury immediately following any incident requiring the listing of said report on the OSHA Log during the prosecution of the work under this Contract. The Contractor shall also furnish the Construction Manager with a copy of the Employer's Report of injury involving any subcontractor on this project.

2.1.9 Notification of Insurance Companies - The Contractor shall advise all insurance companies to familiarize themselves with all of the Conditions and provisions of this Contract, and they shall waive the right of special notification of any change or modification of this Contract or of extension of time, or of decreased or increased work, or of the cancellation of the Contract, or of any other act or acts by the Indemnified Parties, under the terms of this Contract, and failure to so notify the aforesaid insurance companies of changes shall in no way relieve the insurance companies of their obligation under this Contract.

2.2 Insurance During Guarantee Period

For all work the Contractor or its subcontractors perform during the guarantee period, worker's compensation, and commercial general liability insurance and insurance in the amounts and format required herein, shall remain in force and be maintained for one (1) year after Final Completion.

2.3 Third Party Insurance Requirements

The Work, as contemplated by the Contract Documents, does not specifically require an encroachment permit from Placer County. However, in the event the Contractor chooses a means and method of construction that results in Work requiring an encroachment permit from a

public utility, or any other local, state, federal or public agency, Contractor shall ensure that the insurance it obtains in accordance therewith complies with all requirements mandated by each permitting agency from whom permits shall be obtained for the Work and any other third parties from whom third party agreements are necessary to perform the Work (collectively, the "Third Party(ies)"). To the extent there is a conflict between the Third Party(ies)'s Insurance Requirements and those set forth by the Owner in Section 00800 - SUPPLEMENTARY GENERAL CONDITIONS, the requirement(s) providing the more protective coverage for both the Owner and the Third Party(ies) shall control and be purchased and maintained by Contractor.

Contractor shall be responsible to determine what insurance requirements exist as a condition precedent to obtaining permit(s) for the Work, if any. Contractor shall be solely responsible for any delay(s) arising from its failure and/or its Subcontractors' failure to timely obtain all required insurance.

All required third party insurance shall be submitted to the Owner at the same time Contractor submits all other contractually required insurance, which is no later than fifteen (15) days after Notice of Award, unless otherwise agreed to in writing by the Owner prior to this deadline.

Bidders are encouraged to contact the applicable local agency(ies) prior to Bid in determining all applicable permits, and related insurance requirements, for this Project.

3.0 PARTNERING – Not Used

4.0 SUBSTANTIAL COMPLETION

Substantial completion of the Project as required by Section 00700-8.6, **Substantial Completion**, requires that the following portions of the Work must be operational and ready for the Owner's continuous use as intended:

The following items of work must be fully tested and functional for Project Substantial Completion to be attained:

- Completion of the Corrective Work Item List as described in Section 00700-8.6, **Substantial Completion**.
- All alarms are fully functional, tested and demonstrated to properly associate locally, remotely and in the SCADA system.
- Training has been completed for all electrical, mechanical and instrumentation systems.
- All testing required by the Contract and the Specifications has been successfully completed.
- All process equipment shall be installed and operational, or temporary arrangements satisfactory to the Owner have been made.
- All instrumentation and control systems shall be installed and Operational Testing accepted to allow automatic operation.

- All items related to health and safety of Owner operations and maintenance staff, including warning signs, guardrails, and safety equipment and Fire Protection Systems, shall be complete.
- All Operation and Maintenance Manuals have been submitted and approved.
- All record drawings have been submitted, updated, reviewed, and approved.
- Site restoration completed.

Portions of the Work listed below are either required to be completed after Substantial Completion or are not essential to the system operation, which can be completed without interruption of system operations, may be completed after the Work is substantially complete.

- Final Site Clean-Up.
- Completion of the Final Punch List prepared by the Construction Manager in accordance with Section 00700-8.6, **Substantial Completion.**
- Signed Substantial Completion Form.
- Signed Release of Liability Form.
- Completed Warranty Provided.
- Contractor redlines submitted and approved.
- All final documentation required by the Agency has been reviewed and approved.

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Bowman WTP Phase 3 Improvements

Contract No. 2022-02

DIVISION 1

GENERAL REQUIREMENTS

July 2023

SECTION 01060

PLACER COUNTY WATER AGENCY
144 FERGUSON ROAD
AUBURN, CA 95603

REFERENCES

1.0 CODES AND STANDARDS

Whenever reference is made to a code or standard, it means the latest edition in effect the date that the Contract Documents are dated. Where codes, standards and reference documents are referred to in the Contract Documents, the Contractor may submit a written request to the Construction Manager for assistance in locating such documents. Within three days of receipt of such request, the Construction Manager or the Engineer will notify the Contractor as to where the document(s) can be reviewed.

2.0 DEFINITIONS OF WORDS AND TERMS

Where used in the project manual, the following words and terms shall have the meanings indicated. The meanings shall be applicable to the singular, plural, masculine and feminine of the words and terms.

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 the Owner, Construction Manager or 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 the Owner, Construction Manager or 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 Owner, Construction Manager or Engineer any duty or authority to supervise or direct the performance of the Work or any duty or authority contrary to the provisions of the Contract Documents.

Acceptance, Final Acceptance. Formal action of the Placer County Water Agency's Board of Directors in determining that the Contractor's work has been completed in accordance with the Contract Documents and in notifying the Contractor in writing of the acceptability of the Work.

Acts of God. "Acts of God" shall include only the following occurrences or conditions and effects: earthquakes in excess of a magnitude of 3.5 on the Richter Scale and tidal waves.

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.

Agency. Placer County Water Agency or its authorized representative.

Agreement. The written instrument which is evidence of the agreement between Owner and Contractor covering the Work.

Allowance. "Allowance" shall mean an amount of money set aside under the Contract for a special purpose identified and defined in the Contract Documents.

Application for Payment. The form acceptable to Owner's Representative 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.

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

Bid. Offer of a bidder submitted on the prescribed forms setting forth prices of the work to be performed.

Bidder. Any Individual, partnership, corporation, or a combination thereof, includes joint venturers who meet the requirements of the Contract Documents and offer a bid to perform the Work. The term "Successful Bidder" is the lowest responsible Bidder submitting a responsive Bid to whom the Owner (on the basis of Owner's evaluation as provided for in the Contract Documents) makes an award.

Bidding Documents. The Bidding Requirements and the proposed Contract Documents (including all Addenda).

City. Refers to all incorporated cities or towns within Placer County Water Agency Service Area which may be applicable to this Project.

Clarification Letter. A Clarification Letter is issued by the Construction Manager to address the clarification of Contract issues raised by the Construction Manager, Engineer or Owner.

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.

Completion. The word completion shall indicate substantial completion. See Substantial Completion.

Construction Manager. The person designated, in writing, by the Owner to act as its representative at the construction site and to perform administrative functions relating to this Contract. The Construction Manager may also furnish inspection services as provided by the Contract. All contact by the Contractor with the Owner shall be through the Construction Manager.

Contract. The entire and integrated written agreement between the Agency and Contractor concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.

Contract Change Order. A document which is signed as recommended by Owner's Representative, signed by Contractor, and signed by Owner's Director of Technical Services, which 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.

Contract Documents. The words "Contract Documents" shall mean any or all of the following items, as applicable:

- Notice Inviting Bids
- Instructions to Bidders
- Bid Form and Bid Schedule
- Designation of Subcontractors
- Agreement
- Performance Bond
- Payment Bond
- Guaranty Bond
- General Conditions
- Supplementary General Conditions
- General Requirements
- Specifications
- Drawings
- Addenda, if any
- Executed Change Orders, if any
- Field Orders
- Permits

Each of these items is to be considered by reference as part of the Contract Documents, also referred to as Contract.

Contract Price (also referred to as Contract Amount). The amount payable to the Contractor under the terms and conditions of the Contract based on the price given on the bidding schedule, with adjustments made in accordance with the Contract. The base amount given in the bidding schedule shall be either a lump sum bid or the summation of the unit price bids multiplied by the estimated quantities set forth in the bid form.

Contract Time. 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 Construction Manager's written recommendation of final payment.

Contractor. The individual partnership, corporation, or combination thereof including joint venturers who enter into the Contract with the Owner for the performance of the Work. The term "Contractor" means the Contractor or his authorized representative. The term "Contractor" also covers subcontractors, subtier subcontractors, consultants, equipment and material suppliers, and their employees.

Contractor's Plant and Equipment. Equipment, material, supplies, and all other items, except labor, brought onto the site by the Contractor to carry out the Work, but not to be incorporated in the Work.

Corrective Work Item List. List of incomplete items of work, incomplete administrative requirements and items of work which are not in conformance with the Contract, prepared by the Construction Manager and issued to the Contractor as an attachment to the response to the Contractor's notification of Substantial Completion.

County. Refers to the County or Counties where the Project is located.

Days. The word "Days" shall mean calendar days, including legal holidays, Saturdays and Sundays, unless specifically noted otherwise. The day shall be 24 hours measured from midnight to the next midnight.

Defective. 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 the Contract Documents).

Engineer. The engineer or architect designated by the Owner to have design control over the Work or a specified portion of the Work, acting either directly or through duly authorized representatives. Such representatives shall act within the scope of the particular duties delegated to them. The Engineer may also furnish inspection services as provided by the Contract.

Direct. Action of the Owner or Construction Manager by which the Contractor is ordered to perform or refrain from performing work under the Contract.

Drawings. Also referred to as "Plans". That part of the Contract Documents consisting of the graphical and technical requirements of the Contract as included on the plan sheets. Drawings, or reproductions thereof, show the location, character, dimensions and details of the work to be done. Shop drawings and other Contractor submittals are not Drawings as so defined.

Engineer. The person or firm designated as Engineer in the **Supplementary General Conditions** with authority is defined in the Contract Documents.

Engineer Field Directive. Written documentation of the actions of the Owner or Construction Manager in directing the Contractor. Also referred to as a Directive.

Field Order. A written instruction given to the Contractor authorizing work that is a change to the scope of work carried out on a time and material basis or a lump sum cost agreed to between Owner and Contractor.

Final Completion. The date when the Work is 100% complete, including completion and acceptance of all punch list corrections, as certified by the Owner.

Final Inspection List. List of materials, equipment, workmanship, or administrative requirements which are not in conformance with the Contract. The list shall be prepared by the Construction Manager and submitted to the Contractor following the Contractor's notice of completion of the Work, including all items on the Punch List.

Furnish. 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.

General Conditions. Documents 00700, **GENERAL CONDITIONS**, and 00800, **SUPPLEMENTARY GENERAL CONDITIONS**, which form the part of the Contract Documents representing the general clauses that establish how the Project is to be administered.

General Requirements. Division 1, **GENERAL REQUIREMENTS**, which forms the part of the Contract Documents establishing special conditions or requirements peculiar to the Work and supplementary to the General Conditions.

Hazardous Waste. The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6906) as amended from time to time.

Herein. Refers to information presented in the Contract Documents.

Holidays. Legal holidays shall include the following holidays designated by the Owner: New Year's Day, Martin Luther King Jr. Day, President's Day, Memorial Day, Independence Day, Labor Day, Veteran's Day, Thanksgiving Day, the day after Thanksgiving and Christmas Day.

Install. The work "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.

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.

May. "May," wherever or in whatever manner used, refers to permissive actions.

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

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.

Notice of Completion. A form signed by the Owner's Representative recommending to the Owner that the Work is 100% complete, including completion and acceptance of all punch list corrections and fixing the date of the Final Completion. After acceptance of the Work by the Owner's governing Board, the form is signed by the Owner and filed with the County Recorder.

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.

Owner. The word "Owner" refers to the Placer County Water Agency, the governing body of which is termed the "Board of Directors" or "Board". The word "Agency" shall also mean "Owner".

Owner Representative. The person designated in writing by the Owner to act as its agent on specified matters relating to this Contract. The Owner's Representative is an employee or agent

of the Owner who has been designated to represent the Owner.

Paragraph. For reference or citation purposes, a paragraph shall refer to the paragraph, or paragraphs, called out by paragraph number and alphanumeric designator.

Perform. Refer to “Provide.”

Person. The term, person, includes firms, companies, corporations, partnerships, and joint ventures.

Plans. See “Drawings.”

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.

Project. The total construction of which the Work to be provided under the Contract Documents, may be the whole, or a part thereof as indicated elsewhere in the Contract.

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 of Contents.

Provide. The words “provide” or “perform,” 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. When “furnish,” “install,” “perform,” or “provide” is not used in connection with services, materials, or equipment in context clearly requiring an obligation of Contractor, “provide” is implied.

Punch List. List of incomplete items of Work, incomplete administrative requirements and items of Work which are not in conformance with the Contract, prepared by the Construction Manager and issued to the Contractor as an attachment to the Certificate of Substantial Completion.

Request for Information. Also referred to as “Request for Clarification”. A Request for Information (RFI) is issued by the Contractor to the Construction Manager requesting additional information necessary to clarify or amplify an item in the Contract Documents that the Contractor believes is not clearly shown or called for in the Drawings or Specifications or other portions of the Contract Documents, or to address problems which have arisen under field conditions. A RFI is not to be used for request for materials/equipment substitutions or value engineering/cost reduction incentive proposals.

Request For Proposal. A request for a proposed cost made to the Contractor by the Owner to add, delete or change the Work. RFP’s shall not be deemed to be directions to proceed with any addition, deletion or change to the Work. RFP’s may also be referred to as “Request for Quotation”.

Salvage. All items specified to be salvaged shall be carefully removed so as not to damage the item, and neatly stockpiled at the construction site by the Contractor. The exact location to stockpile items shall be determined by the Construction Manager. The Construction Manager shall then make a determination as to which items are to be retained by the Owner. All other items shall be properly disposed of at no additional cost to the Owner.

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.

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.

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.

Shall. Refers to actions entered into by the Contractor or the Owner as a covenant with the other party to do or to perform the action.

Shop Drawings (Submittals). Shop drawings (submittals) are drawings, diagrams, illustrations, schedules, performance charts, brochures, and other data which are prepared by the Contractor or any subcontractor, manufacturer, supplier, or distributor and which illustrate some portion of the work.

Shown. Refers to information presented on the drawings, with or without reference to the drawings.

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.

Specifications. That part of the Contract Documents consisting of written descriptions of the technical features of materials, equipment, constructions systems, standards, and workmanship.

Specify. Refers to information described, shown, noted or presented in any manner in any part of the contract.

Standard Drawings, Standard Plans, Standard Specifications. The latest edition of the Standard Drawings, Standard Plans or Standard Specifications referenced in the Contract Documents.

State of California Specifications. The State of California Department of Transportation Standard Specifications in effect at the date of Notice Inviting Bids, Document 00010. Also referred to as State Standard Specifications and Caltrans Standard Specifications.

Stop Notice. A legal remedy for subcontractors and suppliers who contribute to public works, but who are not paid for their work which secures payment from construction funds possessed by the Owner.

Subcontractor. A subcontractor is a person or entity who has a direct contract with the Contractor or a sub-tier subcontractor who has a direct contract with a subcontractor to perform any of the Work associated with the Project. The term subcontractor means a subcontractor or subcontractor's authorized representative. The term subcontractor, does not include any separate contractor or any separate contractor's subcontractors.

Submittals. The information which is specified for submission to the Construction Manager in accordance with the Contract Documents.

Substantial Completion. Sufficient completion of the project or the portion thereof to permit a utilization of the project. Determination of substantial completion is solely at the discretion of the Owner. Substantial completion does not mean complete in accordance with the Contract nor shall substantial completion of all or any part of the project entitle the Contractor to acceptance under the Contract.

Substantial Completion Date. Date when the Owner puts into service, the Project or that portion of the Project that has been determined to be substantially complete.

Sub-subcontractor. A sub-subcontractor is a person or entity who has a direct or indirect contract with a subcontractor to perform any of the Work associated with the Project. The term sub-subcontractor means a sub-subcontractor or an authorized representative thereof, also referred to as subtier-subcontractor.

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.

Surety. The person, firm, corporation, or organization that joins with the Contractor in assuming the liability for the faithful performance of the Work and for the payment of all obligations pertaining to the Work in accordance with the Contract Documents by issuing the Bonds required by the Contract Documents or by law.

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.

Unit Price Work. Work to be paid for on the basis of unit prices.

Utility. Public or private fixed works for the transportation of fluids, gasses, power, signals, or communications.

Will. See definition of "Shall".

Work. Any and all obligations, duties, and responsibilities necessary to complete the construction assigned to, or undertaken by, the Contractor pursuant to the Contract Documents including all labor necessary to produce such construction and all materials, equipment, and supplies incorporated or to be incorporated in the construction. Also, the completed construction or parts thereof required to be provided under the Contract Documents.

Work Day. A working day is defined as any day, except Saturdays, Sundays and Agency Legal Holidays, unless approved by the Owner. Any work scheduled by the Contractor on non-working days (Saturdays, Sundays, and Agency Legal Holidays) shall be verified and approved by the Agency at least 72 hours in advance. The Agency shall be compensated for inspection work, at an hourly rate, for any work on non-working days and for overtime.

3.0 **ABBREVIATIONS**

- A. Interpret abbreviations by context in which abbreviations are used. Abbreviations for standards and organizations used in the Contract Documents are defined as follows:

AA	Aluminum Association
AABC	Associated Air Balance Council
AAMA	Architectural Aluminum Manufacturers Association
AAN	American Association of Nurerymen
AASHTO	American Association of State Highway and Transportation Officials
ABC	Associated Air Balance Council
ABPA	Acoustical and Board Products Association
ABMA	American Boiler Manufacturers Association
ACI	American Concrete Institute
ACIL	American Council of Independent Laboratories
ACPA	American Concrete Pipe Association
ADC	Air Diffuser Council
AEIC	Association of Edison Illuminating Companies
AFBMA	Antifriction Bearing Manufacturers Association
AFPA	American Forest & Paper Association
AGA	American Gas Association
AGMA	American Gear Manufacturers Association
AHA	American Hardboard Association
AI	Asphalt Institute
AIA	American Institute of Architects
AIMA	Acoustical and Insulating Materials Association
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
AMCA	Air Moving and Conditioning Association
AMG	American Masonry Guild
ANSI	American National Standards Institute
APA	American Plywood Association
API	American Petroleum Institute
AREMA	American Railway Engineers and Maintenance-of-Way Association
ARI	American Refrigeration Institute
ASAHC	American Society of Architectural Hardware Consultants
ASCE	American Society of Civil Engineers
ASAHC	American Society of Architectural Hardware Consultants
ASHRAE	American Society of Heating, Refrigerating, and Air-Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASSE	American Society of Sanitary Engineers
ASTM	American Society for Testing and Materials
AVATI	See RTI
AWG	American Wire Gage
AWI	Architectural Woodwork Institute
AWPA	American Wood-Preservers' Association
AWPB	American Wood Preservers Bureau
AWS	American Welding Society
AWWA	American Water Works Association

BHMA	Builders Hardware Manufacturers Association
BIA	Brick Institute of America (formerly SCPI)
BSI	Building Stone Institute
CAGI	Compressed Air and Gas Institute
CAL/OSHA	State of California Dept. of Industrial Relations, Division of Industrial Safety
CBM	Certified Ballast Manufacturers
CBR	California Bearing Ratio
CDA	Copper Development Association
CI	Chlorine Institute
CISPI	Cast Iron Soil Pipe Institute
CLFMI	Chain Link Fence Manufacturers Institute
CMAA	Crane Manufacturers Association of America
CPSC	U.S. Consumer Products Safety Commission
CRA	California Redwood Association
CRSI	Concrete Reinforcing Steel Institute
CS	Commercial Standard (U.S. Department of Commerce)
CTI	Cooling Tower Institute
DFPA	Douglas Fir Plywood Association
DHI	Door and Hardware Institute
DIPRA	Ductile Iron Pipe Research Association
EEI	Edison Electric Institute
EIA	Electronic Industries Association
EJCDC	Engineers' Joint Contract Documents Committee
EPA	Environmental Protection Agency
ETL	Electronic Testing Laboratory
Fed Spec	Federal Specification
FCI	Fluid Controls Institute
FGMA	Flat Glass Marketing Association
FHWA	Federal Highway Administration
FIA	Factory Insurance Association
FM	Factory Mutual Insurance Company
FPS	Fluid Power Society
FS	Federal Specifications
FSA	Fluid Sealing Association
FTI	Facing Tile Institute
GO 95	General Order No. 95 CA PUC rules for overhead electric line construction
HEI	Heat Exchange Institute
HI	Hydraulic Institute
HMI	Hoist Manufacturers Institute
HPMA	Hardwood Plywood Manufacturers Association
HTI	Hand Tools Institute

IAPMO	International Association of Plumbing and Mechanical Officials
I-B-R	Institute of Boiler and Radiator Manufacturers
IEEE	Institute of Electrical and Electronics Engineers
IBC	International Building Code
IES	Illuminating Engineering Society
IFI	Industrial Fasteners Institute
IPCEA	Insulated Power Cable Engineers Association
IRI	Industrial Risk Insurers
ISA	Instrumentation, Systems, and Automation Society
MHI	Materials Handling Institute
MIL	Military Specification
MMA	Monorail Manufacturers Association
MSS	Manufacturers Standardization Society of Valve and Fitting Industry
NAAMM	National Association of Architectural Metals Manufacturers
NACE	NACE International
NAPA	National Asphalt Pavement Association
NBHA	National Builders Hardware Association
NBBPVI	National Board of Boiler and Pressure Vessel Inspectors
NBS	See NIST
NCSPA	National Corrugated Steel Pipe Association
NCMA	National Concrete Masonry Association
NEBB	National Environmental Balancing Bureau
NEC	National Electrical Code
NECA	National Electrical Contractors Association
NEMA	National Electrical Manufacturers Association
NEMI	National Elevator Manufacturing Industry
NETA	International Electrical Testing Association
NFPA	National Fire Protection Association
NIST	National Institute of Standards and Technology (formerly NBS)
NLA	National Lime Association
NPC	National Plumbing Code
NPCA	National Paint and Coatings Association
NPT	National Pipe Thread
NRMCA	National Ready Mixed Concrete Association
NSC	National Safety Council
NSF	NSF International (formerly National Sanitation Foundation)
NTMA	National Terrazzo and Mosaic Association
NWMA	National Woodwork Manufacturers Association
OSHA	Occupational Safety and Health Administration
PCA	Portland Cement Association
PCI	Prestressed Concrete Institute
PUC	California Public Utilities Commission
PS	Product Standard

RIS	Redwood Inspection Service
RTI	Resilient Tile Institute (formerly AVATI)
SAE	Society of Automotive Engineers
SCPRF	Structural Clay Products Research Foundation
SDI	Steel Door Institute
SFPA	Southern Forest Products Association
SI	Système International des Unités (International System of Units)
SIGMA	Sealed Insulating Glass Manufacturers Association
SJI	Steel Joist Institute
SMA	Screen Manufacturers Association
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
SPFA	Steel Plate Fabricators Association
SPI	Society of the Plastics Industry
SPTA	Southern Pressure Treaters Association
SSI	Scaffolding and Shoring Institute
SSPC	SSPC: The Society for Protective Coatings
UBC	Uniform Building Code (ICBO)
UL	Underwriters' Laboratories
USBR	U.S. Bureau of Reclamation
VA	Vermiculite Association
WCLA	West Coast Lumberman's Association
WCLIB	West Coast Lumber Inspection Bureau
WEF	Water Environment Federation
WIC	Woodwork Institute of California
WPOA	Western Plumbing Officials Association
WSCPA	Western States Clay Products Association
WWPA	Western Wood Products Association

B. Abbreviations used in Specifications are:

a	year or years (metric unit)
A	ampere or amperes
am	ante meridian (before noon)
ac	alternating current
ac-ft	acre-foot or acre-feet
atm	atmosphere
AWG	American Wire Gauge
bbf	barrel or barrels
bd	board
bhp	brake horsepower
bil gal	billion gallons
BOD	biochemical oxygen demand
Btu	British thermal unit or units
Btuh	British thermal units per hour
bu	bushel or bushels

C	degrees Celsius
cal	calorie or calories
cap	capita
cd	candela or candelas
cfm	cubic feet per minute
Ci	curie or curies
cm	centimeter or centimeters
cmu	concrete masonry unit
CO	carbon monoxide
Co.	Company
CO ₂	carbon dioxide
COD	chemical oxygen demand
Corp.	Corporation
counts/min	counts per minute
cu	cubic
cu cm	cubic centimeter or centimeters
cu ft	cubic foot or feet
cu ft/day	cubic feet per day
cu ft/hr	cubic feet per hour
cu ft/min	cubic feet per minute
cu ft/sec	cubic feet per second
cu in	cubic inch or inches
cu m	cubic meter or meters
cu yd	cubic yard or yards
d	day (metric units)
day	day (English units)
db	decibels
DB	dry bulb (temperature)
dc	direct current
diam	diameter
DO	dissolved oxygen
DS	dissolved solids
emf	electromotive force
fpm	feet per minute
F	degrees Fahrenheit
ft	feet or foot
fc	foot-candle or foot candles
ft/day	feet per day
ft/hr	feet per hour
ft/min	feet per minute
ft/sec	feet per second
g	gram or grams
G	gravitational force
gal	gallon or gallons
gal/day	gallons per day

gal/min	gallons per minutes
gal/sec	gallons per second
g/L	grams per liter
gpd	gallons per day
gpd/ac	gallons per day per acre
gpd/cap	gallons per day per capita
gpd/sq ft	gallons per day per square foot
gph	gallons per hour
gpm	gallons per minute
gps	gallons per second
h	hour or hours (metric units)
ha	hectare or hectares
hp	high point
hp	horsepower
hp-hr	horsepower-hour or horsepower-hours
hr	hour or hours (English units)
Hz	hertz
ID	inside diameter
ihp	indicated horsepower
Inc.	Incorporated
inch	inch
inches	inches
inches/sec	inches per second
J	joule or joules
k	kips
K	kelvin
K	thermal conductivity
kcal	kilocalorie or kilocalories
kcmil	thousand circular mils
kg	kilogram or kilograms
km	kilometer or kilometers
kN	kilonewton or kilonewtons
kPa	kilopascal or kilopascals
ksi	kips per square inch
kV	kilovolt or kilovolts
kVA	kilovolt-ampere or kilovolt-amperes
kW	kilowatt or kilowatts
kWh	kilowatt hour
L	liter or liters
lb/1000 cu ft	pounds per thousand cubic foot
lb/acre-ft	pounds per acre-foot
lb/ac	pounds per acre
lb/cu ft	pounds per cubic foot
lb/day/cu ft	pounds per day per cubic foot
lb/day/acre	pounds per day per acre

lb/sq ft	pounds per square foot
lin	linear, lineal
lin ft	linear foot or feet
lm	lumen or lumens
log	logarithm (common)
ln	logarithm (natural)
lx	lux
m	meter or meters
M	molar (concentration)
mA	milliampere or milliamperes
max	maximum
mCi	millicurie or millicuries
meq	milliequivalent
μ F	microfarad or microfarads
MFBM	thousand feet board measure
mfr	manufacturer
mg	milligram or milligrams
mgd/ac	million gallons per day per acre
mgd	million gallons per day
mg/L	milligrams per liter
μ g/L	micrograms per liter
μ m	micrometer or micrometers
mile	mile
mil. gal	million gallons
miles	miles
min	minimum
min	minute or minutes
MLSS	mixed liquor suspended solids
MLVSS	mixed liquor volatile suspended solids
mm	millimeter or millimeters
mol wt	molecular weight
mol	mole
Mpa	megapascal or megapascals
mph	miles per hour
MPN	most probable number
mR	milliroentgen or milliroentgens
Mrad	megarad or megarads
mV	millivolt or millivolts
MW	megawatt or megawatts
N	newton or newtons
N	normal (concentration)
No.	number
Nos	numbers
NRC	noise reduction coefficient
NTU or ntu	Nephelometric Turbidity Units

oc	on center
OD	outside diameter
ORP	oxidation-reduction potential
OT	ortho-tolidine
OTA	ortha-tolidine-arsenite
oz	ounce or ounces
oz/sq ft	ounces per square foot
Pa	pascal or pascals
PAC	powder activated carbon
pl	plate or property line
pm	post meridiem (afternoon)
ppb	parts per billion
ppm	parts per million
ppt	parts per thousand
pr	pair
psf/hr	pounds per square foot per hour
psf	pounds per square foot
psi	pounds per square inch
psia	pounds per square inch absolute
psig	pounds per square inch gauge
PVC	polyvinyl chloride
qt	quart or quarts
R	radius
R	roentgen or roentgens
rad	radiation absorbed dose
RH	relative humidity
rpm	revolutions per minute
rps	revolutions per second
s	second (metric units)
S	Siemens (mho)
SDI	sludge density index
sec	second (English units)
SI	International System of Units
sp	static pressure
sp gr	specific gravity
sp ht	specific heat
sq	square
cm ² or sq cm	square centimeter or centimeters
sq ft	square feet or foot
sq inch	square inch
sq inches	square inches
km ² or sq km	square kilometer or kilometers
m ² or sq m	square meter or meters
mm ² or sq mm	square millimeter or millimeters
sq yd	square yard or yards
SS	suspended solids
STC	Sound Transmission Class

TDS	total dissolved solids
TKN	total Kjeldahl nitrogen
TLM	median tolerance limit
TOC	total organic carbon
TOD	total oxygen demand
TOW	top of weir
TS	total solids
TSS	total suspended solids
TVS	total volatile solids
U	U Factor/U Value
U	Coefficient of Heat Transfer
U	heat transfer coefficient
UNS	Uniform Numbering System
US	United States
V	volt or volts
VA	volt-ampere or volt-amperes
W	watt or watts
WB	wet bulb
wg	water gauge
wk	week or weeks
wt	weight
yd	yard or yards
yr	year or years (English unit)

C. Abbreviations used on Drawings: As listed on Drawings or in Specifications.

D. Symbols used in Specifications:

:	"shall be" or "shall"-where listed within sentences or paragraphs
#1	Number
1#	Pound
&	And
%	Percent
C	Centigrade
F	Fahrenheit
°	Degree
/	per, except where used to combine words; example: power/fuel, and in that case it means and
"	Inch (inches)
'	foot (feet)
@	At
©	Copyright
®	Registered
™	Trademark
±	Plus and Minus tolerance
≠	not equal to

E. Symbols, used only on Drawings, are indicated thereon.

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

SECTION 01090

PLACER COUNTY WATER AGENCY 144 FERGUSON ROAD AUBURN, CA 95603

REGULATORY REQUIREMENTS AND PERMITS

1.0 APPLICABLE CODES

See Technical Specifications for Applicable Codes.

2.0 FEES AND PERMITS

2.1 Summary

Contractor shall comply with all the terms, conditions and requirements attached to all permits, bonds and licenses required by any local, state, or federal agencies to perform work, construct, erect, test and start up of any equipment or facility for this Contract. The Contractor shall give all notices necessary and incidental to the due and lawful prosecution of the Work.

Any permits, bonds, licenses and fees therefore required for the performance of work under this Contract and not specifically mentioned herein as being obtained and paid for by the Owner shall be included in the Contractor's Bid price. The Contractor shall apply for and obtain all safety permits for excavations, tunneling, trenches, construction (building structure, scaffolding, or falsework) and demolition required by CAL/OSHA.

The Contractor shall post at the site of Work all required permits as stipulated by the respective regulatory agency.

2.2 Local Agency and Building Code Fees and Permits

Construction of the proposed improvements does not require a building permit from the County, as PCWA is the Authority Having Jurisdiction, however the Contractor shall be responsible for satisfying all Building Code, Mechanical Code, Plumbing Code, and Electrical Code requirements. The Contractor shall notify the Construction Manager of the need and the readiness of all required Special Inspections, which will be performed by the Owner as noted on Drawing G-6. All inspections are to be coordinated with the Construction Manager. The Contractor shall be responsible for and the Owner shall not provide reimbursement for any costs required for the reinspection of defective work or additional costs due to the Contractor's failure to properly schedule the inspections.

The Owner is not responsible for any local agency or utility permits required for temporary facilities during construction such as field office trailers and temporary electrical service for construction operations. Obtaining all such permits and the costs associated with such permits are the responsibility of the Contractor and shall be included in the Contractor's Bid Price.

2.3 Environmental Permits

There are no Environmental Permits applicable to this Project.

2.4 Other Permits

There are no other permits applicable to this Project.

3.0 STORM WATER QUALITY CONTROLS

3.1 General

The 1972 amendments to the Federal Water Pollution Control Act established the National Pollutant Discharge Elimination System (NPDES) permit program to control discharges of pollutants from point sources. The 1987 amendments to the Clean Water Act (CWA) created a new section of the CWA devoted to storm water permitting (Section 402(p)). The EPA has delegated permitting authority to the State Water Resources Control Board (SWRCB). The SWRCB issues both general and individual permits. Construction activities are regulated under the NPDES General Permit for Storm Water Discharges Associated with Construction Activity (General Permit) provided the total amount of ground disturbance during construction is greater than or equal to 1 (one) acre. The appropriate Regional Water Quality Control Board (RWQCB) enforces the General Permit. Coverage under a General Permit requires the submission of a Notice of Intent (NOI) with the appropriate fee, annual compliance reports, a Notice of Termination (NOT) and preparation of a storm water pollution prevention plan (SWPPP).

Construction activity includes, but is not limited to: clearing, grading, demolition, excavation, construction of new structures, pipelines and reconstruction of existing facilities involving removal and replacement that results in soil disturbance. This includes construction access roads, staging areas, storage areas, stockpiles, and any off-site areas which receive run-off from the construction project such as discharge points into a receiving water.

If a violation of the permit is due to the Contractor's actions or inactions and a fine is assessed, the Contractor shall be responsible for the fine.

3.2 Projects Disturbing Less Than 1-Acre

This project has been determined by the Owner to disturb less than 1-acre; therefore, a NOI, SWPPP, and NOT are not required. The Contractor shall comply with the following requirements for projects disturbing less than 1-acre.

3.2.1 General – the Contractor shall perform water pollution control work in conformance with the requirements in the Section 303 of the Clean Water Act, the Water Quality Control Plan for the Sacramento River Basin (Central Valley Regional Water Control Board 1998) and in the Placer County Stormwater Quality Ordinance.

Before the start of job site activities, the Contractor shall provide training for project managers, supervisory personnel, and employees involved with water pollution control work.

The training shall include:

- A. Rules and regulation
- B. Implementation and maintenance for:
 - 1. Temporary Soil Stabilization
 - 2. Temporary Sediment Control
 - 3. Tracking Control
 - 4. Wind Erosion Control

The Contractor shall designate in writing a Water Pollution Control Manager (WPCM). The Contractor shall submit a statement of qualifications describing the training, work history, and expertise of the proposed WPCM. The qualifications shall include either:

- A. Must have attended State Water Resources Control Board sponsored or approved Qualified SWPPP Practitioner training as described at State Water Resources Control Board web site.
- B. Certification as a Certified Professional in Erosion and Sediment Control (CPESC).

The WPCM shall be:

- A. Responsible for water pollution control work.
- B. The primary contact for water pollution control work.
- C. Have authority to mobilize crews to make immediate repairs to water pollution control practices.

The Contractor may designate one manager to prepare the Water Pollution Control Program (WPCP) and a different manager to implement the plan. The WPCP preparer shall meet the training requirements for the WPCM.

3.2.2 Water Pollution Control Program – The Contractor shall submit a Water Pollution Control Program (WPCP) to the Owner for approval. The WPCP shall conform to the requirements in the Clean Water Act and these special provisions. The WPCP shall include water pollution control practices:

- A. For storm water and non-storm water from areas outside of the job site related to construction activities for the contract such as:
 - 1. Staging areas
 - 2. Storage yards
 - 3. Access roads
- B. Appropriate for each season as described in “Implementation Requirements” of these special provisions.

The WPCP shall include a schedule that:

- A. Describes when work activities that could cause water pollution will be performed.
- B. Identifies soil stabilization and sediment control practices for disturbed soil area.
- C. Includes dates when these practices will be 25, 50, and 100 percent complete.
- D. Shows 100 percent completion of these practices before the rainy season.

The WPCP shall include the following water pollution control practices and their

associated contract items of work as shown on the plans or specified in these special provisions:

- A. Temporary Soil Stabilization
- B. Temporary Sediment Control
- C. Tracking Control
 - 1. Stabilized Construction Entrance/Exit
- D. Wind Erosion Control
- E. Non-Storm Water Management
- F. Waste Management and Materials Pollution Control
 - 1. Concrete Waste Management
- G. Final Stabilization Measures

Within 5 days after contract approval, the Contractor shall submit 2 copies of the WPCP to the Owner. The Contractor shall allow 5 days for the Owner's review. If revisions are required, the Owner will provide comments and specify the date that the review stopped. The Contractor shall revise and resubmit the WPCP within 5 days of receipt of the Owner's comments. The Owner's review will resume when the complete WPCP is resubmitted. When the Owner approves the WPCP, the Contractor shall submit 3 copies of the approved WPCP to the Owner. The Contractor may proceed with construction activities if the Owner conditionally approves the WPCP while minor revisions are being completed. If the Owner fails to complete the review within the time allowed and if, in the opinion of the Owner, completion of the work is delayed or interfered with by reason of the Owner's delay, the Contractor will be compensated for resulting losses, and an extension of time will be granted, as provided for in Section 01350, **CONTRACT MODIFICATION PROCEDURES**.

The Contractor shall not perform work that may cause water pollution until the WPCP has been approved by the Owner. The Owner's review and approval shall not waive any contract requirements and shall not relieve the Contractor from complying with Federal, State and local laws, regulations, and requirements.

If there is a change in construction schedule or activities, the Contractor shall prepare and amendment to the WPCP to identify additional or revised water pollution control practices. The Contractor shall submit the amendment to the Owner for review within a time agreed to by the Owner not to exceed the number of days specified for the initial submittal of the WPCP. The Owner will review the amendment within the same time allotted for the review of the initial submittal of the WPCP.

If directed by the Owner or requested in writing by the Contractor and approved by the Owner, changes to the water pollution control work specified in these special provisions will be allowed. Changes may include addition of new water pollution control practices. The Contractor shall incorporate these changes in the WPCP. Additional water pollution control work will be paid for as extra work in accordance with Section 01350, **CONTRACT MODIFICATION PROCEDURES**.

The Contractor shall keep a copy of the approved WPCP at the job site. The WPCP shall be made available when requested by a representative of the Regional Water Quality Control Board, State Water Resources Control Board, United States Environmental Protection Agency, or the local storm water management agency. Requests from the public shall be directed to the Owner.

3.2.3 Implementation Requirements – The Contractor’s responsibility for WPCP implementation shall continue throughout any temporary suspension of work ordered in conformance with the provisions in Section 01350, **CONTRACT MODIFICATION PROCEDURES**.

If the Contractor or the Owner identifies a deficiency in the implementation of the approved WPCP, the deficiency shall be corrected immediately, unless an agreed date for correction is approved in writing by the Owner. The deficiency shall be corrected before the onset of precipitation. If the Contractor fails to correct the deficiency by the agreed date or before the onset of precipitation, the Department may correct the deficiency and deduct the cost of correcting deficiencies from payments.

3.2.3.1 Year Round – The Contractor shall monitor the National Weather Service weather forecast on a daily basis during the contract. The Contractor may use an alternative weather forecasting service if approved by the Owner. Appropriate water pollution control practices shall be in place before precipitation.

The Contractor may discontinue earthwork operations for a disturbed area for up to 21 days and the disturbed soil area will still be considered active. When earthwork operations in the disturbed area have been completed, the Contractor shall implement appropriate water pollution control practices within 15 days or before predicted precipitation, whichever occurs first.

3.2.3.2 Rainy Season – Soil stabilization and sediment control practices conforming to these special provisions shall be in place during the rainy season between April 15 and October 15.

The Contractor shall implement soil stabilization and sediment control practices a minimum of 10 days before the start of the rainy season.

3.2.4 Inspection and Maintenance – The WPCM shall inspect the water pollution control practices identified in the WPCP as follows:

- A. Before a forecasted storm,
- B. After precipitation that causes site runoff,
- C. At 24-hour intervals during extended precipitation,
- D. On a predetermined schedule, a minimum of once every 2 weeks outside of the defined rainy season, and
- E. On a predetermined schedule, a minimum of once a week during the defined rainy season.

The WPCM shall oversee the maintenance of the water pollution control practices. The WPCM shall use an inspection checklist that is approved by the Owner. A copy of the completed site inspection checklist shall be submitted to the Owner within 24 hours of finishing the inspection.

3.2.5 Reporting Requirements – If the Contractor identified discharges into surface waters or drainage systems causing or potentially causing pollution or if the project receives a written notice or order from a regulatory agency, the Contractor shall immediately inform the Owner. The Contractor shall submit a written report to the Owner within 7 days of the discharge, notice, or order. The report shall include the following information:

- A. The date, time, location, and nature of the operation, type of discharge and quantity, and the cause of the notice or order.
- B. The water pollution control practices used before the discharge, or before receiving the notice or order.
- C. The date of placement and type of additional or altered water pollution control practices placed after the discharge or after receiving the notice or order.
- D. A maintenance schedule for affected water pollution control practices.

4.0 DEWATERING

4.1 Discharges Associated with Construction Dewatering, Pipeline Pressure Testing, Flushing, or Dewatering and Other Wastewater Discharges

Construction dewatering in Placer County is regulated by the California Regional Water Quality Control Board - Central Valley Region. However, the applicable regulations govern discharges to “Waters of the United States”. The discharge of construction dewatering, pipeline pressure testing or flushing water to natural drainage courses or a “Water of the United States” is generally prohibited for this project.

Construction dewatering and pipeline pressure testing and flushing water shall be discharged into the sludge basin or dechlorinated and land applied.

Before construction dewatering is commenced, the Contractor shall obtain acceptance of the Construction Manager for the method, installation, monitoring, removal, discharge point(s) and other system details of the Contractor’s proposed dewatering system and/or discharge of water plan. To that end, the Contractor is to submit to the Construction Manager a complete dewatering plan.

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

SECTION 01110

**PLACER COUNTY WATER AGENCY
144 FERGUSON ROAD
AUBURN, CA 95603**

SUMMARY OF WORK

1.0 THE WORK COVERED BY THE CONTRACT DOCUMENTS

A. The Work consists of, but is not limited to the general items listed below:

- Remove and dispose of existing 27" raw water piping and existing 30" slide gate.
- Demolition and disposal of existing flocculation basin infrastructure including existing paddle flocculators, rapid mixer, concrete supports, handrail and grating.
- Demolition and disposal of existing influent 18" piping, butterfly valve, and flowmeter
- Supply and install new influent 18" piping, flowmeter, butterfly valve, and chemical injection piping.
- Supply and install new 30" raw water piping and associated chemical injection piping and vault.
- Supply and install of new 30" slide gate
- Supply and install (6) vertical turbine flocculators with motor center addition and (1) rapid mixer.
- Supply and install miscellaneous metals including beams, grating, handrail, and davit bases.
- Construction of intake screen channel, supply and installation of automatic fine screen with controls.
- Appurtenant paving, bollards, grading, yard piping, valving, instrumentation, controls, and electrical work to the improvements described above.

B. The Contractor shall provide all labor, superintendence, materials, plant, power, light, heat, fuel, water, tools, appliances, equipment, supplies, services, and other means of construction necessary or proper for performing and completing the Work specified in the Contract Documents. The Contractor shall perform and complete the work in the best manners that promote rapid and efficient construction activities consistent with safety of life and property, to the satisfaction of the Construction Manager, and in strict accordance with the Contract Documents.

C. The Contractor shall comply with all codes, ordinances, regulations, orders, and other legal requirements of public authorities having bearing on the performance of the Work.

2.0 LOCATION OF PROJECT

A. The Work is located at PCWA's Bowman WTP, 595 Christian Valley Rd, Bowman, CA, 95602.

3.0 OWNER ASSIGNED SUBCONTRACTORS AND EQUIPMENT SUPPLIERS

A. Assignment of Subcontractors and Equipment Suppliers by Owner is not anticipated.

4.0 OWNER FURNISHED EQUIPMENT

A. No Owner-furnished equipment will be provided for this Project.

5.0 ACTIVITIES BY OTHERS

A. Owner, utilities, and others may perform activities within Project area while the Work is in progress.

1. Schedule the Work with Owner, utilities, and others to minimize mutual interference.

B. Activities by others which may affect performance of work include:

1. Normal daily operation of the existing facilities by Owner's personnel, see Section 01140, **WORK RESTRICTIONS**.

2. Site security requirements, see Section 01150, **SITE SECURITY**.

C. Cooperate with others to minimize interference and delays.

1. When cooperation fails, submit recommendations and perform Work in coordination with work of others as directed.

6.0 COORDINATION OF WORK

A. Maintain overall coordination of the Work.

B. Obtain construction schedules from each subcontractor, and require each subcontractor to maintain schedules and coordinate modifications.

7.0 EARLY OCCUPANCY OF PORTIONS OF WORK

A. Certificates of Substantial Completion will be executed for each designated portion of Work prior to Owner occupancy. See **SUPPLEMENTARY GENERAL CONDITIONS**, Section 00800 for further detail.

1. Such certificate of Substantial Completion will describe the portion of the Work to be occupied by Owner, items that may be incomplete or defective, date of occupancy by Owner, and other information required by Owner and Contractor.

B. After Owner occupancy, allow access for Owner's personnel, access for others authorized by Owner, and Owner operation of equipment and systems.

- C. Following Occupancy, Owner will:
 - 1. Provide power to operate equipment and systems.
 - 2. Repair damage caused by Owner's occupancy.
- D. Guarantee Correction period for portions of the Work occupied or partially utilized by Owner shall commence with date of Substantial Completion for that portion of the Work and acceptance for use by Owner.
 - 1. However, progress payment withholdings for portions of the Work occupied by Owner will not be released until final acceptance of the total Work.
- E. Prior to such occupancy or use, enter into agreement with Owner indicating work that remains to be performed in occupied areas.
- F. When Owner's use of occupied facilities reveal defective work, correct defects.
- G. No partial acceptance of the Work will be made and no acceptance other than the final acceptance of the completed Work will be made except for those portions of Work designated for early occupancy by Owner.

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

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SECTION 01140

**PLACER COUNTY WATER AGENCY
144 FERGUSON ROAD
AUBURN, CA 95603**

WORK RESTRICTIONS

1.0 GENERAL SEQUENCING AND CONSTRAINTS

The Bowman Water Treatment Plant is a critical source of drinking water for Placer County Water Agency. The existing facility is operating under the terms of a Drinking Water Permit issued by the State of California Department of Drinking Water. This permit specifies the water quality limits that the plant must meet prior to delivering treated water to consumers. A copy of the permit is on file for review at the Owner's Engineering Department. The Contractor is to conduct work such that the Owner's ability to meet its customer demands for treated drinking water shall not be impaired or reduced in terms of the required quantity and quality of treated water. The Contractor's work must never prevent the plant from complying with the drinking water requirements established by State and Federal regulations.

The Contractor is to employ personnel knowledgeable and experienced in water treatment plant construction including knowledge of treatment processes, facility operations and chemical systems. Examples of required knowledge includes, but are not limited to, water treatment terminology, treatment plant functions, and actions that would adversely impact water treatment and water quality.

The Work Sequence and Constraints described hereinafter are critical events which are presented to underscore the importance of proper sequencing, scheduling and coordination so that construction is integrated with the required water treatment plant production and operation. The work sequence and constraints presented do not describe all items affecting the completion of the Work, but are intended to describe important events necessary to minimize disruption of the existing facilities and to ensure compliance with water quality permit requirements.

The existing facility where Contractor's work is to be done will be occupied by the Owner throughout the construction period. The Contractor shall provide all necessary access to the Owner's personnel as required to safely and efficiently operate/maintain the facilities. At all times during the Contract duration, the Contractor is to provide the Owner's personnel and representatives safe and immediate access to all process control equipment. Additionally, the Contractor is to provide for unimpeded access for all delivery vehicles transporting materials, chemicals and equipment to the facility for the Owner's operations.

2.0 INTERRUPTION OF FACILITY OPERATIONS

2.1 General Requirements

The Work shall be bid, scheduled and constructed in such a manner as to result in the least possible disruption to the operations and staff of the existing facility. Modifications

that affect or may affect the operation of the facility shall not be made without first obtaining written or explicit verbal permission from the Construction Manager. Disruptions or interference to one portion of the facility will likely affect other facility processes since they are interrelated and dependent on one another. The Contractor must fully understand the consequences of any and all possible reductions on facility production and/or water quality as they plan the Work.

The Contractor shall note that not all valves and gates that may be used to isolate lines and facilities will completely seal. The Contractor shall allow for leakage in planning its work and may, with the Owner's concurrence, test certain valves and gates before work involving isolation is begun. The Contractor shall provide adequate temporary pumping and piping facilities to properly clear the work areas as necessary of water, chemicals, sludge and/or waste materials. The Contractor shall clean the work areas as required to perform the work. Shutdown and isolation of existing facilities by closing existing valves/gates and operating electrical control panels, or as specifically provided for in the Contract Documents, will be performed by Owner personnel.

Prior to any shutdown or flow diversion, all materials, fittings, supports, equipment and tools shall be on the site and all necessary skilled labor scheduled prior to starting any connection work. The Contractor shall provide staff following shutdowns to monitor and ensure the proper operation of systems.

The Contractor is advised that any shutdown of facilities will place a considerable burden on the Owner's staff before, during and after the shutdown. If through inadequate planning, lack of preparedness, faulty or inefficient workmanship or other causes controllable by the Contractor, delays, excessive time, or additional shutdowns are required that cause the Owner to incur extra cost, said extra cost will be assessed against the Contractor. To minimize impact on plant staff, all outages shall be limited to 8-hour periods, whenever possible unless otherwise specifically stated on the Drawings or in the Specifications.

Planned utility service shutdowns to any service area or process unit of the project shall be accomplished during periods of minimum use. In some cases this will require night or weekend work, which shall be at no additional cost to the Owner. The Contractor shall program work so that service will be restored in the minimum possible time and shall cooperate with the Owner in reducing shutdowns of the utility to a minimum. No utility shall be disconnected without prior written approval from the utility owner and Construction Manager. When it is necessary to disconnect a utility, the Contractor shall give at least two (2) weeks' notice to the utility owner and to the Construction Manager for approval of the proposed schedule.

The Contractor shall note that only certain structures, tie-ins and constraints are addressed in this section. All work, whether or not addressed here, shall be governed by applicable parts of this section, and schedules and procedures further submitted for approval.

2.2 Outage or Bypass Submittal Requirements

The Contractor shall submit to the Construction Manager a detailed outage or bypass plan and time schedule for operations at least two (2) weeks prior to the need for outage or bypass. The detailed plan shall meet the restrictions and conditions found in the

Contract Documents. A System Outage Request (SOR) form shall accompany each outage or bypass plan. See **Section 01999-04 - REFERENCE FORMS** for the SOR form to be used by Contractor. The outage plans shall be coordinated with the construction schedule and shall meet the Contractor's planned method; the length of time required to complete said operation; any necessary temporary power, controls, instrumentation or alarms required to maintain control, monitoring and alarms; and the manpower, plant and equipment which the Contractor shall provide in order to ensure proper operation of affected facilities. In addition, the outage plan shall describe the Contractor's contingency plan that shall be initiated in the event that its temporary facilities fail or it becomes apparent that the time constraints described in the approved SOR cannot be met. The contingency plan shall conform to all specified outage requirements. All costs for preparing and implementing both the outage and contingency plans shall be borne by the Contractor.

The Contractor shall attend a meeting with the Construction Manager and Owner one (1) week before the scheduled outage to review the SOR. Any changes to the SOR must be approved by the Construction Manager and the Owner prior to the outage.

2.3 Work Constraints, Sequencing and Planned System Outages

1. Only one flocculation basin may be taken out of service to complete the retrofit work at a time. The new flocculators, grating, and handrail improvements associated with the first basin to be retrofitted shall be installed, started up, and accepted by the Owner prior to proceeding with the second basin.
2. To isolate a single flocculation basin, stop logs or plates must be manually installed by the contractor as shown on **Attachment A** to this specification section. There are no slide gates or valves in place to allow for isolation of a single flocculation basin.
3. Flocculation basins may only be taken out of service between November 1st and April 30th.
4. The demolition and replacement of the existing 18" raw water piping, butterfly valve, flow meter, and chemical feed piping in the influent raw water vault (see Drawing SM-5) shall be completed between January 1st and March 1st. This work shall be completed within a 3-day window during which the entire Bowman WTP will need to be shut down. Contractor shall work multiple daily shifts if necessary to complete this work within the allowable shutdown window. The replacement of the rapid mixer shall also be completed within this same window. The new rapid mixer and flow meter shall be started up and tested within this window. Contractor shall coordinate to have manufacturer's representative on site to certify installation prior to startup and assist with startup of mixer.
5. The 30" raw piping as shown on Drawing C-1, from the canal intake structure through the 27" FCA including the isolation valves for the new fine screen, shall be completed between December 1st and March 1st. The demolition of existing piping and completion of new piping will affect raw water delivery to the treatment plant. This work shall be completed within a 3-day window during which the entire Bowman WTP will need to be shut down. Contractor shall work multiple daily shifts if necessary to complete this work within the allowable shutdown window. After

completion of the new 30" piping up to the fine screen isolation valves, those valves can be closed and the 30" piping placed into service bypassing the new fine screen.

6. Construction of the new fine screen channel and screen does not have any date restrictions as this facility can be constructed independent of the new 30" raw water piping and tied in when ready for startup.
7. The raw water influent vault (see Drawing SM-5) and the existing rapid mix and flocculation basins are confined spaces. All work in these existing structures shall conform to applicable OSHA requirements for confined spaces and shall be completed under a confined space permit.

2.4 Work By Others

1. The OWNER will operate all existing valves and will affect shut down of existing basins and equipment, as outlined in Contractor's approved System Outage Request Form.
2. The OWNER will perform bacteriological sampling and testing to verify disinfection of pipelines during startup.
3. The OWNER will be performing Systems Integration, including programming updates to the WTP's Master PLC and SCADA system. The Contractor will coordinate will coordinate testing and startup of the new fine screen and flocculators, with support from the manufacturer's representative and system integrator.
4. The OWNER will make terminations of PLC connections and ethernet cables into existing plant networking equipment.

3.0 OTHER WORK RESTRICTIONS AND COORDINATION REQUIREMENTS

3.1 Work Hours

Work hours shall conform to all applicable Federal, State, County, and local laws, ordinances, and codes applicable to the work. Where any of these laws are in conflict, the more stringent requirements shall be followed.

All work shall be performed during the hours of 7:00 a.m. and 4:00 p.m., Monday through Friday except holiday, unless approved by the Owner. This restriction includes deliveries of materials and equipment and servicing of construction equipment on the project site. Any work outside this time frame shall be allowed only with prior written permission from the Owner's Representative. The actual time the Owner's personnel, Construction Manager or Engineer spend working outside this time frame shall be billed to the Contractor at the personnel's standard charge out rate. Any work designated to have a special time frame shall be so noted on the Plans and/or elsewhere in these Specifications and shall be excluded from this reimbursement.

Should the Contractor perform work outside of the standard hours of 7:00 a.m. and 4:00 p.m., Monday through Friday without the Owner's written permission, the Owner will charge the Contractor, as a penalty, five hundred dollars (\$500.00) for each infraction. This charge will be deducted from the next progress payment due Contractor.

Each and every day the Contractor is not going to perform any work, the Contractor shall by 9:00 a.m. review the entire site, considering all situations, and leave a message at the Inspection Section (530) 823-4885 that the site has been reviewed and the site is secure. Should any mitigation be necessary, the Contractor should also advise the Inspection Section.

3.2 Rights-of-Way

The Project area within the WTP security fence is owned by PCWA and therefore no additional easements or Right-of-Way procurement is required to construct the project as shown on the Drawings.

3.3 Existing Utilities

A minimum of 48 hours in advance of excavation activities, the Contractor shall contact the following parties to ascertain and verify the existence and location of utility lines and facilities and shall coordinate all work in accordance with the information obtained from such inquiries in order to prevent damage to such lines and facilities:

Underground Service Alert (USA) (1-800-642-2444)

Prior to conducting any excavation, the Contractor shall contact the appropriate regional notification center as required by Government Code Section 4216. In accordance with Government Code Section 4215, the Contractor shall be compensated for the costs of repairing damage not due to the failure of the Contractor to exercise reasonable care, and removing or relocating existing main or trunkline utility facilities not indicated in the Contract Plans and Specifications with reasonable accuracy, and for the equipment on the project necessarily idled during such work; provided that the Contractor shall first notify the Agency before commencing work on locating, repairing damage to, removing or relocating such utilities.

The Engineer or his representative has endeavored to determine the existence of utilities at the work site from the records of the owners of known utilities in the vicinity of the work. The positions of these utilities, as derived from such records, are shown on the Plans. The service connections to these utilities may not be shown on the Plans.

The Contractor shall make his own investigations, including exploratory excavations, to determine the locations and type of existing service laterals or appurtenances when their presence can be inferred from the presence of other visible facilities, such as buildings, meters and junction boxes, on or adjacent to the work site.

3.4 Trench Excavation

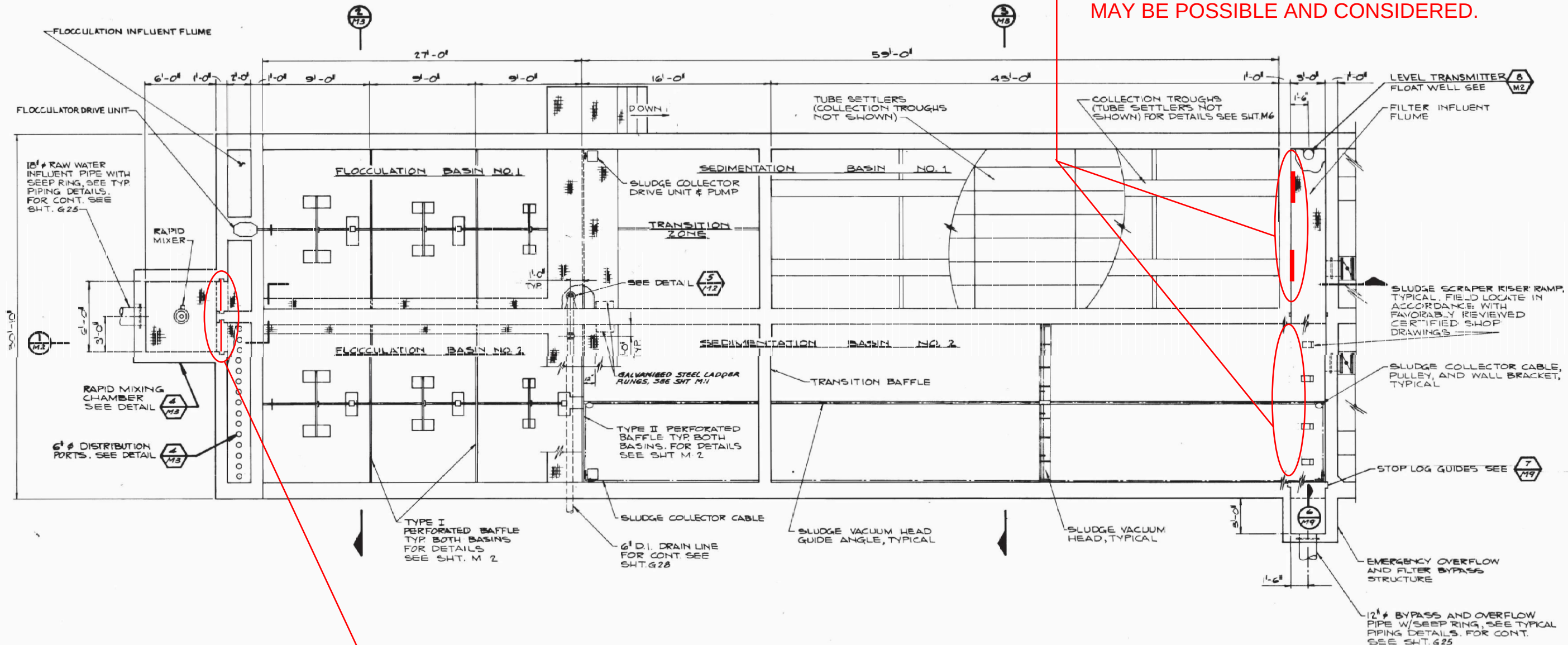
Trench excavation and backfill across the WTP driveway for new water piping and electrical conduit shall be completed as quickly and efficiently as possible so as to minimize the length of disruption to plant traffic. Trench plates shall be used to maintain access if excavation is not backfilled in the same working day.

ATTACHMENT A : FLOCCULATION BASIN ISOLATION REQUIREMENTS

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

ATTACHMENT A: FLOCCULATION BASIN ISOLATION REQUIREMENTS

CONTRACTOR SHALL PROVIDE AND INSTALL PLATES (APPROXIMATELY 24"x24") OVER (2) EXISTING OPENINGS IN EACH BASIN FOR SEDIMENTATION BASIN EFFLUENT TROUGHS, INCLUDING ANCHORING PLATES TO EXISTING WALL. PROVIDE PROVISIONS TO MINIMIZE LEAKAGE AS REQUIRED. ALTERNATIVE METHODS SUCH AS AN INFLATABLE PLUG MAY BE POSSIBLE AND CONSIDERED.



CONTRACTOR SHALL PROVIDE AND INSTALL STOP LOGS IN EXISTING 36" WIDE X 30" TALL SLOTS TO ISOLATE FLOCCULATION BASIN DURING CONSTRUCTION IN EACH BASIN. CONTRACTOR SHALL PROVIDE PROVISIONS TO MINIMIZE LEAKAGE AS REQUIRED

NOTE:
FLOCCULATORS, SLUDGE COLLECTORS, COLLECTION TROUGHS, AND TUBE SETTLERS ARE TYPICAL BOTH BASINS.

					CLENDENEN & ASSOCIATES CONSULTANTS, INC. CONSULTING ENGINEERS 13 AUBURN, CALIFORNIA		PLACER COUNTY WATER AGENCY WATER TREATMENT PLANT FACILITIES AND TRANSMISSION-DISTRIBUTION PIPELINES PLANS & SPECIFICATIONS NO. 7701		BOWMAN WATER TREATMENT PLANT FLOCCULATION & SEDIMENTATION BASIN MECHANICAL PLAN		APPROVED HCE 18888 J. A. Brady DESIGNED MARTIN SCALE 1/4" = 1'-0"		APPROVED GEN. MGR. PCWA B. J. Kelly DRAWN KELLEY JOB NO. 20-476		CHECKED S. C. M. SHT. MI 0224	

SECTION 01150

PLACER COUNTY WATER AGENCY 144 FERGUSON ROAD AUBURN, CA 95603

SITE SECURITY

1.0 GENERAL

The Owner takes site security very seriously and is extremely disciplined in following the established security program set by the Owner's governing Board.

The Contractor shall maintain a secure project site 24 hours per day, every day beginning on the first day of construction and ending at Final Completion. The Contractor shall make adequate provisions for protection of the Work against fire, theft, vandalism and for the protection of Owner's Operators against exposure to injury. If in the opinion of the Owner, the Contractor is not taking adequate steps to maintain site security, the Owner will require that additional protective measures are immediately taken. The Owner shall not have any liability for loss of, and damage to, materials, tools, and equipment of the Contractor or of those employed by him, by contract or otherwise.

2.0 EMPLOYEE IDENTIFICATION AND CONTROL

The Contractor shall provide in advance of starting construction, a list of all employees and vehicles that need access to the site. This list would include employees of subcontractors at all tier levels. The Contractor shall provide periodic updates to this list as needed or required by the Construction Manager.

The Contractor shall be responsible for furnishing to each employee, and for requiring each employee engaged on the work site to display such identification as may be approved and directed by the Construction Manager. All prescribed identification shall immediately be delivered to the Construction Manager for cancellation upon the release of any employee.

The Contractor shall ensure that no alcohol, firearm, weapon or controlled substance enters or is used on the Project site. The Contractor shall immediately remove from the site and terminate the employment at this site of any employee found in violation of this provision.

The Contractor's employees, agents and subcontractors shall be restricted from entry to existing buildings and structures except as may be required by the work.

3.0 VISITORS

The Contractor is to maintain a sign in/out log for all visitors to the site. The Contractor is to provide a full time employee escort if a visitor tours any part of the project site. There are no exceptions to this important requirement. Food vendors are not allowed on the Project site.

4.0 DELIVERIES

The Contractor shall provide a list of all scheduled deliveries to the project site at regular intervals. This list shall include the items to be delivered, the name of the delivery company and the time the delivery is to be made. Deliveries must all be scheduled during allowed work hours.

5.0 FENCING

The Bowman Water Treatment Plant is fenced. Automated security gates are in place at two locations on the access driveway, at the main entrance from Christian Valley Road and also at the plant near the canal intake. However, fencing around other borders of the property is older barbed-wire. Contractor shall not modify site fencing as part of this Project. However, Contractor may provide temporary fencing around Contractor's Work or equipment if desired to provide additional security of the Work during Construction.

6.0 ENTRY AND EXIT

The Contractor's point of entry and exit will be through the plant's automated security gates described above.

7.0 LIABILITY FOR PROJECT SECURITY

The Owner shall not be liable for the damage or loss due to trespass or theft.

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

SECTION 01160

PLACER COUNTY WATER AGENCY 144 FERGUSON ROAD AUBURN, CA 95603

FIELD ENGINEERING

1.0 DATUM

Vertical and horizontal datum are based on the coordinates and benchmarks shown on the Drawings or as provided by Owner prior to the start of construction. The Contractor is to locate and protect Owner furnished control points prior to starting the Work and preserve control points during construction. The Contractor shall re-establish all control points disturbed by its operations at no cost to Owner.

The Contractor shall establish other vertical and horizontal control from these Owner furnished reference points as required to properly layout and construct the Work. All connections shall be installed based on actual elevations of existing structures to which connections are made.

The Contractor's layout shall be based upon existing structures and the vertical and horizontal datum established by the Owner.

The Contractor shall be responsible for the preservation of all existing survey monuments or permanent bench marks. Any monuments or bench marks disturbed or destroyed by Contractor shall be referenced and replaced by a licensed land surveyor. A corner record or record of survey, as appropriate, shall be filed by the licensed land surveyor as required by the Land Surveyor's Act with the appropriate local government agencies.

2.0 QUALITY ASSURANCE

The Contractor's Surveyor shall be a land surveyor registered in California or civil engineer qualified and licensed in California with at least five (5) years surveying experience of similar projects.

Dimensions for all existing structures, piping, paving, and other nonstructural items are taken from the available information during the Owner's planning and design. The Contractor shall field verify all dimensions and conditions in advance of any construction in the area. Any discrepancy between the field survey by the Contractor and the information indicated in the Contract Documents shall be immediately brought to Construction Manager's attention by written notification. In all questions arising as to proper location of lines and grades, the Construction Manager's decision will be final.

Accuracy of the Contractor's stakes, alignments and grades may be periodically and randomly checked by the Construction Manager. If requested by Construction Manager, the Contractor shall supply field labor as required, at no extra charge to Owner, to aid and assist the Construction Manager in checking location and grades of the work as set by the Contractor. This shall include postponing parts of the Work affected by survey check, moving materials and equipment that interfere with a clear line of sight between horizontal control points and the construction work.

The Contractor is not to assume that Construction Manager's check substitutes or complements the Contractor's required field quality control procedures.

The Contractor's registered land surveyor shall check the line and grade of the slab or footing concrete forms prior to the first slab or footing pour at each structure and building.

3.0 PROJECT SURVEY REQUIREMENTS

As part of the bid price for the construction of the improvements the Contractor shall provide and be responsible for the layout of all work specified in the contract. The Contractor shall provide all necessary surveys, field staking, and positioning for the construction of all components at the proper alignment, elevations, grades, and positions, as indicated on the Drawings and as required for the proper operation and function.

The Contractor shall lay out all work, including structures and pipelines, and shall be solely responsible for executing the Work in accordance with the lines and grades indicated.

3.1 SUBMITTALS

Contractor to furnish Construction Manager one copy of all land surveyor notes, calculations, sketches and drawings within 48 hours after completion of each survey task.

4.0 RECORD DOCUMENTS

The Contractor is to prepare, maintain and submit Record Documents as specified in Section 01770, **CLOSEOUT PROCEDURES**. The Contractor's land surveyor is to affix his signature and registration number to applicable record drawings certifying the accuracy of lines and grades shown.

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

SECTION 01200

PLACER COUNTY WATER AGENCY 144 FERGUSON ROAD AUBURN, CA 95603

MEASUREMENT AND PAYMENT

1.0 MEASUREMENT AND PAYMENT

1.1 General

Measurements of the completed work shall be in accordance with, and by instruments and devices calibrated to United States Standard Measures and the units of measurement for payment, and the limits thereof, shall be made as shown on the Plans, Specifications, General Requirements, and Supplementary Conditions.

1.2 Units of Measurement

Measurements shall be in accordance with U.S. Standard Measures. A pound is an avoirdupois pound. A ton is 2,000 pounds avoirdupois. The unit of liquid measure is the U.S. gallon.

1.3 Certified Weights

When payment is to be made on the basis of weight, the weighing shall be done on certified platform scales, or when approved by the Construction Manager, on a completely automated weighing and recording system. The Contractor shall furnish the Construction Manager with duplicate licensed weighmaster's certificates showing the actual net weights. The Owner will accept the certificates as evidence of the weights delivered.

1.4 Methods of Measurement

Materials and items of work which are to be paid for on the basis of measurement shall be measured in accordance with the method stipulated in the particular sections involved or the description of Bid Items found in 2.2 of this Section. In determining quantities, all measurements shall be made in a horizontal plane unless otherwise specified.

Material not used from a transporting vehicle shall be determined by the Construction Manager and deducted from the certified tag.

When material is to be measured and paid for on a volume basis and it would be impractical to determine the volume, or when requested by the Contractor in writing and approved by the Construction Manager in writing, the material will be weighed and converted to volume measurement for payment purposes. Factors for conversion from weight measurement to volume measurement will be determined by the Construction Manager and shall be agreed to by the Contractor before such method of measurement of pay quantities will be adopted.

Full compensation for all expense involved in conforming to the above requirements for measuring and weighing materials shall be considered as included in the unit prices paid

for the materials being measured or weighed and no additional allowances will be made therefore.

Quantities of material wasted or disposed of in a manner not called for under the Contract; or rejected loads of material, including material rejected after it has been placed by reason of failure of the Contractor to conform to the provisions of the Contract; or material not unloaded from the transporting vehicle; or material placed outside the lines indicated on the plans or given by the Construction Manager; or material remaining on hand after completion of the Contract, will not be paid for and such quantities will be deducted from the final total quantities. No compensation will be allowed for hauling rejected material.

2.0 DESCRIPTION OF BID ITEMS

2.1 Summary

The Bid Amounts for each Bid Item will be used for comparative bid analysis. The Bid amounts will also form the basis of monthly progress payments. Each Lump Sum bid amount will undergo further breakdown as described later in this section. Unit prices for any unit price bid items will be the basis for monthly progress payment determinations and for any changes related to that Work item. Bid Item #2, WORKER PROTECTION, SAFETY/SHORING, SITE SECURITY will also demonstrate the Contractor's compliance with the California Labor Code relating to the price for sheeting, shoring, and bracing of excavations. Bid items are not intended to be exclusive descriptions of work categories and the Contractor shall determine and include in its pricing all materials, labor, and equipment necessary to complete each Bid Item (work phase) as shown and specified, including all Work described in any Drawings or Specifications that may apply to that bid item, such as providing equipment Operations and Maintenance Manuals and Record Drawings.

2.2 Description of Bid Items

All bid items are lump sum. The lump sum bid prices shall be full compensation for the preparation and installation, submittal of materials, and for all labor, equipment, tools and incidentals to complete each item. Contractor may apply for payment of each Bid Item on a percent complete basis as the items covered under each Bid Item are being completed.

BID ITEM NO. 1 MOBILIZATION / DEMOBILIZATION The lump sum bid for mobilization shall not exceed four percent (4%) of the total base bid price. Mobilization shall include: the obtaining of insurance and bonds; moving onto the site of all equipment; submittal and approval of initial project schedule; furnishing temporary construction utilities (temporary power, toilets, water, etc.); installing construction signs; temporary buildings and field office trailer(s); and other construction all as required for the proper performance and completion of the work.

The lump sum bid for demobilization shall not exceed two percent (2%) of the total base bid price. Demobilization shall include site cleaning and restoration of surfaces within the job site, post-construction meeting, removal of all temporary facilities and equipment from the work area, disconnection of the temporary construction utilities and turnover of project to the Owner.

In the event the Contractor writes in a Mobilization/Demobilization price greater than six percent (6%) of the base bid price on the Bid Schedule found in Section 00300, **BID FORM**, the Owner will pay any excess with the final Progress Payment.

Contractor may apply for payment of mobilization on a percent complete basis as the items covered in the Mobilization are being completed.

Contractor may apply for payment of demobilization after the overall project substantial completion is achieved and the project begins to demobilize.

BID ITEM NO. 2 WORKER PROTECTION, SAFETY/SHORING, SITE SECURITY

The lump sum amount for providing a detailed plan for worker safety and maintaining safety during construction, including conforming to Labor Code Sections 6700-6708, all applicable safety orders, and permits. This bid item shall include sheeting, shoring, and bracing for the excavations required for installation of the new raw water piping and intake screen channel and to protect the existing adjacent Powder Activated Carbon facility. This bid item shall also include providing adequate site security as deemed necessary by Contractor for protection of Contractor's materials.

BID ITEM NO. 3 27" PIPELINE EXCAVATION AND DEMOLITION The lump sum amount for completing the excavation, demolition, and disposal of the existing 27" raw water piping as shown on Drawing D-1. This bid item shall also include overtime work as necessary to complete the work within the specified shutdown window

BID ITEM NO. 4 FLOCCULATORS, RAPID MIXER, AND MISCELLANEOUS METALS DEMOLITION The lump sum amount for demolition of the existing horizontal paddle flocculators, flocculator support piers rapid mixer, existing redwood baffles, and flocculation basin grating and handrail as shown on Drawings D-2 and D-3. Demolition includes all ancillary beams and grating supports, accessories, and anchors. This bid item shall also include disposal costs of all demolished/removed items.

BID ITEM NO. 5 INFLUENT FLOWMETER VAULT PIPING, VALVE, AND FLOWMETER REPLACEMENT The lump sum amount for demolition and replacement of the existing 18" influent flowmeter, 18" butterfly valve, 18" raw water piping, and chemical injection piping as shown on Drawing SM-5. This bid item shall include overtime work as necessary to complete the work within the specified shutdown window. This bid item shall also include disposal costs of all demolished/removed items.

BID ITEM NO. 6 FURNISH AND INSTALL 30" RAW WATER PIPING AND VALVES The lump sum amount for supply and installation of 30" raw water piping, chemical injection vault, 9valves, and appurtenances as shown on Drawings C-1, SM-1, and SM-2. This bid item shall also include pressure testing, flushing, backfill and compaction of excavations.

BID ITEM NO. 7 CONSTRUCT INTAKE SCREEN CHANNEL, EXCAVATION, CONCRETE, AND MISCELLANEOUS METALS The lump sum amount for construction of the intake screen channel including excavation, formwork, reinforcement, concrete, and miscellaneous metals as shown on Drawings C-1, and SM-2.

BID ITEM NO. 8 FURNISH AND INSTALL INTAKE FINE SCREEN The lump sum amount for supply and install of the fine screen as shown on Drawings C-1, and SM-2

and as specified in Section 11600.

BID ITEM NO. 9 FURNISH AND INSTALL (6) VERTICAL FLOCCULATORS AND (1) RAPID MIXER The lump sum amount for supply and install of the vertical flocculators and rapid mixer as shown on Drawings SM-3 and SM-4 and as specified in Section 11810.

BID ITEM NO. 10 FURNISH AND INSTALL FLOCCULATION BASIN MISCELLANEOUS METALS AND REDWOOD BAFFLES The lump sum amount for supply and install of the grating and mixer support beams, grating, checkered plate, handrail, davit bases, and associated anchorage as shown on Drawings SM-3 and SM-4. This bid item shall also include replacement of the redwood baffles in the floc basins.

BID ITEM NO. 11 DEMOLISH EXISTING INTAKE SLIDE GATE, AND FURNISH AND INSTALL (1) SLIDE GATE The lump sum amount for demolition of the existing canal intake slide gate; and supply and install of a new slide gate as shown on Drawings D-1 and SM-1 and as specified in Section 11100.

BID ITEM NO. 12 CIVIL SITE IMPROVEMENTS The lump sum amount for all Civil Improvements required as shown Drawings C-1 and C-2, including but not limited to grading, asphalt concrete paving, bollards, and all ancillary yard piping and valves (excluding raw water piping) including new water and drain piping for the new fine screen, and replacement or rerouting of existing chemical feed piping, sample piping, and washwater recycle piping. This bid item shall also include construction of the canopy as shown on Drawing SM-6.

BID ITEM NO. 13 ELECTRICAL, INSTRUMENTATION, AND CONTROLS The lump sum amount for procuring and installing all electrical, instrumentation, and controls improvements shown on the Electrical (E-series) Drawings related to the Fine Screen, Influent Flow Meter, Flocculators, and Rapid Mixer; including all electrical panels, motor control valves, VFDs, instruments, conduit, wire, and tie-ins to existing electrical equipment. This includes work shown on Drawings G-8, G-9, E-1, E-2, E-3, E-4, E-5, E-100, E-101, E-102, and E-103.

BID ITEM NO. 14 INSTALLATION CERTIFICATION, TESTING, AND STARTUP The lump sum amount for all costs for manufacturer's representative installation certification and assistance to complete testing as described in Section 01700 and the applicable equipment technical specifications.

BID ITEM NO. 15 FINAL DOCUMENTATION The lump sum amount for providing final Contractor redline drawings showing all details of modifications/changes made to treatment plant per the plans in Appendix A. Includes providing signed warranty guarantee, guarantee bonds, retention release forms, and certificate of insurance with valid coverage through the warranty period.

BID ITEM NO. 16 ALL OTHER ITEMS OF WORK The lump sum amount to furnish labor, materials, tools, equipment and incidentals to perform all work not included in other bid items.

The lump sum price shall be full compensation for the preparation and installation or submittal of these materials, and for all labor, equipment, tools, and incidentals to complete this item.

3.0 DESCRIPTION OF BID ALTERNATES

There are no proposed Bid Alternates for this Project.

4.0 CONTRACTOR'S COST BREAKDOWN

For work to be performed for a lump sum amount, the Contractor shall submit a cost breakdown to the Construction Manager prior to the first payment and within ten (10) days after Notice to Proceed. The cost breakdown, as agreed upon by the Contractor and the Construction Manager, shall be used for preparing future estimates for partial payments to the Contractor, and shall list the major items of work with a price fairly apportioned to each item.

The cost breakdown shall be generally in the same format as the Contract specifications divisions and subdivisions, with major items of work listed individually. The cost breakdown shall be by structural, civil, mechanical, or other logical division of work. The cost breakdown for architectural, structural, mechanical, and electrical work shall include separate items for identifiable portions of the structures. The cost breakdown shall include separate allowances for any testing and startup work required. Measurable approximate quantities of work performed by the Contractor or its subcontractors shall be provided. For quantities that are the sum total of several individual quantities, backup summaries shall be provided which list the individual descriptions and quantities. These summaries then will be used to determine the quantities of work in place in subsequent progress payment requests.

The above is a statement of the intent of the Contract Documents to provide a high level of detail, acceptable to the Construction Manager, to allow a fair and reasonable estimate to be made of the value of work installed. The detail of the cost breakdown must be sufficient to provide timely processing of the monthly progress payment request.

The cost breakdown will be subject to the approval of the Construction Manager, and upon request, the Contractor shall substantiate the price for any or all items and provide additional level of detail, including quantities of work. The cost breakdown shall be sufficiently detailed to permit its use by the Construction Manager as one of the bases for evaluating requests for payments. The Construction Manager shall be the sole judge of the adequacy of the cost breakdown.

The cost breakdown shall be solely used to determine progress payments. The cost breakdown shall not be considered in determining payment or credit for additional or deleted work.

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SECTION 01312

PLACER COUNTY WATER AGENCY 144 FERGUSON ROAD AUBURN, CA 95603

PROJECT MEETINGS

1.0 GENERAL

Project meetings and conferences are an important administration and communication requirement of all project participants. Meetings will address issues related to the Work, review and coordinate progress of the Work and other matters of common interest to project participants. This section describes the requirements for calling for and conducting meetings for the Work. Meeting and conference locations and qualified participants will be determined by the Construction Manager and the Contractor based on the meeting agenda topics.

Minutes will be taken by the Construction Manager for the Pre-Construction Conference(s) and all Progress and Coordination Meetings hereinafter described. Copies of meeting minutes will be distributed to all attendees within five (5) days after meeting. Attendees will have three (3) days to submit comments or additions to minutes received from Construction Manager. Minutes will constitute final documentation of meeting discussion topics, results and action items. Meetings may be recorded by the Construction Manager for accuracy of meeting minutes.

2.0 PRECONSTRUCTION CONFERENCE

Upon issuance of Notice to Proceed, or earlier when mutually agreeable, Construction Manager will schedule a preconstruction conference and organizational meeting at a suitable conference room at the Owner's offices or other suitable location. More than one preconstruction conference may be required if the Owner and Contractor deem it is in the best interest of the project to do so. Construction Manager will preside at conference.

Attending the Preconstruction Conference: Contractor's Project Manager, Contractor's Superintendent(s), Owner, Construction Manager, Engineer, Owner's sub-consultants, representatives of utilities, major subcontractors and others involved in performance of the Work, and others necessary to agenda.

The Construction Manager, in concert with the Owner, Engineer and Contractor, will prepare an agenda for discussion of significant items relative to contract requirements, procedures, coordination and construction. Items on the agenda will include the Contractor's field organization, Owner's organizational chart of representatives/consultants, contract administration procedures, Contractor's preliminary schedule, submittals, progress payments, change order procedures, security, testing, safety and permit requirements, inspection procedures, and other project related matters.

Unless previously submitted to Engineer, Contractor shall bring to the conference a preliminary schedule for each of the following:

- Progress Schedule.

- Procurement Schedule.

- Schedule of Values for progress payment purposes.

- Schedule of Shop Drawings and other submittals.

The purpose of the conference is to designate responsible personnel and establish a working relationship. Matters requiring coordination will be discussed and procedures for handling such matters established. The agenda will include, but not be limited to:

- Contractor's preliminary schedules.
- Transmittal, review, and distribution of Contractor's submittals.
- Processing Applications for Payment.
- Maintaining record documents.
- Critical Work sequencing.
- Field decisions and Change Orders.
- Use of premises, office and storage areas, security, housekeeping, and
- Owner's needs.
- Major equipment deliveries and priorities.
- Contractor's assignments for safety and first aid.

3.0 PROGRESS AND COORDINATION MEETINGS

The Construction Manager shall schedule, arrange and conduct progress and coordination meetings. These meetings shall be conducted not more than once per week and shall be attended by the Contractor's superintendent and representatives of all subcontractors, utilities, and others that are active in the execution of the Work or involved in an important progress meeting agenda item. Upon approval of the Construction Manager, meeting sub-tier level participants with a minor role at that juncture in the project, may participate in progress meetings by speakerphone if there are suitable facilities to do so.

The Agenda of each progress meeting will include the review, correction (if necessary) and approval of minutes of the previous progress meeting; review items of significance that could affect project progress and cost; review status of previous action items and determine what new action items are necessary to insure the project stays on schedule; review quality control; and review Contractor's three (3) week schedule provided in accordance with other sections of these Specifications. The Contractor will distribute a copy of and present the submittal, RFI, Submittal, potential change logs at each progress and coordination meeting.

Progress and coordination meetings will be held at the project site, Owner's offices or another mutually agreeable place.

4.0 PROGRESS SCHEDULE AND PROGRESS BILLING MEETINGS

Each month the Contractor shall attend a progress schedule and progress payment meeting with the Construction Manager. At this meeting, the Construction Manager and Contractor are to review the percentage of the work completed and establish an amount to be requested in the Application for Payment. The meeting date shall be scheduled in accordance with the Owner's deadline for submittal of Progress Pay Estimates. Following review of the proposed billing, the Contractor will prepare an Application of Payment and submit to the Construction Manager for final review and processing.

These meetings will also discuss time impact evaluations for change orders and time extension requests, actual and anticipated schedule activity sequence/duration changes, and Contractor delays. These meetings are considered a critical component of the overall monthly schedule update submittal and Contractor shall have appropriate personnel attend.

The Construction Manager can also call for special progress schedule meetings should there be schedule revisions that necessitate such a meeting.

5.0 SUBMITTAL MEETINGS

When required in the individual technical specification, or if requested by the Contractor or the Construction Manager, a meeting regarding a required submittal will be held to facilitate the timeliness of the submittal preparation and review process. This meeting will convene at a mutually agreeable place. The party responsible for preparing the submittal shall be in attendance along with the Engineer.

6.0 QUALITY ASSURANCE MEETINGS

The Contractor or the Construction Manager may request a meeting prior to the start of a particular phase of the project to discuss how the Work shall be accomplished in accordance with the quality requirements of the contract documents, codes, permits and industry standards. All required inspection and testing applicable to this phase of the project will be discussed in detail. The Contractor shall require that all management and quality control personnel employed by the Contractor for this phase of the project are in attendance. Quality assurance meetings might be requested for such phases of the project as site work, concrete, piping, mechanical, specialty subtrades and electrical/instrumentation.

7.0 PRE-INSTALLATION MEETINGS

When required in the individual specification, or if requested by the Contractor or Construction Manager, a pre-installation meeting will be held to review conditions of the installation, installation procedures and coordination with related work. This meeting should take place at least seven (7) days in advance of installation or as required in the technical specifications. Meeting is to be attended by all parties involved in the installation.

8.0 PRE-SUBSTANTIAL COMPLETION MEETING

Thirty (30) days prior to the estimated substantial completion, the Construction Manager, Owner, Engineer, Contractor and appropriate subcontractors will meet to review maintenance manuals, guarantees, closeout submittals, bonds, and service contracts for materials and equipment.

9.0 SPECIAL MEETINGS

Any time during progress of the Work, the Owner and the Construction Manager shall have the authority to require the Contractor and any subcontractor, suppliers, or service providers to attend job-site conferences on matters which require immediate or special attention. Any notice of such conference shall be duly observed and complied with by the Contractor and subcontractors, suppliers, or service providers without extra cost to Owner.

10.0 POST CONSTRUCTION GUARANTY PERIOD MEETING

The Contractor shall meet with the Owner, Construction Manager and Engineer approximately eleven (11) months after date of Substantial Completion to inspect the Work. Meeting will be arranged by the Owner at least seven (7) days before meeting. The Contractor will require attendance of its Project Manager/Superintendent, appropriate manufactures and appropriate subcontractors.

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

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SECTION 01325

PLACER COUNTY WATER AGENCY 144 FERGUSON ROAD AUBURN, CA 95603

PROGRESS SCHEDULES AND REPORTS

1.0 GENERAL

The requirements for progress schedules and reports are included to assure adequate planning and execution of the work and to assist the Construction Manager in appraising the reasonableness of the proposed schedule and evaluating the progress of the work.

2.0 CONSTRUCTION SCHEDULE

2.1 The schedule shall be submitted within ten (10) days of Notice to Proceed and favorably reviewed by the Construction Manager before the first partial payment can be made.

2.2 Baseline Schedule

The Contractor shall submit the schedule based on either the bar chart method or the Critical Path Method (CPM). The schedule shall indicate preceding activity relationships and/or restraints where applicable and a controlling path shall be indicated. The schedule shall be time scaled and shall be drafted to show a continuous flow from left to right. The construction schedule shall clearly show the sequence of construction operations and specifically list:

- A. The start and completion dates of all work items.
- B. The dates of submittals, procurement, delivery, installation and completion of each major equipment and material requirement.
- C. Progress milestone events or other significant stages of completion, as defined in Section 00800-1.1, **Time Allowed for Completion**, and Section 01140, **WORK RESTRICTIONS**.
- D. The lead time required for testing, inspection and other procedures required prior to acceptance of the work.

Activities shall be no longer than ten (10) workdays, except for submittals and delivery items. If an activity takes longer, it shall be broken into appropriate segments of work for measurement of progress. This limitation may be waived, upon approval of the Construction Manager, for repetitious activities of longer durations for which progress can be easily monitored.

2.3 Float

“Total Float” or “Float” shall be defined as the difference between the early finish and late finish dates for an activity.

On the schedule delineate the specified Contract duration and identify the planned completion of the Work as the final milestone. The time period between these two dates, if any, shall be considered contract float.

Float in any activity, milestone completion date or Contract completion date shall be considered a resource available to both the Owner and the Contractor. Neither the Owner nor the Contractor has ownership of the float. Float is for the benefit of the Project. Acceptance of the Contractor's Baseline Schedule, monthly updates or revised schedule, when based on less time than the maximum time allowed for milestone(s) or Contract completion does not serve to change any Contract duration, nor serve as a waiver of the Contractor's nor the Owner's right to utilize the full amount of time specified in the Contract, unless so modified in a Contract Change Order.

2.4 Reports – One of the following reports shall be submitted as the Baseline Schedule:

A. Bar Chart: A report which lists each activity description, early start and finish dates, and all preceding and succeeding activities. The report shall conspicuously indicate all activities on the controlling path.

B. CPM Schedule: A CPM network report sorted by activity number which lists each activity description, early start and finish dates, preceding and succeeding activities and restraints, including lead/lag durations. The report shall show the critical path.

- CPM network report sorted by total float.
- CPM network report sorted by early start.

3.0 WEATHER CONDITIONS

Seasonal weather conditions shall be considered in the planning and scheduling of work activity durations influenced by high or low ambient temperatures or precipitation to ensure the completion of the Work within the Contract Time. No time extensions will be granted for the Contractor's failure to take into account such weather conditions for the location of the Work and for the period of time in which the Work is to be accomplished.

The expected loss of working days specified in the Supplementary General Conditions, Section 00800-1.3, **Weather Days**, shall be included in a separate identifiable critical activity labeled "Weather Days Allowance" to be included as the last critical activity of the project schedule. When weather days are experienced, and are approved as such by the Construction Manager, the Contractor shall either:

A. Increase the duration of the current critical activity(ies) by the number of weather days experienced, or

B. Add a critical activity to the schedule to reflect the occurrence of the weather day(s).

The duration of the weather day allowance activity shall be reduced as weather days are experienced and included in the schedule. Any remaining weather days in the weather day allowance activity at the completion of the project shall be considered as float and shall not be for the exclusive use or benefit of either the Owner or Contractor.

4.0 UPDATES

4.1 Submittal Period

The Contractor shall submit at monthly intervals a report of the actual construction progress. Each monthly report shall cover a period of approximately thirty (30) days. The monthly reports shall be submitted within ten (10) days of the end of the reporting period. The end of the reporting period shall be as agreed upon by the Construction Manager and Contractor.

Produce and provide one (1) complete set each of time-scaled logic diagrams and bar chart on 22-inch by 34-inch sheets. The network diagram shall be clear and legible. Critical activities shall be indicated in red color. Progress bars shall be conspicuously identified by color other than red, black or white.

4.1.1 All Monthly Updates - All monthly updates shall include as a minimum:

A. Reports - Provide the reports defined in Section 2.4, Reports.

B. Narrative and Tabular Report - The report shall show the activities or portions of activities completed during the reporting period. The report shall state the percentage of the work actually completed and scheduled, the remaining duration, and the progress along the critical path in terms of days ahead or behind the allowable dates as of the report date. Any changes made by the Contractor to the CPM schedule, including activity numbers, durations, constraints and activity descriptions, shall be listed in a detailed report which describes the reason for each.

C. Activity Numbers and Descriptions – New activity numbers and descriptions may be added where required to further define the work and as approved by the Construction Manager. Activities may be deleted if the applicable work has not been performed and is deleted from the Work and as approved by the Construction Manager.

4.1.2 Delayed Schedule Updates - If, in the opinion of the Construction Manager, the project is behind schedule, the Contractor shall submit a narrative report with each updated analysis which shall include but not be limited to, a description of current and anticipated problem areas, delaying factors and their impact, and an explanation of corrective actions taken or proposed.

4.2 Schedule Review

Once each month, on a date mutually agreed upon, but no later than ten (10) days after the submittal of the monthly update specified herein, a jobsite meeting will be held to review the CPM Schedule, job progress and the monthly update, or the Construction Manager will provide written comments on the monthly update.

5.0 TIME IMPACT ANALYSES

When change orders are initiated, delays are experienced, or the Contractor desires to revise the schedule logic, the Contractor shall submit to the Construction Manager a written Time Impact Analysis illustrating the influence of each change, delay, or Contractor request on the current contract schedule completion date.

6.0 WEEKLY ACTIVITIES PLAN

On the last working day of every week the Contractor shall submit to the Construction Manager the Contractor's Plan of Activities for the next three weeks. The Plan of Activities shall describe the activity and location of the activity and include the activity number as provided in the CPM Schedule.

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

SECTION 01330

**PLACER COUNTY WATER AGENCY
144 FERGUSON ROAD
AUBURN, CA 95603**

SUBMITTAL PROCEDURES

1.0 GENERAL

Where required by the Contract Documents, the Contractor shall submit descriptive information that will enable determination of whether the Contractor's proposed materials, equipment, or methods of work are in general conformance to the design concept and in compliance with the Contract Documents. The information to be submitted shall consist of drawings, specifications, descriptive data, certificates, samples, test results and such other information, all as specifically required in the specifications. In some instances, specified submittal information describes some, but not all, features of the material equipment, or method of work. Features not requiring submittals shall be as specified.

Submittal review shall be only for general conformance with the design concept and general compliance with the information given in the contract documents. It shall not include review of quantities, dimensions, weights or gages, fabrication processes, construction safety precautions, all of which are the sole responsibility of the Contractor. Review of a specific item shall not indicate acceptance of an assembly of which the item is a component. The Construction Manager and/or Engineer shall not be required to review and shall not be responsible for any deviations from the contract documents not clearly noted by the Contractor, nor shall the Construction Manager and/or Engineer be required to review partial submissions or those for which submissions for correlated items have not been received.

The Contractor may authorize material or equipment suppliers to deal directly with the Construction Manager with regard to such submittals; however, ultimate responsibility for the accuracy and completeness of the information contained in the submittal shall remain with the Contractor.

2.0 CONTRACTOR RESPONSIBILITIES

The Contractor shall be responsible for the accuracy and completeness of the information contained in each submittal and shall assure that the materials and equipment incorporated into the Work, or the methods of performing the Work shall be as described in the accepted submittals.

The Contractor shall verify that all features of all products conform to the specified requirements. Submittal documents shall be clearly edited to indicate only those items, models, or series of equipment that are being submitted for review. All extraneous materials shall be crossed out or otherwise obliterated.

The Contractor shall ensure that there is no conflict with other submittals and notify the Construction Manager in each case where his submittal may affect the work of another contractor or the Owner. The Contractor shall coordinate submittals among its

subcontractors and suppliers including those submittals complying with unit responsibility requirements specified in applicable technical sections.

The Contractor shall coordinate submittals with the work so that work will not be delayed. He shall coordinate and schedule different categories of submittals, so that one will not be delayed for lack of coordination with another. No extension of time will be allowed because of failure to properly schedule submittals. The Contractor shall not proceed with work related to a submittal until the submittal process is complete. This requires that submittals for review and comment shall be returned to the Contractor stamped "No Exceptions Taken" or "Make Corrections Noted." The Contractor assumes the risk of expense and delays when proceeding with work related to required.

The Contractor shall certify on each submittal document that it has reviewed the submittal, verified field conditions, and complied with the contract documents.

The Contractor shall include a copy of the applicable specification section, with addendums and all referenced sections included with each paragraph check-marked to indicate specification compliance or marked to indicate requested deviations from the specification requirements. Check Marks (✓) shall denote full compliance with a paragraph as a whole. If deviations from the specifications are indicated, and therefore requested by the Contractor, each deviation shall be underlined and denoted by a number in the margin to the right of the identified paragraph. The remaining portions of the paragraph not underlined will signify compliance on the part of the Contractor with the specifications. The submittal shall be accompanied by a detailed, written justification for each deviation. Failure to include a copy of the marked-up specification sections, along with justification(s) for any requested deviations to the specification requirements, with the submittal shall be sufficient cause for rejection of the entire submittal.

3.0 SUBMITTAL AND MATERIAL LIST

Within fifteen (15) days after the Notice to Proceed, and prior to the submission of the initial shop drawings, the Contractor shall submit a draft Master Submittal List of all required submittals to the Construction Manager for favorable review. The Master Submittal List shall include a description of each item, Specification reference and the anticipated submittal date. The List shall include all items of equipment and materials for architectural, structural, mechanical, piping, electrical, heating and ventilating, equipment piping, and plumbing work; and the names of manufacturers with whom purchase orders have been placed. Items on the List shall be arranged in the same order as in these Specifications, and shall contain sufficient data to identify precisely the items of material and equipment the Contractor proposes to furnish. The List shall reference the applicable Specification section or Drawing. After the submission is favorably reviewed and returned to the Contractor by the Construction Manager, it shall become the basis for the submission of detailed manufacturer's drawings, catalog cuts, curves, diagrams, schematics, data, and information on each separate item for review. No work shall proceed on any item until it has been submitted and favorably reviewed. An incomplete submittal list is not a basis for avoiding a submittal required by the specifications.

4.0 DEFINITIONS

A. Manufacturer's Instructions: Instructions, stipulations, directions, and recommendations issued in printed form by the manufacturer of a product

addressing handling, installation, erection, and application of the product; Manufacturers Instructions are not prepared especially for the Work.

- B. Shop Drawings: Drawings, diagrams, schedules, and other data specially prepared for the Work to illustrate some portion of the Work. Shop drawings include, but not necessarily be limited to:
 - 1. Custom-prepared data such as fabrication or erection/installation (working) drawings.
 - 2. Scheduled information, setting diagrams, actual shop work manufacturing instructions, custom templates, special wiring diagrams, coordination drawings, individual system or equipment inspection and test reports including performance curves and certifications, as applicable to the Work.
- C. Product Data: Illustrations, standard schedules, performance charts, brochures, diagrams and other information to illustrate materials or equipment for some portion of the Work.
 - 1. Product data as specified in individual Sections, and as applicable to the Work shall include, but not necessarily be limited to:
 - a. Standard prepared data for manufactured products (sometimes referred to as catalog data or "cuts").
 - b. Manufacturer's product specifications.
 - c. Installation instructions.
 - d. Availability of colors and patterns.
 - e. Manufacturer's printed statements of compliance and applicability.
 - f. Roughing-in diagrams and templates.
 - g. Product photographs.
 - h. Standard wiring diagrams.
 - i. Performance curves and operational-range diagrams.
 - j. Production or quality control inspection and test reports and certifications, and mill reports.
 - k. Operating and maintenance instructions and recommended spare parts listing and printed product warranties.
- D. Samples: Physical examples which illustrate materials, equipment, or workmanship and establish standards by which the Work will be judged. Samples specified in individual Sections, include, but are not necessarily limited to, physical examples of the work such as sections of manufactured or fabricated work, small cuts or containers of materials, complete units of repetitively-used products, color/texture/pattern swatches and range sets, specimens of coordination of visual effect, graphic symbols and units of work to be used by the Engineer or others for independent inspection and testing, as applicable to the Work.

5.0 PROCEDURES

- A. The Contractor shall deliver submittals to the Construction Manager at the address provided to Contractor by the Construction Manager. The Contractor is required to allow adequate time in its project schedule for the preparation and review

of the submittal to ensure that the submittal will serve its intended purpose. The Contractor is encouraged to mark the submittal “high”, “normal” or “low” priority to assist the reviewer in prioritizing the submittal reviews during periods of high volume of submissions.

B. Transmittal Form - Unless otherwise specified, submittals regarding material and equipment shall be accompanied by Form 01999-05. A separate transmittal form shall be used for each specific item, class of material, equipment, and items specified in separate, discrete sections, for which the submittal is required. Submittal documents common to more than one piece of equipment shall be identified with all the appropriate equipment numbers. Submittals for various items shall be made with a single form when the items taken together constitute a manufacturer's package or are so functionally related that expediency indicates checking or review of the group or package as a whole. The specification section and subsection or paragraph to which the submittal is related shall be indicated on the transmittal form.

C. Assign each submittal a unique number. Clearly note the submittal numbers on the transmittal. Number each submittal with the identifying specification section, followed by a sequential number that represents the Contractor's assigned number of 01, 02, et cetera. Resubmittals shall be numbered by adding a dot (.) and 01, 02, 03, et cetera to the original submittal number, depending on the number of times the submittal has been resubmitted. For example: if Submittal 03300-01 requires a resubmittal, the first resubmittal will bear the designation “03300-01.01” and the second resubmittal will bear the designation “03300-01.02” and so on.

D. Submit specified number of copies of submittal. Should the Contractor require more returned copies of any particular submittal, the Contractor shall furnish an equal greater number of copies to the Construction Manager than is specified.

E. Provide or furnish products and execute the Work in accordance with accepted submittals, unless in conflict with Contract Documents.

F. Deviations From The Contract – If the submittals show any deviations from the Contract requirements, the Contractor shall submit with the submittal submission a separate written description of such deviations and the reasons therefore. If the Owner accepts such deviation, the Owner shall issue an appropriate Contract Change Order, except that, if the deviation is minor, or does not involve a change in price or in time of performance, a Change Order need not be issued. If any deviations from the Contract requirements are not noted on the submittal, the review of the shop drawing shall not constitute acceptance of such deviations.

6.0 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

A. Submit Shop Drawings, Product Data, Samples, and other pertinent information in sufficient detail to show compliance with specified requirements.

B. Check, verify, and revise submittals as necessary to bring them into conformance with Contract Documents and actual field conditions.

1. Determine and verify quantities, dimensions, specified design and performance criteria, materials, catalog numbers, and similar data.

2. Coordinate submittal with other submittals and with the requirements of the Contract Documents.
- C. Field Verification: Prior to submitting shop drawings, Contractor shall have determined and verified all field measurements, elevations, potential conflicts, quantities and dimensions. This verification may require potholing.
- D. After completion of checking, verification, and revising; stamp, sign and date submittals indicating review and approval; and submit to Construction Manager.
1. Stamp and signature indicates Contractor has satisfied shop drawing review responsibilities and constitutes Contractor's written approval of shop drawing.
 2. Shop drawings without Contractor's written approval will be returned for resubmission.
- E. Shop Drawings: Submit eight (8) copies. Three (3) will be returned with reviewer's comments and stamp.
- F. Product Data and Manufacturer's Instructions: Submit four (4) copies. Excise or cross out non-applicable information and clearly mark applicable information with citations to and terminology consistent with Contract Documents.
1. One (1) copy will be returned with reviewer's comments and stamp.
- G. Samples: Submit two (2) samples labeled with reference to applicable Contract Documents. Label will be returned with reviewer's selection when appropriate, comments and stamp. Samples will not be returned unless return is requested in writing and additional sample is submitted.
- H. Special Samples: Submit one (1) sample labeled with reference to applicable Contract Documents. Sample and one (1) label will be returned for installation in the Work.

7.0 MANUFACTURER'S INSTRUCTIONS

Submit manufacturer's instructions whenever made available by manufacturers and when installation, erection, or application in accordance with manufacturer's instructions is required by the Specifications. Submit manufacturer's instructions prior to installation, erection, or application of equipment and other project components. Submit manufacturer's instructions in accordance with requirements for Product Data.

8.0 ENGINEER'S REVIEW

A. The Engineer's review of submittals shall not release Contractor from Contractor's responsibility for performance of requirements of Contract Documents. Neither shall Engineer's review release Contractor from fulfilling purpose of installation nor from Contractor's liability to replace defective work. The Contractor shall not consider submittals as Contract Documents. The purpose of submittals is to demonstrate how Contractor intends to conform to the Contract Documents and design concepts. Engineer will be entitled to rely upon the accuracy or completeness of

designs, calculations, or certifications made by licensed professionals accompanying a particular submittal whether or not a stamp or seal is required by Contract Documents or Laws and Regulations.

B. The Engineer's review of shop drawings, samples, or test procedures will be only for conformance with design concepts and for compliance with information given in Contract Documents. The Engineer's review does not extend to:

- 1) Accuracy of dimensions, quantities, or performance of equipment and systems designed by Contractor.
- 2) Contractor's means, methods, techniques, sequences, or procedures except when specified, indicated on the Drawings, or required by Contract Documents.
- 3) Safety precautions or programs related to safety which shall remain the sole responsibility of the Contractor.

C. Except as may be provided in subsequent specifications, a submittal will be returned within thirty (30) calendar days. When a submittal cannot be returned within that period, Construction Manager will, within a reasonable time after receipt of the submittal, give notice of the date by which that submittal will be returned. The returned submittal shall indicate on the following actions:

- 1) If the review indicates that the material, equipment or work method complies with the project manual, submittal copies will be marked "NO EXCEPTIONS TAKEN." In this event, the Contractor may begin to implement the work method or incorporate the material or equipment covered by the submittal.
- 2) If the review indicates limited corrections are required, copies will be marked "MAKE CORRECTIONS NOTED." The Contractor may begin implementing the work method or incorporating the material and equipment covered by the submittal in accordance with the noted corrections. Where submittal information will be incorporated in O&M data, a corrected copy shall be provided.
- 3) If the review reveals that the submittal is insufficient or contains incorrect data, copies will be marked "AMEND AND RESUBMIT." Except at its own risk, the Contractor shall not undertake work covered by this submittal until it has been revised, resubmitted and returned marked either "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED."
- 4) If the review indicates that the material, equipment, or work method does not comply with the project manual, copies of the submittal will be marked "REJECTED - SEE REMARKS." Submittals with deviations that have not been identified clearly may be rejected. Except at its own risk, the Contractor shall not undertake the work covered by such submittals until a new submittal is made and returned marked either "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED."
- 5) If the submittal information does not require a review by the Engineer, copies of the submittal will be marked "Review not Required" and will be returned without review.

9.0 REVIEW COSTS

The Owner's cost for review of submittals for the same proposed materials, equipment or work shall be apportioned as follows:

- 1) The cost of review of the initial submittal and the first revised submittal will be borne by the Owner.
- 2) The cost to review all additional revised submittals after the first revised submittal will be charged to the Contractor. The cost of review shall include, without limitation, administrative, design and engineering activities directly related to review of submittals.
- 3) If a submittal is approved and the Contractor elects to submit an alternate item for review for the same application, the Contractor shall be responsible for the review costs for the alternate submittal. The cost of review shall include, without limitation, administrative, design and engineering activities directly related to review of submittals.

10.0 SUBMITTALS FOR INFORMATION OR RECORD ONLY

Where specified, the Contractor shall furnish five (5) copies of informational submittals to the Construction Manager. Incomplete or inadequate product data, test/inspection reports will be returned to the Contractor for re-submittal. The Contractor is to pay for all mill and factory tests that are required in the Contract Documents. No copies of informational submittals will be returned unless they are found to be incomplete or inadequate.

11.0 SUBSTITUTES OR "OR EQUAL" ITEMS AND PRODUCT OPTIONS

Whenever materials or equipment are specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the naming of the item is intended to establish the type, function, and quality required. Unless the name is designated a "sole source" and/or is followed by words indicating that no substitution is permitted, the materials or equipment of other Suppliers may be accepted by Engineer if sufficient information is submitted by Contractor to allow Engineer to determine that the material or equipment proposed is equivalent or equal to that named.

The procedure for review by Engineer will include the following as may also be supplemented in the Contract Documents. Requirements for review of substitute items of material or equipment will not be accepted by Engineer from anyone other than Contractor. If Contractor wishes to furnish or use a substitute item of material or equipment, Contractor shall make written application to the Construction Manager for acceptance thereof, certifying that the proposed substitute will perform adequately the functions and achieve the results called for by the general design, be similar and of equal substance to that specified and be suited to the same use as that specified. The application will state that the evaluation and acceptance of the proposed substitute will not prejudice Contractor's achievement of Substantial Completion on time, whether or not acceptance of the substitute for use 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

Work on the Project) to adapt the design to the proposed substitute and whether or not incorporation or use of the substitute in connection with the Work is subject to payment of any license fee or royalty. All variations of the proposed substitute from that specified will be identified in the application and available maintenance, repair, and replacement service will be indicated. The application will also contain an itemized estimate of all costs that will result directly or indirectly from acceptance of such substitute, including costs of redesign and claims of other contractors affected by the resulting change, all of which shall be considered by Engineer in evaluating the proposed substitute. The Owner may require Contractor to furnish at Contractor's expense additional data about the proposed substitute.

If a specific means, method, technique, sequence or procedure of construction is indicated in or required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, sequence, technique or procedure of construction acceptable to Engineer, if Contractor submits sufficient information to allow Engineer to determine that the substitute proposed is equivalent to that indicated or required by the Contract Documents. The procedure for review by Engineer will be similar to that provided in Section 01330 – Submittal Procedures.

All requests for substitution shall be submitted within thirty-five (35) calendar days after award of the contract. The Engineer will be allowed a reasonable time within which to evaluate each proposed substitute. The Engineer and Owner will be the sole judge of acceptability, and no substitute will be ordered, installed or utilized without Engineer's prior written acceptance that will be evidenced by either a Change Order or an accepted Shop Drawing. Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute. Contractor shall pay all costs for redesign required by the implementation of the proposed substitute.

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

SECTION 01340

PLACER COUNTY WATER AGENCY 144 FERGUSON ROAD AUBURN, CA 95603

REQUESTS FOR INFORMATION AND CLARIFICATIONS

1.0 GENERAL

Should the Contractor discover conflicts, omissions, or errors in the Contract Documents, or have any questions concerning interpretation or clarification of the Contract Documents, or if it appears to the contractor that work to be done or any matter relative thereto are not sufficiently detailed or explained in the Contract Documents, then, before proceeding with the work affected, the Contractor shall immediately notify the Construction Manager in writing and request interpretation, clarification, or additional detailed instructions concerning the work. The Contractor shall ask for any clarification or request for information immediately upon discovery, but no less than fifteen (15) days prior to the start date of the activities related to the clarification, based on the latest updated and accepted construction schedule. Contractor shall be responsible for its costs to implement and administer RFI's throughout the Contract duration. Regardless of the number of RFI's submitted, Contractor will not be entitled to additional compensation.

A RFI is not to be used for request for materials/equipment substitutions or value engineering/cost reduction incentive proposals.

2.0 RFI PROCEDURES

2.1 Contractor Review and Submittal

A. Contractor's Review

Before submitting each RFI, the Contractor shall carefully review the following for relevant information:

1. All field measurements, quantities, dimensions, specified performance criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto.
2. All materials with respect to intended use, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work.
3. All information relative to means, methods, techniques, sequences, and procedures of construction and safety precautions and programs incident thereto.
4. The coordination of each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents.

5. The Contract Documents.
6. The Project correspondence and documentation.

B. RFI Submittal Requests

The Contractor shall submit all requests for clarification and/or additional information in writing through the Construction Manager to the Engineer using the request for information (RFI) form. See Form 01999-06, **Request For Information**. Contractor shall provide a detailed written statement that indicates the specific Drawings or Specifications in need of clarification and the nature of the clarification requested.

Contractor shall submit each RFI electronically to the CM via email. Each RFI shall be dated and bear a signed certification that Contractor has performed the review defined above. No consideration for review by Construction Manager of any RFI will be made for any item which has not been certified by the Contractor. All non-certified RFI's will be returned to Contractor without action taken by Engineer, and any delays caused thereby shall be the total responsibility of Contractor.

Each RFI shall be limited to one subject.

2.2 **RFI Numbering System**

The Construction Manager will assign blocks of numbers for the Contractor, Engineer, Owner's Representative, and for substitutions. The Contractor will use the block of numbers consecutively with the date of issue, except for re-issuance of a respective RFI in which the subscript A, B, C, etc., will be added until the RFI is resolved. If Contractor believes the RFI reviewer's response is incomplete, Contractor shall issue another RFI (with the same RFI number with the letter "A" indicating if it is a follow-up RFI) to Construction Manager clarifying original RFI. Additionally, Construction Manager may return RFI requesting additional information should original RFI be inadequate in describing condition.

2.3 **Owner's RFI Review and Response Time**

Except as may otherwise be provided herein, the Construction Manager will return one copy of each RFI form to Contractor, with its comments noted thereon or on a separate comment sheet, within a reasonable amount of time, but no more than fifteen (15) calendar days following their receipt from Contractor, or if it is necessary to extend this period, the Construction Manager shall notify the Contractor in writing as to when a decision will be provided.

Engineer's review will be only to provide clarification and interpretation of the Contract Documents. Engineer's review shall not relieve Contractor for the responsibility for compliance with the Contract Documents.

Engineer's review 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 Engineer may furnish additional detailed written instructions to further explain the work, and such instructions shall be a part of the contract documents. Clarifications will be issued using the above RFI system and Form 01999-09 **Field Directive**. Should additional detailed instructions in the opinion of the Contractor constitute work in excess of the scope of the contract, the Contractor shall submit notification immediately and written notification thereof to the Construction Manager no more than seven (7) days following receipt of such instruction, and in any event prior to the commencement of work thereon. If the Construction Manager considers it justified, the instructions of the Engineer will be revised or a proposed change order will be issued for the Owner's consideration. The Contractor shall have no claim for additional compensation or extension of the schedule because of any such additional instructions unless the Contractor provides the Construction Manager written notice thereof within the time frame specified above. In addition, the Contractor shall within fifteen (15) days from the date of notification provide detailed justification and analysis as well as complete pricing and schedule CPM fragmentary network to support any request for time extension. See the Section 01350, **CONTRACT MODIFICATION PROCEDURES** for more details.

Should the Contractor proceed with the work affected before receipt of a response from the Construction Manager, any portion of the work which is not done in accordance with the Owner's interpretation, clarifications, instructions, or decisions subject to removal or replacement and the Contractor shall be responsible for all losses.

RFI's will not be recognized or accepted, if in the opinion of the Construction Manager or Engineer, that one of the following conditions exists:

- A. The Contractor submits an RFI as a submittal.
- B. The Contractor submits the RFI under the pretense of a contract documents discrepancy or omission without thoroughly reviewing the documents. In this case, the Contractor shall be responsible for both the Construction Manager's and Engineer's administrative costs to process the RFI. Such costs will be deducted from Contractor's progress payments.
- C. The Contractor submits the RFI in a manner that suggests that specific portions of the contract documents are assumed to be excluded, or be taken as an isolated portion of the contract documents in part rather than whole.
- D. The Contractor submits an RFI in an untimely manner without proper coordination and scheduling of work or related trades.

The Engineer's review shall not relieve Contractor from the entire responsibility for any variation from the requirements of the Contract Documents unless Contractor has in writing called attention to each such variation at the time of each RFI submittal and Engineer has given written approval of each such variation by specific written notation thereof incorporated in the RFI review; nor will any review by Engineer relieve Contractor from responsibility for compliance with the requirements for careful review above.

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

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SECTION 01350

PLACER COUNTY WATER AGENCY
144 FERGUSON ROAD
AUBURN, CA 95603

CONTRACT MODIFICATION PROCEDURES

1.0 GENERAL

This section provides supplementary procedures for the administration of changes to the Contract as specified in Section 00700-7.0, **CHANGES IN THE WORK**. Whenever corrections, alterations, or modifications of the work under this Contract are ordered by the Construction Manager and approved by the Owner which increases the amount of work to be done, such added work shall be known as extra work; and when such corrections, alterations, or modifications decrease the amount of work to be done, such subtracted work shall be known as omitted work.

Any change in scope of Work or deviation from Contract Documents including, without limitation, extra Work, or alterations or additions to or deductions from the original Work, shall not invalidate the original Contract, and shall be performed under the terms of the Contract Documents. The difference in cost of the work affected by such change will be added to or deducted from the amount of said Contract price, as the case may be, by a fair and reasonable valuation, as outlined in this Section.

The prices agreed upon and any agreed upon adjustment in Contract Time shall be incorporated in the written order issued by the Owner, which shall be written so as to indicate an acceptance on the part of the Contractor as evidenced by its signature. By signature of the Change Order, the Contractor acknowledges that the adjustments to cost and time contained in the Change Order are in full satisfaction and accord, payment in full, and so waives any right to claim any further cost and time impacts at any time during and after completion of the Contract for the changes encompassed by the Change Order.

Only Contractor or Owner may initiate changes in scope of Work or deviation from Contract Documents.

2.0 CONTRACT MODIFICATION PROCEDURES

2.1 Request for Proposal (RFP)

A request for a proposed cost made to the Contractor by the Owner to add, delete or change the Work. RFP's shall not be deemed to be directions to proceed with any addition, deletion or change to the Work.

Whenever Contractor is required to prepare a Cost Proposal, and whenever Contractor is entitled to submit a Cost Proposal and elects to do so, Contractor shall prepare and submit to Owner for consideration a Cost Proposal using Forms 01999-08 and 01999-12 found in Section 01999, **REFERENCE FORMS**. All Cost Proposals must contain a complete breakdown of costs of credits, deducts, and extras; and itemizing materials, labor, equipment, special services, taxes, overhead and profit.

All Subcontractor Work shall be so indicated. Individual entries on the Cost Proposal form shall follow the cost items defined in Cost Determination in this Section. The Contractor shall provide all required information requested in the RFP no later than fourteen (14) days after receiving the RFP.

Upon receipt of a Cost Proposal with a detailed breakdown as prescribed herein this Section, the Construction Manager will act promptly thereon. If Construction Manager accepts a Cost Proposal, Construction Manager will prepare Change Order for Owner and Contractor signatures. If Cost Proposal is not acceptable to Construction Manager because it does not agree with cost and/or time included in Cost Proposal, Construction Manager will submit in a response what it believes to be a reasonable cost and/or adjustment, if any. Except as otherwise provided in this Section, Contractor shall have seven (7) days in which to respond to Construction Manager with a revised Cost Proposal.

If the parties do not agree on the price or time for an RFP, Owner may either issue a unilateral change order pursuant to Section 00700-7.1.4 or a Construction Change Directive (CCD) as defined below. Contractor shall perform the changed Work notwithstanding any claims or disagreements of any nature.

When necessity to proceed with a change does not allow the Construction Manager sufficient time to conduct a proper check of a Cost Proposal (or revised Cost Proposal), Construction Manager may order Contractor to proceed on basis to be determined at earliest practical date. In this event, value of change, with corresponding equitable adjustment to Contract, shall not be more than increase or less than decrease proposed.

2.2 Field Directive/Supplemental Instruction Resulting from RFI's or Submittals

The Contractor may be issued a Field Directive or Supplemental Instructions resulting from an RFI (see Section 01340, **REQUESTS FOR INFORMATION AND CLARIFICATIONS**) The Field Directive Form to be used is Form 01999-09 found in Section 01999, **REFERENCE FORMS**.

If Contractor is satisfied with Field Directive or Supplemental Instruction and does not request change in Contract Sum or Contract Time, then Field Directive or Supplemental Instruction shall be executed without a Change Order.

If Contractor believes the Field Directive/Supplemental Instruction results in a change in Contract Sum or Contract Time, then Contractor must notify the Construction Manager with seven (7) days following receipt of Field Directive/Supplemental Instruction and before proceeding with this Work. If the Construction Manager considers it justified, the instructions of the Field Directive/Supplemental Instructions will be revised or a proposed change order will be issued for the Owner's consideration. The Contractor shall have no claim for additional compensation or extension of the schedule because of any such additional instructions unless the Contractor provides the Construction Manager written notice thereof within the time frame specified above. In addition, the Contractor shall within fifteen (15) days from the date of notification provide detailed justification and analysis as well as complete pricing and schedule CPM fragmentary network to support any request for time extension.

Should the Contractor proceed with the work affected before receipt of a response from the Construction Manager, any portion of the work which is not done in accordance with the Owner's interpretation, clarifications, instructions, or decisions subject to removal or replacement and the Contractor shall be responsible for all losses.

If the parties still do not agree on the a Field Directive's impact to the Contract Sum or Contract Time, then Contractor will be directed again in writing to make the changes covered in the Field Directive/Supplemental Instructions and Contractor shall do so notwithstanding any claims or disagreements of any nature. Contractor may file a Claim in accordance with Section 00700-7.3, **Resolution of Disputes**.

2.3 Construction Change Directive (CCD)

A CCD is a written order prepared by the Construction Manager and signed by the Owner, directing a change in the Work and stating a proposed basis for adjustment, if any, in the Contract Price or Contract Time.

If at any time Owner believes in good faith that a timely Change Order will not be agreed upon using the foregoing procedures, Owner may issue a CCD with its recommended cost and/or time adjustment. Upon receipt of CCD, Contractor shall promptly proceed with the change of Work involved and concurrently respond to Owner's CCD within ten (10) calendar days.

Contractor's response must be any one of following:

- A. Return CCD signed, thereby accepting Owner's response, time, and cost.
- B. Submit a (revised if applicable) Cost Proposal with supporting documentation (if applicable, reference original Cost Proposal number followed by letter A, B, etc. for each revision), if Owner so requests.
- C. Give notice of intent to submit a Claim as described in Section 00700-7.3.1 within thirty (30) days.

If the CCD provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

- A. Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation.
- B. Unit prices stated in the Contract Documents or subsequently agreed upon.
- C. Cost to be determined in a manner agreed by the Owner and Contractor.

A CCD signed by Contractor indicates the agreement of Contractor therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

If Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the method and the adjustment shall be determined by Construction Manager on the basis of reasonable expenditures and savings of those performing the Work attributable to the change including, in case of an increase in the Contract Sum, an allowance for overhead and profit in accordance with 3.2- **Mark-Up Allowances**. If the parties still do not agree on the price for a CCD, Contractor may file a Claim in accordance with Section 00700-7.3, **Resolution of Disputes**. Contractor shall keep and present, in such form as Construction Manager may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this paragraph shall be limited to those provided in Section 01350-3.0, **COST DETERMINATION**.

Pending final determination of cost to Owner, amounts not in dispute may be included in Applications for Payment.

2.4 Field Order- Force Account Work

If either the amount of work or payment for a Change Order cannot be determined or agreed upon beforehand, the Owner may direct by written Change Order or Field Order that the work be done on a force account basis. The term "force account" shall be understood to mean that payment for the work will be done on a time and expense basis, that is, on an accounting of the Contractor's forces, materials, equipment, and other items of cost as required and used to do the work. For the work performed, payment will be made for the documented actual cost of the work as described in Section 01350-3.0, **COST DETERMINATION**.

Prior to the commencement of force account work, the Contractor shall notify the Construction Manager of its intent to begin work. Labor, equipment and materials furnished on force account work shall be recorded daily by the Contractor using Form 01999-13 - **DAILY EXTRA WORK REPORT** or an equivalent form approved by the Construction Manager. The reports, if found to be correct, shall be signed by both the Contractor and Construction Manager, or inspector, and a copy of which shall be furnished to the Construction Manager no later than the working day following the performance of said work. The Daily Extra Work Report sheet shall thereafter be considered the true record of force account work provided. If the Construction Manager, or inspector, do not agree with the labor, equipment and/or materials listed on the Contractor's daily force account report, the Contractor and Construction Manager, or inspector, shall sign-off on the items on which they are in agreement. The Construction Manager shall then review the items of disagreement and will advise the Contractor, in writing, of its determination. If the Contractor disagrees with this determination, it shall have the right to file a claim notice as provided in Paragraph 00700-7.3.1, **Notice**.

The Contractor shall maintain its records in such a manner as to provide a clear distinction between the direct costs of work paid for on a force account basis and the costs of other operations.

To receive partial payments and final payment for force account work, the Contractor shall submit, in a manner approved by the Construction Manager, detailed and complete documented verification of the Contractor's and any of its subcontractor's actual costs involved in the force account pursuant to the pertinent Change Order or Field Order. Such costs shall be submitted within thirty (30) days after said work has been performed.

No payments will be made for work billed and submitted to the Construction Manager after the thirty (30) day period has expired.

The force account invoice shall itemize the materials used and shall cover the direct costs of labor and the charges for equipment rental, whether furnished by the Contractor, subcontractor, or other forces. The invoice shall be in a form acceptable to the Construction Manager and shall provide names or identifications and classifications of workers, the hourly rate of pay and hours worked, and also the size, type, and identification number of equipment and hours operated. Material charges shall be substantiated by vendor's invoices acceptable to the Construction Manager.

2.5 Differing Site Conditions

Contractor shall submit Notices of Differing Site Conditions to resolve problems regarding differing Site conditions encountered in the execution of the Work pursuant to Section 00700-7.2, **Differing Site Conditions** which shall govern. If Owner determines that a change in Contract Sum or Contract Time is justified, Owner will issue an RFP, CCD or Field Order.

2.6 Hazardous Waste Conditions

Contractor shall submit Notices of Hazardous Waste Conditions to resolve problems regarding hazardous materials encountered in the execution of the Work pursuant to Section 00700-7.2, **Differing Site Conditions**, which shall govern. If Owner determines that a change in Contract Sum or Contract Time is justified, Owner will issue RFP, CCD or Field Order.

2.7 Contractor Cost Reduction Proposals

See item 7.0 below for procedures on Cost Reduction Proposals, also known as Value Engineering Proposals.

2.8 All Changes

A. Upon request of the Construction Manager, the Contractor shall provide the following information to support the request for change in cost:

1. Copy of original quotations, purchase order or invoices to verify costs included in original bid.
2. Copy of all quotations, purchase order or actual invoices to support new costs submitted.
3. Copy of all subcontracts.
4. Copy of all employee time records and wage rates paid.
5. Copy of all insurance and bond costs resulting from change.
6. Copy of all quantity takeoff sheets for materials, labor and equipment.
7. Certified payroll records.
8. Certified composite wage rate statements including employees' base rate and Contractor's contributions for fringe benefits, subsistence and travel.
9. A list of equipment with manufacturer's name and model number and the alphanumeric designation used in the Equipment Rental Rates prepared by the California Department of Transportation.

10. Invoices for all rental equipment.
11. Other information, as required, to document the labor, equipment and materials used.

Item 5.0 below provides expanded Contractor requirements regarding providing access to cost pricing data and related change records.

B. Correlation of Other Items:

1. Contractor shall revise Schedule of Values and Application for Payment forms to record each authorized Change Order, CCD or Field Order as a separate line item and adjust the Contract Sum as shown thereon prior to the next monthly pay period.
2. Contractor shall revise the Progress Schedules prior to the next monthly pay period to reflect the effects of all authorized Change Order, CCD or Field Order.
3. Contractor shall enter changes in Project Record Documents prior to the next monthly pay period.

3.0 COST DETERMINATION

3.1 Direct Cost Categories

The categories described below are defined to be direct costs. No other type of costs will be allowable as a direct cost. Direct costs shall not include any labor costs or indirect costs pertaining to the Contractor's and subcontractor's managers or superintendents, their office and engineering staffs, the cost of their offices, facilities, vehicles, or anyone not directly employed on such work, nor small tools (as defined in item C below) and supplies. All such items are considered indirect costs which form a part of the Contractor's and subcontractors' overhead expenses.

The Owner reserves the right to furnish such labor, materials and equipment as it deems expedient, and the Contractor shall have no claim for profit or added fees on the cost of such items.

A. Direct Field Labor

The cost of labor for workers (including forepersons when authorized by the Construction Manager) used in actual and direct performance of the work by the Contractor will be the sum of the following:

1. The actual wages paid plus any employer payments to, or on behalf of workers for fringe benefits including health and welfare, pension, vacation and similar purposes.
2. All payments imposed by State and Federal Laws including, but not limited to, workers' compensation insurance, and social security payments. The rates used for workers' compensation insurance shall be actual rates paid by the Contractor for each specific craft and broken down by wage rate if applicable to that craft.

3. Liability insurance burden applied to Contractor's payroll. Contractor shall provide adequate backup information to Construction Manager to verify this burden rate is indicative of the actual rates paid by the Contractor as a percent of labor.

Except as otherwise may be agreed to in writing by the Construction Manager, the actual wages and benefits paid for manual classifications of Contractor's on-site workers will not, in the aggregate, be more than the current applicable wage for each classification as established by the State of California Director of Industrial Relations.

Specifically prohibited from the labor costs are other payroll burden factors such as small tools (as defined in item C below), bonuses of any kind and safety incentives.

Contractor shall include the actual travel and/or subsistence costs, if any, as a separate line item under the labor cost category. Except as otherwise may be agreed to in writing by the Construction Manager, the actual travel and/or subsistence costs will not be more than established in an applicable Master Labor Agreement or the State of California Director of Industrial Relations.

Within fifteen (15) days following Notice to Proceed date, the Contractor shall submit to Construction Manager for approval a breakdown of labor costs as allowed herein for each expected craft used in the Work showing straight time and overtime rates. These rates would be good during defined period for each craft until wages are changed by the either Union Master Labor Agreements, if Contractor is signatory, or the Department of Industrial Relations.

B. Materials

The cost of all materials, including all factory testing, freight and delivery costs of materials, accepted by the Owner and used in performing the work will be the cost to the Contractor from the supplier thereof. All discounts for early payment shall accrue to the Contractor unless the Owner's payment to Contractor is paid to Contractor before discount payment is due in which case discount savings will be fully credited to Owner on next progress billing. All rebates and all returns from the sale of surplus materials shall be credited to the Cost of the Work.

For materials used in construction of the Project which may have additional uses on other projects for the Contractor's benefit, such as dimensional lumber, beams and plywood to form concrete or temporary diversion pipes, the Contractor shall submit a material unit cost to cover use of these types of materials for the approval of the Owner prior to delivery to the Work Site. This unit cost shall take into account the use of such materials on other past and future projects.

C. Construction Equipment

The cost of construction machinery and equipment for changes shall be based on fair rental cost or equivalent rental cost of owned equipment. Such costs will be allowed for only those days or hours during which the equipment is in actual use. Payment shall be based on actual rental and transportation invoices but shall not exceed the rental rates listed for such equipment in the State of California Department of Transportation publication entitled "Labor Surcharge and Equipment Rental Rates" which is in effect on the date upon which the work is performed.

Owner-operated equipment rates shall not exceed the rates in the aforesaid Rental Rate publication plus the labor costs as provided in Section 01350-4.1, **Direct Field Labor**. The rental cost allowed for equipment will, in all cases, be understood to cover all fuel, supplies, repairs, ownership, and incidental costs and no further allowances will be made for those items, unless specific written agreement to that effect is made. Compensation for idle time of equipment through delays caused by the Owner will be made consistent with Section 8-1.09, Right of Way Delays, of the Caltrans Standard Specifications.

Individual items of construction equipment or small tools which have a replacement value of \$500 or less shall not be charged to the Change Order work unless it can be demonstrated that the particular item is needed solely for the completion of the Change Order work.

Within fifteen (15) days following Notice to Proceed date, the Contractor shall submit to Construction Manager for approval a list of hourly rates for equipment owned by the Contractor and expected to be used in the Work.

D. Special Services

When the Construction Manager and the Contractor, by agreement, determine that special service or item of extra Work cannot be performed by forces of the Contractor or those of any Subcontractors, service or extra Work item may be performed by a specialist. These types of services will be paid based on an agreed upon current market rate.

3.2 Mark-Up Allowances

The Contractor and subcontractors shall be entitled to compensation for indirect field and home office overhead costs, and profit for Change Order work. This compensation shall be in the form of markup percentages applied to the direct cost of the Change Order work, as further described below. The maximum markup which will be allowed for the Contractor's combined overhead and profit will be:

A. For work by its own organization, the Contractor may add up to the following percentages:

Direct Field Labor	20 percent
Materials:	10 percent
Equipment (owned or rented):	15 percent
Special Services	5 percent

B. For all such work performed by subcontractors, such subcontractor may add the same percentages as the Contractor as listed in (A) above to its actual net increase in costs for combined overhead and profit. The Contractor may add up to five percent (5%) of the subcontractor's total for its combined overhead and profit. No further

compensation will be allowed for the Contractor's administration of the work performed by the subcontractor.

C. For all such work done by sub-tier-subcontractors, such sub-subcontractors may add the same percentages as the Contractor as listed in (A) above to its actual net increase in costs for combined overhead and profit. The subcontractor may then add up to five percent (5%) of the sub-subcontractor's total for its combined overhead and profit. The Contractor may add up to five percent (5%) of the subcontractor's total for its combined overhead and profit. No further compensation will be allowed for the subcontractors' and Contractor's administration of the work performed by the sub-tier-subcontractor. No additional mark-ups will be allowed for further tier-ed subcontracts.

D. When both additional and deleted work are involved in any one change, the markup allowances of this section shall be applied to the net extra cost of the work, if any, after subtraction of the costs for the omitted work from the extra work. For Change Order work which results in a net decrease in cost a minimum of five percent (5%) markup shall be added to the sum of the direct labor, materials and equipment as a deduction for profit, costs, and reduction in bond and insurance. The Contractor shall not be entitled to nor claim for anticipated profits on work that may be omitted.

To the total of the actual costs and fees allowed herein under, not more than two and one half percent (2.5%) shall be added for additional bond and insurance. The compensable percentage for additional bonds and insurance shall be based on the Contractor's actual costs, as substantiated through documentation submitted to the Construction Manager.

The added fixed fees shall be considered to be full compensation, covering the cost of general supervision, overhead, profit, small tools, incidentals and any other general expenses. The above fixed fees represent the maximum limits which will be allowed, and they include but are not limited to the Contractor's and all subcontractors' indirect field and home office expenses and all other costs for cost proposal preparation, schedule analysis and preparation, operation and maintenance manual documentation, and record documents and change order administration.

4.0 INCREASED OR DECREASED QUANTITIES

Increases or decreases in the quantity of a Contract unit price bid item of work will be determined by comparing the total pay quantity of such item of work with the Bid Schedule quantity.

If the total pay quantity of any item of work required under the Contract varies from the Bid Schedule quantity by twenty-five percent (25%) or less, payment will be made for the quantity of work of said item performed at the Contract unit prices therefor, unless eligible for adjustment pursuant to Section 01350-4.4, **Changes in Character of Work**.

If the total pay quantity of any item of work required under the Contract varies from the Bid Schedule quantity by more than twenty-five percent (25%), in the absence of an executed Contract change order specifying the compensation to be paid, the compensation payable to the Contractor will be determined in accordance with Sections 01350-4.1, 4.2 or 4.3, as the case may be.

4.1 Increases of More Than 25 Percent

Should the total pay quantity of any item of work required under the Contract exceed the Bid Schedule quantity by more than twenty-five percent (25%), the work in excess of 125 percent of the Bid Schedule quantity will be paid for by adjusting the Contract unit price, as hereinafter provided. At the option of the Construction Manager, payment for the work involved in such excess will be made on the basis of force account as provided by Section 01350-2.4, **Force Account Payment**.

Such adjustment of the Contract unit price will be the difference between the Contract unit prices and the actual unit costs, which will be determined as hereinafter provided, of the total pay quantity of the item. If the costs applicable to such item of work include fixed costs, such fixed costs will be deemed to have been recovered by the Contractor by the payments made for 125 percent of the Bid Schedule quantity for such item, and in computing the actual unit cost, such fixed costs will be excluded. Subject to the above provisions, such actual unit cost will be determined by the Construction Manager in the same manner as if the work were to be paid for on a force account basis as provided in Section 01350-2.4, **Force Account Payment** or such adjustment will be as agreed to by the Contractor and the Construction Manager.

When the compensation payable for the number of units of an item of work performed in excess of 125 percent of the Bid Schedule quantity is less than \$5,000 at the applicable Contract unit price, the Construction Manager reserves the right to make no adjustment in said price if it so elects, except that an adjustment will be further considered if requested in writing by the Contractor.

4.2 Decreases of More Than 25 Percent

Should the total pay quantity of any item of work required under the Contract be less than seventy-five percent (75%) of the Bid Schedule quantity, an adjustment in compensation pursuant to this Section will not be made unless the Contractor so requests in writing. If the Contractor so requests, the revised quantity will be paid for by adjusting the Contract unit price as hereinafter provided. At the option of the Construction Manager, payment for the quantity of the work of such item performed will be made on the basis of force account as provided in Section 01350-2.4, **Force Account Payment**. However, in no case shall the payment for such work be less than that which would be made at the Contract unit price.

Such adjustment of the Contract unit price will be the difference between the Contract unit price and the actual unit cost of the total pay quantity of the item, including fixed costs. Such actual unit cost will be determined by the Construction Manager in the same manner as if the work were to be paid for on a force account basis as provided in Section 01350-2.4, **Force Account Payment**; or such adjustment will be as agreed to by the Contractor and the Construction Manager.

The payment for the total pay quantity of such item of work will in no case exceed the payment which would have been made for the performance of seventy-five percent (75%) of the Bid Schedule of the quantity for such item at the original Contract unit price.

4.3 Eliminated Items

In the event that a part of the Work is to be eliminated in its entirety and such Work is covered by unit price(s) contained in the Bid and/or Contract Documents, the price of the eliminated Work item shall be based on the applicable unit price(s). The Contractor shall be paid five percent (5%) of the total extended amount (bid price times quantity) for the eliminated Work item in consideration of the applicable Contractor's overhead costs.

Should any Contract item of the Work be eliminated in its entirety, in the absence of an executed Contract change order covering such elimination, payment will be made to the Contractor for actual costs incurred in connection with such eliminated Contract item if incurred prior to the date of notification in writing by the Construction Manager of such elimination.

If acceptable material is ordered by the Contractor for the eliminated item prior to the date of notification of such elimination by the Construction Manager, and if orders for such material cannot be canceled, it will be paid for at the actual cost. In such case, the material paid for shall become the property of the Owner and the actual cost of any further handling will be paid for. If the material is returnable to the vendor and if the Construction Manager so directs, the material shall be returned and the Contractor will be paid for the actual costs of charges made by the vendor for returning the material. The actual cost of handling returned material will be paid for by the Owner.

4.4 Changes in Character of Work

If an ordered change in the plans and specifications materially changes the character of work of a Contract unit price bid item from that on which the Contractor based its Bid price, and if the change increases or decreases the actual unit cost of such changed item as compared to the actual or estimated actual unit cost of performing the work of said item in accordance with the plans and specifications originally applicable thereto, in the absence of an executed Contract change order specifying the compensation payable, an adjustment in compensation therefor will be made in accordance with the following:

The basis of such adjustment in compensation will be the difference between the actual unit cost to perform the work of said item or portion thereof involved in the change as originally planned and the actual unit cost of performing the work of said item or portion thereof involved in the change, as changed. Actual unit costs will be determined by the Construction Manager in the same manner as if the work were to be paid for on a force account basis as provided in Section 01350-2.4, **Force Account Payment**; or such adjustment will be agreed to by the Contractor and the Construction Manager. Any such adjustment will apply only to the portion of the work of said item actually changed in character. At the option of the Construction Manager, the work of said item or portion of item which is changed in character will be paid for by force account as provided in Section 01350-2.4, **Force Account Payment**.

If the compensation for an item of work is adjusted under this Section, the costs recognized in determining such adjustment shall be excluded from consideration in making an adjustment for such item of work under the provisions in Sections 01350-4.1, **Increases of More Than 25 Percent** and 4.2, **Decreases of More Than 25 Percent**.

5.0 COST PRICING DATA AND ACCESS TO RECORDS

All cost and pricing data submitted by the Contractor with respect to any change, prospective or executed, or any claim for extra compensation shall be a true, complete, accurate and current representation of actual cost and pricing of the work. The Construction Manager may require a formal certification as to cost and pricing data submitted by the Contractor.

The Construction Manager shall have access, upon reasonable notice during normal business hours, to any books, documents, accounting records, papers, project correspondence, project files, scheduling information and other relevant records of the Contractor and all subcontractors directly or indirectly pertinent to the work, original as well as changes and claimed extra work, and the Contract for the purpose of making audit, examination, excerpts and transcriptions and in order to verify or evaluate any change, prospective or executed, or any claim for which compensation has been requested or notice of potential claim has been tendered.

Such books, documents, and other records mentioned above shall include, but are not limited to all those reasonably necessary to determine the accurate amount of direct and indirect costs, job site, and delay and impact costs, however characterized, and shall include the original Bid and all documents related to the Bid and its preparation, as well as, the as-planned construction schedule and all related documents.

Such access shall include the right to examine and audit such records and make excerpts, transcriptions, and photocopies at the Owner's cost.

6.0 TIME EXTENSIONS FOR CHANGE ORDERS

If the Contractor requests a time extension for the extra work necessitated by a proposed Change Order, the request must comply with the applicable requirements of Section 01325-5.0, **TIME IMPACT ANALYSIS**.

7.0 COST-REDUCTION INCENTIVE (Value Engineering Proposal)

7.1 General

The cost-reduction incentive program provides a mechanism by which the Contractor can be motivated to use his construction expertise to improve contract performance and thereby create an overall reduction in the total cost of the Contract. The Contractor and its subcontractors may participate in the cost-reduction program; however, participation of the subcontractors shall be through the Contractor. In addition, the sharing arrangement between the Contractor and the subcontractor must be mutually agreed upon by the Contractor and its subcontractor, and written evidence of such agreement will be submitted along with the submittal of the cost-reduction proposal.

No cost reduction proposals shall be submitted for which the Owner's share in the participation of the proposals is not greater than \$5,000.

Cost-reduction proposals shall comply with the following conditions:

- A. The proposed change shall not impair, in any manner, the essential functions or characteristics of the project, including but not limited to, service life, economy of operation, ease of maintenance, desired appearance, or design and safety standards.
- B. The proposed change will not cause undue interruption of the Contract work, nor shall the proposed change be allowed to extend the Contract completion date of the project unless an extension provides a specific project benefit.
- C. The proposed change shall be in compliance with all local permits and regulations and code requirements as set forth in the contract documents.
- D. The proposed change shall not involve payment of royalties by the Owner to the Contractor.

7.2 **Proposal Submittal**

The cost-reduction proposal shall generally conform to Section 01330, **SUBMITTAL PROCEDURES**.

The cost-reduction proposals shall contain as a minimum the following information:

- A. Name of individuals associated with the development and preparation of the cost-reduction proposal.
- B. A detailed description and duly signed plans and specifications showing work as presently designed and the proposed changes. Clear identification of all advantages and disadvantages for each change proposed.
- C. A summary of estimated costs which shall include but not be limited to the following:
 - 1. Project construction costs before and after the cost-reduction proposal. This shall be a detailed estimate identifying the following items:
 - a. Quantities of material and equipment.
 - b. Unit prices of materials and equipment.
 - c. Labor hours and rates for installation.
 - d. Equipment hours and rates for installation.
 - e. Subcontractors and prime contractor markups.
 - f. Other estimate items necessary to evaluate the proposal.
 - 2. Operation and maintenance costs before and after the cost-reduction proposal.
 - 3. Costs for implementing the cost-reduction proposal not included in item 1 above.
 - 4. Other costs as required to meet all local permits, regulations, and code requirements as set forth in the contract documents.

5. Time required for execution of the proposed change.

D. A preliminary schedule indicating the general time impacts for implementing the proposed change. Also indicate the date that the cost-reduction proposal needs to be approved for implementation.

E. If the Owner advises the Contractor that the proposed change will be reviewed for more detailed consideration and approval, a detailed procedure and schedule for implementing the proposed change shall be submitted. This detailed procedure and schedule shall include all necessary Contract amendments. This submittal shall also include a copy of the current Contractor's schedule showing all changes which would occur if the cost-reduction proposal were accepted.

The provisions of Section 01350-7.0, **COST-REDUCTION INCENTIVE** shall not be construed to require the Owner or Engineer to consider any cost-reduction proposal which may be submitted. The Owner will not be liable to the Contractor for failure to accept or act upon any cost-reduction proposal submitted pursuant to this section nor for any delays to the work attributable to any such proposal. The Owner shall not be responsible or liable for payment of any of the Contractor's costs associated with a non-accepted proposal.

If a cost-reduction proposal is similar to a change in the Contract Documents under consideration by the Owner at the time said proposal is submitted, or if such a proposal is based upon or similar to standard specifications, standard special provisions, or standard plans adopted by the Owner after the advertisement for the Contract, the Owner will not accept such proposal, and the Owner reserves the right to make such changes without cost-reduction compensation to the Contractor under the provisions of this section.

The Contractor shall continue to perform the work in accordance with the requirements of the contract until an executed change order, incorporating the cost-reduction proposal has been issued. If an executed change order has not been issued by the date upon which the Contractor's cost-reduction proposal specifies that a decision thereon should be made, or such other date as the Contractor may subsequently have specified in writing, such cost-reduction proposal shall be deemed rejected.

The Owner shall be the sole judge of the acceptability of the cost-reduction proposal and the estimated net savings in construction costs from the adoption of all or any part of such proposal. In determining the estimated net savings, the right is reserved to disregard the contract bid prices if in the judgment of the Owner, such prices do not represent a fair measure of the value of work to be performed or to be deleted.

The Owner reserves the right, where it deems such action appropriate, to require the Contractor to share in the Owner's costs of investigating a cost-reduction proposal submitted by the Contractor as a condition of considering such proposal. Where such a condition is imposed, the Contractor shall indicate its acceptance thereof in writing, and such acceptance shall constitute full authority for the Owner to deduct amounts payable to the Owner from any monies due or may become due to the Contractor under the Contract.

7.3 **Acceptance**

If the Contractor's cost-reduction proposal is accepted in whole or in part, such acceptance will be by a Contract change order, which shall specifically state that it is executed pursuant to Section 01350, **CONTRACT MODIFICATION PROCEDURES**. Such change order shall incorporate the changes in the plans and specifications, which are necessary to be put into effect and shall include any conditions upon which the Owner's approval thereof is based if the approval of the Owner is conditional. The change order shall also set forth estimated net savings in construction costs attributable to the cost-reduction proposal effectuated by the change order and shall further provide that the Contractor be paid fifty percent (50%) of said estimated net savings amount. The Contractor's cost of preparing the cost-reduction proposal and the Owner's costs of investigating a cost-reduction proposal, including any portion thereof paid by the Contractor, shall be excluded from consideration in determining the estimated net savings in construction costs.

Acceptance of the cost-reduction proposal and performance of the work thereunder shall not extend the time of completion of the contract, unless specifically provided for in the contract change order authorizing the use of the cost-reduction proposal.

The amount specified to be paid to the Contractor in the change order which effectuates a cost-reduction proposal shall constitute full compensation to the Contractor for the cost-reduction proposal and the performance of the work thereof pursuant to the said change order.

The Owner expressly reserves the rights to adopt a cost-reduction proposal for general use on contracts administered by the Owner when it determines that said proposal is suitable for the application to other contracts. When an accepted cost-reduction proposal is adopted for general use, only the Contractor who first submitted such proposal will be eligible for compensation pursuant to this section, and in that case, only as to those contracts awarded to this same Contractor prior to submission of the accepted cost-reduction proposal and as to which such cost-reduction proposal is also submitted and accepted. Cost-reduction proposals identical or similar to previously submitted proposals will be eligible for consideration and compensation under the provisions of this section, if the identical or similar previously submitted proposals were not adopted for general application to other contracts administered by the Owner.

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SECTION 01354

**PLACER COUNTY WATER AGENCY
144 FERGUSON ROAD
AUBURN, CA 95603**

HAZARDOUS MATERIAL PROCEDURES

1.0 GENERAL

This section includes procedures required when encountering hazardous materials at the Work site.

2.0 REFERENCES

- A. California Health and Safety Code, Section 25117.
- B. State of California Code of Regulations (CCR).
 - 1. Title 8. Industrial Relations.
 - a. Division 1. Department of Industrial Relations.
 - 2. Title 22. Social Security
 - a. Division 4. Environmental Health.
 - b. Division 4.5. Environmental Health Standards for the Management of Hazardous Waste.
- C. United States Code of Federal Regulation (CFR), Title 29 and Title 40.
 - 1. 29 CFR 1910.1000.
 - 2. 29 CFR 1910.134.
- D. Steel Structure Painting Council:
 - 1. Guide 61 - Guide for Containing Debris Generated During Paint Removal Operations.
 - 2. Guide 61 - Description of Methods and Systems.
 - 3. Guide 71 - Guide for the Disposal of Lead-Contamination Surface Preparation Debris.
 - 4. PA Guide 3.

3.0 SUBMITTALS

Submit laboratory reports, hazardous material removal plans, and certifications.

4.0 HAZARDOUS MATERIALS PROCEDURES

- A. Hazardous materials are those defined by the State of California Health and Safety Code, Section 25117.

- B. When Hazardous Materials Including Contaminated Soil Have Been Found:
1. Prepare and initiate implementation of plan of action.
 2. Notify immediately Construction Manager, and other affected persons.
 3. Notify such agencies as are required to be notified by Laws and Regulations with the times stipulated by such Laws and Regulations.
 4. Designate a Certified Industrial Hygienist to issue pertinent instructions and recommendations for protection of workers and other affected persons' health and safety.
 5. Identify and contact subcontractors and licensed personnel qualified to undertake storage, removal, transportation, disposal, and other remedial work required by, and in accordance with laws and regulations.
- C. Forward to Construction Manager, copies of reports, permits, receipts, and other documentation related to remedial work.
- D. Assume responsibility for worker health and safety, including health and safety of Subcontractors and their workers.
1. Instruct workers on recognition and reporting of materials that may be hazardous.
- E. File requests for adjustments to Contract Times and Contract Price due to the finding of Hazardous Materials in the Work site in accordance with **Article 7.2 – DIFFERING SITE CONDITIONS** of the General Conditions.
1. Minimize delays by continuing performance of the Work in areas not affected by hazardous materials operations.

5.0 LEAD PAINT REMOVAL AND DISPOSAL

- A. There is no known lead paint in the Project Area that would require removal.

6.0 ASBESTOS MATERIALS

- A. It is the specific intent of these Contract Documents to exclude from the Work any and all products or materials containing asbestos. No new products containing asbestos shall be incorporated in the Work.
- B. There is no known asbestos material in the Project Area that would require removal.

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

SECTION 01360

PLACER COUNTY WATER AGENCY 144 FERGUSON ROAD AUBURN, CA 95603

ENVIRONMENTAL CONTROLS

1.0 SITE MAINTENANCE

The Contractor shall keep the work site, staging areas, and Contractor's facilities clean and free from rubbish and debris and shall comply with the requirements of Section 01090- 3.0, **STORMWATER QUALITY CONTROLS** and the Water Pollution Control Plan. Materials and equipment shall be removed from the site when they are no longer necessary. Upon completion of the work and before final acceptance, the work site shall be cleared of equipment, unused materials, and rubbish to present a clean and neat appearance.

A. Cleanup

1. Waste material of any kind will not be permitted to remain on the site of the work or on adjacent streets. Immediately upon such materials becoming unfit for use in the work, they shall be collected, carried off the site and disposed of by the Contractor.
2. The Contractor shall keep all buildings occupied by the Contractor clear of all refuse, rubbish and debris that may accumulate from any source and shall keep them in a neat condition to the satisfaction of the Construction Manager.
3. In the event that waste material, refuse, debris and/or rubbish are not so removed from the work by the Contractor, the Owner reserves the right to have the waste material, refuse, debris and/or rubbish removed and the expense of the removal and disposal charged to the Contractor.
4. Paints, solvents, and other construction materials shall be handled with care to prevent entry of contaminants into storm drains, surface waters, or soils.

B. Street Cleaning

1. The Contractor shall be responsible for preventing dirt and dust from escaping from trucks departing the project site, by covering dusty loads, washing truck tires before leaving the site, or other reasonable methods.
2. When working dump trucks and/or other equipment on paved streets and roadways, the Contractor will be required to clean said streets as required by the Construction Manager to remove dirt caused by the Contractor's activities. The use of water in amounts which results in mud on public streets is not acceptable as a substitute for sweeping or other methods. Equipment for this operation shall be on the job site or available at all times.
3. In the event that the above requirements are violated and no action is taken by the Contractor after notification of infraction by the Construction Manager, the Owner reserves the right to have the streets in question

cleaned by others and the expense of the operation charged to the Contractor.

2.0 DUST AND AIR POLLUTION CONTROL

- A. The Contractor shall be required to reduce particulate emissions by complying with the Placer County Air Pollution Control District. The Contractor shall provide the following measures as a minimum:
 - 1. Enclose, cover, or water all soil stockpiles as needed to maintain dampness and prevent visible dust emissions. The amount of watering may depend upon temperature, humidity, and wind speed for any given day. Alternatively, a higher degree of emission reduction can be achieved through installation of sprinklers on all soil stockpiles. Contractor is advised that high wind conditions are prevalent at the site.
 - 2. Water all exposed soil as needed to maintain dampness and prevent visible dust emissions. The amount of watering may vary depending upon temperature, humidity, and wind speed for a given day.
 - 3. Water all haul roads as necessary to maintain dampness and prevent visible dust emissions. The amount of watering may vary depending upon temperature, humidity, and wind speed for a given day.
 - 4. Maintain adequate freeboard or secure covering of all haul/dump trucks sufficient to prevent visible dust emissions and to prevent soil spillage on to surrounding roadways.
- B. The Contractor shall not discharge smoke, dust, and other contaminants into the atmosphere that violate the regulations of the Placer County Air Pollution Control District combustion engines shall not be allowed to idle for prolonged periods of time. The Contractor shall maintain construction vehicles and equipment in good repair. Exhaust emissions that are determined to be excessive by the Construction Manager shall be repaired or replaced.

3.0 NOISE CONTROL

- A. The Contractor shall comply with applicable laws, regulations, and ordinances which apply to any work performed pursuant to the contract. If the requirements of this Section are more restrictive than those of the local regulations, the requirements of this Section shall govern.
- B. Each internal combustion engine, used for any purpose on the job or related to the job, shall be enclosed and be equipped with a muffler of a type recommended by the manufacturer. No internal combustion engine shall be operated on the project without said muffler and enclosure. Use "quiet package" or "hush" equipment which is readily available for such equipment as trailer-mounted compressors, generators, welders, etc. All equipment shall be operated in the quietest manner practicable.
- C. Contractor shall be required to locate all fixed construction equipment such as compressors and generators as far as feasibly possible from sensitive receptors. Contractor shall shroud or shield all impact tools.

- D. Where possible, the Contractor shall use electric rather than diesel or gas-powered equipment.
- E. There shall be no start-up of machines or equipment, no delivery of materials or equipment, no cleaning of machines or equipment and no servicing of equipment except during the permitted hours of construction involving noisy operations.
- F. Amplified sound and other forms of loud communication constituting a nuisance, at the sole discretion of the Construction Manager, shall not be permitted.
- G. Material stockpiles and/or vehicle staging areas shall be located as far as practicable from dwellings.

4.0 TREE AND PLANT PROTECTION

- A. Temporary tree protection:
 - 1. The Contractor shall carefully protect existing trees from damage by construction activities. Trees that are not specifically designated on the drawings for removal shall not be removed or damaged, unless authorized by the Construction Manager.
 - 2. If a tree is damaged or destroyed by construction (other than those designated for removal), the Contractor shall replace it in species, size and grade with a healthy tree as directed by the Construction Manager. Where it is necessary to replace a tree damaged by construction, the Contractor shall bear all expenses required to establish the replacement tree and paying Placer County tree removal fees.
- B. Cultivated areas and other surface improvements:

All landscaped areas and other surface improvements which are damaged by actions of the Contractor shall be restored. The Contractor shall minimize vegetation removal. Areas shall not be cleared until construction activities require the work. Erosion controls shall be in place prior to clearing and grading activities.

5.0 WATER CONTROL

- A. Temporary pumping and drainage:
 - 1. The Contractor shall conform to the regulations and requirements of legally authorized surface water management agencies.
 - 2. The Contractor shall be responsible for keeping trenches and other areas free from water as required to permit continuous progress of, or to prevent damage to, its own work or the work of others. The Contractor's operations shall be conducted in such a manner as to prevent sediment from reaching existing sewers, storm drains, and creeks.
 - 3. The Contractor shall cover exposed excavated areas and spoils piles when runoff from rain is or would be likely to cause turbidity to enter local

waterways. The Contractor shall suspend work in the rain if such work cannot be performed without causing turbid runoff.

4. To avoid solids or turbid runoff from entering local waterways, the Contractor shall cover, secure, and/or berm excavated area and spoils piles and employ other methods as necessary such as hay bale around storm drains or around construction sites; use of cut and cover construction method; or use of sedimentation basins.

B. Water quality measures:

1. Erosion control measures, such as silt fences, filter fabric, sedimentation ponds, placement of hay bales along the peripheries of construction sites, temporary detention ponds, and terraced slopes, shall be employed as appropriate in conformance with the approved Water Pollution Control Plan (WPCP) and shall be in place prior to any clearing or grading activity.

6.0 OIL SPILL PREVENTION AND CONTROL

A. General:

The Contractor shall be responsible for prevention, containment, and cleanup of spilling of oil, fuel, and other petroleum products used in the Contractor's operations. All such prevention, containment, and cleanup costs shall be borne by the Contractor. The Contractor shall not discharge oil, fuel, or other petroleum products from equipment or facilities into surrounding waters or onto adjacent land.

B. Spill mitigation measures:

The Contractor shall, at a minimum, take the following measures regarding oil spill prevention, containment, and cleanup:

1. Fuel hoses, lubrication equipment, hydraulically operated equipment, oil drums, and other equipment and facilities shall be inspected regularly for drips, leaks, or signs of damage, and shall be maintained and stored properly to prevent spills. Proper security shall be maintained to discourage vandalism.
2. All land-based oil and product storage tanks shall be diked or located so as to prevent spills from escaping to the water. Diking and subsoils shall be lined with impervious material to prevent oil from seeping through the ground and dikes.
3. All visible oils on land shall be immediately contained using dikes, straw bales, or other appropriate means and removed using sand, ground clay, sawdust, or other absorbent material, which shall then be properly disposed of by the Contractor. Waste materials shall be temporarily stored in drums or other leakproof containers after cleanup and during transport to disposal. Waste material shall be disposed off property at an approved site.

7.0 DISCOVERY OF CULTURAL RESOURCES

If discovery is made of items of historical archaeological or paleontological interest, the Contractor is to immediately cease all Work in the area of discovery and promptly notify the Construction Manager. Archaeological indicators may include, but are not limited to, dwelling sites, locally darkened soils, stone implements or other artifacts, fragments of glass or ceramics, animal bones, human bones and fossils. Do not resume Work in the area of discovery until authorization is received from the Construction Manager. When work is resumed, excavation or other activities shall be as directed by the Construction Manager. If the discovery of cultural resources causes a decrease or increase in the Contractor's cost of, or the time required for, performance of any part of the Work the Owner shall cause to be issued a change order under the procedures provided in Section 00700-7.1, **Change Orders**

8.0 CONSTRUCTION SITE RE-SEEDING

8.1 Scope

The work under this article consists of furnishing all labor, equipment, materials, and performing all operations required to install erosion protection on the areas disturbed during the construction operation.

8.2 Materials

Materials shall conform to the provisions in Section 21-2 of Caltrans Standard Specifications. The materials shall include fertilizer, soil, seed, straw, and other materials as approved by the Engineer. Seed used shall be of a variety native to the area as recommended by the Soil Conservation Service.

8.3 Installation

Preparation shall include all work required to get the areas ready to receive the erosion control materials, including spreading straw over the area after fertilizing and seeding.

Topsoil shall be spread uniformly and shall be cultivated, if necessary, to a sufficient depth to break up any compaction resulting from the spreading operations.

Fertilizers and seed shall be uniformly spread over the area and shall be done in accordance with Section 21-2 of Caltrans Standard Specifications or as approved by the Engineer.

Straw shall be uniformly spread over all areas receiving erosion control materials. Straw shall be placed after all other erosion control materials are properly placed. Straw shall be dispensed onto the areas using a power driven dispenser approved by the Engineer.

Contractor shall maintain and water re-seeded areas until an acceptable stand of grass is established.

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SECTION 01400

**PLACER COUNTY WATER AGENCY
144 FERGUSON ROAD
AUBURN, CA 95603**

QUALITY CONTROL AND INSPECTION

1.0 CONTRACTOR'S QUALITY CONTROL

1.1 General

The Contractor is to ensure that products, services, workmanship and Site conditions comply with the requirements of the Contract Documents by coordinating, supervising, testing and inspecting its Work. The Contractor shall utilize only suitably qualified, skilled and trained personnel experienced in the tasks required to complete the Work in accordance with the quality requirements of the Contract Documents. Should there be no quality basis specifically prescribed for any portion of the Work, the quality and testing procedures shall be in accordance with the best-accepted practices of the construction industry for the locale of the Project, for projects of this type, or standards set by engineering or technical societies (e.g. ASTM or ASHRAE), whichever is more stringent.

1.2 Quality of Work

The Contractor's quality of Work shall include, but not be limited to, the following requirements:

- A. Quality of Products: Unless otherwise indicated or specified, all products shall be new, free of defects, and fit for the intended use.
- B. Quality of Installation: All Work shall be produced plumb, level, square and true, or true to indicated angle, and with proper alignment and relationship between the various elements, as shown on or required by Contract Documents.
- C. Protection of Completed Work: Take all measures necessary to preserve completed Work free from damage, deterioration, soiling, and staining, until acceptance by Owner.
- D. Standards and Code Compliance and Manufacturer's Instructions and Recommendations: Unless more stringent requirements are indicated or specified, comply with manufacturer's instructions and recommendations, reference standards and building code research report requirements in preparing, fabricating, erecting, installing, applying, connecting, and finishing Work.
- E. Deviations from Standards and Code Compliance and Manufacturer's instructions and Recommendations: Secure Owner's advanced written consent. Document and explain all deviations from reference standards and building code research report requirements and manufacturer's product installation instructions and recommendations, including acknowledgement by the manufacturer that such deviations are acceptable and appropriate for the Project.

F. Verification of Quality: Work shall be subject to verification of quality by Owner in accordance with provisions of the Contract Documents.

1.3 Defective Work

Defective Work shall be modified, replaced, repaired or redone by the Contractor at no change in Contract Sum or Contract Time. Acceptance of Defective Work, without specific written acknowledgement and approval of Owner, shall not relieve the Contractor of the obligation to correct such Work. Should Owner determine that it is not feasible or in Owner's interest to require Defective Work to be repaired or replaced, an equitable reduction in Contract Sum shall be made by agreement between Owner and Contractor. If equitable amount cannot be agreed upon, a Construction Change Directive will be issued and the amount in dispute resolved in accordance with the Contract Documents. Owner and Owner's consultants disclaim any and all responsibility for Work produced not in conformance with the Drawings and Specifications. Contractor shall have full responsibility for all consequences resulting from Defective Work, including without limitation all delays, disruptions, extra inspection and correction costs by Contractor and Owner and re-Work, and extra time and costs of all types. Contractor waives excuses for defective work relating to Owner's prior review of Submittals and/or prior failure to notice Defective Work in place on inspection.

2.0 INSPECTION AND TESTING

Additional requirements for tests are described in other Technical Paragraphs of these Contract Documents.

2.1 General

Where the Contract Documents require work to be field tested or approved, it shall be tested in the presence of the Construction Manager or its authorized representative. The Construction Manager shall have the right to witness all on-site tests performed by the Contractor and any shop tests. The results of any tests performed by the Contractor shall be made available for the information of the Construction Manager. Inspections, tests or favorable reviews by the Construction Manager or others shall not relieve the Contractor from its obligation to perform the work in accordance with the requirements of the Contract Documents or for its sole responsibility for the quality of workmanship and materials.

Except as specifically required under the technical specifications for testing and inspection, all tests for materials furnished by the Contractor will be done in accordance with commonly recognized standards of national organizations. Where tests are to be performed by the Construction Manager or by an independent laboratory or agency, the Contractor shall furnish such samples of all materials as required by the Construction Manager without charge. The sample or samples of materials to be tested shall be selected by such laboratory or agency, or the Construction Manager, and not by the Contractor. No material for which the Contract Documents require the submittal and approval of tests, certificates of compliance or other documentation shall be incorporated in the Work until such submittal has been made and approved. The Contractor shall provide safe access, including plants where materials or equipment are manufactured or fabricated, for the Construction Manager and inspectors to adequately inspect the quality of work and the conformance with the Contract Documents. The Contractor shall furnish the Construction Manager the necessary labor and facilities for such things as excavation in the compacted fill to the depths required

to take samples. The Contractor shall provide adequate lighting, ventilation, ladders and other protective facilities as may be necessary for the safe performance of inspections.

Upon completion of the Work the Construction Manager will conduct a final inspection as provided for in Section 00700-8.7, **Final Inspection and Payment**. Records shall be available at all reasonable hours for inspection by other local or State agencies to ascertain compliance with laws and regulations.

Neither the employment of independent testing and inspection agency nor observations or tests by Owner and Owner's consultants shall in any manner relieve the Contractor of obligation to perform Work in full conformance to all requirements of the Contract Documents. The Owner reserves the right to reject all Work not in conformance to the requirements of the Contract Documents, or otherwise Defective.

2.2 Notice

The Contractor shall notify the Construction Manager in writing at least twenty-four (24) hours before any field testing or special inspections are required to be performed by the Construction Manager or independent laboratory furnished by the Owner. The Contractor shall notify the Construction Manager at least two hours before any inspection is required to be performed or to witness the Contractor's on-site field testing.

Whenever the Contractor varies the period during which work is carried on each day, the Contractor shall give due notice to the Construction Manager so that proper inspection may be provided. Any work done in the absence of the Construction Manager shall be considered to be rejected. It will be the responsibility of the Contractor to demonstrate to the satisfaction the Construction Manager that the work meets all conditions of the specification and if such conditions are not met to remove the work.

The Contractor shall give the Construction Manager written notification at least thirty (30) days prior to the shipment of materials and equipment to be tested and/or inspected at the point of origin. Satisfactory tests and inspections at the point of origin shall not be construed as a final acceptance of the materials and equipment nor shall such tests and inspections preclude retesting or reinspection at the site of the Work.

2.3 Costs of Testing

The Contractor shall be responsible for, and shall pay for, all quality control and off-site tests of materials required including all source and mix design tests for the approval of soil and concrete materials. The Owner will perform the soils and concrete confirmation tests detailed in the Technical Specifications during the performance of the Work. Owner will retain and pay a qualified testing agency to perform soil compaction testing and work identified as requiring special inspections and testing as defined by The California Building Code or noted in the Drawings or Specifications. All other testing required by the technical specifications shall be the responsibility of the Contractor.

The Contractor shall be responsible for, and shall pay for, all source quality control and all on-site tests of materials required, except those tests specifically noted to be performed and paid for by the Owner.

The Construction Manager shall have the authority to require additional tests or inspections due to the manner in which the Contractor executes its work. Examples of such additional tests and inspections include; tests of materials substituted for previously accepted materials, or substituted for specified materials, or retests made necessary by failure of material to comply with the requirements of the Specifications. Where such tests and inspections are required by Contract to be performed by the Owner, the Owner will pay for the additional tests and inspections but will issue a unilateral Change Order to deduct these costs from the Contract price.

2.4 Work Covered Prior to Inspection and/or Testing

Work requiring inspection and/or testing shall not be concealed or buried prior to the acceptance of such inspection or testing. Work covered without the favorable review or consent of the Construction Manager shall, if required by the Construction Manager, be uncovered for inspection and/or testing at the Contractor's expense.

2.5 Work Covered With Prior Inspection and/or Testing

If the Construction Manager considers it necessary or advisable that covered work which was favorably inspected and tested be uncovered for reinspection and/or retesting, the Contractor, at the Construction Manager's request, will uncover, expose or otherwise make available for observation, inspection or testing as the Construction Manager may require, that portion of the work in question, furnishing all necessary labor, materials, tools, and equipment. If it is found that such work is defective, the Contractor will bear all expenses of such uncovering, exposure, observation, inspection and testing and of satisfactory reconstruction. If, however, such work is not found to be defective the Contractor will be allowed an increase in the Contract price or an extension of the Contract time, or both, directly attributable to such uncovering, exposure, observation, testing and reconstruction, and a Change Order shall be issued for such additional work.

2.6 Coordination of County, City Building and Other Inspections

Inspections by agencies other than PCWA are not required for this Project.

2.7 Special Tests and Inspections

As provided for in the Contract Documents, laws and regulations, specialized tests and inspections shall be performed by special inspectors certified by the International Conference of Building Officials (ICBO). Unless otherwise stated in the Contract Documents, each of these tests will be performed and paid for by the Owner.

2.8 Inspections and Tests by Serving Utilities

Unless otherwise indicated in the Contract Documents, the Contractor shall cause, schedule and conduct inspections and tests by serving Utilities required for the Work under this Contract.

2.9 Inspections and Tests by Serving Manufacturers

Unless otherwise indicated in the Contract Documents, the Contractor shall cause all required tests and inspections to be conducted by materials, equipment or systems

manufacturers. Additionally, all tests and inspections required by materials, equipment or systems manufacturers as conditions of warranty or certification of Work shall be made, the cost of which shall be included in the Contractor's bid.

3.0 TEST WATER

The Owner will furnish water for testing to the Contractor, free of charge, as is available from the Agency's water system. The conveyance of water shall be the responsibility of the Contractor and shall be at the Contractor's expense.

The Contractor shall submit a written request of water needs for testing including a description, volume, location and duration of use to the Construction Manager for approval. The Construction Manager will designate the type of water, locations where connections may be made and the backflow protection, if required. The Contractor is responsible for providing, installing and testing the backflow prevention device at the Contractor's expense. The Construction Manager may also require a meter on the connection depending on the volume of water requested.

There may be short periods of time when water is not available from the Owner's system.

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SECTION 01500

**PLACER COUNTY WATER AGENCY
144 FERGUSON ROAD
AUBURN, CA 95603**

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

1.0 GENERAL

This section covers the general requirements for the Contractor's temporary facilities at the job site and for the prosecution of the work. The Contractor shall be responsible for furnishing, installing and maintaining all temporary utilities required for the Work, all construction aids required for the Work, fences and barriers as required for protection of Owner's Operators, property, environment and the Work, field offices and storage facilities, as specified, except as allowed herein, and removal of said items upon completion of the Work. The Contractor may use existing roadways for access and parking to the extent practical and allowable. Access points to the construction site(s) shall be as designated by the Owner.

2.0 QUALITY ASSURANCE

Contractor shall comply with applicable Federal, State, and local laws, codes, regulations and ordinances and with utility company requirements.

3.0 SUBMITTALS

Submit the following information:

1. Backflow prevention procedures for temporary connection to Owner's potable water system, if applicable.
2. Proposed plan and layout for all temporary offices, designated parking areas, sanitary facilities, storage yards, temporary water service and distribution, and temporary power service and distribution.

4.0 TEMPORARY UTILITIES

4.1 Utility Requirements

The Contractor shall maintain and operate the temporary utility systems to assure continuous service. The systems shall be modified and extended as Work progress requires. Temporary materials and equipment shall be completely removed when their use is no longer required. The Contractor shall clean and repair any damage caused by temporary utility installations or use.

4.2 Power

Contractor shall make arrangements for temporary power, make temporary connection, and make arrangements and pay all costs for a temporary power supply. Contractor shall arrange for and pay all costs associated with temporary power service to the field offices and to Contractor's storage sheds, and shall pay all costs for installation and removal of temporary service and all power used. Contractor shall pay for energy used

during start-up and testing and until such time that the Owner takes beneficial occupancy of the Work or the Work is accepted by the Owner, whichever occurs first.

Contractor may utilize 120V power readily available from outlets at the plant where approved by the Construction Manager.

The Contractor shall provide temporary lighting to meet applicable requirements to allow erection or installation of materials and equipment and to allow observation and inspection of the Work.

4.3 Water

Contractor shall provide bottled drinking water service for all drinking water required by construction personnel. Provide refrigerated bottled water dispensers for all trailers to be occupied by personnel. Each dispenser shall have two 3-gallon internal reservoirs and an additional 5-gallon water bottle storage. A minimum of two extra 5-gallon water bottles shall be on hand at each trailer during the duration of occupancy. The Contractor shall be responsible for paying all costs associated with supplying drinking water.

Potable water supply is available at the site from existing facilities and may be utilized by the Contractor for construction related purposes at no cost to the Contractor. The Contractor shall be responsible for making the connection, providing proper backflow prevention equipment and installing all temporary piping. Arrangements for use of the water during construction shall be made with the Owner prior to making the connection. The Contractor shall be responsible for all costs associated with using the water.

The Contractor shall provide water storage tankage as necessary for construction purposes if required.

4.4 Telephone

The Contractor shall provide for their own telephone service.

4.5 Heating and Ventilation

The Contractor shall provide temporary heat and ventilation as required to maintain adequate environmental conditions to facilitate the progress of the Work, to meet specified minimum conditions for the installation of materials, and to protect materials and finishes from damage due to temperature or humidity. Adequate forced ventilation of enclosed areas shall be provided for curing of installed materials, to disperse humidity, and to prevent hazardous accumulations of dust, fumes, vapors or gases. Portable heaters shall be standard approved units complete with controls and suitably vented to the outside as required for protection of health and property. The Contractor shall be responsible for paying all costs of installation, fuel, maintenance, operation, and removal.

5.0 CONSTRUCTION FACILITIES

5.1 General

Temporary structures shall be structurally sound, weather tight, with floors raised above ground. Temperature transmission resistance shall be compatible with occupancy and storage requirements. At the Contractor's option, portable or mobile buildings modified for office use may be used. Existing site facilities and new permanent facilities shall not be used for construction facilities. Sites for temporary structures shall be filled and graded to provide surface drainage. Temporary structures shall be constructed on proper foundations, secured, provided with connections for utility services and provided with railed steps and landings at elevated entrance doors. Periodic maintenance and cleaning shall be provided for temporary structures, furnishings, equipment and services. Temporary structures, contents and services shall be removed when they are no longer needed for the Work. Foundations and debris shall be removed, the site graded to required elevations and the areas cleaned.

Contractor's field office shall be located in the staging area as shown on the Drawings. Additional areas of the plant may only be utilized by the Contractor for staging with the approval of the Construction Manager. Contractor shall obtain any additional areas, as required, at no additional cost to the Owner. Additional areas are subject to the controls identified in this section and the Contract Documents. The Contractor shall maintain the temporary facility site during construction in a manner that will not obstruct roads or access to Owner's facilities. The Contractor shall proceed with the Work in an orderly manner, maintaining the site free of debris and unnecessary equipment or materials.

Contractor shall not use any of the Owners facilities or supplies, including telephones, sanitary facilities, trash receptacles or vehicles.

The Contractor shall, at all times, be responsible for the security of the Contractor's facilities, materials and equipment. The Owner will not be responsible for missing or damaged equipment, tools or personal belongings.

5.2 Storage Buildings

Storage buildings shall be adequate for the requirements of the various trades and shall have adequate dimensions for storage and handling of products. Ventilation shall be provided to comply with specified and code requirements for the products stored. Heating shall be provided to maintain temperatures specified in the respective sections for the products stored. Buildings shall be arranged and/or partitioned to provide security of contents and ready access for inspection and inventory. Combustible materials shall be stored in a well ventilated, remote building meeting applicable safety standards.

5.3 Contractor's Field Office

Contractor is not required to maintain a field office, but may do so at Contractor's option.

5.4 Owner's Field Office

The WTP's Control Building will serve as the Owner's field office.

5.5 Sanitary Facilities

The Contractor shall provide sanitary facilities for the on site personnel:

1. As required by laws and regulations.
2. Not less than one (1) facility per site.
3. Not less than one (1) facility for each 20 employees, or fraction thereof, of Contractor and subcontractors at the site.

Facilities and enclosures shall be serviced, cleaned and maintained on a weekly basis.

The Owner's existing sanitary facilities will not be available for use by Contractor or subcontractors.

6.0 TEMPORARY CONSTRUCTION

Not used.

7.0 CONSTRUCTION AIDS

The Contractor shall provide construction aids and equipment required by personnel and to facilitate the execution of the Work including, but not limited to, scaffolds, staging, ladders, stairs, ramps, runways, platforms, railways, hoists, cranes, chutes and other such facilities and equipment as required. Contractor may, at his own risk, use hoists and cranes installed as part of the work, subject to the following:

1. Coordinate with Engineer and Owner.
2. Do not exceed rated capacity of hoists and cranes.
3. Replace or repair any damaged units to the satisfaction of the Owner.
4. Owner makes no representation as to the suitability, serviceability, or safety of hoists and cranes and assumes no responsibility for their safe use by the Contractor's personnel.

Construction aids shall be relocated as required by the progress of construction, by storage or work requirements, and to accommodate legitimate requirements of Owner. Temporary materials and equipment shall be completely removed at the completion of the Project. Remove foundations and underground installations for construction aids. The areas of the site affected by temporary installations shall be graded to required elevations and slopes and the area clean. The Contractor shall clean and repair damage caused by installation or by use of temporary facilities

8.0 VEHICLE ACCESS AND PARKING

There is limited paved parking available at the treatment plant. Contractor's construction vehicles shall not be parked in paved parking spaces or on paved treatment plant access roads. Vehicles shall be parked in the staging areas designated on the Drawings or as otherwise approved by the Construction Manager. Owner will provide Contractor 24-hour notice of chemical deliveries or other unusual access requirements which may necessitate the clearance of particular areas of the Plant Site of parked vehicles.

9.0 TEMPORARY BARRIERS AND ENCLOSURES

9.1 Barricades

The Contractor shall provide suitable barricades as required for protection of the work and protection of Owner's employees, Contractor's employees and others who may be affected by the Work. The barricades shall be provided to prevent unauthorized entry to construction areas and to protect existing facilities and adjacent property from damage. Warning lights shall be illuminated on barricades from sunset to sunrise where required for safety. Placement of barricades shall be done in a manner that will allow Owner's personnel access to existing facilities. The barricades shall be installed in a neat manner, with a reasonable uniform appearance and structurally adequate for the required purposes. Barricades shall be relocated as required by the progress of the Work. Barricades, including foundations, shall be removed when construction has progressed to the point that they are no longer needed. The Contractor shall repair damage caused by installation, fill and grade the areas of the site to required elevations and slopes and clean the area.

9.2 Fences

The existing Work site is fenced. Site perimeter fencing shall be maintained at all times throughout construction, unless otherwise specified. The Contractor shall provide fencing required to protect products or to ensure the safety of Contractor and Owner's personnel. Fencing shall be provided around equipment staging areas and other areas as required for adequate safety or security. The Owner's security requirements are contained in Specification Section 01150, **SITE SECURITY**.

10.0 CONFINED SPACES

All Contractor's work in the existing influent raw water vault and in the existing flocculation basins shall be considered work in a confined space. Contractor shall implement a confined space entry permit procedure in compliance with OSHA requirements and provide all safety gear as required for workers.

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SECTION 01610

PLACER COUNTY WATER AGENCY
144 FERGUSON ROAD
AUBURN, CA 95603

GENERAL PRODUCT REQUIREMENTS

1.0 GENERAL

1.1 Scope

- A. All products furnished and installed under this contract shall conform to the general stipulations set forth in this Section except as otherwise specified in other Sections.

1.2 Coordination

- A. The CONTRACTOR shall coordinate all details of the products and equipment with other related parts of the work, including verification that all structures, piping, wiring, and equipment components are compatible. The CONTRACTOR shall be responsible for all structural and other alterations in the work required to accommodate products or equipment differing in dimensions or other characteristics from that contemplated in the Contract Drawings or Specifications.

1.3 Design Requirements

- A. Where CONTRACTOR design is specified, design and installation of systems, equipment, and components, including supports and anchorage, shall be in accordance with provisions of 2019 edition of the California Building Code (CBC).

- 1. Basic Wind Speed: 115 mph, Exposure C.

- 2. Snow:

- a. Ground Snow Load = 20 psf

- b. Exposure Factor = 1.0

- c. Thermal Factor = 1.2

- d. Importance Factor = 1.2

- 3. Seismic:

- a. S_s (maximum short-term spectral response acceleration) = 0.485

- b. S_1 (maximum 1-second spectral response acceleration) = 0.223

- c. S_{DS} (design short-term spectral response acceleration) = 0.457

- d. S_{D1} (design 1-second spectral response acceleration) = N/A

- e. Site Class = D (assumed)

- f. Seismic Design Category = D
- g. I_e (Seismic Importance Factor) = 1.5
- h. Risk Category = IV
- i. Seismic Use Group = III

4. Maximum Rain Intensity: 3-inches/hour

B. Contractor's Seismic Design Requirements:

1. Structural integrity and anchorage shall be certified by an approved calculation that demonstrates the adequacy of the anchorage system for seismic forces. This calculation may be based on principles of structural analysis and engineering mechanics or based on similarity to approved shake-table tests.
2. The CONTRACTOR shall submit for review and approval test data or calculations certified by a Civil or Structural Engineer registered in the State of California to show compliance with the above requirements.
3. The CONTRACTOR shall provide and submit for review seismic anchorage calculations certified by a Civil or Structural Engineer registered in the State of California for all CONTRACTOR-supplied equipment as required by the California Building Code.

1.4 Environmental Requirements

- A. Altitude: Provide materials and equipment suitable for installation and operation under rated conditions at 1,800 feet above sea level.
- B. Provide equipment and devices installed outdoors or in unheated enclosures capable of continuous operation within an ambient temperature range of 0 degrees F to 120 degrees F.

1.5 Workmanship And Materials

- A. The CONTRACTOR shall guarantee all equipment against faulty or inadequate design, improper assembly or erection, defective workmanship or materials, and leakage, breakage, or other failure. Materials shall be suitable for service conditions.
- B. All equipment shall be designed, fabricated, and assembled in accordance with recognized and acceptable engineering and shop practice. Individual parts shall be manufactured to standard sizes and gages so that repair parts, furnished at any time, can be installed in the field. Like parts of duplicate units shall be interchangeable. Equipment shall not have been in service at any time prior to delivery, except as required by tests.
- C. Except where otherwise specified, structural and miscellaneous fabricated steel used in equipment shall conform to AISC standards. All structural members shall be designed for shock or vibratory loads. Unless otherwise specified, all steel which will be submerged, all or in part, during normal operation of the equipment shall be at least 1/4 inch thick.
- D. Except where otherwise specified, all metal which will be exposed to weather, submerged or otherwise exposed to moisture shall be either non-ferrous or stainless steel, as the application may require.

1.6 Lubrication

- A. Equipment shall be adequately lubricated by systems which require attention no more frequently than monthly during continuous operation. Lubrication systems shall not require attention during startup or shutdown and shall not waste lubricants.
- B. Lubricants of the type recommended by the equipment manufacturer shall be provided in sufficient quantity to fill all lubricant reservoirs and to replace all consumption during testing, startup, and operation prior to acceptance of equipment by OWNER. Unless otherwise specified or permitted, the use of synthetic lubricants will not be acceptable.
- C. Lubrication facilities shall be convenient and accessible. Oil drains and fill openings shall be easily accessible from the normal operating area or platform. Drains shall allow for convenient collection of waste oil in containers from the normal operating area or platform without removing the unit from its normal installed position.

1.7 Electric Motors

- A. Unless otherwise specified, motors furnished with equipment shall meet the following requirements:
 - 1. Designed and applied in accordance with NEMA, ANSI, IEEE, AFBMA, and NEC for the duty service imposed by the driven equipment, such as frequent starting, intermittent overload, high inertia, mounting configuration, or service environment.
 - 2. Rated for continuous duty at 50°C ambient, unless the application is well recognized for intermittent duty service as a standard industry practice.
 - 3. Insulated with Class F insulation and designed for a service factor of 1.15, or greater.
 - 4. Three phase motors used in conjunction with variable speed drives shall have Class H insulation with a Class B temperature rise at rated nameplate horsepower, and 1.15 service factor.
 - 5. When operating at service factor load, maximum observable temperature rise of insulation and motor parts, as determined by resistance or thermometer methods, shall not exceed the NEMA allowable limits for the type of motor, the type of enclosure, and the particular application with regard to continuous or intermittent duty.
 - 6. To ensure long motor life, nameplate horsepower, regardless of service factor, shall be at least 115 percent of the maximum load imposed by the driven equipment.
 - 7. Designed for full voltage starting.
 - 8. Designed to operate from an electrical system that may have a maximum of 5 percent voltage distortion per IEEE Standard 519.
 - 9. Derated, if required, for the altitude at which the equipment is installed.
 - 10. Clamp-type grounding terminal shall be inside motor conduit box.
 - 11. All motors shall be provided with split-type cast metal conduit boxes. Motors shall be provided with oversized conduit boxes at least one size larger than NEMA standard.

Where conduit sizes indicated do not match the motor terminal box, the CONTRACTOR shall provide means to accommodate the motor requirements. Motor boxes shall be gasketed.

12. Provide an auxiliary terminal box for terminating auxiliary and protective devices lead wires.
13. Totally enclosed motors shall be furnished on all equipment.
14. Totally enclosed motors shall have a continuous moisture drain which also excludes insects.
15. Bearings shall be either oil or grease lubricated.
16. Electric motors driving identical machines shall be identical.
17. Electric motors shall comply with NEMA MG-1 - Motor and Generator. Motors used with adjustable frequency drives shall comply with NEMA MG-1, Part 31, and shall be clearly identified as "Inverter Duty."
18. Inverter duty motors shall be provided with shaft grounding rings. Rings shall be factory installed, and shall be manufactured by Aegis, or equal. The motor warranty shall include coverage against VFD-induced bearing damage or failure.
19. Thermostats: Where indicated or specified, winding thermostats shall be snap action, bi-metallic, temperature-actuated switch. Thermostats shall be provided with one normally closed contact. The thermostat switch point shall be pre-calibrated by the manufacturer. All inverter duty motors shall be provided with winding thermostats, unless RTDs are specified.

1.8 Drive Units

- A. The nominal input horsepower rating of each gear or speed reducer shall be at least equal to the nameplate horsepower of the drive motor. Drive units shall be designed for 24 hours continuous service.
- B. Unless otherwise specified, the use of gearmotors will not be acceptable.
- C. Gear Reducers:
 1. Each gear reducer shall be a totally enclosed unit with oil or grease lubricated antifriction, rolling element bearings throughout.
 2. Helical, spiral bevel, combination bevel-helical, and worm gear reducers shall have a service factor of at least 1.50 based on the nameplate horsepower of the drive motor. Shaft-mounted and flange-mounted gear reducers shall be rated AGMA Class II. Helical gear reducers shall have a gear strength rating to catalog rating of 1.5. Each gear reducer shall bear an AGMA nameplate.
 3. The thermal horsepower rating of each unit shall equal or exceed the nameplate horsepower of the drive motor. During continuous operation, the maximum sump oil temperature shall not rise more than 100°F above the ambient air temperature in the vicinity of the unit and shall not exceed 200°F.

4. Bearings:

- a. Each grease lubricated bearing shall be installed in a bearing housing designed to facilitate periodic re-greasing of the bearing by means of a manually operated grease gun.
 - b. Each bearing housing shall be designed to evenly distribute new grease, to properly dispose of old grease, and to prevent over-greasing of the bearing.
 - c. The use of permanently sealed, grease lubricated bearings will not be acceptable.
 - d. An internal or external oil pump and appurtenances shall be provided if required to properly lubricate oil lubricated bearings.
 - e. A dipstick or sight glass arranged to permit visual inspection of lubricant level shall be provided on each unit.
5. Gear reducers that require the removal of parts or periodic disassembly of the unit for cleaning and manual re-greasing of bearings will not be acceptable.
6. Certification shall be furnished by the gear reducer manufacturer indicating that the intended application of each unit has been reviewed in detail by the manufacturer and that the unit provided is fully compatible with the conditions of installation and service.

D. V-belt drives:

1. Each V-belt drive shall include a sliding base or other suitable tension adjustment. V-belt drives shall have a service factor of at least 1.6 at maximum speed based on the Nameplate Horsepower Of The Drive Motor.

1.9 Safety Guards

- A. All belt or chain drives, fan blades, couplings, and other moving or rotating parts shall be covered on all sides by a safety guard.
- B. Safety guards shall be fabricated from 16 USS gauge or heavier galvanized or aluminum-clad sheet steel or 1/2 inch mesh galvanized expanded metal.
- C. Each guard shall be designed for easy installation and removal.
- D. All necessary supports and accessories shall be provided for each guard. Supports and accessories, including bolts, shall be galvanized.
- E. All safety guards in outdoor locations shall be designed to prevent the entrance of rain and dripping water.

1.10 Anchor Bolts

- A. Equipment suppliers shall furnish suitable anchor bolts for each item of equipment.
- B. Anchor bolts, together with templates or setting drawings, shall be delivered sufficiently early to permit setting the anchor bolts when the structural concrete is placed.

- C. Anchor bolts shall comply with Section 05051, **ANCHORS, INSERTS AND DOWELS** and, unless otherwise specified, shall have a minimum diameter of 1/2-inch.
- D. Unless otherwise indicated or specified, anchor bolts for items of equipment mounted on baseplates shall be long enough to permit 1-1/2 inches of grout beneath the baseplate and to provide adequate anchorage into structural concrete.

1.11 Equipment Bases

- A. Cast iron or welded steel baseplates with holes for the required anchors shall be provided for all equipment.

1.12 Special Tools And Accessories

- A. Equipment requiring periodic repair and adjustment shall be furnished complete with all special tools, instruments, and accessories required for proper maintenance. Equipment requiring special devices for lifting or handling shall be furnished complete with those devices.

1.13 Shop Painting

A. Surface Protection:

1. All steel and iron surfaces shall be protected by suitable paint or coatings applied in the shop.
2. Surfaces that will be inaccessible after assembly shall be protected for the life of the equipment.
3. Exposed surfaces shall be finished smooth, thoroughly cleaned, and filled as necessary to provide a smooth uniform base for painting.
4. Electric motors, speed reducers, starters, and other self-contained or enclosed components shall be shop primed or finished with a high-grade oil-resistant enamel suitable for coating in the field with an alkyd enamel.
5. Coatings shall be suitable for the environment where the equipment is installed.

B. Shop Primer:

1. Surfaces to be painted after installation shall be prepared for painting as recommended by the paint manufacturer for the intended service, and then shop painted with one or more coats of the specified primer.
2. Unless otherwise specified, the shop primer for steel and iron surfaces shall be:
 - a. Cook "391-N-167 Barrier Coat",
 - b. Koppers "No. 10 Inhibitive Primer",
 - c. Tnemec "37H Chem-Prime HS",
 - d. Valspar "13-R-28 Chromox Primer",

- e. Or equal.
- C. Machined, polished, and nonferrous surfaces which are not to be painted shall be coated with rust-preventive compound, Houghton "Rust Veto 344", Rust-Oleum "R-9", or equal.

1.14 Preparation For Shipment

- A. All equipment shall be suitably packaged to facilitate handling and protect against damage during transit and storage. All equipment shall be boxed, crated, or otherwise completely enclosed and protected during shipment, handling, and storage. All equipment shall be protected from exposure to the elements and shall be kept thoroughly dry at all times.
- B. Painted surfaces shall be protected against impact, abrasion, discoloration, and other damage. All painted surfaces which are damaged prior to acceptance of equipment shall be repainted to the satisfaction of ENGINEER.
- C. Grease and lubricating oil shall be applied to all bearings and similar items.
- D. Each item of equipment shall be tagged or marked as identified in the delivery schedule or on the Shop Drawings. Complete packing lists and bills of material shall be included with each shipment.

1.15 Storage

- A. Upon delivery, all equipment and material shall immediately be stored and protected until installed in the work.
- B. Pumps, motors, electrical equipment, and all equipment with antifriction or sleeve bearings shall be stored in weathertight structures maintained at a temperature above 60° F. Equipment, controls, and insulation shall be protected against moisture and water damage. All space heaters furnished in equipment shall be connected and operated continuously.
- C. Equipment and materials shall not show any pitting, rust, decay, or other deleterious effects of storage when installed in the work.

1.16 Installation And Operation

- A. Equipment shall not be installed or operated except by, or with the guidance of, qualified personnel having the knowledge and experience necessary for proper results. When so specified, or when employees of the CONTRACTOR or their subcontractors are not qualified, such personnel shall be field representatives of the manufacturer of the equipment or materials being installed.
- B. Qualified field representatives shall be provided by the equipment manufacturers as required by Section 01700, **EQUIPMENT AND SYSTEM TESTING, STARTUP AND DEMONSTRATION**.
- C. All equipment installed under this Contract, including that furnished by OWNER shall be placed into successful operation according to the written instructions of the manufacturer or the instructions of the manufacturer's field representative. All required adjustments, tests, operation checks, and other startup activity shall be provided.

- D. Acceptance of work in connection with the installation of equipment furnished by others will be subject to approval of the field representative. The CONTRACTOR shall be responsible for planning, supervising, and executing the installation of work, and the approval or acceptance of ENGINEER or the field representative will not relieve the CONTRACTOR of responsibility for defective work.

2.0 PRODUCTS (NOT USED)

3.0 EXECUTION (NOT USED)

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

SECTION 01700

PLACER COUNTY WATER AGENCY 144 FERGUSON ROAD AUBURN, CA 95603

EQUIPMENT AND SYSTEM TESTING, STARTUP AND DEMONSTRATION

1.0 GENERAL

1.1 Summary

This section contains requirements for Performance Testing and Facility Startup/Operational Testing for all the mechanical, electrical, and instrumentation systems. In addition, this section contains requirements for the documentation of all testing work. This section supplements the specific testing requirements found in the individual sections of these Specifications.

1.2 Overview

The general sequence of testing and startup will proceed as follows. Expanded information on each item is presented later in this Section:

- A. **SUBMITTALS**
All relevant submittals, operation and maintenance manuals and factory testing shall be completed and acceptable to the Engineer.
- B. **CALIBRATION**
All test equipment to be used during the testing shall be calibrated.
- C. **TESTING PREPARATION**
Preparation for actual testing will then take place (visual inspections, lubrication, etc.)
- D. **Performance Testing (8-Hours)**
Performance Testing shall be conducted on each piece of equipment to verify its operation prior to putting the entire system on-line. Performance Testing will be for a continuous 8-hour period for each piece of equipment.
- E. **Training**
Training of the Owner's personnel shall take place after the Contractor has verified that the individual pieces of equipment are in working order.
- F. **FACILITY STARTUP/OPERATIONAL TESTING (5-DAYS)**
Facility Startup/Operational Testing will then follow. The Operational Testing is to verify that the facility as a whole is functioning properly. Operational Testing will be for a continuous 5-day period.

1.3 **Contractor's Testing Manager**

The Contractor shall appoint a qualified professional as the Contractor's Testing Manager to manage, coordinate, and supervise the Testing Program.

1.4 **Submittals**

Submittals shall be provided in accordance with Section 01330, **SUBMITTAL PROCEDURES** and shall include the following information:

- A. A schedule for the Performance Testing and Facility Startup/Operational Testing updated monthly (weekly when testing is taking place).
- B. A complete Testing and Startup Plan for review at least 30 days prior to planned start of testing.
- B. An Equipment Testing Plan to be used during Performance Testing.
- C. A Facility Startup/Operational Testing Plan.
- D. Calibration and Performance Test results, documented as required by the test program, of equipment or system prior to commencement of the Operational Test.
- E. The original and three copies of all records produced during the Testing Program.
- H. Completed **Equipment Test Report** forms for each piece of equipment. Sample **Equipment Test Report** 01999-18 is located in Section 01999, **REFERENCE FORMS**.

2.0 **PRODUCTS**

2.1 **Equipment Testing Plans**

The objective of the Equipment Testing Plan shall be to demonstrate, to the Engineer's complete satisfaction, that the structures, systems, and equipment meet all the performance requirements. In addition, the Equipment Testing Plan shall produce a record of baseline operating conditions for the Owner.

The Contractor shall participate with the Engineer in the development of the Equipment Testing Plan which will be based on the detailed testing requirements as stated in the individual Specification sections. The Equipment Testing Plan shall be divided into the various process systems. The Equipment Testing Plan shall include tests and documentation procedures for the calibration of all analysis instruments and control sensors followed by step-by-step procedures for the Performance Testing and Facility Startup/Operational Testing for each individual item of mechanical, electrical, and instrumentation equipment, and for the facility as a whole as specified in the individual Sections. The Contractor shall be responsible for leading the development of the Equipment Testing Plan effort and the Equipment Testing Plan shall be reviewed and accepted by the Engineer prior to beginning any testing.

The Contractor shall submit **Equipment Test Report Form** 01999-18 located in Section 01999, **REFERENCE FORMS** for each item of equipment to be tested. A copy of a sample test form is included for the Contractor's use. The sample is furnished as a means of illustrating the level of detail required for preparation of equipment and test report forms for this project. The minimum information to be included shall be as follows:

- A. Project Name.
- B. Equipment or item tested (including tag numbers).
- C. Date and time of test.
- D. Type of test performed (Performance or Operational).
- E. Test conditions.
- F. Manufacturer's representatives present during testing (if applicable)
- G. Temporary systems required during the testing (if applicable)
- H. Test results.
- I. Calibration documentation for all test equipment (including test laboratory)
- J. Signature space for Contractor and Engineer.

The Contractor shall prepare a testing schedule establishing the time period when the Contractor plans to proceed with the testing of the completed systems and each system element. The schedule shall include a description of the temporary systems and installations planned to allow testing to take place. The schedule shall detail the sequence, time and duration of Performance Testing and Facility Startup/Operational Testing. No testing or startup shall take place on dates and times other than those given in the testing schedule.

3.0 EXECUTION

3.1 Contractor's Responsibilities

The Contractor shall provide, at no expense to the Owner, all fuel, chemicals, compressed air supplies, all labor, temporary piping, valves, gauges, test equipment, heating, ventilating, air conditioning and all other items and work required to complete the tests. Temporary facilities shall be maintained until permanent systems are in service.

The Contractor shall arrange for the manufacturer's representatives to revisit the Site as often as necessary to correct malfunctions to the Engineer's satisfaction.

The Contractor is responsible to coordinate with equipment manufacturer's representative for certification of equipment installation and startup testing support.

3.2 Contractor's Testing Manager

The Contractor's Testing Manager shall organize qualified representatives of equipment suppliers, subcontractor's, the Contractor's independent testing laboratory, and others, as appropriate, to calibrate and test the equipment, systems, and the facility as a whole. Testing shall follow the procedures and sequences as described in the Equipment Testing Plan.

Test results shall be documented on forms provided in the Equipment Testing Plan, including but not limited to the **Equipment Test Report** 01999-18, as previously described. The Contractor's Testing Manager shall conduct at least weekly meetings

with the test team and the Engineer beginning one week prior and continuing during equipment testing periods to discuss procedures and testing results. The Testing Manager shall be present during equipment testing, facility startup, and meetings and shall be available at all times during Testing.

3.3 Test Equipment Calibration

The Contractor shall conduct a calibration program for all instruments, gages, meters, monitors, and thermometers used for determining the performance of equipment and systems to be tested.

All test equipment (gages, thermometers, meters, analysis instruments, and other equipment) used for calibrating or verifying the performance of equipment installed under this contract shall be calibrated to an accuracy at least as accurate as the tolerance specified for the item being tested with $\pm 2\%$ of actual value at full scale being the maximum allowable. Test equipment employed for individual test runs shall be selected so that expected values as indicated by the detailed performance specifications will fall between 60 and 85% of full scale.

Pressure gages shall be calibrated in accordance with ANSI/ASME B40.1. Thermometers shall be calibrated in accordance with ASTM E77. Liquid flow meters, including all open channel flow meters and all meters installed in pipelines with diameters greater than 2" shall be calibrated in situ using either the total count or dye dilution methods. Ultrasonic level and magnetic type flow meters shall be calibrated per manufacturers' recommendations. For gas flow meters installed in piping systems with diameters greater than 6", factory calibration curves for the primary element shall be submitted and the transmitters shall be calibrated onsite per factory specifications.

3.4 Testing Preparation

The following steps apply to each process system or facility as it is readied for startup and operation:

- A. **SUBMITTALS**
All submittals relevant to installation practices, equipment, piping, anchorage calculations, instrumentation, materials, and testing plans have been submitted to the Engineer and received "No Exceptions Taken" or "Make Corrections Noted" review status.
- B. **FACTORY TESTING**
Where required prior to the shipment of equipment to the site, complete factory testing. Such testing may be both unwitnessed and witnessed by the Engineer and/or Owner as specified and at their discretion.
- C. **OPERATIONS AND MAINTENANCE MANUALS**
Operations and maintenance manuals for equipment shall be submitted and receive "No Exceptions Taken" or "Make Corrections Noted" review status.
- D. **CONSTRUCTION COMPLETE**
Construction is substantially complete so that facility is ready to be used for its intended purposes and all signage is posted. All construction deficiencies shall

be corrected prior to testing, unless agreed by Owner that testing can begin concurrent with correcting a construction deficiency.

E. INSPECTION

Inspect and clean equipment, devices, connected piping, and structures to ensure they are free of foreign material.

F. LUBRICATION

Lubricate equipment in accordance with manufacturer's instructions.

3.5 **Performance Tests**

A. GENERAL

Each item and system of mechanical, electrical, and instrumentation equipment installed under this contract shall be tested for 8-hours continuously to demonstrate compliance with the performance requirements of the individual Specification sections, unless otherwise specified.

Follow the approved Equipment Testing Plan and detailed procedures specified. Unless otherwise indicated, furnish all labor, materials, and supplies for conducting the test and taking all samples and performance measurements. Prepare Performance Test reports summarizing test methods and results as described in the Equipment Testing Plan.

The Contractor is responsible for performance testing of all project equipment and systems in all modes of operation including remote PLC modes of operation. Owner will operate equipment in remote modes of control and test all PLC/SCADA logic.

B. PRESSURE AND LEAKAGE TESTS

Pressure and leakage tests shall be conducted in accordance with applicable provisions of Division 15 and shall be completed prior to any testing of connected mechanical equipment or valves. All tests shall be witnessed by the Engineer. Evidence of successful completion of the pressure and leakage tests shall be the Engineer's signature on **Pipe Test Record Form** 01999-24 located in Section 01999, **REFERENCE FORMS**.

C. CALIBRATION

Calibration of analysis instruments, sensors, gages, and meters installed under this contract shall proceed on a system-by-system basis. No equipment or system Performance Tests shall be performed until instruments, gages, and meters to be installed in that particular system have been calibrated and the calibration work has been witnessed by the Engineer. Calibrate testing equipment in accordance with the manufacturer's instructions. The Contractor shall execute and submit completed **Instrument Calibration Test Data Form** 01999-43 found in Section 01999, **REFERENCE FORMS**.

D. MECHANICAL SYSTEMS

Manufacturer's representatives shall confirm that all equipment and valves are properly installed before first operation and shall conduct/oversee the initial

operation and testing. All mechanical systems shall be tested as specified in the individual equipment specification sections and as follows:

1. Ensure and demonstrate that equipment and valves operate properly and reliably. Open and close valves by hand and operate other devices to check for binding, interference, or improper functioning.
2. Inspect hand and motorized valves for proper adjustment. Tighten packing glands to insure no leakage, but permit valve stems to rotate without galling. Verify valve seats are positioned for proper flow direction.
3. Tighten leaking flanges or replace flange gasket. Inspect screwed joints for leakage.
4. Equipment that is capable of automatic or remote operation shall be tested first in manual mode. Limit switches shall be set and adjusted on all valves so equipped. Setpoints on all pressure regulating, pressure relief, vacuum relief, and other valves with setpoints shall be confirmed and reset as directed by the Engineer.
5. Remove rust preventatives and oils applied to protect equipment during construction.
6. Flush lubrication systems and dispose of flushing oils. Recharge lubrication system with lubricant recommended by manufacturer.
7. Install and adjust packing, mechanical seals, O-rings, and other seals. Replace defective seals.
8. Remove temporary supports, bracing, or other foreign objects installed to prevent damage during shipment, storage, and erection.
9. Check rotating machinery for correct direction of rotation and for freedom of moving parts before connecting driver. Turn rotating equipment by hand when possible to confirm that equipment is not bound.
10. Perform cold alignment and hot alignment to manufacturer's tolerances.
11. Adjust V-belt tension and variable pitch sheaves.
12. Startup tests of motors and VFD's shall be performed to verify performance and operation over the full operating range from minimum to maximum speed.
13. Install all associated safety accessories and handrail/guardrail prior to Facility Startup/Operational Testing.

E. ELECTRICAL SYSTEMS

Testing shall be performed in three stages as specified in the individual equipment specification sections and as follows:

1. The first stage shall consist of electrical equipment testing prior to energization and operation of electrical equipment. Testing, calibration, and setting of electrical conductors, equipment, protective devices, grounding, and other components as specified in the electrical sections of the Specifications shall be conducted prior to equipment startup. This also includes bumping all motors to verify the direction of rotation. Unsatisfactory equipment test results shall require that the equipment be repaired and re-tested until acceptable results are obtained at no additional cost to the Owner.
2. The second stage of electrical testing shall occur after energization and start-up of equipment and shall consist of complete testing of all other equipment as specified in the Electrical Sections.
3. The third stage of testing will take place during the Operational Testing and shall include all possible operating scenarios, alarm conditions, prohibitive interlocks, and indication functions.

F. INSTRUMENTATION

Conduct field calibration, loop acceptance, and end-to-end testing as specified in the individual Instrumentation Sections. Bench or field calibrate instruments and make required adjustments and control point settings. Energize transmitting and control signal systems, verify proper operation, ranges, and settings. Demonstrate proper operation of each instrument loop function including alarms, local and remote controls, instrumentation and other equipment functions. Generate signals with test equipment to simulate operating conditions in each control mode.

G. PERMANENT UTILITIES

Conduct Performance Tests on utilities impacted, constructed, or modified by construction, as specified in the applicable Sections.

I. DEMONSTRATION

Demonstrate proper rotation, alignment, speed, flow, pressure, vibration, sound level, adjustments, and calibration over the full operating range of equipment and systems. Perform initial checks in the presence of and with the assistance of the manufacturer's representative.

3.6.1 Test Results

Test results shall be within the tolerances stated in the individual Specification sections. If no tolerances have been specified, test results shall conform to tolerances established by recognized industry practice. When, in Engineer's opinion, equipment meets performance requirements specified, such equipment will be accepted as to conforming to Contract requirements. Such acceptance will be evidenced by Engineer's signature on the **Equipment Test Report** 01999-18.

Should any doubt, dispute, or difference arise between the Engineer and the Contractor regarding the test results or the methods or equipment used in the performance of the testing, then the Engineer may order the test to be repeated. If the repeat test, using such methods or equipment as the Engineer requires, substantially confirms the previous test, then all costs in connection with the repeat test will be paid by the Owner, otherwise the costs shall be borne by the Contractor. All costs associated with repeat testing due to failed test results shall be borne by the Contractor, including the Engineers expenses.

If any portion of the work should fail to fulfill the contract requirements and is adjusted, altered, renewed, or replaced, tests on that portion of the work together with all other affected portions of the work, shall, be repeated within reasonable time and in accordance with the specified requirements. The Contractor shall pay to the Owner all reasonable expenses incurred by the Owner, including the costs of the Engineer, as a result of repeating such tests.

3.7 Post Test Inspection

Once Performance Testing has been completed, all machines shall be rechecked for proper alignment and realigned, as required. All equipment shall be checked for loose connections, unusual movement, or other indications of improper operating characteristics. Any deficiencies shall be corrected to the satisfaction of the Engineer. All machines or devices, which exhibit unusual or unacceptable operating characteristics, shall be disassembled and inspected. Any defects found during the course of the inspection shall be repaired or the specific part or entire equipment item shall be replaced to the complete satisfaction of the Engineer, at no cost to the Owner.

3.8 Manufacturer's Certificate of Proper Installation

Upon completion of Performance Testing and prior to Facility Startup/Operational Testing, the Contractor shall submit the **Manufacturer's Installation Certification Form** 01999-21 found in Section 01999, **REFERENCE FORMS**, signed by the manufacturer's authorized representative and certifying that the equipment:

- A. Has been properly installed, adjusted, aligned, and lubricated.
- B. Is free of any stresses imposed by connecting piping or anchor bolts.
- C. Is suitable for satisfactory full-time operation under full load conditions.
- D. Operates within the allowable limits for vibration.
- E. Controls, protective devices, instrumentation, and control panels furnished as part of the equipment package are properly installed, calibrated, and functioning.
- F. Control logic for start-up, shutdown, sequencing, interlocks, and emergency shutdown have been tested and are properly functioning.

The Contractor shall also submit the **Manufacturer's Installation Certification Form** 01999-21 found in Section 01999, **REFERENCE FORMS**, signed by the electrical and/or instrumentation Subcontractor certifying:

- A. Control logic that resides in motor control centers, control panels, and circuit boards furnished by the electrical and/or instrumentation subcontractor has been calibrated and tested and is properly operating.
- B. Control logic for equipment start-up, shutdown, sequencing, interlocks and emergency shutdown has been tested and is properly operating.

The Contractor shall co-sign the **Manufacturer's Installation Certification Form** 01999-21 along with the manufacturer's representative and Subcontractors and deliver the reports to the Engineer prior to Facility Startup/Operational Testing.

3.9 Training

The Contractor shall conduct the training of the Owner's staff as specified for equipment and facility operation and maintenance before each associated system is placed into service. Refer to Section 01710, **TRAINING** for specific requirements.

3.10 Facility Startup and Operational Testing

After completion of all Performance Testing and operator training the Contractor shall begin the Facility Startup and conduct Operational Tests of each system as described herein. shall conduct the Operational Test for a continuous 5-day period. Contractor shall be present during the Operational Testing and provide Subcontractor and equipment manufacturers' staff as needed to correct deficiencies and prevent delays.

A. FACILITY STARTUP/OPERATIONAL PLAN

- 1. Develop a plan detailing step-by-step instructions for startup of each unit process and the complete facility. The Owner will assist by providing system operational constraints.
- 2. Evaluate each unit process, utilizing the **Startup and Performance Evaluation Forms** 01999-47 found in Section 01999, **REFERENCE FORMS**. Use one form for each unit process. **Startup and Performance Evaluation Forms** will minimally include the following:
 - a. Description of unit process being started.
 - b. All equipment and devices included in the unit process.
 - c. Unit process startup procedures (i.e., valves to be open/closed, order of equipment startup, etc.).
 - d. Requirements for water, power, chemicals, etc. needed for startup.
 - e. Space for performance evaluation comments.

B. OWNER'S RESPONSIBILITIES

1. Assist Contractor in developing a Facility Startup and Demonstration Plan detailing step-by-step instructions for startup of each unit process and the complete facility.
2. Provide water and power for testing and facility startup, unless otherwise indicated.
3. Operate process units and devices, with support of Contractor.
4. Provide labor and materials as required for sampling and laboratory analyses.
5. Test all remote modes of operation via plant Master PLC/SCADA system and all Master PLC control logic which is provided by Owner's Systems Integrator.

C. FACILITY STARTUP/OPERATIONAL TESTING PERIOD

1. Startup sequence of the unit processes shall be in accordance with the Facility Startup/Operation Plan developed by the Contractor and the Owner, and as approved by the Engineer.
2. Startup of the entire facility or any portion thereof shall be considered complete when, in the opinion of the Engineer, the facility or designated portion has operated in manner intended for 5-continuous days, without interruption, unless otherwise specified. This period is in addition to training, or Performance Test periods specified elsewhere.
3. Repeat the Operational Test when malfunctions or deficiencies cause shutdown or partial operation of the facility or results in performance that is less than specified, as determined by the Engineer. Any interruption will require the startup then in progress to be stopped and restarted for an additional 5-continuous days, after corrections are made.

D. FACILITY PERFORMANCE EVALUATION

1. During the Facility Startup/Operational Testing Period, conduct a performance evaluation to determine the full capabilities of the facility and performance of the system, until all unit processes are operable and under successful control of the Plant SCADA system.
2. Certify, on the **Startup and Performance Evaluation Forms**, 01999-47 found in Section 01999, **REFERENCE FORMS** that each unit process is capable of performing its intended function(s), including fully automatic and computerized operation.

3. At the end of the Facility Performance Evaluation and when all corrections required by the Engineer to assure a reliable and completely operational facility are complete and all test reports have been submitted and approved, the Engineer shall issue a Completion Certification.

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SECTION 01710

PLACER COUNTY WATER AGENCY 144 FERGUSON ROAD AUBURN, CA 95603

TRAINING

1.0 GENERAL

1.1 Summary

This section contains requirements for training the Owner's personnel, by persons retained by the Contractor specifically for the purpose, in the proper operation and maintenance of the equipment and systems installed under this contract. All costs for training shall be the responsibility of the Contractor.

1.2 Quality Assurance

The Contractor shall provide on-the-job training of the Owner's personnel for all equipment identified in the technical specifications. The training sessions shall be conducted by qualified, competent, experienced (two years minimum), manufacturers' factory-trained representatives (not sales representatives) of the various equipment manufacturers. Representatives shall be thoroughly familiar with instructional methods in addition to the subject matter.

If, in the opinion of the Owner, an appropriately knowledgeable person did not provide the scheduled training, such training shall be rescheduled and repeated with a suitable instructor at no additional cost to the Owner.

Training shall include instruction of operating personnel in equipment operation in one session, and preventive maintenance and instruction of station mechanics, electricians, and electronics technicians in normal maintenance up to major repair in a separate session.

1.3 Submittals

- A. The Contractor shall submit a training plan to the Engineer for review, in accordance with the provisions of Section 01330, **SUBMITTAL PROCEDURES**. The submitted training plan shall include lesson materials in addition to a training schedule as follows:
 - 1. A class agenda and lesson plans for each training session to be conducted by the manufacturer's representatives shall be submitted. In addition, training manuals, handouts, visual aids, and other reference materials shall be included.
 - 2. Date, time, and subject of each training session and identity the qualifications of individuals to be conducting the training.
- B. The Contractor shall submit a list of all equipment items or systems for which training will be provided in accordance with the Specifications. The list shall

include item number, specification section, description and required training in hours.

2.0 PRODUCTS

2.1 General

Where specified in Divisions 11, 15, and 16 the Contractor shall conduct training sessions for the Owner's operating personnel in one session to instruct the staff on the proper operation of the equipment, and maintenance and repair personnel in a separate session to instruct the staff on the proper care and maintenance of the equipment and systems installed under this contract. Training shall take place at the site of the work and under the conditions specified in the following paragraphs.

2.2 Operation and Maintenance Manuals

If training is being conducted on equipment, systems, or products for which an operations and maintenance manual is required, this manual shall be complete, approved by the Engineer and used during the classroom instruction. Approved operating and maintenance manuals shall be available to Owner personnel at least 30-days prior to the date scheduled for the individual training session. Refer to Section 01782, **OPERATING AND MAINTENANCE MATERIALS**, for additional requirements.

2.3 Location

Field training sessions shall take place at the site of the equipment. Classroom training facility will be provided by the Owner.

2.4 Lesson Plans

A class agenda shall be prepared and submitted to the Engineer as least 4 weeks in advance of the training sessions. Formal written lesson plans shall be prepared for each training session. Lesson plans shall contain an outline of the material to be presented along with a description of visual aids to be utilized during the session, and the training materials shall include a list of tasks which the Owner's employees may perform with the equipment. Each plan shall contain a time allocation for each subject.

One complete set of originals of the lesson plans, training manuals, handouts, visual aids, and reference material shall be the property of the Owner and shall be suitably bound for proper organization and easy reproduction. The Contractor shall furnish three copies of necessary training manuals, handouts, and reference materials and one copy of necessary visual aids at least two weeks prior to each training session. It is estimated that 5 to 10 persons will attend each training session. The Owner will determine the actual number of students and provide an estimated "headcount" one week prior to the class, so that the instructor can furnish the class room materials, samples, and handout for all those in attendance.

2.5 Format and Content

For the fine screen and flocculation equipment, the training for operation personnel and for maintenance personnel shall be provided as separate entities. Each training session shall be composed of time spent both in the classroom and at the specific location of the equipment or system. As a minimum, a training session shall cover the following topics for each item of equipment or system:

Topic	Operations Personnel	Maintenance & Repair Personnel
Familiarization	X	X
Safety	X	X
Operation (Start-up, Shut-down, Normal & Emergency)	X	X
Instrumentation	X	X
Electrical and Mechanical Troubleshooting		X
Preventive Maintenance	X	X
Lubrication of Equipment	X	X
Corrective Maintenance, Repair, and Overhaul		X
Lockout Procedures, Alarm, and Fail-Safe Operation	X	X
Parts (Including Inventory of Spare Parts)		X
Local Representatives		X
Operation and Maintenance Manuals	X	X

2.6 Video Recording

The Contractor shall record, or retain the services of a commercial video taping service to record, each training session. The videotape shall be transferred onto DVD-R and two copies shall be provided to the Owner. The Contractor shall advise all manufacturers providing training sessions that the material will be video taped.

3.0 EXECUTION

3.1 Training

Training shall be conducted after the Performance Testing and prior to the Facility Startup/Operational Testing. Refer to Section 01700, **EQUIPMENT AND SYSTEM TESTING, STARTUP AND DEMONSTRATION** for additional information.

Classes shall be scheduled such that classroom sessions are interspersed with field instruction in a logical sequence. The Contractor shall consolidate short training

sessions into combined sessions so that staff time is more efficiently used. Organize training sessions into maintenance versus operation topics and identify on schedule.

A. No training sessions shall be scheduled for Mondays or Fridays, or legal holidays recognized by the Owner. The Contractor shall coordinate the scheduling of training sessions and the length of the classes with the Owner's Treatment Plant Operations Supervisor.

B. The following services shall be provided for each item of equipment or system as required in individual Specification sections. Additional services shall be provided, where specifically required in individual Specification sections.

1. As a minimum, classroom equipment training for operations personnel shall include:

- a. Using slides and drawings, discuss the equipment's specific location in the plant and an operational overview.
- b. Purpose and plant function of the equipment.
- c. A working knowledge of the operating theory of the equipment.
- d. Start-up, shutdown, normal operation, and emergency operating procedures, including a discussion on system integration and electrical interlocks, if any.
- e. Identify and discuss safety items and procedures.
- f. Routine preventative maintenance, including specific details on lubrication and maintenance of corrosion protection of the equipment and components.
- g. Operator detection, without test instruments, of specific equipment trouble symptoms.
- h. Required equipment exercise procedures and intervals.
- i. Routine disassembly and assembly of equipment if applicable (as judged by the Owner on a case-by-case basis) for purposes such as operator inspection of equipment.

include: 2. As a minimum, hands-on equipment training for operations personnel will

- a. Identify location of equipment and review the purpose.
- b. Identifying piping and flow options.
- c. Identifying valves and their purpose.

- d. Identifying instrumentation:
 - i. Location of primary element.
 - ii. Location of instrument readout.
 - iii. Discuss purpose, basic operation, and information interpretation.
 - e. Discuss, demonstrate, and perform standard operating procedures and round checks.
 - f. Discuss and perform the preventative maintenance activities.
 - g. Discuss and perform start-up and shutdown procedures.
 - h. Perform the required equipment exercise procedures.
 - i. Perform routine disassembly and assembly of equipment if applicable.
 - j. Identify and review safety items and perform safety procedures, if feasible
3. Classroom equipment training for the maintenance and repair personnel will include:
- a. Theory of operation.
 - b. Description and function of equipment.
 - c. Start-up and shutdown procedures.
 - d. Normal and major repair procedures.
 - e. Equipment inspection and troubleshooting procedures including the use of applicable test instruments and the "pass" and "no pass" test instrument readings.
 - f. Routine and long-term calibration procedures.

- g. Safety procedures.
- h. Preventive maintenance such as lubrication; normal maintenance such as belt, seal, and bearing replacement; and up to major repairs such as replacement of major equipment part(s) with the use of special tools.

4. Hands-on equipment training for maintenance and repair personnel shall

include:

- a. Locate and identify equipment components.
 - b. Review the equipment function and theory of operation.
 - c. Review normal repair procedures.
 - d. Perform start-up and shutdown procedures.
 - e. Review and perform the safety procedures.
 - f. Perform Owner approved practice maintenance and repair job(s), including mechanical and electrical adjustments and calibration and troubleshooting equipment problems.
 - g. Review and use equipment manufacturers' manuals in the hands-on training.
- C. Maintain a log of class room training including: Instructors, topics, dates, time, and attendance. In addition, the Contractor shall submit to the Engineer a **Training Certification Form** 01999-50 found in Section 01999, **REFERENCE FORMS**, for each piece of equipment that the Owners' personnel is trained on.
- D. The Contractor shall replace equipment that is damaged during the training exercises at no additional cost to the Owner.

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

SECTION 01770

PLACER COUNTY WATER AGENCY 144 FERGUSON ROAD AUBURN, CA 95603

CLOSEOUT PROCEDURES

1.0 GENERAL

Section Includes: Contract closeout requirements including:

1. Final cleaning,
2. Disinfection of systems,
3. Preparation and submittal of closeout documents,
4. Final completion certification.

2.0 FINAL CLEANING

- A. Perform final cleaning prior to inspections for Final Acceptance.
- B. Use cleaning materials which are recommended by the manufacturers of the surfaces to be cleaned.
- C. Prevent scratching, discoloring, and otherwise damaging surfaces being cleaned.
- D. Clean roofs, gutters, downspouts, and drainage systems.
- E. Broom clean exterior paved surfaces and rake clean other surfaces of sitework.
- F. Remove dust, cobwebs, and traces of insects and dirt.
- G. Clean grease, mastic, adhesives, dust, dirt, stains, fingerprints, paint, blemishes, sealants, plaster, concrete, and other foreign materials from sight-exposed surfaces, and fixtures and equipment.
- H. Remove non-permanent protection and labels.

3.0 WASTE DISPOSAL

- A. Arrange for and dispose of surplus materials, waste products, and debris off-site.
- B. Do not fill ditches, washes, or drainage ways which may create drainage problems.
- C. Do not create unsightly or unsanitary nuisances during disposal operations.
- D. Maintain disposal site in safe condition and good appearance.

- E. Complete leveling and cleanup prior to final acceptance of the Work.

4.0 TOUCH-UP AND REPAIR

- A. Touch-up or repair finished surfaces on structures, equipment, fixtures, and installations that have been damaged prior to inspection for Final Acceptance.
- B. Refinish or replace entire surfaces which cannot be touched-up or repaired satisfactorily.

5.0 FINAL CLEANING OF SYSTEMS OF PLANT FACILITIES

- A. Clean pipe, channel, and equipment before running of five (5) day Facility Startup/Operational Testing (refer to Section 01700). All visible debris, grease, and chemicals shall be removed from all surfaces that will contact raw water.

6.0 FINAL CLEANING AND STERILIZATION [DISINFECTION] OF SYSTEMS OF POTABLE WATER MAINS

- A. Clean interior of pipe and fittings.
- B. When pipe contains dirt that cannot be removed by flushing, swab pipe interiors with solution containing not less than 500 parts per million of chlorine until clean.
- C. Flush 12 inch in diameter and smaller pipe as thoroughly as available water sources will permit.
- D. Fill pipe with chlorine solution of sufficient strength to provide 10 parts per million chlorine residual at end of 24 hours.
- E. Flush pipes with potable water until chlorine residual is less than 0.6 parts per million before pipe are put into service.

7.0 CLOSEOUT DOCUMENTS

- A. Submit following Closeout Submittals upon Completion and at least seven (7) days prior to submitting Application for Final Payment:
 - 1. Project Record Documents.
 - 2. Operation and Maintenance Manuals, final O&M Manuals electronically on flash drive(s).
 - 3. Warranties and Bonds.
 - 4. Keys and Keying Schedule.
 - 5. Evidence of Payment and Release of Liens and Stop Payment Notices as outlined in Conditions of the Contract.
 - 6. Release of claims as outlined in Conditions of the Contract.
 - 7. Signed Substantial Completion Form 01999-16
 - 8. Survey Record Documents as specified in Section 01160.

8.0 EVIDENCE OF COMPLIANCE WITH REQUIREMENTS OF GOVERNING AUTHORITIES

- A. Not used.

9.0 PROJECT RECORD DOCUMENTS

- A. Maintain at Project site, available to Owner and Construction Manager, one (1) copy of the Contract Documents, shop drawings and other submittals, in good order.
1. Mark and record field changes and detailed information contained in submittals and change orders.
 2. Record actual depths, horizontal and vertical location of underground pipes, duct banks and other buried utilities. Reference dimensions to permanent surface features.
 3. Identify specific details of pipe connections, location of existing buried features located during excavation, and the final locations of piping, equipment, electrical conduits, manholes, and pull boxes.
 4. Identify location of spare conduits including beginning, ending and routing through pull boxes, and manholes. Record spare conductors, including number and size, within spare conduits, and filled conduits.
 5. Provide schedules, lists, layout drawings, and wiring diagrams.
 6. Make annotations with erasable colored pencil conforming to the following color code:

Additions:	Red
Deletions:	Green
Comments	Blue
Dimensions:	Graphite

- B. Maintain documents separate from those used for construction.
1. Label documents "RECORD DOCUMENTS."
- C. Keep documents current.
1. Record required information at the time the material and equipment is installed and before permanently concealing.
- D. Deliver record documents with transmittal letter containing date, Project title, Contractor's name and address, list of documents, and signature of Contractor.
- E. Record documents shall be available for the Construction Manager to review to ascertain that changes have been recorded.
- F. Failure of the Contractor to keep current with the updating of the Record Documents shall be grounds for withholding monies from partial payment estimates as specified in Section 00700-8.3.

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

SECTION 01782

PLACER COUNTY WATER AGENCY
144 FERGUSON ROAD
AUBURN, CA 95603

OPERATING AND MAINTENANCE MATERIALS

1.0 GENERAL

1.1 Summary

Operating and Maintenance information shall be provided in accordance with this section and as required in the technical sections of these Specifications. Operating and Maintenance information shall be provided for each maintainable piece of equipment, equipment assembly or subassembly, and material provided or modified under this contract. Operating and Maintenance manuals must be submitted and accepted before Performance Testing or on-site training may start. Refer to Section 01710, **TRAINING** for additional information.

1.2 Transmittal Procedure

Unless otherwise specified, Operating and Maintenance information and data shall be transmitted in accordance with Section 01330, **SUBMITTAL PROCEDURES**. The **Operating and Maintenance Information Transmittal** Form 01999-15, which is located in Section 01999, **REFERENCE FORMS** shall be used as a checklist to ensure that the manual is complete. Only complete sets of Operating and Maintenance manuals will be reviewed for acceptance. Three copies of the specified Operating and Maintenance information shall be provided.

If the manufacturers' standard brochures and manuals are used to describe Operating and Maintenance procedures, such brochures and manuals shall be modified to reflect only the model or series of equipment used on this project. Extraneous material shall be crossed out neatly or otherwise annotated or eliminated.

2.0 PRODUCTS (NOT USED)

3.0 EXECUTION

3.1 General

Operating and Maintenance information shall be bound in sturdy, heavy-duty 3-ring binders. One binder shall be provided for each piece of equipment (for example, sump pumps will have a separate binder from vertical turbine pumps). The binders shall be clearly labeled on the front and spine identifying the equipment located in the Operating and Maintenance Manual. For ease of identification, each manufacturer's brochure and manual shall be appropriately labeled with the equipment name and equipment number as it appears in these Contract Documents. The information shall be organized in the binders in numerical order by the equipment numbers assigned in the Specifications. The binders shall be provided with a table of contents and tab sheets to permit easy location of desired information.

Operating and Maintenance manuals shall contain the names, addresses, and telephone numbers of the manufacturer, the nearest representative of the manufacturer, and the nearest supplier of the manufacturer's equipment and parts.

Provide identification of all parts of each component, assembly, subassembly, and accessory, using the **Equipment Record Form** 01999-19 located in Section 01999, **REFERENCE FORMS**. Include special hardware requirements, such as requirement to use high-strength bolts and nuts. Identify parts by make, model, serial number, and source of supply to allow reordering without further identification. Provide clear and legible illustrations, drawings, and exploded views to enable easy identification of the items. When illustrations omit the part numbers and description, both the illustrations and separate listing shall show the index, reference, or key number which will cross-reference the illustrated part to the listed part. Parts shown in the listings shall be grouped by components, assemblies, and subassemblies. Include control and flow diagrams and panel wiring diagrams. Coordinate drawings to ensure correct illustration of completed installation.

All manuals shall also be provided in an electronic format which includes all information included in the Operation and Maintenance Manuals. Provide the final electronic files on flash drive(s) in searchable PDF format. These files shall become the property of the Owner for use in training programs and other uses.

3.2 Operating Instructions

Specific instructions, procedures, and illustrations shall be provided for the following phases of operations:

- A. **SAFETY PRECAUTIONS**
List personnel hazards for equipment and list safety precautions for all operating conditions.
- B. **OPERATOR PRE-START**
Provide requirements to set up and prepare each system for use.
- C. **STARTUP, SHUTDOWN, AND POST SHUTDOWN PROCEDURES**
Provide step-by-step procedures for start-up, break-in, shutdown, and post-shutdown operations. Include recommendations for installation, adjustment, calibration, troubleshooting, regulation, control, stopping, and shutdown operations. Summer and winter operating instructions shall be included as required.
- D. **NORMAL OPERATIONS**
Provide control diagrams with data to explain operation and control of systems and specific equipment.
- E. **EMERGENCY OPERATIONS**
Provide emergency procedures for equipment malfunctions to permit a short period of continued operation or to shut down the equipment to prevent further damage to systems and equipment, as applicable. Include emergency shutdown instructions for fire, explosion, spills, or other foreseeable contingencies. Provide

guidance on emergency operations of all utility systems including valve locations and portions of systems controlled.

F. OPERATOR SERVICE REQUIREMENTS

Provide instructions for services to be performed by the operator such as lubrication, adjustments, and inspection.

G. ENVIRONMENTAL CONDITIONS

Provide a list of environmental conditions (temperature, humidity, and other relevant data) which are best suited for each product or piece of equipment and describe conditions under which equipment should not be allowed to run.

3.3 **Preventive Maintenance**

The following information shall be provided for preventive and scheduled maintenance to minimize corrective maintenance and repair:

A. LUBRICATION DATA

Provide lubrication data in accordance with these Specifications and the manufacturer's requirements of the respective equipment. Lubrication Information shall include the required lubricants and lubrication schedules. For each required lubricant, provide a list of acceptable equivalents from at least one different major manufacturer whose products are locally available. Provide the following information:

1. A table showing recommended lubricants for specific temperature ranges and applications;
2. Charts with a schematic diagram of the equipment showing lubrication points, recommended types and grades of lubricants, and capacities; and
3. A lubrication schedule showing service interval frequency.

B. PREVENTIVE MAINTENANCE PLAN AND SCHEDULE

Provide manufacturer's schedule for routine preventive maintenance, inspections, tests, and adjustments required to ensure proper and economical operation and to minimize corrective maintenance and repair. Provide manufacturer's projection of preventive maintenance man-hours on a daily, weekly, monthly, and annual basis. Include procedures for disassembly, repair, and assembly, alignment, adjusting, and checking. Supply a table showing the predicted life of parts subject to wear. Provide the Manufacturer's printed operating and maintenance instructions.

3.4 **Corrective Maintenance**

Manufacturer's recommendations shall be provided on procedures and instructions for correcting problems and making repairs.

A. TROUBLESHOOTING GUIDES AND DIAGNOSTIC TECHNIQUES

Provide step-by-step procedures to promptly isolate the cause of typical malfunctions. Describe clearly why the checkout is performed and what conditions are to be sought. Identify tests or inspections and test equipment

required to determine whether parts and equipment may be reused or require replacement.

B. WIRING DIAGRAMS AND CONTROL DIAGRAMS

Wiring diagrams and control diagrams shall be point-to-point drawings of wiring and control circuits including factory-field interfaces. Provide a complete and accurate depiction of the actual job-specific wiring and control work. On diagrams, number electrical and electronic wiring and pneumatic control tubing and the terminals for each type identically to actual installation numbering.

C. MAINTENANCE AND REPAIR PROCEDURES

Provide instructions and list tools required to restore product or equipment to proper condition or operating standards.

D. REMOVAL AND REPLACEMENT INSTRUCTIONS

Provide step-by-step procedures and list required tools and supplies for removal, replacement, disassembly, and assembly of components, assemblies, subassemblies, accessories, and attachments. Provide tolerances, dimensions, settings, and adjustments required. Instructions shall include a combination of text and illustrations.

E. SPARE PARTS AND SUPPLY LISTS

Provide lists of spare parts and supplies required for maintenance and repair to ensure continued service or operation without unreasonably delays. Special consideration is required for facilities at remote locations. List spare parts and supplies that have a long lead-time to obtain. The spare parts list shall include the name, address, telephone number, and FAX number of authorized repair facilities, address of factory, and location of a local supplier where spare parts are to be obtained. The spare parts list may be incorporated on to the **Equipment Record Form 01999-19** found in Section 01999, **REFERENCE FORMS**.

F. CORRECTIVE MAINTENANCE MAN-HOURS

Provide manufacturer's projection of corrective maintenance man-hours including craft requirements by type of craft. Corrective maintenance that requires participation of the equipment manufacturer shall be identified and tabulated separately.

G. TEST RESULTS

Provide copies of factory test reports as specified in the applicable equipment section. After field testing is completed, insert field test reports as specified in the equipment section. Include performance curves and engineering data.

3.5 **Appendices**

The following information shall be provided; include information not specified in the preceding paragraphs but pertinent to the maintenance or operation of the product or equipment.

A. WARRANTY INFORMATION

List and explain all of the warranties, bonds and service agreements and include the servicing and technical precautions prescribed by the manufacturers or

contract documents to keep the warranties in force. Include the proper procedures in event of failure.

B. **PERSONNEL TRAINING REQUIREMENTS**

Provide information available from the manufacturers to use in training designated personnel to operate and maintain the equipment and systems properly. Refer to Section 01710, **TRAINING** for additional training information.

C. **TESTING EQUIPMENT AND SPECIAL TOOL INFORMATION**

Provide information on test equipment required to perform specified tests and any special tools needed for the operation, maintenance, and repair of components.

3.6 Field Changes

Following the acceptable installation and operation of an equipment item, the item's instructions and procedures shall be modified and supplemented by the Contractor to reflect any field changes or information requiring field data.

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

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SECTION 01999

PLACER COUNTY WATER AGENCY 144 FERGUSON ROAD AUBURN, CA 95603

REFERENCE FORMS

The forms listed below and included in this section are referenced from other sections of the project manual. Contractor may submit equivalent forms for Owner's approval prior to use. If Owner does approve substitute form, Contractor must use forms found in this Section. Owner will provide Contractor electronic files of prescribed forms upon request.

Form No.	Referenced in Section(s)	Title of Form
01999-01	00700	CAD WAIVER
01999-02	01324	CONTRACTOR'S DAILY REPORT
	00700	
01999-03	01200	CONTRACTOR'S APPLICATION FOR PAYMENT
01999-04	01140	SYSTEM OUTAGE REQUEST (SOR)
01999-05	01330	SUBMITTAL TRANSMITTAL
01999-06	01340	REQUEST FOR INFORMATION (RFI)
01999-07	00700	WARRANTY FORM
01999-08	01350	REQUEST FOR PROPOSAL (RFP)
01999-09	01350	FIELD DIRECTIVE
01999-10	01350	CONSTRUCTION CHANGE DIRECTIVE (CCD)
01999-11	01350	FIELD ORDER- FORCE ACCOUNT WORK
01999-12		CONTRACTOR COST BREAKDOWN WORKSHEET
01999-13	01350	DAILY EXTRA WORK REPORT
01999-14	01350	CHANGE ORDER
01999-15	01782	OPERATING AND MAINTENANCE INFORMATION TRANSMITTAL
01999-16	00700-8.6	CERTIFICATE OF SUBSTANTIAL COMPLETION
01999-17		UNIT RESPONSIBILITY CERTIFICATE
01999-18		EQUIPMENT TEST REPORT
01999-19		EQUIPMENT RECORD FORM A
01999-20		EQUIPMENT RECORD FORM B
01999-21		MANUFACTURER'S INSTALLATION CERTIFICATION FORM A

01999-22		MANUFACTURER'S INSTALLATION CERTIFICATION FORM B
01999-23		MOTOR DATA FORM
01999-24		PIPE TEST RECORD
01999-43		INSTRUMENT CALIBRATION TEST FORM
01999-47		START-UP AND PERFORMANCE EVALUATION
01999-50		TRAINING CERTIFICATE FORM

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

CAD WAIVER

Date: _____

From: (Contractor and Address)

To: Placer County Water Agency
P.O. Box 6570
Auburn, CA 95604

The undersigned agrees to the terms of this CAD Waiver as a condition for receiving the Plans of Bowman Phase 3 Improvements Project

_____ in electronic form on a CD-ROM.

(Contractor) _____, hereafter referred to as Contractor, acknowledges that anomalies and errors can be introduced into CAD Files when they are transferred or used in an incompatible computer environment. Contractor further acknowledges that differences can exist between the data in CAD Files and the information contained in hard copy Plans (which are the drawings, sketches, and other graphic materials contained within the (Project) _____

Plans, issued to date to the (Contractor) printed from such CAD Files. Contractor's use of CAD Files will be solely at Contractor's risk. Contractor hereby releases the Owner, and Design Consultant as designated in the Contract Documents of the subject Project, from any damages or losses of any kind, including, but not limited to, damages or losses to property or persons (including death), economic losses, delays, contract cost increases, and any consequential, special, indirect or incidental damages, resulting from the transfer or use of the CAD Files, except for damages or losses caused by the Owner's sole negligence or willful misconduct.

Contractor's use of the CAD Files is limited to the (Project) _____

_____ project.

Contractor agrees that the CAD Files will not be used for any other purpose. Contractor agrees not to reproduce, distribute, disclose, modify, transfer, or assign the CAD Files.

The CAD Files represent instruments of professional service and shall remain the Owner's property. Owner shall be deemed the owner of the CAD Files and shall retain all proprietary rights, including copyrights, embodied therein. The Design Consultant remains responsible for the design to the extent allowed by the Business and Professions Code.

The Owner provides the CAD Files "as is" and makes no representations or warranties, express or implied, of merchantability, adequacy, completeness or sufficiency, or any results intended to be achieved as to its use.

Any discrepancy between the electronic files and the hard copy Plans shall be determined in favor of the hard copy Plans provided as per the Contract Documents.

Contractor agrees to defend, indemnify, and hold the Owner and Design Consultant harmless from any claims, suits, or losses (including reasonable attorney's fees and all legal expenses) arising out of or in any way related to the Contractor's use of the CAD Files.

Contractor shall not transfer the CAD Files, any derivative of the CAD Files, or any copy of the CAD Files in any form to a third party without obtaining written consent of the Owner. If the Contractor fails to perform or observe any of the terms hereunder, the Owner may terminate Contractor's use of the CAD Files, among other remedies.

Should any legal proceeding be commenced between the parties to this Agreement seeking to enforce any of its provisions, the prevailing party in such a proceeding shall be entitled, in addition to such other relief as may be granted, to a reasonable sum for attorney's fees which shall be determined by the court or forum in such a proceeding or in a separate action brought for that purpose.

This Agreement shall be governed by the laws of the State of California.

The signatures below indicate acceptance to the terms stated above.

CONTRACTOR:

PLACER COUNTY WATER AGENCY:

By:_____

By:_____

Name:_____

Name:_____

Title:_____

Title:_____

Contractor's Daily Report

PROJECT NAME: CONTRACT NO.:				DATE	REPORT NO
CONTRACTOR			OWNER		
PROJECT MANAGER		HOURS WORKED From: To:		WEATHER	
CONTRACTOR MANPOWER (BY LABOR CLASS)	NO.	TOTAL HOURS	SUBCONTRACTOR MANPOWER	NO.	TOTAL HOURS
CONTRACTOR EQUIPMENT	NO.	TOTAL HOURS	SUBCONTRACTOR EQUIPMENT	NO.	TOTAL HOURS
DESCRIPTION OF WORK PERFORMED TODAY (ATTACH ADDITIONAL SHEETS IF NECESSARY)					

REMARKS BY CONTRACTOR (Delays, Interruptions, Deviations, Extra Work Activities, Unusual Occurrences, etc.)		
MATERIALS/EQUIPMENT DELIVERED		
REPORT PREPARED BY	TITLE	DATE

PCWA Bowman WTP Phase 3 Improvements

CONTRACT NO. 2022-22

PROGRESS PAY ESTIMATE NO. _____

DATE

ANALYSIS OF WORK PERFORMED

Previous Total Estimate \$0.00
Estimate this period 0.00
Subtotal Estimate to date \$0.00
Total estimate to date..... \$0.00
 Less: 5% retention..... \$0.00
 Less: Amount of previous payments..... \$0.00
Balance due this payment..... \$0.00

CONTRACT COMPLETION DATA

% Time Elapsed: ____% (based upon ____ calendar days)
% Work Completed: ____%(based upon \$ _____ Contract Price)

First Working Day of Contract.....
Contract Completion Time.....Calendar days
Contract Completion Date.....

CERTIFICATION

I certify that all items and amounts shown on this Progress Pay Estimate are correct to the best of my knowledge; that all work has been performed and/or material supplied in full accordance with the requirements of the Contract, and/or duly authorized deviation, substitutions, alterations, and/or additions to the best of my knowledge; and that this Estimate is a true and correct statement of the Contract account up to and including the last day of the period covered by this Progress Pay Estimate.

Submitted by Contractor:

By _____ Date _____
Authorized Representative

Recommended for approval by Agency Inspector:

_____ Date _____
PCWA Inspector –

Approved by Project Engineer:

_____ Date _____
Project Engineer –

PCWA Bowman WTP Phase 3 Improvements
CONTRACT NO. 2022-XX
PROGRESS PAY ESTIMATE NO. XX
Date

ANALYSIS OF WORK PERFORMED

Previous total estimate.....	\$0.00
Estimate this period.....	\$0.00
Total estimate to date.....	\$0.00
Less: 5% retention.....	\$0.00
Less: Amount of previous payments.....	\$0.00
Balance due this payment.....	\$0.00

CONTRACT COMPLETION DATA

Original Contract Amount.....	\$0.00
Current Change Orders to Date.....	\$0.00
Current Contract Amount.....	\$0.00
Total Estimate to Date (from above).....	\$0.00
Remaining Contract Amount.....	\$0.00
Percent of Work Complete.....	0%

CERTIFICATION

I certify that all items and amounts shown on this Progress Pay Estimate are correct to the best of my knowledge; that all work has been performed and/or material supplied in full accordance with the requirements of the Contract, and/or duly authorized deviation, substitutions, alterations, and/or additions to the best of my knowledge; and that this Estimate is a true and correct statement of the Contract account up to and including the last day of the period covered by this Progress Pay Estimate.

By signing below, I warrant that Contractors as-built drawings are up to date and that all certified payroll has been submitted to the Agency and is current through this period.

Submitted by Contractor:

By _____ Date _____
Authorized Representative

By signing below, I warrant that Contractors as-built drawings are up to date and all items and amounts shown on this Progress Pay Estimate are correct to the best of my knowledge.

By _____ Date _____
PCWA Inspector -

By signing below, I warrant that Contractors certified payroll has been submitted to the Agency and is current through this period and all items and amounts shown on this Progress Pay Estimate are correct to the best of my knowledge.

By _____ Date _____
Project Engineer -

SYSTEM OUTAGE REQUEST FORM

System to be Shutdown: _____

Date of Shutdown: _____ Beginning at _____ a.m. p.m.

Duration of Shutdown: _____ Critical Path Activity? ☐ yes ☐ no

Submittal No.	
☐ 1st Submission	☐ Re-Submittal
Spec Section	
Dwg/Detail No.	

Owner: Placer County Water Agency	Routing	Date Sent	Date Received
Project:	Contractor/CM		
	CM/Design Consultant		
Contractor:	CM/PCWA Operations		
	Design Consultant/CM		
Regulatory Agency Notification Required? ☐ yes ☐ no	PCWA Operations/CM		
Is a Dry Run Required? ☐ yes ☐ no	CM/Contractor		
Confined Space Entry? ☐ yes ☐ no			
Combustible/Hazardous Gases Present? ☐ yes ☐ no			

Describe work to be performed including detailed sequence of events, safety plan, protection of existing facilities, equipment to be used and contingency plan. Use additional sheets as necessary.

Will you require assistance from PCWA Operations? Note that all existing valves and controls shall be operated by PCWA staff only.

Outage Contact Information	Name of Person on Call/Duty	Home Phone	Cell Phone and/or Pager
Contractor			
Construction Manager			
PCWA Operations			
Design Consultant			

Additional Contractor Comments:	CM / PCWA / Design Consultant Review Action ☐ SOR Acceptable with comments noted on attached. ☐ SOR Not Acceptable with reasons noted on attached. Re-Submittal is required.
Certified by: _____ (Contractor's Signature)	_____ Date: _____ (Construction Manager's Signature)

SUBMITTAL TRANSMITTAL

Submittal Description: _____

Priority Level: () Low () Medium () High () On Critical Path

Submittal No.	
() 1st Submission	() Re-Submittal
Spec Section	
Dwg/Detail No.	

Owner: Placer County Water Agency	Routing	Date Sent	Date Received
	Contractor/CM		
Project:	CM/Design Consultant		
	Design Consultant/CM		
Contractor:	CM/Contractor		

We are sending you: () Attached () Under separate cover via _____
() Submittals for review and comment Remarks: _____
() Product Data for information only _____

No. Copies	Description	Manufacturer	Reviewer Action	Reviewer Initials

The Action Designated Above is in Accordance with the Following Legend:

- A – No Exceptions Taken
- B – Make Corrections Noted
- C – Amend and Submit
- D – Rejected
- E – Design Consultant's review not required

CONTRACTOR: Must certify one of the following statements pertaining to the transmittal or submittal sent for review:

- () As the General Contractor for this project we certify that the material or equipment contained in this submittal meets all the requirements, including coordination with all related work specified (no exceptions)
- () As the General Contractor for this project we certify that the material or equipment contained in this submittal meets all the requirements specified except for the attached deviations.

Comments:

Certified by: _____
(Contractor's Signature)

REQUEST FOR INFORMATION

Area of Work in Question: _____

RFI Generated by: () Contractor () CM () Other _____

Priority Level: () Low () Medium () High () **On Critical Path**

Is there a Cost Impact associated with this RFI? () yes () no () possibly

Is there a Time Impact associated with this RFI? () yes () no () possibly

RFI No.	
() 1st Submission	() Re-Submittal
Spec Section(s)	
Dwg/Detail No.'s	

Owner: Placer County Water Agency	Routing	Date Sent	Date Received
	Contractor/CM		
Project:	CM/Design Consultant		
	Design Consultant/CM		
Contractor:	CM/Contractor		

Question (s): (Attach sketches or additional sheets as needed)

Submitted by: _____ Date: _____

Response: (Attach sketches or additional sheets as needed)

Response by: _____ Date: _____

WARRANTY FORM

Warranty For:

Project: _____

Location: _____

We hereby guarantee the _____ (Project Name)

_____ that we have constructed for a period of one (1) year from _____ the date of acceptance of the work/substantial completion by the Placer County Water Agency.

The following are excluded from the provisions of this warranty:

We agree that if any of the equipment should fail due to any reason other than improper maintenance or improper operation, if any pipe or appurtenances should develop leakage, or if any settlement of fill or backfill occurs, or should any portion of the work fail to fulfill any of the requirements of the Specifications, we will, within ten days after written notice of such defects, commence to repair or replace the same together with any other work which may be damaged or displaced in so doing.

In the event of our failure to comply with the above mentioned conditions within a reasonable time after being notified, or should exigent circumstances require repairs or replacements to be made before we can be notified or respond to notification, we do hereby authorize the Placer County Water Agency to proceed to have the defect repaired and made good at our expense, and we will pay the cost therefor upon demand.

The warranty provided herein shall not be in lieu of, but shall be in addition to any warranties or other obligations otherwise imposed by the Contract Documents and by law.

Contractor: _____

Signed: _____

Title: _____

Date: _____

***** END OF DOCUMENT *****

Request for Proposal

QUOTATION NO: _____

TO: _____ DATE: _____

FROM: _____

PROJECT: _____

KEYWORD DESCRIPTION: _____

DATE PROPOSAL REQUIRED: _____

The following modification to the contract has been identified. Pursuant to Section 01350 – Modification Procedures, please provide a proposal for the alteration as described in Item 1. The proposal should include an itemized breakdown of contractor and subcontractor costs, including labor, materials, rentals, approved services, overhead, and profit. This request shall not be considered authorization to proceed with the work herein described. This is not a change order.

To be completed by Initiator of Request:

1. Scope of Work: (include list of attachments)

Scope of work has not changed.

2. Reason(s) for Modification:

3. Approval of Request:

Owner: _____ Date: _____

Construction Manager: _____ Date: _____

To be completed by Contractor:

4. Total cost of modification (attach detailed breakdown) \$ _____

5. Will a modification to the contract time be required? ☐ Yes ☐ No

If yes, please provide time impact analysis in accordance with Section 01324 – Progress Schedules and Reports

6. Proposal is in effect until: (date) _____

Signed:

Contractor's Authorized Representative _____ Date _____

No. _____

July 2023
Field Directive

Construction Change Directive (CCD)

OWNER: _____

PROJECT: _____

CHANGE DIRECTIVE NO: _____ DATE: _____

(Contractor)

When signed by the Owner, this document becomes effective immediately and the Contractor shall proceed with the change(s) described below. The Contractor is hereby directed to make the following change(s) to the Work of the Contract: *(Reference attachments by name and date)*

PROPOSED ADJUSTMENTS

1. The proposed basis of adjustment to the Contract Sum is:

☐ A Lump Sum adjustment of: _____

☐ A Unit Price adjustment of: _____ per _____

☐ Actual costs as documented and approved per the Contract.

☐ Other method as provided below: *(Insert terms of the basis of adjustment or reference attachment by name and date)*

☐ Unilateral determination by Owner.

☐ NO CHANGE

2. The proposed adjustment to the Contract Time is:

☐ NO CHANGE

☐ An increase of _____ calendar days

☐ A decrease of _____ calendar days

PREPARED BY: _____

(Print or Type Name of Construction Manager)

(Signature)

(Date)

WORK AUTHORIZED BY:

(Print or Type Name of Agency)

(Signature)

(Date)

DIRECTIVE ACCEPTED BY:

Signature by the Contractor indicates the Contractor's full and complete agreement with the proposed basis of adjustment in the Contract Sum and Time set forth in this Construction Change Directive. Change Directives accepted by the Contractor shall be incorporated into a Change Order without further adjustment.

(Print or Type Name of Contractor)

(Signature)

(Date)

Field Order

FIELD ORDER NO: _____ Date: _____

To Contractor: _____

Project No.: _____

Contract Days Changed ☐ Yes

Project Name: _____

☐ No

Location: _____

☐ To be determined

You are authorized to proceed with the following work:

Justification: _____

Cost Basis: \$ _____

Time and Material
Not to Exceed Estimate

Contractor to submit.

Recommended by Construction Manager

DATE: _____

Approval By: _____
Owner

DATE: _____

Accepted By: _____
Contractor

DATE: _____

Field Work Orders will be converted to a Change Order within thirty (30) days of the Owner's approval. Maximum amount for any one Field Work Order shall conform to the Owner's policy guidelines. All costs incurred by Contractor resulting from this Field Order will be determined in accordance with Section 01350-3.0- COST DETERMINATION.

Contractor must submit Daily Extra Work Reports to the Construction Manager no later than the working day following the performance of said work. See Section 01350-2.4- FIELD ORDER- FORCE ACCOUNT WORK.

CONTRACTOR'S COST BREAKDOWN WORKSHEET

Project Name:

Contract No.:

Name of Contractor:

RFP # _____, Field Directive # _____, RFI # _____ or Other Reference _____

[illegible]

Daily Extra Work Report

Job Title:	Contract No.:	Field Order No.:	Sheet No. ____ of ____
Contractor:		Date Reported:	Date Performed
Description of Work:			

Equipment*			Hours	Hourly Rate	Delay Factor	Extended Amounts	Labor*		Hours	Hourly Rate	Extended Amounts
Model	Code	Description									
					1.00	\$0.00		OT			\$0.00
								Reg			\$0.00
					1.00	\$0.00		OT			\$0.00
								Reg			\$0.00
					1.00	\$0.00		OT			\$0.00
								Reg			\$0.00
					1.00	\$0.00		OT			\$0.00
								Reg			\$0.00
					1.00	\$0.00		OT			\$0.00
								Reg			\$0.00
					1.00	\$0.00		OT			\$0.00
								Reg			\$0.00
Total Cost of Equipment - Regular Hours						B.	\$0.00	Subtotal - Overtime Hours		OT	\$0.00
Material and/or Work done by Others**							Subtotal - Regular Hours		Reg		\$0.00
Description			No. Units	Unit Cost		Extended Amounts	Description	Ltr.	% Markup	Total Costs	
						\$0.00	Total Cost of labor (Regular + OT)	A.		\$0.00	
						\$0.00	Total Cost of Equipment	B.		\$0.00	
						\$0.00	Material and/or Work done by Others	C.		\$0.00	
						\$0.00	Markup on Labor (A.)		20%	\$0.00	
						\$0.00	Markup on Equipment (B.)		15%	\$0.00	
						\$0.00	Markup on Materials and Work (C.)		10%	\$0.00	
Total Cost of Materials and Work - Regular Hours						C.	\$0.00	Total This Report			\$0.00

* Includes Equipment and Labor of Subcontractors and Owner-Operators.

** Section is used to report work for which labor rates as described in the specifications are unavailable.

Contractor's Authorized Field Representative

Owner's Field Representative

Receipt does not constitute acceptability for payment or acceptance of "Extra Work" status for work.

1. List Model, Code & Description of Equipment as it appears in the equipment rental rates booklet published by Caltrans.

2. List labor as it appears in the labor rate breakdown as described in the specifications.

3. Attach photocopies of applicable labor rate breakdown and equipment rental sheets.

4. List operator on same line as equipment.

NON OR DISCRETIONARY
CONTRACT CHANGE ORDER

Change Order No.
Date:
Project No.
Contract #

CONTRACT FOR:
TO:
(Contractor)

You are hereby requested to comply with the following changes from the Original Contract, Plans and Specifications.

Item Number	Description of Changes	Decrease in Contract Price	Increase in Contract Price

Subtotals

\$

\$

Total Net Increase / Decrease: \$

Justification:

The amount of the Contract will be decreased/increased by the sum of: (\$)

The Contract Total including this and previous Change Orders will be: (\$)

This document will become a supplement to the Contract and all provisions will apply here.

Recommended _____
Project Engineer -

Date _____

Accepted _____
Contractor –

Date _____

Approved _____
Placer County Water Agency or
R. Brent Smith, P.E., Director of Technical Services

Date _____

OPERATING AND MAINTENANCE INFORMATION TRANSMITTAL

Submittal Description: _____

Submittal No.		# Copies
() 1st Submission	() Re-Submittal	
Spec Section		

Owner:	Routing	Date Sent	Date Received
	Contractor/CM		
Project:	CM/Design Consultant		
	Design Consultant/CM		
Contractor:	CM/Contractor		

Supplier Name: Checklist	Supplier Review		Design Consultant Review	
	Satisfactory	N/A	Accept	Deficient
1. Table of Contents				
2. Equipment Record Forms				
3. Supplier/Vendor Contact Information				
4. Safety Precautions				
5. Operator Pre-Start				
6. Start-up, Shutdown/Post-Shutdown Procedures				
7. Normal Operations				
8. Emergency Operations				
9. Operator Service Requirements				
10. Environmental Conditions				
11. Lubrication Data				
12. Preventative Maintenance Plan/Schedule				
13. Troubleshooting Guide/Diagnostic Techniques				
14. Wiring Diagrams and Control Diagrams				
15. Maintenance and Repair Procedures				
16. Removal and Replacement Procedures				
17. Spare Parts and Supply List				
18. Corrective Maintenance Man-hours				
19. Parts Identification				
20. Warranty Information				
21. Personnel Training Requirements				
22. Testing Equipment and Special Tool Information				

Remarks: _____

(Contractor's Signature)

(Supplier's Signature)

CERTIFICATE OF SUBSTANTIAL COMPLETION

Project Name: _____

OWNER's Contract Number: _____

CONTRACTOR: _____

Contract for Construction of: _____

Project or Specified Part Shall Include: _____

Contract Date: _____

The Work performed under this Contract has been inspected by authorized representatives of the OWNER, CONTRACTOR, and ENGINEER, and the Project (or specified part of the Project, as indicated above) is hereby accepted by the OWNER and declared to be substantially completed on the above date.

- 1) Final completion of the Work shall be the date of such acceptance of the Work by the OWNER.
- 2) Final completion shall mean full performance of the Contract requirements.

A list of all items remaining to be completed or corrected has been sent to the CONTRACTOR in the OWNER's letter dated _____. All such work shall be completed or corrected to the satisfaction of the OWNER prior to the release of the CONTRACTOR's retention and within 30 calendar days following the date of the Notice of Substantial Completion.

ENGINEER

(Signature)

(Date)

The CONTRACTOR hereby accepts the above Notice of Substantial Completion and agrees to complete and correct all of the items as outlined in the OWNER's letter to the CONTRACTOR dated _____.

CONTRACTOR

(Signature)

(Date)

The OWNER accepts the project or specified area of the project as substantially completed and will assume full possession of the Project or specified area of the Project at (time and date). The responsibility for heat, utilities, security, and insurance under the Contract Documents will be assumed by the OWNER after that date.

OWNER

(Signature)

(Date)

Bowman WTP Phase 3 Improvements

**CERTIFICATE OF UNIT RESPONSIBILITY
For Specification Section**

(Section title)

In accordance with the contract documents, the undersigned manufacturer accepts unit responsibility for all components of equipment furnished under specification Section [REDACTED]. We hereby certify that these components are compatible and comprise a functional unit suitable for the specified performance and design requirements.

Name of Corporation

Street Address

City, State and Zip Code

Notary Public

By: _____
Duly Authorized Official

Commission Expiration Date

Name

Title

Seal:

Date: _____

EQUIPMENT TEST REPORT

NOTE: This example equipment test report is provided for the benefit of the Supplier and is not specific to any piece of equipment to be installed as a part of this project. The example is furnished as a means of illustrating the level of detail required for the preparation of equipment test report forms for this project.

Project: _____

Contractor: _____

Supplier: _____

Equipment Name: _____

Equipment Number: _____

Specification Ref: _____

PRE-OPERATIONAL CHECKLIST

	Supplier		Engineer	
	Verified	Date	Verified	Date
Mechanical				
Lubrication				
Alignment				
Anchor bolts				
Pump/mechanical equipment vibration testing				
Seal water system operational				
Equipment rotates freely				
Safety guards				
Valves operational				
O&M manual information complete				
Supplier's installation certificate complete				
Electrical (Circuit ring-out and high-pot tests)				
Circuits: Power to MCC Control to HOA				
Indicators at MCC: Red (running) Green (power)				

	Supplier		Engineer	
	Verified	Date	Verified	Date
Amber (auto)				
Indicators at local control panel				
Wiring labels complete				
Nameplates: MCC Control station Control panel				
Electrical equipment grounding verification				
Equipment bumped for rotation				
Piping Systems				
Cleaned and flushed: Suction Discharge				
Pressure tests				
Temporary piping screens in place				
Thrust restraint and pipe supports in place				
Instrumentation and Controls				
Flow meter _____ calibration Calibration Report No.				
Flow recorder _____ calibrated against transmitter				
VFD speed indicator calibrated against independent reference				
Discharge overpressure shutdown switch calibration				
Simulate discharge overpressure shutdown				
I/C equipment grounding verification				

FUNCTIONAL TESTS

	Supplier		Engineer	
	Verified	Date	Verified	Date
Mechanical				
Motor operation temperature satisfactory				
Pump operating temperature satisfactory				
Unusual noise, <i>etc?</i>				
Pump operation: gpm/ psig				
Pump Measurement: Flow/Pressure Test gage number				
Alignment hot				
Doweled in				
Pump/mechanical equipment vibration testing				
Remarks:				
Electrical				
Local switch function: Runs in <i>HAND</i> No control power in <i>OFF</i> Timer control in <i>AUTO</i>				
Overpressure protection switch PS2502C functional in both <i>HAND</i> and <i>AUTO</i>				
Overpressure protection switch PS2502C set at 75 psig				
PLC 2500 set at 24 hr cycle, 25 min <i>ON</i>				
Motor amperage draw test				

OPERATIONAL TEST

	Supplier		Engineer	
	Verified	Date	Verified	Date
48-hour continuous test: • pump cycles as specified • indicators functional • controls functional • pump maintains capacity • overpressure protection remains functional • hour meter functional				

RECOMMENDED FOR BENEFICIAL OCCUPANCY

Engineer

Date

ACCEPTED FOR BENEFICIAL OCCUPANCY

Owner's Representative

Date

EQUIPMENT RECORD FORM A (Electrical or Motorized Mechanical Equipment):

Equip. Description		Equip. Loc.	
Equip. No.	Shop Dwg. No.	Date Inst.	Cost
Mfgr.		Mfgr Contact	
Mfgr. Address			Phone
Vendor		Vendor Contact	
Vendor Address			Phone

MAINTENANCE REQUIREMENTS	D	W	M	Q	S	A	Hours
Lubricants: Recommended							
Alternative:							
Misc. Notes:							

Recommended Spare Parts				Electrical Nameplate Data			
Part No.	Qty	Part Name	Cost	Equip			
				Make			
				Serial No.		Id. No.	
				Model No.		Frame No.	
				HP	V	Amp	Hz
				pH	RPM	SF	Duty
				Code	Ins. Cl.	DES	Type
				NEMA DES	C Amb.	Temp Rise	Rating
				Misc.			
				Mechanical Nameplate Data			
				Equip			
				Make			
				Serial No.		Id. No.	
				Model No.		Frame No.	
				HP	V	Amp	Hz
				pH	RPM	SF	Duty
				Code	Ins. Cl.	DES	Type
				NEMA DES	C Amb.	Temp Rise	Rating
				Misc.			

EQUIPMENT RECORD FORM B (Electrical or Non-Motorized Mechanical Equipment):

Equip. Description		Equip. Loc.	
Equip. No.	Shop Dwg. No.	Date Inst.	Cost
Mfgr.		Mfgr Contact	
Mfgr. Address			Phone
Vendor		Vendor Contact	
Vendor Address			Phone

[illegible]

MANUFACTURER'S INSTALLATION CERTIFICATION FORM A:

Contract No: _____ Specification Section: _____

Project Name: _____

Equipment name: _____

Contractor: _____

Manufacturer of equipment item: _____

The undersigned manufacturer of the equipment item described above hereby certifies that he has checked the installation of the equipment and that the equipment, as specified in the project manual, has been provided in accordance with the manufacturer's recommendations and that the trial operation of the equipment item has been satisfactory.

Comments: _____

Date

Manufacturer

Signature of
Authorized Representative

Date

Contractor

Signature of
Authorized Representative

MANUFACTURER'S INSTRUCTION CERTIFICATION FORM B:

Contract No.: _____ Specification Section: _____

Project Name: _____

Equipment name: _____

Contractor: _____

Manufacturer of equipment item: _____

The undersigned manufacturer certifies that a service engineer has instructed the owner's staff in the proper maintenance and operation of the equipment designated herein.

Operations Check List (check appropriate spaces)

Start-up procedure reviewed

Shutdown procedure reviewed

Normal operation procedure reviewed

Others: _____

Maintenance Check List (check appropriate spaces)

Described normal oil changes (frequency)

Described special tools required

Described normal items to be reviewed for wear

Described preventive maintenance instructions

Described greasing frequency

Others: _____

Date

Manufacturer

Signature of
Authorized Representative

Date

Signature of
Owner's Representative

Date

Signature of
Contractor's Representative

MOTOR DATA FORM:

Equipment Name _____ Equipment Number(s) _____

Site Location _____

Nameplate Markings

Mfr _____ Mfr Model _____ Frame _____ HP _____

Volts _____ Phase _____ RPM _____ Service factor _____

FLA _____ LRA _____ Freq _____ Amb temp rating _____ degrees C

Time rating _____ Design letter _____

(NEMA MG1-10.35)

(NEMA MG-1.16)

KVA code letter _____ Insulation class _____

The following information is required for explosionproof motors only:

A. Approved by UL for installation in Class _____, Div _____

B. UL frame temperature code _____; Group _____ Atmosphere

(NEC Tables 500-2 and 500-2(b))

The following information is required for high efficiency motors only:

A. Guaranteed minimum efficiency at full load or NEMA efficiency index

(NEMA MG1-12.53b)

B. Nameplate or nominal efficiency _____

Data Not Necessarily Marked on Nameplate

Type of enclosure _____ Enclosure material _____

Temp rise _____ degrees C (NEMA MG1-12.41,42)

Space heater included? __Yes __No; if Yes, __watts __volts

Type of motor winding overtemperature protection, if specified:

Use the space below to provide additional information on other motor modifications, if specified:

PIPE TEST RECORD

Date: _____

Project Name:	Project No.:	Contractor:
Pipeline Size & Name:	Pipe Type:	Pipe Location/Description:
(SL, SN, IA, etc.)	(DI, PVC, Steel, Copper, etc.)	(Attach sketch if needed)
Section Tested:	First Test ____ Or Re-Test ____	Length of Pipe Tested: Ft.
From: _____ To: _____		

Test Specifications	Actual Test Results		
Type of Test: _____			
Test Pressure: _____	Start pressure: _____	End Pressure: _____	
Duration: _____	Start time: _____	Stop time: _____	Duration: _____
Allowable loss: _____	Actual loss: _____		

Comments:

Test Passes	
Test Fails	

Tested By:

Contractor

**Test Witnessed
By:**

Construction Inspector

INSTRUMENT CALIBRATION TEST DATA FORM

(For instruments not covered by any of the other test forms, the Contractor shall create a form containing all necessary information and calibration procedures.)

CERTIFIED _____ Date.
Contractor's Representative

WITNESSED _____ Date.
Owner's Representative

START-UP AND PERFORMANCE EVALUATION FORM

OWNER: _____ PROJECT: _____

Plant Unit Process Description: (Include description and equipment number of all equipment and devices):

Startup Procedure: (Describe procedure for sequential startup and evaluation, including valves to be opened/closed, order of equipment startup, etc.):

Startup Requirements (Water, power, chemicals, etc.):

Performance Evaluation Comments:

Contractor Certification that Unit Process is capable of performing its intended function(s), including fully automatic operation:

Firm Name:

Startup Representative: _____ Date: _____, 20____
(Authorized Signature)

TRAINING CERTIFICATION FORM

Contract No.: _____ Specification Section: _____

Equipment name: _____

Contractor: _____

Manufacturer of equipment item: _____

The undersigned manufacturer certifies that a qualified factory-trained representative with a minimum of two years experience has instructed the Owner's staff in the proper maintenance and operation of the equipment designated herein. The undersigned manufacturer (or equipment supplier) also agrees to conduct an eight (8) hour follow-up training session(s) after the equipment has been installed and continually operated by the Owner for at least three (3) months but prior to expiration of the one year warranty period, if the supplier is listed in 01710, **TRAINING** Specifications.

Operations Check List (check appropriate spaces)

Start-up procedure reviewed	_____
Shutdown procedure reviewed	_____
Normal operation procedure reviewed	_____
Others: _____	_____
_____	_____
_____	_____

Maintenance Check List (check appropriate spaces)

Described normal oil changes (frequency)	_____
Described special tools required	_____
Described normal items to be reviewed for wear	_____
Described preventive maintenance instructions	_____
Described greasing frequency	_____
Others: _____	_____
_____	_____
_____	_____

_____	_____
Date	Manufacturer

Signature of Manufacturer's Authorized Representative

_____	_____
Date	Signature of Owner's Representative

_____	_____
Date	Signature of Contractor's Representative



Bowman WTP Phase 3 Improvements

Contract No. 2022-02

DIVISIONS 2-16

TECHNICAL DIVISIONS

July 2023

SECTION 02300

EARTHWORK

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. The work shall consist of: performing all operations necessary to excavate earth and rock or other material, of whatever nature, including removing water, regardless of character and subsurface conditions necessary for the construction of the project facilities; placing backfill for all project facilities, including site grading, piping, concrete structures, roadwork; removing and replacing unsuitable material; placing embankment material for all required project facilities; other earthwork shown on the Plans and indicated in the Specifications including excavating and backfilling all trenches and depressions resulting from the removal of obstructions.

- B. References:** In connection with these Specifications, tests shall be made in accordance with these requirements:

<u>Tests</u>	<u>ASTM</u>	<u>California Test No.</u>
Relative Compaction	D-1557	216 or 231
Sand Equivalent		217
Resistance (R-Value)		301
Sieve Analysis		202

1.2 SUBMITTALS

- A. Test Reports - Borrow, Backfill, and Grading:** Testing laboratory will submit copies of the following reports directly to OWNER, with one copy to CONTRACTOR:

1. Tests on borrow material and imported fill.
2. Optimum moisture: Maximum density curve for each soil used for backfill.
1. Controlled Low Strength Material: Certified mix design and strength test results 30 days prior to installation. Include material types and weight per cubic yard for each component of mix.
2. Reports of observations for conformance of borrow material to the Project Geotechnical Report.

- B. Submit to the Engineer samples of all materials, including structural fill, backfill, pipe bedding, crushed stone, sand and topsoil. Submit samples of the proposed material at least seven days in advance of its anticipated use.**

1.3 PROJECT GEOTECHNICAL REPORT

- A. A Project-Specific Geotechnical Report has been prepared. Refer to the Project Geotechnical Report for supplemental information.**

PART 2 - PRODUCTS

2.1 PIPE BEDDING, HAUNCHING, AND INITIAL BACKFILL

- A. This material shall consist of well-graded clean sand or decomposed granite material with 100% passing the No. 4 sieve, and less than 5% passing a #200 sieve. The material shall be free from vegetative matter and other deleterious substances. The backfill material shall be able to be compacted readily to form a firm and stable base. The material shall have a minimum Sand Equivalent (SE) of 30 (SE30). Any trench soil or moisture condition that prevents the bedding and haunching material from forming a firm and stable base requires the use of 3/4-inch crushed rock for bedding and haunching and foundation as approved by the Engineer. Proposed bedding, haunching, and initial backfill materials shall be submitted to the Engineer with sieve analysis and SE test results.

2.2 INTERMEDIATE BACKFILL

- A. Intermediate backfill can only be used with prior written approval from the Engineer. The intermediate backfill material shall have a minimum SE of 30 with 100% passing a 1.5-inch sieve and well graded with less than 5% passing a #200 sieve. Any request to use intermediate backfill must be submitted with a sieve analyses and SE test results for review and approval.

2.3 STRUCTURAL FILL MATERIAL

- A. Structural Fill Material is fill adjacent to structures to a distance measured horizontally from the structure that is equal to the depth from the finished grade and extending a minimum of 5 feet beyond the structure footprint.
- B. On-site soil, including in the borrow area, may be used as Structural Fill provided it is free of debris and visible concentrations of vegetation and has a maximum particle size of 1 inch.
- C. Structural Fill (native or imported) must meet the following requirements:
 - 1. No concentrations of organics, debris, and other deleterious materials.
 - 2. Maximum particle size of 1-inch, with at least 75% passing the No. 4 Sieve, and between 15-40% passing the No. 200 Sieve.
 - 3. Expansion Index of less than or equal to 20, per ASTM D4829.
 - 4. Gain approval from the Engineer prior to ordering and transport to the site.

2.4 EMBANKMENT CONSTRUCTION MATERIAL

- A. Embankments not required to consist of Structural Fill (not associated with a structure) shall be constructed of excavated or imported material that is free from organic matter, roots, debris, rocks larger than 3 inches in the greatest dimension, and shall not have more than 14% of the rocks larger than 1-1/2 inches, and shall have these properties:
 - 1. Maximum Plasticity Index: 15
 - 2. Maximum Percent Passing the No. 200 Sieve: 50
 - 3. Maximum Liquid Limit: 50

2.5 AGGREGATE BASE

- A. Class 2, 3/4-inch maximum conforming to Section 26 of the Caltrans Standard Specifications.

2.6 CRUSHED ROCK

- A. 3/4" Crushed Rock: Crushed rock or gravel conforming to the requirements of ASTM C33, Size #57.
- B. 1-1/2" Crushed Rock: 1-1/2" crushed rock is an aggregate that has been crushed, reduced in size and screened through a 2-1/4" square screen. The material ranges in size from 1" to 2".

2.7 CONTROLLED LOW STRENGTH MATERIAL (CLSM)

- A. Select and proportion ingredients to obtain compressive strength between 50 and 150 psi at 7 days in accordance with ASTM D4832. Sufficient cement shall be added to meet the strength and material requirements given below and as required to provide sufficient strength for compacting overlying trench backfill. Provide certified mix design and test results in accordance with submittal requirements.
- B. Materials:
 - 1. Cement: ASTM C150, Type I or II, two sacks minimum per cubic yard.
 - 2. Aggregate: ASTM C33, maximum Size 7. The amount of material passing a No. 200 sieve shall not exceed 12%. The above No. 200 sieve material shall be well graded so as to avoid segregation. The minus #200 sieve fraction shall be nonplastic.
 - 3. Fly Ash (if used): ASTM C618, Class C or F.
 - 4. Water: Clean, potable, containing less than 500 ppm of chlorides.
- C. Mix Design:
 - 1. The CONTRACTOR and its suppliers shall determine the materials and proportions used to meet the requirements of these Specifications. Make daily checks of the aggregate gradation and adjust the mix design as required. Modify the CLSM mix as necessary to meet the flowability, pumpability, and set time requirements for each individual pour.
 - 2. At least 30 days before placing CLSM, submit to the ENGINEER a mix design for each CLSM to be used. The mix design shall include trial lab and field data, with pairs of 6-inch by 12-inch cylinder breaks performed at 7, 14, and 28 days. Molds shall be plastic or waxed cardboard. The mix design shall be performed by an independent laboratory under the direction of an engineer licensed in California.
 - 3. No CLSM shall be placed until the ENGINEER has approved the mix design. The ENGINEER's approval of the mix design shall be understood to indicate conditional acceptance. Final acceptance will be based on tests conducted on field samples and conformance with these Specifications.

2.8 PIPE MARKING TAPE

- A. Plastic:
 - 1. Inert polyethylene, impervious to known alkalis, acids, chemical reagents, and solvents likely to be encountered in soil.
 - 2. Thickness: Minimum 4 mils.
 - 3. Width: 12 inches.
 - 4. Identifying Lettering: Minimum 4-inch high, permanent black lettering imprinted continuously over entire length.
 - 5. Manufacturers and Products:
 - a. Christy.
 - b. Or Equal.
- B. Marking tape shall be marked with the following statement:
 - 1. CAUTION – WATER
 - a. Color: blue
 - 2. CAUTION – RAW WATER
 - a. Color: purple

2.9 PIPE LOCATING WIRE

- A. Pipe locating wire shall be direct-bury insulated soft drawn, single-strand copper wire, AWG No. 10 THHN. Provide epoxy splicing kits.
- B. Provide at least 6 mil PVC electrical tape insulation around wire where adjacent to metal pipe, valves, and in all valve boxes.

2.10 FILTER FABRIC

- A. Wherever filter fabric is specified or required, provide geotextile fabric meeting the minimum requirements shown in the following table:

Minimum Properties	Test Method	Values
Unit Weight (oz/yd ²)	ASTM D-5199	12
Thickness (mils)	ASTM D-1777	110
Grab Tensile Strength (lbs)	ASTM D-4632	300
Grab Elongation (%)	ASTM D-4632	50
Puncture Strength (lbs)	ASTM D-4833	175
Burst Strength (psi)	ASTM D-3786	580
Permeability (cm/s)	ASTM D-4991	0.1
AOS (vs. Std. Sieve)	ASTM D-4751	100

PART 3 - EXECUTION

3.1 CLEARING AND GRUBBING

- A. Clearing: Remove and dispose of shrubs, brush, limbs, and other vegetative growth. Remove all evidence of their presence from the surface including sticks and branches greater than 2 inches in diameter or thickness. Remove and dispose of trash piles and

rubbish. Protect trees, shrubs, vegetative growth, and fencing which are not designated for removal.

- B. Grubbing: Remove and dispose of wood or root matter below the ground surface remaining after clearing, including stumps, trunks, roots, or root systems greater than 2 inches in diameter or thickness, to a depth of 12 inches.
- C. Stripping: Remove and dispose of all organic sod, topsoil, grass and grass roots, and other objectionable material remaining after clearing and grubbing from the areas designated to be stripped.
- D. Trees and Shrubbery:
 - 1. Existing trees, shrubbery, and other vegetative material may not be shown on the plans. Inspect the site as to the nature, location, size, and extent of vegetative material to be removed or preserved, as specified herein. No trees shall be removed without prior approval of the Owner.
 - 2. All plant materials (trees, shrubbery, and plants) beyond the limits of clearing and grubbing shall be saved and protected from damage resulting from the work. No filling, excavating, trenching, or stockpiling of materials shall be permitted within the dripline of these plant materials. To prevent soil compaction within the dripline area, no equipment shall be permitted within this area.
- E. All graded areas and areas associated with new facilities and pipelines shall be cleared, grubbed, and stripped. Do not burn combustible materials. Remove all excess material from the worksite and dispose of in accordance with all local laws, codes, and ordinances.
- F. Strippings shall not be used within any backfill, including Structural Fill.

3.2 POTHOLING

- A. Excavate and backfill, in advance of the construction, test pits to determine conditions or location of the existing utilities and structures shown on the Drawings which will be in the area of Work.
- B. Define the location of each existing facility involved within the area of excavation for Work under this Contract.
- C. Exercise care during such location work to avoid damaging and/or disrupting the affected facility.
- D. CONTRACTOR is responsible for repairing, at his expense, damage to any structure, piping, or utility caused by his Work.

3.3 INSPECTION

- A. Provide Engineer with sufficient notice and with means to examine the areas and conditions under which excavating, filling, and grading are to be performed.
- B. Engineer will notify Contractor if conditions are found that may be detrimental to the proper and timely completion of the Work.

- C. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to Engineer.

3.4 TRENCH EXCAVATION

- A. Trench excavation shall include the removal of all materials or obstructions of any nature, except as otherwise specified, the installation and removal of all sheeting and bracing and the control of water necessary to construct the work as shown. Unless otherwise indicated on the Drawings or permitted by the Engineer, excavation shall be open cut.
- B. Trenching machines may be used except where their use will result in damage to existing facilities or where hand trenching is required to prevent damage to trees, tree roots, or other utilities.
- C. All paving shall be saw cut or ground to a neat line. All loose, lifted, or cracked paving shall be removed to sound material and to a neat line as directed by the Engineer.
- D. Trench Width:
 - 1. Minimum trench width at the top of the pipe shall be as shown in the Project Standard Details.

3.5 STRUCTURAL EXCAVATION

- A. The geotechnical exploration (Hand Augers 1 and 2) showed soft, intensely fractured metasedimentary rock underlaying the surface soils at approximately elevation 1808.0. The new fine screen channel has a footing subgrade elevation of 1805.93. It is likely that excavation of the fine screen channel will require removal of approximately 2'-0" of this fractured metasedimentary rock to place the channel base slab. Excavation of the fine screen channel will also require shoring to protect the existing Powder Activated Carbon (PAC) building and sidewalk. There are water and electrical utilities under the existing sidewalk that shall not be disturbed and shall be protected by adequate sheeting and shoring to support the fine screen channel excavation and construction.
- B. Rock Excavation:
 - 1. Refer to the Project Geotechnical Report regarding the characterization of the sub-grade and materials to be excavated.
 - 2. Rock excavation that is achievable using conventional heavy grading equipment, up to a 60,000 lb excavator with appropriate rock ripping gear shall be included in the CONTRACTOR's bid price.
 - 3. Rock excavation that is not achievable using conventional heavy grading equipment, up to a 60,000 lb excavator with appropriate rock ripping gear, shall be paid for as extra worked tracked on a Time and Materials basis by OWNER and CONTRACTOR.
 - 4. Alternative methods of excavation may be needed to penetrate less weathered bedrock. Those alternative methods could include the use of:
 - a. Hydraulic or pneumatic hoe-rams (may require some drilling to facilitate quicker excavation);
 - b. Use of a rock saw capable of reaching trench bottom depths;
 - c. Mechanical grinding machines (such as a Vermeer Terrain Leveler with a trench attachment);
 - d. Drilling and use of expansive compounds to fracture rock, followed by bucket excavation and hoe rams;

- e. Other methods suggested by the CONTRACTOR, as submitted to and approved by the OWNER. Explosives shall not be used for excavation on the project site.
- C. Hand trim all structure excavations to permit the placing of full widths and lengths of footings on horizontal beds. Rounded and undercut edges will not be permitted.
- D. Excavations shall allow for aggregate base, forms, working space, installation of shoring or bracing or the safe sloping of banks.

3.6 FOUNDATION BEDDING TREATMENT

- A. Subgrades for roadways, structures and trench bottoms shall be firm, dense, and thoroughly compacted and consolidated; free from mud, muck, and other soft or unsuitable materials; and remain firm and intact under all construction operations.
- B. Subgrade shall be compacted to 90% minimum relative compaction.
- C. The finished elevation of stabilized subgrades shall not be above subgrade elevations shown.
- D. Whenever the bottom of the trench is soft, yielding, or in the opinion of the Engineer, otherwise unsuitable as a foundation, the unsuitable material shall be removed to a depth such that when replaced with 3/4 inch crushed rock it shall provide a stable and satisfactory foundation as certified by the Engineer.
- E. 3/4-inch crushed rock shall be used only with approval of the Engineer. Use of 3/4-inch crushed rock must be reviewed for migration of fines and filter fabric shall be required around all 3/4-inch minus crushed rock as approved by the Engineer.
- F. Whenever the trench bottom is in rocky material, the trench shall be excavated to 6 inches below the bottom of the bells, couplings, or joints of pipe and backfilled with bedding material as specified.

3.7 TRENCH BEDDING, HAUNCHING, AND BACKFILL

- A. Pipe shall be bedded and backfilled uniformly throughout its length. The specified bedding shall be compacted to a minimum 6-inch thickness before placing the pipe. The bedding shall be compacted and leveled to give a uniform surface for laying the pipe.
- B. Pipe shall not bear on bells, couplings, or joints. The trench shall be excavated at these locations as necessary to provide at least 6 inches of bedding material below the bell, coupling, or joint. No permanent wedging and/or blocking of pipe shall be permitted. Care shall be taken not to compact the material beneath the bells, couplings, or joints until the pipe is in its final position.
- C. Bedding shall be the material placed between the bottom of the trench and the bottom of the bells, couplings, or joints of pipe and shall be no less than 6-inches in depth. Haunching shall be the material placed from the top of the bedding to the springline of the pipe. Haunching shall be forced under the pipe and made firm and stable before any material is placed above the springline of the pipe.

- D. Backfill shall be the material placed from the top of the haunching to the top of the trench or to the bottom of the structural road section. Backfill is composed of initial backfill and intermediate backfill.

3.8 TRENCH COMPACTION

- A. The initial pipe backfill (from the top of the haunching to 12 inches above the top of the pipe) shall be placed immediately after the pipe joints have been completed, inspected, and haunched. The initial backfill shall be carefully placed so as not to disturb and/or damage the pipe and/or joints, and shall be brought up evenly on both sides of the pipe. The initial backfill shall be manually compacted using care not to damage the pipe or joints to a relative compaction of 90%. "Manually compacted" does not exclude careful use of hand-controlled, power-operated units such as air tampers, vibrating tampers, or other hand-controlled tools used so as not to damage the pipe or joints. Compaction by jetting shall not be allowed.
- B. Continuously install marking tape along centerline of all buried piping, on top of last lift of pipe zone material 12" above top of pipe. Install in accordance with manufacturer's recommendations.
- C. The area 12-inches above the top of the pipe up to the bottom of the structural road section can be backfilled with intermediate backfill material provided the material can be placed and compacted without damage to the project facilities and with prior written approval of the Engineer.
- D. Compaction of backfill shall be performed in loose layers not exceeding 8 inches and shall be compacted to a relative compaction in conformance with this Specification Section and the Drawings. The backfill material shall be moisture conditioned to 1-2% over optimum.

3.9 STRUCTURAL BACKFILL AND COMPACTION

- A. No backfill or fill material shall be placed when free water is standing on the surface of the area.
- B. No compaction of fill will be permitted with free water on any portion of the fill to be compacted.
- C. No fill shall be placed or compacted in a frozen condition or on top of frozen material.
- D. Any fill containing organic materials or other unacceptable material previously described shall be removed and replaced with approved fill material prior to compaction.
- E. Wherever a pipe passes through a structure backfill, the structure backfill shall be placed and compacted to an elevation 12" above the top of the pipe before the trench is excavated.
- F. Compaction by inundation with water will not be permitted.
- G. Provide equipment capable of discing, aerating, and mixing the soil to ensure reasonable uniformity of moisture content throughout the material and to reduce the moisture content by air drying, if necessary, to a moisture content as specified herein.

3.10 EMBANKMENTS

- A. To the maximum extent available, use excess earth obtained from structure and trench excavations for construction of embankments. Obtain additional material from borrow pits, if such pits are shown, otherwise obtain additional material from offsite sources as necessary.
- B. Strip, scarify, level and roll the subgrade so that surface materials of the subgrade will be compact and well bonded with the first layer of the embankment.
- C. Wherever a pipe is to pass through a fill or embankment, place and compact the fill or embankment material to an elevation 12" above the top of the pipe before the trench is excavated.

3.11 COMPACTION DENSITY REQUIREMENTS:

- A. The degree of compaction required for several types of fill is listed below. Moisten or aerate material as necessary to provide the moisture content at 1-2% over optimum to facilitate obtaining the specified compaction. These requirements apply to both native and borrow material.

MATERIAL	Required Minimum Density (ASTM D 1557)	Maximum Uncompacted Lift
Prepared Subgrade and Embankments:	90%	8"
Structural Fill/Trench Backfill above pipe:		
More than 2 feet below final grade	90%	8"
Less than 2 feet below final grade	95%	8"
Aggregate Base:	95%	8"
Pipe Bedding	90%	6"
Gravel Surfacing	95%	6"

3.12 GRADING

- A. General:
1. Uniformly grade areas within limits of grading under this Section, including adjacent transition areas.
 2. Smooth subgrade surfaces within specified tolerances, and compact with uniform levels or slopes between points where elevations are shown or between such points and existing grades.
- B. Adjacent to Structures: Grade areas adjacent to structures to drain away from structures and to prevent ponding.
- C. Walks: Shape surface of areas under walks to line, grade and cross section, with finish surface not more than 1" above or below the required subgrade elevation.
- D. Pavements: Shape surface of areas under pavement to line, and grade and cross section with finish surface not more than 1/2" above or below the required subgrade elevation.
- E. Under Structure Slabs: Grade smooth and even, free of voids, compacted as specified and to required elevation. Provide final grades within a tolerance of 1/2" when tested with a 10' straightedge.
- F. Special Areas: In turfed areas or areas covered with gravel, stone, wood chips, or other special cover, grade to within not more than 1-inch above or below the required subgrade elevations.

3.13 TESTING

- A. General: Testing by a testing laboratory of materials, testing for moisture content during placement and compaction of fill materials, and of compaction requirements for compliance with technical requirements of the Specifications.
- B. OWNER will provide the specified testing services. Contractor will facilitate these tests, provide safe access for them, provide casual labor to obtain samples, and advise the Engineer 24 hours in advance of operations requiring such tests. Conduct such supplemental tests as required to control Work.
- C. Frequency of tests: Frequency will be not less than as follows:
 - 1. For trenches: 1 location every 25 linear feet, for each layer
 - 2. For structural backfill: 1 every 25 cubic yards.
 - 3. In embankment or fill: 1 every 25 cubic yards.
 - 4. Base material: 1 every 25 cubic yards.
 - 5. Footing Subgrade: minimum of 3 tests.
 - 6. Paved Areas and Structure Slab Subgrade: 1 every 50 square feet, but in no case less than 3 tests, for each layer.
- D. If compaction fails to meet the specified requirements, remove and replace the backfill at proper density or bring the density up to the specified level by other means acceptable to the Engineer. Subsequent tests required to confirm and verify the reconstructed backfill has been brought up to specified density will be paid by Contractor.

+ + END OF SECTION + +

SECTION 02770

ASPHALT CONCRETE PAVING

PART 1 - GENERAL

1.1 SUBMITTALS

- A. Information Submittals:
 - 1. Asphalt Concrete Mix Formula:
 - a. Submit minimum of 30 days prior to start of production.
 - b. Submittal to include the following information:
 - 1) Type and name of Mix
 - 2) Gradation analysis
 - 3) Grade of asphalt cement
 - 4) Volumetric properties
 - 5) Laboratory test results indicating compliance with criteria of Section 39 of the Caltrans Standard Specifications.
 - 6) A letter signed by the Contractor certifying the materials and mix ratios conform to the requirements specified herein
 - 2. Statement of qualification for independent testing laboratory.

1.2 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Independent Testing Laboratory: In accordance with ASTM E329.
 - 2. Asphalt concrete mix formula shall be prepared by approved certified independent laboratory under the supervision of a certified asphalt technician.

1.3 ENVIRONMENTAL REQUIREMENTS

- A. Temperature: Do not apply asphalt materials or place asphalt mixes when ground temperature is lower than 50 degrees F or air temperature is lower than 40 degrees F. Measure ground and air temperature in shaded areas away from heat sources or wet surfaces.
- B. Moisture: Do not apply asphalt materials or place asphalt mixes when application surface is wet.

PART 2 - PRODUCTS

2.1 ASPHALT CONCRETE

- A. Asphalt concrete shall conform to Type A in Section 39 of the Caltrans Standard Specifications, having 1/2-inch-maximum medium grading.

2.2 AGGREGATE BASE

- A. Aggregate base shall be Class 2 aggregate base, 3/4-inch-maximum size per Section 26 of the Caltrans Standard Specifications. Aggregate shall contain no detectable asbestos.

2.3 TACK COAT

- A. Tack coat shall be Rapid-Setting Type per Section 94 of the Caltrans Standard Specifications. Use Slow-Setting Type per Section 94 of the Caltrans Standard Specifications if a delay of more than 4 hours is expected between application of tack coat and paving operations.

2.4 ASPHALT

- A. Asphalt shall be Performance Grade PG 64-10 binder that complies with Section 92 of the Caltrans Standard Specifications.

2.5 AGGREGATE FOR ASPHALT CONCRETE

- A. Aggregate shall be Type A per Section 39-2.02 in the Caltrans Standard Specifications. Aggregate shall contain no detectable asbestos.

2.6 SEAL COAT

- A. Seal coat shall be Type II slurry seal per Section 37 of the Caltrans Standard Specifications.

PART 3 - EXECUTION

3.1 GENERAL

- A. Method of placement shall conform to Sections 39 and 92 of the Caltrans Standard Specifications.
- B. Traffic Control:
 - 1. Minimize inconvenience to traffic, but keep vehicles off freshly treated or paved surfaces to avoid pickup and tracking of asphalt.
- C. Driveways: Repave driveways from which pavement was removed. Contractor shall leave driveways in as good or better condition than before start of construction.

3.2 PREPARATION

- A. Cut lines made on existing pavement, both longitudinally and transversely, shall be sawcut straight and smooth.
- B. Scarify subgrade to a depth of 8-inches below finished subgrade elevation and compact to at least 95% relative compaction based on ASTM D 1557. Shape subgrade to line, grade, and cross section shown in the drawings. The subgrade shall be considered to extend over the full width of the base course.
- C. Place aggregate base to the minimum thickness as specified. Compact to at least 95% relative compaction based on ASTM D 1557. Install in accordance with Section 26 of the State Specifications.

3.3 LINE AND GRADE

- A. Provide and maintain intermediate control of line and grade, independent of underlying base, to meet finish surface grades and minimum thickness.

- B. Shoulders: Construct to line, grade, and cross-section shown.

3.4 PAVEMENT APPLICATION

- A. General: Place asphalt concrete mixture on approved, prepared base in conformance with this section.
- B. Placing Tack Coat:
1. Existing paving edges shall be clean and free of dirt and dust prior to placing tack coat. Asphaltic emulsion shall be used as a tack coat or paint binder on existing pavement that is to receive an asphalt concrete overlay and also along the exposed edges of abutting pavement and concrete curb and gutters.
- C. Pavement Mix:
1. Place asphalt concrete pavement mix in one single lift.
 2. Total Compacted Thickness: 3 inches minimum, or matching existing paving thickness.
 3. Apply such that meet lines are straight and edges are vertical.
 4. Collect and dispose of segregated aggregate from raking process. Do not scatter material over finished surface.
 5. After placement of pavement, seal meet line by painting a minimum of 150 millimeters (6 inches) on each side of joint with emulsified asphalt. Cover immediately with sand.
- D. Roll until roller marks are eliminated and density is 95 percent of measured maximum density as determined in the lab by Test Methods No. Calif. 304 and No. Calif. 375.
- E. Tolerances:
1. General: Conduct measurements for conformity with crown and grade immediately after initial compression. Correct variations immediately by removal or addition of materials and by continuous rolling.
 2. Completed Surface or Wearing Layer Smoothness:
 - a. Uniform texture, smooth, and uniform to crown and grade.
 - b. Maximum Deviation: 1/8 inch from lower edge of a 3.6-meter (12-foot) straightedge, measured continuously parallel and at right angle to centerline.
 - c. If surface of completed pavement deviates by more than twice specified tolerances, remove and replace wearing surface.
 3. Transverse Slope Maximum Deviation: 1/4 inch.
- F. Seal Coat:
1. General: Apply seal coat of paving grade or emulsified asphalt to finished surface at longitudinal and transverse joints, joints at abutting pavements, areas where asphalt concrete was placed by hand, patched surfaces, and other areas as directed by OWNER.
 2. Preparation:
 - a. Surfaces that are to be sealed shall be maintained free of holes, dry, and clean of dust and loose material.
 - b. Seal in dry weather and when temperature is above 35 degrees F.
 3. Application:
 - a. Fill cracks over 1.5 millimeters (1/16 inch) in width with asphalt-sand slurry or approved crack sealer prior to sealing.
 - b. When sealing patched surfaces and joints with existing pavements, extend minimum 150 millimeters (6 inches) beyond edges of patches.

+ + END OF SECTION + +

SECTION 03100
CONCRETE FORMWORK

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes: Formwork as required to construct cast-in-place concrete, including placing of all items such as sleeves, anchor bolts, inserts and all other items to be embedded in concrete for which placement is not specifically provided under other Sections.
- B. REFERENCES
 - 1. American Concrete Institute (ACI)
 - a. ACI 301, Specifications for Structural Concrete for Buildings.
 - b. ACI 347, Guide for Concrete Formwork.

1.2 SYSTEM DESCRIPTION

- A. Coordination:
 - 1. Review installation procedures under other Sections and coordinate the installation of items that must be installed with the formwork.
 - 2. Coordinate formwork specifications herein with the requirements for finished surfaces specified in Section 03300, **CAST-IN-PLACE CONCRETE**.

1.3 SUBMITTALS

- A. Submit for information purposes the following: Copies of manufacturer's data and installation instructions for all proprietary materials, including form coatings, manufactured form systems, ties and accessories.
- B. Shop Drawings: Forming, shoring and bracing drawings for footings and walls.
- C. Calculations: Calculations verifying the selection of form ties, horizontal and vertical stiff-backs or braces for wall panels, forming and form openings, falsework or roof forms, brace and form anchorage, or any other part of forming, shoring or bracing which may be considered critical by the ENGINEER. The drawings, with supporting calculations, must be signed and sealed by a Civil or Structural Engineer registered in the State of California.

- D. Access Plan: Prior to installation of any formwork system greater than 5-feet in height, Contractor shall submit a formwork access plan demonstrating competency and adherence with all applicable local and federal guidelines. Any custom platforms, stairs, ladders, or fall arrest systems shall include supporting calculations that must be signed and sealed by a Civil or Structural Engineer registered in the State of California.

1.4 QUALITY ASSURANCE

- A. Allowable Tolerances: Construct formwork to provide completed concrete surfaces complying with tolerances specified in ACI 347, Chapter 3.3, except as otherwise specified.
- B. Furnish and install all items for permanent or temporary facilities in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.1 FORM MATERIALS

- A. Forms for Exposed Finish Concrete: Unless otherwise shown or specified, construct formwork for exposed concrete surfaces with plywood overlaid with medium density overlay (MDO) or high density overlay (HDO) specifically designed for concrete forms, metal, metal-framed plywood-faced or other acceptable panel materials, to provide continuous, straight, smooth as-cast surfaces. Furnish in largest practical sizes to minimize number of joints. Provide form material with sufficient thickness to remain watertight and withstand pressure of newly placed concrete without bow or deflection.
- B. Forms for Unexposed Finish Concrete: Form concrete surfaces that will be unexposed in the finished structure with plywood, lumber, metal, or other acceptable material. Provide lumber that is dressed on at least 2 edges and 1 side.
- C. Form Ties:
 - 1. Form ties on exposed surfaces shall be located in a uniform pattern or as indicated on the Drawings. Form ties shall be constructed so that the tie remains embedded in the wall, except for a removable portion at each end. Form ties shall have conical or spherical type inserts, inserts shall be fixed so that they remain in contact with forming material, and shall be constructed so that no metal is within 1 inch of the concrete surface when the forms, inserts, and tie ends are removed. Wire ties will not be permitted. Ties shall withstand all pressures and limit deflection of forms to acceptable limits.
 - 2. Flat bar ties for panel forms shall have plastic or rubber inserts having a minimum depth of 1 inch and sufficient dimensions to permit proper patching of the tie hole.

3. Ties for water-holding structures or dry structures with access such as basements, pipe galleries, etc., that are below finish grade, shall have either an integral steel water stop 0.103 inch thick and 0.625 inch in diameter that is tightly and continuously welded to the tie, or a neoprene water stop 3/16-inch thick and 15/16 inch in diameter whose center hole is 1/2 the diameter of the snap tie, or a molded plastic water stop of comparable size. Flat snap ties complying with above requirements and other sections of this Specification may be used. The water stop shall be considerably larger in area than the tie cross sectional area, and shall be oriented perpendicular to the tie and symmetrical about the center of the tie. The ties shall be constructed to provide a positive means of preventing rotation or disturbance of the center portion of the tie during removal of the ends.

D. Alternative Form Ties – Through-Bolts:

1. Alternate form ties consisting of tapered through-bolts at least 1 inch in diameter at smallest end, or through-bolts that utilize a removable tapered sleeve of the same minimum size may be used at the CONTRACTOR's option. Clean and roughen, fill, and seal form tie hole as shown on the Drawings; or where not shown on the Drawings, the CONTRACTOR shall provide a shop drawing submittal of his proposed method of sealing the through-bolt hole by sandblasting or mechanically cleaning and roughening the entire interior surface of the hole, epoxy coating the roughened surface and driving a vinyl plug and then dry packing the entire hole on each side of the plug with nonshrink grout, meeting these Specifications. Dry packing shall be done while the epoxy is tacky or remove the epoxy by mechanical means and reapply new epoxy. The CONTRACTOR shall be responsible for watertightness and any repair needed. Any leaks or dampness on the exterior of through-bolt patches during or after water testing shall require repair or replacement of the patch.
2. The elastic plug to be inserted into the form tie hole as shown on the Drawings shall be a Dayton Sure Plug, or approved equal, sized to allow insertion using the insertion tool to elongate the plug, place it at the correct location, and allow the plug to return to its original length and diameter upon removal to form a watertight seal. The plugs shall be as manufactured and supplied by Dayton Superior, Dayton OH, or Equal.

- E. Forms Coatings: Provide commercial formulation form-coating compounds that will not bond with, stain, nor adversely affect concrete surfaces, and will not impair subsequent treatment of concrete surfaces requiring bond or adhesion, nor impede the wetting of surfaces to be cured with water or curing compounds.

1. For concrete structures which will be in contact with potable water, the manufacturer shall certify that the form coating used is NSF 61 approved.

2.2 DESIGN OF FORMWORK

- A. The CONTRACTOR shall design all formwork prior to fabrication. The design shall account for all the tolerances, form ties, finishes, architectural features, rebar supports, construction joint locations, and other features and other nonstructural formwork requirements specified. Forms shall contain pouring and observation windows to allow placement of concrete through windows or shall be staged to allow visual observation at

all times of the fresh concrete to ensure correct placement and vibration. Provide a formwork and placement design that will limit free fall of concrete in forms 8-inch or less in width to 5 feet; and for forms wider than 8 inches, limit this fall to 8 feet, except as hereinafter specified. Review methods with ENGINEER prior to start of work. Use placement devices, such as chutes, pouring spouts, pumps, as required.

- B. Wall forms shall be designed such that wall sections can be poured full height without creating horizontal cold joints and without causing snapping of form ties which shall be of sufficient strength and number to prevent spreading of the forms during the placement of concrete and which shall permit ready removal of the forms without spalling or damaging the concrete.
- C. Reuse of forms will be permitted only if a "like new" condition, unless otherwise approved in writing, is maintained. The ENGINEER shall be notified 1 full working day prior to concrete placement so that the forms can be inspected. The CONTRACTOR shall correct any defective work, found in the ENGINEER's inspection, prior to delivery of concrete to the project. Formwork surfaces that were in good condition and accepted for use, but were damaged during removal and handling shall not be reused on additional pours. The CONTRACTOR is expected to take care in the handling of forms and to obtain approval of form surfaces prior to each reuse.
- D. All forms and other structural formwork required shall be structurally designed by the CONTRACTOR and the design shall comply with all applicable safety regulations, current OSHA regulations, and other codes. Where federal or state agencies require a licensed engineer to prepare and/or seal all formwork, falsework or shoring designs, the CONTRACTOR shall hire this engineer and pay all costs. The designs shall be made available to any governing agency upon request. Comply with applicable portions of ACI 347, ACI 318 current edition, and these Specifications. All design, supervision, and construction for safety of property and personnel shall be the CONTRACTOR's full responsibility.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Examine the substrate and the conditions under which Work is to be performed with installer and notify ENGINEER, in writing, of unsatisfactory conditions. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to ENGINEER.

3.2 FORM CONSTRUCTION

- A. Construct forms complying with ACI 347; to the exact sizes, shapes, lines and dimensions shown; as required to obtain accurate alignment, location and grades; to tolerances specified; and to obtain level and plumb work in finish structures. Provide for

openings, offsets, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required. Use selected materials to obtain required finishes. Finish shall be as determined by approved mock-up or sample panel, if specified.

- B. Fabricate forms for easy removal without damaging concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where the slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like, to prevent swelling and assure ease of removal.
- C. Provide temporary form windows where interior area of formwork is inaccessible for cleanout, for inspection before concrete placement, and for placement of concrete. Brace temporary closures and set tightly to forms to prevent loss of concrete mortar. Locate form windows on forms in locations as inconspicuous as possible, consistent with requirements of the Work. Form intersecting planes of openings to provide true, clean-cut corners, with edge grain of plywood not exposed as form for concrete.
- D. Forms for Exposed To View Concrete:
 - 1. Do not use metal cover plates for patching holes or defects in forms.
 - 2. Provide sharp, clean corners at intersecting planes, without visible edges or offsets. Back joints with extra studs or girts to maintain true, square intersections.
 - 3. Use extra studs, walers and bracing to prevent bowing of forms between studs and to avoid bowed appearance in concrete. Do not use narrow strips of form material that will produce bow.
 - 4. Assemble forms so they may be readily removed without damage to exposed concrete surfaces.
 - 5. Form molding shapes, recesses, rustication joints and projections with smooth-finish materials, and install in forms with sealed joints to prevent displacement.
- E. Corner Treatment:
 - 1. Form exposed corners of beams, walls, foundations, bases and columns to produce smooth, solid, unbroken lines, except as otherwise shown. Except as specified below for reentrant or internal corners, exposed corners shall be chamfered.
 - 2. Form chamfers with 3/4"x 3/4" strips, unless otherwise shown, accurately formed and surfaced to produce uniformly straight lines and tight edge joints. Use rigid PVC chamfers for all architecturally formed concrete. Extend terminal edges to require limit and miter chamfer strips at changes in direction.
 - 3. Reentrant or internal corners and unexposed corners need not be formed chamfered.
- F. Openings and Built-In Work:

1. Provide openings in concrete formwork shown or required by other Sections or other contracts.
 2. Accurately place and securely support items to be built into forms.
- G. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt or other debris just before concrete is to be placed. Retighten forms immediately after concrete placement as required to eliminate mortar leaks.

3.3 FORM COATINGS

- A. Coat form contact surfaces with a non-staining form-coating compound before reinforcement is placed. Do not allow excess form coating material to accumulate in the forms or to come into contact with surfaces that will be bonded to fresh concrete. Apply in compliance with manufacturer's instructions.
- B. Coat steel forms with a non-staining, rust-preventative form oil or otherwise protect against rusting. Rust-stained steel formwork is not acceptable.

3.4 INSTALLATION OF EMBEDDED ITEMS

- A. Set and build into the formwork, anchorage devices and other embedded items, shown, specified or required by other Sections and other contracts. Use necessary setting drawings, diagrams, instructions and directions.
- B. Edge Forms and Screeds Strips for Slabs: Set edge forms or bulkheads and intermediate screed strips for slabs to obtain required elevations and contours in the finished slab surface. Provide and secure units to support screeds.

3.5 FIELD QUALITY CONTROL

- A. Before concrete placement, check the formwork, including tolerances, lines, ties, tie cones, and form coatings. Make corrections and adjustments to ensure proper size and location of concrete members and stability of forming systems.
- B. During concrete placement check formwork and related supports to ensure that forms are not displaced and that completed Work is within specified tolerances.
- C. If forms are unsatisfactory in any way, either before or during placing of concrete, postpone or stop placement of concrete until the defects have been corrected, and reviewed by ENGINEER.

3.6 REMOVAL OF FORMS

- A. Conform to the requirements of ACI 301, Chapter 2 and ACI 347, Chapter 3.7 except as specified below.
1. Removal of Forms and Supports: Continue curing in accordance with Section 03300, **CAST-IN-PLACE CONCRETE**, Paragraph 3.6. Forms are to remain in-place for the time specified below following the end of concrete placement. The durations shown represent a cumulative number of days, or hours, not necessarily consecutive, during which the temperature of the air surrounding the concrete is above or below 50°F.

<u>Temperature:</u>	<u>Above 50°F</u>	<u>Below 50°F or when retarders are used</u>
Walls	12 hours	24 hours
Sides of Slabs	6 hours	12 hours
Structural Supports	Do not remove forms until site-cured test cylinders develop 100% of 28-days strength.	

2. When high-early strength concrete is specified, a schedule for removal of forms will be developed in the field from the age/ strength relationships established for the materials and proportions used by tests in accordance with ACI 301, Section 2.3.4.

3.7 RE-USE OF FORMS

- A. Clean and repair surfaces of forms to be re-used in the Work. Split, frayed, delaminated or otherwise damaged form facing material will not be acceptable. Apply new form coating compound material to concrete contact surfaces as specified for new formwork.
- B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close all joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces. Form surfaces shall be subject to ENGINEER'S approval.

+ + END OF SECTION + +

SECTION 03200
CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes: Fabrication and placement of reinforcement including bars, ties and supports, and encasements.

1.2 SUBMITTALS

A. Shop Drawings:

1. Manufacturer's specifications and installation instructions for all materials and reinforcement accessories.
2. Drawings for fabrication, bending, and placement of concrete reinforcement. Comply with ACI 315, Parts A and B. For walls, show elevations to a minimum scale of 1/4-inch to 1 foot. For slabs, show top and bottom reinforcing on separate plan views. Show bar schedules, stirrup spacing, diagrams of bent bars, arrangements and assemblies, as required for the fabrication and placement of concrete reinforcement, unless otherwise noted. Keep splices to a minimum. Avoid splices in regions of maximum tension stresses whenever possible.

- B. Certificates: Submit one (1) copy of steel producer's certificates of mill analysis, tensile and bend tests for reinforcing steel.

1.3 QUALITY ASSURANCE

- A. Reference Standards: Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified:

1. American Concrete Institute (ACI):
 - a. ACI 315, Manual of Engineering and Placing Drawings for Reinforced Concrete Structures.
 - b. ACI 318, Building Code Requirements for Reinforced Concrete.
2. Concrete Reinforcing Steel Institute:
 - a. Manual of Standard Practice, includes ASTM standards referred to herein.

- B. Allowable Placing Tolerances: Comply with ACI 318, Chapter 7 - Details of Reinforcement.

1.4 DELIVERY, HANDLING AND STORAGE

- A. Deliver concrete reinforcement materials to the site bundled, tagged and marked. Use metal tags indicating bar size, lengths, and other information corresponding to markings shown on placement diagrams.
- B. Store concrete reinforcement material at the site to prevent damage and accumulation of dirt or excessive rust. Store on heavy wood blocking so that no part of it will come in contact with the ground.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Reinforcing Bars: ASTM A615, Grade 60 for all non-welded bars. ASTM A706, Grade 60 for welded bars.
- B. Steel Wire: ASTM A82.
- C. Supports for Reinforcement: Bolsters, chairs, spacers and other devices for spacing, supporting and fastening reinforcement in place.
 - 1. Use wire bar type supports complying with Concrete Reinforcing Steel Institute (CRSI) recommendations, except as specified below. Do not use wood, brick, or other unacceptable materials.
 - 2. For slabs on grade, use 5000 psi concrete blocks.
 - 3. At all formed surfaces, provide supports complying with CRSI "Manual of Standard Practice" as follows: Plastic protected or stainless steel legs.

2.2 FABRICATION

- A. General: Fabricate reinforcing bars to conform to required shapes and dimensions, with fabrication tolerances complying with CRSI, "Manual of Standard Practice". In case of fabricating errors, do not re-bend or straighten reinforcement in a manner that will injure or weaken the material.
- B. Unacceptable Materials: Reinforcement with any of the following defects will not be permitted in the Work:
 - 1. Bar lengths, bends, and other dimensions exceeding specified fabrication tolerances.
 - 2. Bends or kinks not shown on approved Shop Drawings.
 - 3. Bars with reduced cross-section due to excessive rusting or other cause.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Examine substrate and conditions under which concrete reinforcement is to be placed with installer, and notify ENGINEER, in writing, of unsatisfactory conditions. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to ENGINEER.

3.2 INSTALLATION

- A. Comply with the applicable recommendations of specified codes and standards, and CRSI, Manual of Standard Practice, for details and methods of reinforcement placement and supports.
- B. Clean reinforcement to remove loose rust and mill scale, oil, earth, ice, and other materials that reduce or destroy bond with concrete.
- C. Position, support, and secure reinforcement against displacement during formwork construction or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers and hangers, as required.
 - 1. Place reinforcement to obtain the minimum concrete cover as shown. Arrange, space, and securely tie bars and bar supports together with 16-gage wire to hold reinforcement accurately in position during concrete placement operations. Slab and wall bars shall be tied at every intersection around the periphery of the slab or wall and not less than every 48 inches in the field at walls and 60 inches in the field at slabs.
 - 2. Bar supports shall be placed no further than 4 feet apart in each direction. Supports must be completely concealed in the concrete and shall not discolor or otherwise mar the surface of the concrete.
 - 3. Set wire ties so that twisted ends are directed away from exposed concrete surfaces.
 - 4. Do not secure reinforcing steel to forms with wire, nails or other ferrous metal. Do not permit metal supports subject to corrosion to touch or be within the required clearance to formed or exposed concrete surfaces.
- D. Provide sufficient numbers of supports of strength required to carry reinforcement. Do not place reinforcing bars more than 2-inches beyond the last leg of any continuous bar support. Do not use supports as bases for runways for concrete conveying equipment or similar construction loads.
- E. Splices: Provide reinforcement lap splices by placing bars in contact, and tying tightly with wire. Comply with requirements shown for minimum lap of spliced bars.
- F. Reinforcement Around Openings: Place an equivalent area of steel around the pipe or opening and extend on each side sufficiently to develop bond in each bar. See the

Details on Drawings for bar extension length each side of opening. Where welded wire fabric is used, provide extra reinforcing using fabric or deformed bars.

- G. Field Bending: Field bending of reinforcing steel bars is not permitted when rebending will later be required to straighten bars. Rebending of bars at the same place where strain hardening has taken place due to the original bend will damage the bar. Consult with the ENGINEER prior to any pour if the CONTRACTOR foresees a need to work out a solution to prevent field bending.

3.3 INSPECTION OF REINFORCEMENT

- A. Do not place concrete until the reinforcing steel is inspected and permission for placing concrete is granted by ENGINEER. All concrete placed in violation of this provision will be rejected.

+ + END OF SECTION + +

SECTION 03251
CONCRETE JOINTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes installation of concrete joints including construction joints and waterstops.

1.2 REFERENCES

- A. American Concrete Institute (ACI)
 - 1. ACI 301, Specifications for Structural Concrete for Buildings.
- B. American Society for Testing and Materials (ASTM)
 - 1. ASTM A36, Standard Specification for Structural Steel.
 - 2. ASTM D1752, Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
 - 3. ASTM D570, Standard Test Method for Water Absorption of Plastics.
- C. NSF/ANSI Standard 61 Drinking Water Systems Components.

1.3 SYSTEM DESCRIPTION

- A. All joints subject to hydrostatic pressure shall be provided with continuous waterstop.

1.4 SUBMITTALS

- A. Product Data: Submit for approval, Manufacturer's specifications and installation instructions for all materials required.
- B. Shop Drawings: Submit for approval:
 - 1. Layout of all construction joint locations prior to the submittal of steel reinforcing drawings. The concrete pour sequence and placement schedule shall be stated in the construction joint shop drawing layout.
 - 2. Detail for joining polyvinyl chloride waterstops.
- C. Samples: Submit for approval:

1. Waterstops for joints.

1.5 QUALITY ASSURANCE

- A. Install all manufactured items in accordance with manufacturer's instructions.
- B. Store materials off the ground and protected from moisture, dirt and other contaminants. Protect installed and uninstalled materials from UV exposure in accordance with manufacturer's instruction.

PART 2 - PRODUCTS

2.1 WATERSTOPS

- A. Polyvinyl Chloride:
 1. At potable water facilities, provide NSF-61 Certified PVC waterstops.
 2. Reference Standard: ASTM D570.
 3. Construction Joints: Minimum of 3/8" thick, ribbed, width as shown, or if not shown, 6-inch minimum, center bulb type may be provided but is not required.
 4. Product and Manufacturer: Provide polyvinyl chloride waterstops of one of the following:
 - a. W.R. Meadows
 - b. Sika Greenstreak
 - c. Or approved equal

2.2 PREFORMED EXPANSION JOINT FILLER

- A. Bituminous type conforming to ASTM D994 or D1751, unless otherwise shown or specified.

2.3 CONCRETE CONSTRUCTION JOINT ROUGHENER

- A. Provide a water-soluble non-flammable, surface-retardant roughener.
- B. Product and Manufacturer: Provide one of the following:
 1. Rugasol-S, as manufactured by Sika Corporation for horizontal joints.
 2. MBT EAC-S, as manufactured by Master Builders for horizontal joints.
 3. MBT Tuf-Cote (Deep Etch), as manufactured by Master Builders for vertical joints.

4. Or approved equal.

2.4 NSF 61 APPROVED BONDING AGENT

- A. Provide an NSF-61 epoxy-resin bonding agent, two component type.
- B. Product and Manufacturer:
 1. Sikadur 31 Hi-Mod Gel
 2. Or approved Equal

2.5 MORTAR

- A. Mortar must be composed of cement, sand and water. Materials for mortar must comply with Section 03300. The proportion of sand to cement measured by volume must be 2 to 1 respectively. Mortar must contain only enough water to allow placing.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Examine substrate and conditions under which Work is to be performed with installer and notify ENGINEER, in writing, of unsatisfactory conditions. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to ENGINEER.

3.2 CONSTRUCTION JOINTS

- A. Comply with ACI 301, Chapter 2.2, and as specified below.
- B. Locate and install construction joints as shown. Locate additional construction joints as required to satisfactorily complete all Work.
- C. Horizontal Joints:
 1. Roughen concrete at the interface of construction joints by sandblasting to expose the aggregate (1/4-inch minimum amplitude) and remove accumulated concrete on rebar immediately subsequent to form stripping. When sandblasting adjacent to installed waterstops, shield installed waterstops from the sandblasting operation. Immediately before placing fresh concrete, thoroughly clean the existing contact surface using a stiff brush or other tools and a stream of water under pressure. The surface shall be clean and wet, but free from pools of water at the moment the fresh concrete is placed.
 2. Remove laitance, waste mortar or other substance that may prevent complete adhesion.

3.3 WATERSTOPS

A. General:

1. Comply with ACI 301, Chapter 2, and as specified below. Make all joints in accordance with manufacturer's instructions.
2. Obtain ENGINEER'S approval for waterstop locations not shown.
3. Provide waterstops in all basements, tanks and other substructures up to an elevation at least 12" above grade or to an elevation at least 12" above highest liquid level in tanks, whichever is higher, except where otherwise shown or noted.
4. Pipe Penetrations: Apply mastic waterstop on pipe outer diameter before casting in concrete.
 - a. Sika Lockstop, or approved equal.

B. Polyvinyl Chloride Waterstop:

1. Tie waterstops to reinforcing steel at 12-inches on center, in each direction, so that it is securely and rigidly supported in the proper position, centered in the joint, during concrete placement. Hog rings shall be used to facilitate placing and tying of waterstops to reinforcing steel forms or form-ties.
2. Continuously inspect waterstops during concrete placement to ensure their proper positioning.
3. Provide fused waterstops using equipment as supplied by or recommended by the manufacturer. Joints shall be inspected for strength and pinholes after splicing. Splices shall be strong enough to develop a pulling force of 75 percent of the strength of the waterstop, and shall be watertight.
4. Cover and protect installed waterstops from UV if the pour of concrete will be delayed more than 30 days.
5. Shield installed waterstops from sandblasting when performing surface roughening adjacent to installed waterstops.

3.4 BONDING WITH EPOXY ADHESIVE

A. Use adhesive for the following:

1. Bonding of fresh concrete to concrete cured at least 45 days or to existing concrete.
2. Bonding of horizontal surfaces, which will receive a topping.
3. Patching in areas of concrete demolition, as shown on the drawings.

B. Use NSF-61 approved bonding agent where there will be contact with the water treatment process.

C. Handle and store epoxy adhesive in compliance with the manufacturer's printed instructions, including safety precautions.

- D. Mix the epoxy adhesive in complete accordance with the instructions of the manufacturer.
- E. Before placing fresh concrete, thoroughly roughen and clean hardened concrete surfaces and coat with epoxy adhesive not less than 1/16" thick. Place fresh concrete while the epoxy material is still tacky, without removing the in-place grout coat, and as directed by the epoxy manufacturer.

+ + END OF SECTION + +

SECTION 03300
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes: Place, finish, cure, strip, and repair concrete.

1.2 REFERENCES

A. American Concrete Institute (ACI)

1. ACI 211.1, Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete.
2. ACI 214, Recommended Practice for Evaluation of Strength Test Results of Concrete.
3. ACI 301, Specifications for Structural Concrete for Buildings, (includes ASTM Standards referred to herein).
4. ACI 304, Guide for Measuring, Mixing, Transporting and Placing Concrete.
5. ACI 305, Hot Weather Concreting.
6. ACI 306, Cold Weather Concreting.
7. ACI 309, Guide for Consolidation of Concrete.
8. ACI 311, Guide for Concrete Inspection.
9. ACI 318, Building Code Requirements for Reinforced Concrete.
10. ACI 347, Guide to Formwork for Concrete
11. ACI 350, Environmental Engineering Concrete Structures.

B. NSF/ANSI 61: Drinking Water System Components – Health Effects

1.3 SYSTEM DESCRIPTION

A. Class A Concrete shall be steel reinforced and includes:

1. Foundations.
2. Walls.
3. Slabs.
4. Beams.
5. Equipment bases.
6. Pipe supports.

- B. Class B Concrete shall be placed without forms or with simple forms, with little or no reinforcing, and includes:
 - 1. Concrete fill.
 - 2. Curbs and gutters.
 - 3. Sidewalks.
 - 4. Thrust blocks.
 - 5. Encasements.

1.4 SUBMITTALS

- A. Samples: Submit samples of materials as specified and as otherwise may be requested by ENGINEER, including names, sources and descriptions.
- B. Product Data: Submit for approval the following:
 - 1. Manufacturer's specifications with application and installation instructions for proprietary materials and items, including admixtures and bonding agents.
 - 2. List of concrete materials and concrete mix designs proposed for use. Include the results of all tests performed to qualify the materials and to establish the mix designs.
 - 3. NSF/ANSI 61 certification, for admixtures and curing compounds in direct contact with the water treatment process.
- C. Laboratory Test Reports: Submit copies of laboratory test reports for materials and mix design tests.
- D. Delivery Tickets: Furnish to ENGINEER copies of all weighmaster certificate delivery tickets for each load of concrete delivered to the site. Provide items of information as specified in ASTM C94, Section 16. Delivery tickets shall be signed by a Certified Weighmaster.

1.5 QUALITY ASSURANCE

- A. Tests for Concrete Materials: Submit written reports to ENGINEER, for each material sampled and tested, prior to the start of Work. Provide the Project identification name and number, date of report, name of CONTRACTOR, name of concrete testing service, source of concrete aggregates, material manufacturer and brand name for manufactured materials, values specified in the referenced specification for each material, and test results. Indicate whether or not material is acceptable for intended use.
- B. If the concrete mix designs specified herein have not been used previously by the ready-mix supplier, mix proportions and concrete strength curves for regular cylinder tests shall be established by an approved ready-mix supplier or an independent testing laboratory based on the relationship of 7, 14 and 28 day strengths versus slump values of 2, 4 and 6 inches, all conforming to these Specifications. A laboratory, independent of the ready-mix supplier, shall be required to prepare and test all concrete cylinders. The costs for preparation of mix designs, not previously used by the ready-mix supplier, and testing of concrete and materials shall be borne by CONTRACTOR.

- C. NSF/ANSI 61 Certification: Concrete that comes in direct contact with the water treatment process shall include the following:
1. Admixtures shall be NSF/ANSI 61 certified
 2. Curing compounds shall be NSF/ANSI 61 certified

PART 2 - PRODUCTS

2.1 CONCRETE MATERIALS

- A. Cement:
1. Portland cement, ASTM C150, Type II; or blended hydraulic cement, ASTM C595, Type 1P (MS).
 2. Do not use cement which has deteriorated because of improper storage or handling.
- B. Aggregates: ASTM C33 and as herein specified.
1. Do not use aggregates containing soluble salts, substances such as iron sulfides, pyrite, marcasite, ochre, or other materials that can cause stains on exposed concrete surfaces.
 2. Fine Aggregate: Provide clean, sharp, natural sand free from loam, clay, lumps or other deleterious substances.
 3. Coarse Aggregate: Provide clean, uncoated, processed aggregate containing no clay, mud, loam, or foreign matter, as follows:
 - a. Crushed stone, processed from natural rock or stone.
 - b. Coarse Aggregate Size: Size to be ASTM C33, Nos. 57 or 67, except that No. 467 may be used for footings, foundation mats and walls 16" or greater in thickness.
- C. Water: Clean, free from injurious amounts of oils, acids, alkalis, organic materials or other substances that may be deleterious to concrete or steel.

2.2 CONCRETE ADMIXTURES

- A. Provide admixtures produced by established reputable manufacturers, and use in compliance with the manufacturer's printed instruction. Do not use admixtures that have not been incorporated and tested in the accepted mixes, unless otherwise authorized in writing by ENGINEER.
- B. Air-Entraining Admixtures: ASTM C260.
1. Product and Manufacturer: Provide one of the following:
 - a. SIKA AER, as manufactured by Sika Corporation.

- b. MasterAir AE 200, as manufactured by BASF.
 - c. Daravair, as manufactured by W.R. Grace & Conn.
 - d. Or approved equal.
- C. High-Range Water-Reducing Admixture ("Superplasticizer"): ASTM C494, Type F/G.
 - 1. Superplasticizer shall be used in all Class A Concrete. Do not use high range water-reducing admixture containing more chloride ions than are contained in municipal drinking water. Add only at the job site to concrete in compliance with the manufacturer's printed instruction.
 - 2. Product and Manufacturer: Provide one of the following:
 - a. Sikament 320, as manufactured by Sika Corporation.
 - b. MasterGlenium, as manufactured by BASF.
 - c. Daracem-100, as manufactured by W.R. Grace & Conn.
 - d. Or approved equal.
- D. Water-Reducing Admixture: ASTM C 494, Type A.
 - 1. A water-reducing, aqueous solution of a modification of the salt of polyhydroxylated organic acids. Do not use admixture containing any lignin, nitrates or chlorides added during manufacture.
 - 2. Product and Manufacturer: Provide one of the following:
 - a. Eucon WR-75, as manufactured by The Euclid Chemical Company.
 - b. MasterPozzolith, as manufactured by BASF.
 - c. WRDA series, as manufactured by W.R. Grace & Conn.
 - d. Or approved equal.
- E. Set-Control Admixtures: ASTM C494, as follows:
 - 1. Type B, Retarding.
 - 2. Type C, Accelerating.
 - 3. Type D, Water-reducing and Retarding.
 - 4. Type E, Water-reducing and Accelerating.
 - 5. Type F, Water-reducing, high range admixtures.
 - 6. Type G, Water-reducing, high range, and retarding admixtures.
- F. Calcium Chloride: Do not use calcium chloride in concrete, unless otherwise authorized in writing by ENGINEER. Do not use admixtures containing calcium chloride where concrete is placed against galvanized steel.

2.3 PROPORTIONING AND DESIGN OF MIXES

A. Prepare design mixes of concrete. Mixes subject to the following limitations:

1. Class A Concrete

- a. Specified 28-day Compressive Strength: 4,000 psi minimum.
- b. Air content: 5% $\pm$ 1%. For concrete placed at least 2 feet below the adjacent grade, an air-entraining admixture is not required unless otherwise specified.
- c. Slump, before addition of superplasticizer: 3½" $\pm$ ½"
- d. Slump, after addition of superplasticizer: 8" maximum

Concrete at Water Bearing Structures		
Coarse Aggregate Size	Cementitious Content-Pounds Per Cubic Yard	Max Water-Cement Ratio by Weight
¾"	625 min, 800 max	0.38
1"	600 min, 800 max	0.39

- e. Use superplasticizer in all Class A Concrete. Use water reducers in combination with superplasticizers as required for mixing.

2. Class B Concrete

- a. Specified 28-day Compressive Strength: 2,500 psi.
- b. Maximum Water-Cement Ratio by Weight: 0.49.
- c. Slump: 3" Minimum, 5" Maximum.

B. Use an independent testing facility acceptable to ENGINEER for preparing and reporting proposed mix designs.

C. Admixtures:

- 1. Use air-entraining admixture in all concrete, except interior slabs subject to abrasion, unless otherwise shown or specified. Add air-entraining admixture at the manufacturer's prescribed rate to result in concrete at the point of placement having air content within the prescribed limits.
- 2. Use amounts of admixtures as recommended by the manufacturer for climatic conditions prevailing at the time of placing. Adjust quantities and types of admixtures as required to maintain quality control.

2.4 NSF 61 APPROVED EPOXY BONDING AGENT

- A. For use in all dry-packed holes, concrete repair and for unplanned cold-joints.
- B. Provide an epoxy-resin bonding agent, two component type.
- C. Product and Manufacturer: Provide one of the following:
 - 1. Sikadur 31 Hi-Mod Gel
 - 2. Or approved Equal

2.5 CONCRETE CURING MATERIALS

- A. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 10 ounces per square yard and complying with AASHTO M182, Class 3.
- B. Moisture-Retaining Cover: One of the following, complying with ASTM C171.
 - 1. Waterproof paper.
 - 2. Polyethylene film.
 - 3. White burlap-polyethylene sheet.
- C. Curing Compound:
 - 1. Where compound is used on potable water bearing structures, provide NSF-61 Certified:
 - a. Product and Manufacturer: Provide one of the following:
 - 1) Quantum-Cure 61, as manufactured by Atlas Tech Products
 - 2) Or approved equal.
 - 2. Where compound is used on non-potable concrete surfaces: ASTM C309 Type 1-D (water retention requirements):
 - a. Super Aqua Cure VOX, as manufactured by The Euclid Chemical Company.
 - b. Sealtight 1100, as manufactured by W.R. Meadows, Incorporated.
 - c. Or approved equal.

2.6 EMBEDDED ITEMS

- A. Provide and install items such as plates, angles, inserts, bolts and similar items not specified elsewhere under this Section. Carbon steel embedded items shall be hot dip galvanized after fabrication.

PART 3 - EXECUTION

3.1 CONCRETE MIXING

- A. Provide concrete produced by the ready-mixed process.
- B. Comply with the requirements of ASTM C 94, and as herein specified. Proposed changes in mixing procedures, other than herein specified, must be accepted by ENGINEER before implementation.
 - 1. Plant equipment and facilities: Conform to National Ready- Mix Concrete Association "Plant and Delivery Equipment Specification."
 - 2. Mix concrete in revolving type truck mixers that are in good condition and which produce thoroughly mixed concrete of the specified consistency and strength.
 - 3. Do not exceed the proper capacity of the mixer.
 - 4. Mix concrete for a minimum of two minutes after arrival at the job site, or as recommended by the mixer manufacturer.
 - 5. Mix concrete during transit only as recommended by the mixer manufacturer.
 - 6. Mix at proper speed until concrete is discharged.
 - 7. Maintain adequate facilities at the job site for continuous delivery of concrete at the required rates.
 - 8. Provide access to the mixing plant for ENGINEER at all times.

3.2 TRANSPORTING CONCRETE

- A. Transport and place concrete not more than 90 minutes after water has been added to the dry ingredients or before 250 revolutions of the drum or blades, whichever occurs first.
- B. If an admixture is used to retard the set time and the concrete temperature does not exceed 85 degrees F, the travel and placing time may be extended to 120 minutes or 300 revolutions of the drum or blades, whichever occurs first.
- C. Take care to avoid spilling and separation of the mixture during transportation.
- D. Do not place concrete in which the ingredients have been separated.
- E. Do not retemper partially set concrete.
- F. Use suitable and approved equipment for transporting concrete from mixer to forms.

3.3 CONCRETE PLACEMENT

- A. General: Place concrete continuously so that no concrete will be placed on concrete, which has hardened sufficiently to cause the formation of seams or planes of weakness within the section. If a section cannot be placed continuously, provide construction joints as specified in Section 03251, **CONCRETE JOINTS**. Deposit concrete as nearly as practical in its final location to avoid segregation due to rehandling or flowing. Do not subject concrete to any procedure that will cause segregation.
1. Screed concrete that is to receive other construction to the proper level to avoid excessive skimming or grouting.
 2. Do not use concrete which becomes non-plastic and unworkable, or does not meet the required quality control limits, or which has been contaminated by foreign materials. Do not use retempered concrete. Remove rejected concrete from the job site and dispose of it in an acceptable location.
 3. Do not place concrete until all forms, bracing, reinforcement, and embedded items are in final and secure position.
 4. Do not place in cold weather, unless adequate precautions are taken against frost action.
 5. Do not place footings, piers or pile caps on frozen soil.
 6. Unless otherwise approved, place concrete only when ENGINEER is present.
 7. Allow a minimum of 3 days of curing before placing new concrete against a slab or wall already in place.
- B. Concrete Conveying:
1. Handle concrete from the point of delivery and transfer to the concrete conveying equipment and to the locations of final deposit as rapidly as practical by methods that will prevent segregation and loss of concrete mix materials.
 2. Provide mechanical equipment for conveying concrete to ensure a continuous flow of concrete at the delivery end. Provide runways for wheeled concrete conveying equipment from the concrete delivery point to the locations of final deposit. Keep interior surfaces of conveying equipment, including chutes, free of hardened concrete, debris, water, ice and other deleterious materials.
 3. Pumping concrete is permitted, however do not use aluminum pipe for conveying.
- C. Placing Concrete into Forms:
1. Deposit concrete in forms in horizontal layers not deeper than 24" and in a manner to avoid inclined construction joints. Where placement consists of several layers, place concrete at such a rate that concrete that is being integrated with fresh concrete is still plastic.
 2. Do not permit concrete to free fall within the form from a distance exceeding 8'-0", except as noted in Section 03100. Use "elephant trunks" or "wall pipes" to prevent free fall and excessive splashing on forms and reinforcement.

3. Remove temporary spreaders in forms when concrete placing has reached the elevation of such spreaders.
4. Consolidate concrete placed in forms by mechanical vibrating equipment supplemented by hand-spading, rodding or tamping. Use equipment and procedures for consolidation of concrete in accordance with the applicable recommended practices of ACI 309. Vibration of forms and reinforcing will not be permitted.
5. Vibrators shall have a frequency of at least 8,000 vpm, with amplitude required to consolidate the concrete in the section being placed. At least one stand-by vibrator in operable condition shall be at the placement site prior to initiating placement of the concrete.
6. Do not use vibrators to transport concrete inside of forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than the visible effectiveness of the machine. Place vibrators to rapidly penetrate the layer of concrete and at least 6" into the preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion, limit the duration of vibration to the time necessary to consolidate the concrete and complete embedment of reinforcement and other embedded items without causing segregation of the mix.
7. The forms shall contain sufficient windows or be limited in height to allow visual observation of the concrete and the vibrator operators shall be required to see the concrete being consolidated to ensure good quality workmanship or the CONTRACTOR shall have a person who is actually observing the vibration of the concrete at all times and advising the vibrator operators of any changes needed to assure complete consolidation.
8. Do not place concrete in beam and slab forms until the concrete previously placed in columns and walls is no longer plastic.
9. Force concrete under pipes, sleeves, openings and inserts from one side until visible from the other side to prevent voids.

D. Placing Concrete Slabs and Footings:

1. Deposit and consolidate concrete in a continuous operation, within the limits of construction joints, until the placing of a panel or section is completed.
2. Consolidate concrete during placing operations using mechanical vibrating equipment, so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.
3. Consolidate concrete placed in beams and girders of supported slabs, and against bulkheads of slabs on ground, as specified for formed concrete structures.
4. Bring surfaces to the correct level. Smooth the surface, leaving it free of humps or hollows. Do not sprinkle water on the plastic surface. Do not disturb the surfaces prior to beginning finishing operations.

E. Bonding for Next Concrete Pour: Per Section 03251, **CONCRETE JOINTS**.

F. Quality of Concrete Work:

1. Make all concrete solid, compact and smooth, and free of laitance, cracks and cold joints.
2. All concrete for liquid retaining structures, and all concrete in contact with earth, water, or exposed directly to the elements shall be watertight.
3. Cut out and properly replace to the extent ordered by ENGINEER, or repair to the satisfaction of ENGINEER, surfaces which contain cracks or voids, are unduly rough, or are in any way defective. Thin patches or plastering will not be acceptable.
4. Repair all leaks through concrete, and cracks, holes or other defective concrete in areas of potential leakage and make watertight.
5. Repair, remove, and replace defective concrete as ordered by ENGINEER at no additional cost to OWNER.

G. Cold Weather Placing:

1. Protect all concrete Work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures, in compliance with the requirements of ACI 306 and as herein specified.
2. When the air temperature has fallen to or may be expected to fall below 40°F, provide adequate means to maintain the temperature, in the area where concrete is being placed, at between 50°F and 70°F for at least seven days after placing. Provide temporary housings or coverings including tarpaulins or plastic film. Maintain the heat and protection, if necessary, to ensure that the ambient temperature does not fall more than 30°F in the 24 hours following the seven-day period. Avoid rapid dry-out of concrete due to overheating, and avoid thermal shock due to sudden cooling or heating.
3. When air temperature has fallen to or is expected to fall below 40°F, uniformly heat all water and aggregates before mixing as required to obtain a concrete mixture temperature of not less than 55°F and not more than 85°F at point of placement.
4. Do not use frozen materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials. Ascertain that forms, reinforcing steel, and adjacent concrete surfaces are entirely free of frost and ice before placing concrete.
5. When temperatures are expected to be below 32°F the night before the concrete is placed, then all reinforcing steel, forms and the ground shall be preheated, for a minimum of 12 hours, under a minimum temperature of 50°F.
6. Do not use salt and other materials containing antifreeze agents or chemical accelerators, or set-control admixtures, unless approved by ENGINEER, in mix designs.
7. Weather predictions made by the nearest NOAA station, and corrected for the local elevation and environmental conditions, may be used to determine whether cold weather protection shall be required. Thermometers will be used by ENGINEER and these readings shall determine whether cold weather protection shall be required and whether cold weather protection is adequate.

H. Hot Weather Placing:

1. When hot weather conditions exist as any combination of high air temperature, low relative humidity and wind velocity that would seriously impair the quality and strength of concrete, place concrete as recommended by ACI 305 and as herein specified.
 2. Cool ingredients before mixing to maintain concrete temperature at time of placement below 85°F. No concrete shall be placed if its temperature exceeds 90°F. Mixing water may be chilled, or chopped ice may be used, or liquid nitrogen may be added. Ice, when introduced into the mixer shall be in such form that it will be completely melted and dispersed throughout the mix at the completion of the mixing time. The addition of ice shall not increase the specified water to cement ratio.
 3. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that the steel temperature will not exceed the ambient air temperature immediately before embedment in concrete.
 4. Thoroughly wet forms before placing concrete. Forms shall be free of standing water when concrete is placed.
 5. Do not use set-control admixtures, unless approved by ENGINEER in mix designs.
 6. Fog spray shall be used during finishing operations whenever necessary to avoid surface plastic shrinkage cracking. Fog spray shall also be used after finishing and before the specified curing is commenced to avoid surface plastic shrinkage cracking.
 7. Obtain ENGINEER'S approval of other methods and materials proposed for use.
- I. Removal of Forms:
1. The CONTRACTOR shall be responsible for all damage resulting from improper and premature removal of forms. Satisfy all applicable OSHA requirements with regard to safety of personnel and property.
 2. Forms and shoring for elevated structural slabs or beams shall remain in place in accordance with ACI 318, Chapter 6, and until the concrete has reached a compressive strength equal to the specified 28-day compressive strength as determined by test cylinders unless noted otherwise in Section 03100 - **CONCRETE FORMWORK**. Removal of all supports prior to obtaining adequate field cured cylinder results and reshoring shall not be permitted.
- J. Patching:
1. Patching of concrete shall provide an acceptable and structurally sound surface finish uniform in appearance or the CONTRACTOR shall upgrade the finish by other means at no additional cost.
 2. Tie Holes: All tie holes, except where sealant is indicated, shall be filled with dry pack nonshrink grout. White cement shall be added as needed so the color of grout after curing matches the color of adjacent concrete. Tie holes shall be thoroughly sandblasted or roughened. Flush the patch area with water and allow to dry. Coat the surface of the existing concrete with an approved bonding agent prior to filling with nonshrink grout. Complete the repair in the time duration specified by the bonding agent manufacturer. The grout shall be rammed into place in thin layers and leveled to the plane of the surrounding concrete. Cure in accordance with the manufacturer's recommendations.

3. Defective Areas: Remove all defective concrete such as honeycombed areas and rock pockets out to sound concrete. Small shallow holes caused by air entrapment at the surface of the forms shall not be considered defects unless the amount is so great as to be considered not the standard of the industry and due primarily of poor workmanship. If chipping is required, the edges shall be perpendicular to the surface. Feather edges shall not be permitted. The defective area shall be filled with a nonshrink, nonmetallic, grout. Use an approved bonding agent on horizontal patches prior to placing nonmetallic, non shrink grout. Since some bonding agents may not be compatible for some vertical surface patching techniques, demonstrate all methods for repair of vertical surfaces using the actual materials, methods, and curing procedures required by the manufactures of the materials on the project site. The CONTRACTOR shall consult with representatives of the bonding agent manufacturer and the nonshrink grout manufacturer, and these representatives shall be onsite and assist in the demonstration.
4. Blockouts at Pipes or Other Penetrations: Conform to details shown or submit proposed blockouts for review. Use nonshrink, nonmetallic grout.

3.4 FINISH OF FORMED SURFACES

A. Rough Form Finish:

1. Standard rough form finish is with concrete surface having the texture imparted by the form material, with tie holes and defective areas repaired and patched with mortar of 1 part cement to 1½ parts sand & all fins and other projections exceeding 1/4" in height rubbed down or chipped off.
2. Use rough form finish for the following:
 - a. Exterior vertical surfaces up to 1' below grade.
 - b. Interior exposed vertical surfaces of liquid containers up to 1' below liquid level.
 - c. Interior and exterior exposed beams and undersides of slabs.
 - d. Other areas shown.

B. Smooth Form Finish:

1. Produce smooth form finish (Class A, as defined by ACI-347) by selecting form materials that will impart a smooth, hard, uniform texture. Arrange panels in an orderly and symmetrical manner with a minimum of seams. Repair and patch defective areas as above with all fins or other projections completely removed and smoothed.
2. Use smooth form finish for surfaces that are to be covered with a coating material. The material may be applied directly to the concrete or may be a covering bonded to the concrete such as waterproofing, damp proofing, painting or other similar system.

C. Smooth Rubbed Finish:

1. Provide smooth, rubbed finish to concrete surfaces which have received smooth form finish as follows:

- a. Rubbing of concrete surfaces not later than the day after form removal.
- b. Moistening of concrete surfaces and rubbing with carborundum brick or other abrasive until a uniform color and texture is produced. Do not apply cement grout other than that created by the rubbing process.
2. Except where surfaces have been previously covered as specified above, use smooth rubbed finish for the following:
 - a. Interior exposed walls and other vertical surfaces.
 - b. Exterior exposed walls and other vertical surfaces down to 1' below grade.
 - c. Interior and exterior horizontal surfaces, except exterior exposed slabs and steps.
 - d. Interior exposed vertical surfaces of liquid containers down to 1' below liquid level.
 - e. Other areas shown.

D. Related Unformed Surfaces:

1. At tops of walls, horizontal offsets, and similar unformed surfaces occurring adjacent to formed surfaces, strike off smooth and finish with a texture matching the adjacent formed surfaces. Continue the final surface treatment of formed surfaces uniformly across the adjacent unformed surfaces, unless otherwise shown.

3.5 MONOLITHIC SLAB FINISHES

A. Float Finish:

1. After placing concrete slabs, do not work the surface further until ready for floating. Begin floating when the surface water has disappeared or when the concrete has stiffened sufficiently. Check and level the surface plane to a tolerance not exceeding 1/4" in 10' when tested with a 10' straightedge. Cut down high spots and fill all low spots. Uniformly slope surface to drains as shown. Immediately after leveling, refloat the surface to a uniform, smooth, granular texture.
2. Use float finish for the following:
 - a. Interior horizontal surfaces of liquid containers, except those to receive grout topping.
 - b. Exterior below grade horizontal surfaces.
 - c. Surfaces to receive additional finishes, except as shown or specified.

B. Non-Slip Broom Finish:

1. Immediately after float finishing, slightly roughen the concrete surface by brooming in the direction perpendicular to the main traffic route. Use fiber-bristle broom, unless otherwise directed. Coordinate the required final finish with ENGINEER before application.
2. Use Non-Slip Broom Finish for the following:

- a. Exterior exposed horizontal surfaces subject to light foot traffic.
- b. Interior and exterior concrete steps and ramps.
- c. Horizontal surfaces which will receive a grout topping or a concrete equipment base slab.

3.6 CONCRETE CURING AND PROTECTION

A. General:

1. Protect freshly placed concrete from premature drying and excessive cold or hot temperature, and maintain without drying at a relatively constant temperature for the period of time necessary for hydration of the cement and proper hardening of the concrete.
2. Start initial curing after placing and finishing concrete as soon as free moisture and bleed water sheen has disappeared from the concrete surface. Keep concrete continuously moist during initial curing.
3. Begin final curing procedures immediately following initial curing and before the concrete has dried. The total curing duration shall not be less than ten (10) days. For concrete sections over 30" thick, continue curing for an additional seven (7) days, minimum. Avoid rapid drying at the end of the final curing period.

B. Use one of the following methods as approved by ENGINEER:

1. Walls:

- a. Method 1: Leave concrete forms in place and keep entire surfaces of forms and exposed concrete surfaces wet for the entire curing duration. If forms are loosened and the contact between the concrete surface and forms is broken then the entire wall shall be wet cured.
- b. Method 2: Continuously sprinkle or fog with water 100 percent of the exposed surfaces for the curing duration immediately after removal of forms.
- c. Method 3: When approved by ENGINEER and as noted below, apply curing compound immediately after removal of forms.

2. Slab and Curbs:

- a. Method 1: Protect surface by water ponding for the entire curing duration.
- b. Method 2: Cover concrete surfaces and exposed edges with the specified absorptive cover, thoroughly saturating the cover with water, and keeping the absorptive cover continuously wet with sprinklers or porous hoses during the curing duration. Lap adjacent absorptive cover sections 3-inches minimum.
- c. Method 3: Cover the concrete surfaces and exposed edges with the specified moisture-retaining cover during the curing duration. Seal edges and seams with waterproof tape, adhesive or sand berm. Water must be introduced between the moisture-retaining cover and the concrete surface whenever moist drops cannot be detected on the concrete side of the cover or the concrete surface is noticeably dry.

- d. Method 4: Cover all exposed surfaces with 1-inch minimum layer of wet sand, earth, or sawdust and keep continuously wet for the curing duration.
- e. Method 5: Continuously sprinkle or fog exposed surfaces for the curing duration.
- f. Method 6: When approved by ENGINEER and as noted below, apply liquid curing compound immediately after final finishing when surface will no longer be damaged by traffic necessary to apply curing compound.

C. Liquid curing compound:

- 1. Apply the specified curing compound to concrete surfaces when permitted by ENGINEER. Slabs to receive terrazzo floors, concrete/grout topping or ceramic tile, concrete of water bearing structures, and concrete that will receive coatings shall not be cured with liquid curing compound. The compounds shall be applied by power spray equipment in accordance with the manufacturer's directions. Recoat areas, which are subjected to heavy rainfall within 3 hours after initial application. Maintain the continuity of the coating and repair damage to the coat during the entire curing period. Remove curing compound from exposed surfaces at the end of the curing duration. For concrete surfaces, which will be in contact with potable water, the manufacturer shall certify that the curing compound used is NSF/ANSI 61 approved.

D. Temperature of Concrete During Curing:

- 1. When the nighttime low temperature may drop to 40°F or below, maintain the concrete temperature between 50°F and 70°F continuously throughout the curing period, by heating, covering, insulation or housing as required.
- 2. When the daytime high temperature may rise to 90°F or above, maintain the concrete temperature at a minimum and reduce temperature variations by providing moist curing continuously for the concrete curing period.
- 3. During either of the conditions specified above, the minimum curing time shall be 10 days (240 hours), after which coverings, housings, and insulation shall remain on the work for an additional 3 days, to allow gradual temperature equalization with the atmosphere.

- E. Protection from Mechanical Injury: During the curing period, protect concrete from damaging mechanical disturbances including load stresses, heavy shock, excessive vibration, and from damage caused by rain or flowing water. Protect all finished concrete surfaces from damage by subsequent construction operations.

3.7 FIELD QUALITY CONTROL

- A. The OWNER will employ a testing laboratory to perform field quality control testing. ENGINEER will direct the number of tests and cylinders required. Furnish all necessary assistance required by ENGINEER.
- B. Quality Control Testing During Construction (performed by OWNER):
 - 1. Perform sampling and testing for field quality control during the placement of concrete, as follows:

- a. Sampling Fresh Concrete: ASTM C172.
 - b. Slump: ASTM C143; one test for each concrete load at point of discharge; and one for each set of compressive strength test specimens.
 - c. Air Content: ASTM C231; one for the first concrete load, and one for every two concrete loads thereafter, or when required by an indication of change. Adjust mix if test results are unsatisfactory and resubmit for ENGINEER'S approval.
 - d. Compressive Strength Tests: ASTM C39; one set of 4 standard compression cylinders for each 100 cubic yards or fraction thereof, of each mix design placed in any one day; 1 specimen tested at 7 days, and 2 specimens tested at 28 days, 1 held. Cast, store and cure specimens as specified in ASTM C31.
 - 1) Adjust mix if test results are unsatisfactory and resubmit for ENGINEER'S approval.
 - 2) Concrete that does not meet the strength requirements is subject to rejection and removal from the Work, or to other such corrective measures as directed by ENGINEER, at the expense of CONTRACTOR.
 - e. Concrete Temperature: Test each time a slump test is made.
2. Where questionable field conditions may exist during placing concrete or immediately thereafter, strength tests of specimens cured under field conditions will be required by ENGINEER to check the adequacy of curing and protecting of the concrete placed. Specimens shall be molded at the same time and from the same samples as the laboratory cured specimens.
 - a. Provide improved means and procedures for protecting concrete when the 28-day compressive strength of field- cured cylinders is less than 85% of companion laboratory-cured cylinders.
 - b. When laboratory-cured cylinder strengths are appreciably higher than the minimum required compressive strength, field-cured cylinder strengths need not exceed the minimum required compressive strength by more than 500 psi even though the 85 percent criterion is not met.
 3. The testing laboratory shall submit certified copies of test results directly to ENGINEER and CONTRACTOR after tests are made.

C. Evaluation of Quality Control Tests:

1. Do not use concrete delivered to the final point of placement that has slump or temperature outside the specified values, nor that which is older than specified in section 3.2.
2. Compressive strength tests for laboratory-cured cylinders will be considered satisfactory if the averages of all sets of three consecutive compressive strength tests results equal or exceed the 28 day design compressive strength of the type or class of concrete; and, no individual strength test falls below the required compressive strength by more than 500 psi.
3. If the compressive strength tests fail to meet the minimum requirements specified, the concrete represented by such tests will be considered deficient in strength and subject to replacement, reconstruction or to other action approved by ENGINEER.

D. Testing Concrete Structure for Strength:

1. When there is evidence that the strength of the in-place concrete does not meet specification requirements, provide the services of a concrete testing service to take cores drilled from hardened concrete for compressive strength determination at no additional expense to OWNER. Provide tests complying with ASTM C42 and the following:
 - a. Take at least three (3) representative cores from each member or suspect area at locations directed by ENGINEER.
 - b. Strength of concrete for each series of cores will be considered satisfactory if their average compressive strength is at least 85% and no single core is less than 75% of the 28 day required compressive strength.
 - c. Report test results, in writing, to ENGINEER on the same day that tests are made. Include in test reports the Project identification name and number, date, name of CONTRACTOR, name of concrete testing service, location of test core in the structure, type or class of concrete represented by core sample, nominal maximum size aggregate, design compressive strength, compression breaking strength and type of break (corrected for length-diameter ratio), direction of applied load to core with respect to horizontal plane of the concrete as placed, and the moisture condition of the core at time of testing.
2. Fill core holes solid with non-shrink, high strength grout, and finish to match adjacent concrete surfaces.

3.8 MISCELLANEOUS CONCRETE ITEMS

- A. Filling-In: Fill-in holes and openings left in concrete structures for the passage of work by other contractors, unless otherwise shown or directed, after the work of other contractors is in place. Mix, place and cure concrete as herein specified, to blend with in-place construction. Provide all other miscellaneous concrete filling shown or required to complete the Work.
- B. Curbs:
 1. Provide monolithic finish to interior curbs by stripping forms while concrete is still green and steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
 2. Exterior curbs shall have rubbed finish for vertical surfaces and a broomed finish for top surfaces.
- C. Equipment Bases:
 1. Construct bases to the dimensions shown, or as required to meet manufacturers requirements and drawing elevations. Where no specific elevations are shown, bases shall be 6-inches thick and extend 3-inches outside the metal equipment base or supports.
 2. Include all concrete equipment base work not specifically included under other Sections.

3. In general, place bases up to 1-inch below the metal base. Properly shim equipment to grade and fill 1-inch void with non-shrink grout as specified in Section 03600, **GROUT**.

D. Installation of embedded items:

1. Install all embedded items prior to concrete placement, or, if necessary, as soon after concrete placement as possible, before concrete is set.
2. Use temporary support and bracing to keep embedded items in place while concrete cures.
3. Protect all embedded items from damage during concrete installation.

3.9 CONCRETE REPAIRS

A. Repair of Formed surfaces:

1. Repair exposed-to-view formed concrete surfaces that contain defects which adversely affect the appearance of the finish. Surface defects that require repair include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets, and holes left by the rods and bolts; fins and other projections on the surface; and stains and other discolorations that cannot be removed by cleaning.
2. Repair concealed formed concrete surfaces that may contain defects that adversely affect the durability of the concrete. Surface defects that require repair include cracks in excess of 0.01-inch wide, cracks of any width and other surface deficiencies which penetrate to the reinforcement or completely through non-reinforced sections, honeycomb, rock pockets, holes left by tie rods and bolts, and spalls except minor breakage at corner.
3. Repair structural cracks and cracks in water-holding structures.

B. Method of Repair of Formed Surfaces:

1. Repair and patch defective areas with cement mortar immediately after removal of forms and as directed by ENGINEER.
2. Cut out honeycomb, rock pockets, voids over 1/2" diameter, and holes left by tie rods and bolts, down to solid concrete but, in no case, to a depth of less than 1". Make edges of cuts perpendicular to the concrete surface. Before placing the cement mortar, thoroughly clean, dampen with water, and brush-coat the area to be patched with the specified bonding agent.
 - a. For exposed-to-view surfaces, blend white portland cement and standard portland cement so that, when dry, the patching mortar color will match the color of the surrounding concrete. CONTRACTOR shall impart texture to repaired surfaces to match texture of existing adjacent surfaces. Provide test areas at inconspicuous locations to verify mixture, texture and color match before proceeding with the patching. Compact mortar in place and strike off slightly higher than the surrounding surface.
3. Cracks which require repair shall be pressure grouted, epoxy injected. Apply in accordance with the manufacturer's directions and recommendations.

- a. Sikadur 35, Hi-Mod L.V. and Sikadur 31, Hi-Mod Gel, as manufactured by Sika Corporation Company.
 - b. Euco Epoxy #452 Epoxy System, as manufactured by The Euclid Chemical Company.
 - c. Or approved equal.
4. Fill holes extending through concrete by means of a plunger- type gun or other suitable device from the least exposed face, using a flush stop held at the exposed face to ensure completely filling.
 5. Sandblast exposed-to-view surfaces that require removal of stains, grout accumulations, sealing compounds, and other substances marring the surfaces. Use sand finer than No. 30 and air pressure from 15 to 25 psi.

C. Repair of Unformed Surfaces:

1. Test unformed surfaces, such as monolithic slabs, for smoothness and to verify surface plane to the tolerances specified for each surface and finish. Correct low and high areas as herein specified.
2. Test unformed surfaces sloped to drain for trueness of slope, in addition to smoothness, using a template having the required slope. Correct high and low areas as herein specified.
3. Repair finish of unformed surfaces that contain defects which adversely affect the durability of the concrete. Surface defects, as such, include crazing, cracks in excess of 0.01-inch wide or which penetrate to the reinforcement or completely through non-reinforced sections regardless of width, spalling, popouts, honeycomb, rock pockets, and other objectionable conditions.
4. Repair structural cracks and cracks in water-holding structures.

D. Methods of Repair of Unformed Surfaces:

1. Correct high areas in unformed surfaces by grinding, after the concrete has cured sufficiently so that repairs can be made without damage to adjacent areas.
2. Correct low areas in unformed surfaces during, or immediately after completion of surface finishing operations by cutting out the low areas and replacing with fresh concrete. Finish repaired areas to blend into adjacent concrete. Use one of the following. Apply in accordance with the manufacturer's directions and recommendations.
 - a. Euco Poly-Patch, as manufactured by The Euclid Chemical Company.
 - b. Sikatop 122, as manufactured by Sika Corporation.
 - c. Or approved equal.
3. Repair defective areas, except random cracks and single holes not exceeding 2" diameter, by cutting out and replacing with fresh concrete. Remove defective areas to sound concrete with clean, square cuts, and expose reinforcing steel with at least 3/4" clearance all around. Dampen all concrete surfaces in contact with patching concrete and brush with the specified bonding agent. Place patching concrete before grout takes its initial set. Mix patching concrete of the same materials and

proportions to provide concrete of the same type or class as the original adjacent concrete. Place, compact and finish as required to blend with adjacent finished concrete. Cure in the same manner as adjacent concrete.

4. Repair isolated random cracks, as approved by ENGINEER, and single holes not over 2" diameter, by the dry-pack method. Groove the top of cracks, and cut out holes to sound concrete and clean of dust, dirt and loose particles. Dampen all cleaned concrete surfaces and brush with the specified bonding agent. Place dry-pack before the cement grout takes its initial set. Mix dry-pack, consisting of 1 part portland cement to 2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched areas continuously moist for not less than 72 hours.
5. Cracks which extend through the full member section, or any cracks determined by ENGINEER to require pressure grouting repair, shall be pressure grouted, epoxy injected. Apply in accordance with the manufacturer's directions and recommendations.
 - a. Sikadur 35, Hi-Mod L.V. and Sikadur 31, Hi-Mod Gel, as manufactured by Sika Corporation.
 - b. Euco Epoxy #452 Epoxy System, as manufactured by The Euclid Chemical Company.
 - c. Or approved equal.
6. Assure that surface is acceptable for flooring material to be installed in accordance with manufacturer's recommendations.

E. Other Methods of Repair:

1. Repair methods not specified above may be used if approved by ENGINEER.

+ + END OF SECTION + +

SECTION 03600

GROUT

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes non-metallic, non-shrink, and ordinary Portland cement-sand grouts.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM)
 - 1. ASTM C33, Standard Specification for Concrete Aggregates.
 - 2. ASTM C150, Standard Specification for Portland Cement.
 - 3. ASTM C595, Standard Specification for Blended Hydraulic Cements.
 - 4. ASTM C1107, Standard Specification for Packaged Dry, Hydraulic-Cement Grout.

1.3 SYSTEM DESCRIPTION

- A. Furnish ordinary cement-sand grout for the following:
 - 1. Construction joint grout.
 - 2. As shown in the Drawings.
- B. Furnish non-shrink, non-metallic grout for the following:
 - 1. Equipment bases, 25 hp or less.
 - 2. Base plates.
 - 3. Guardrail and railings.
 - 4. Through-bolt and form tie openings.
 - 5. As shown in the Drawings.

1.4 SUBMITTALS

- A. Product Data:
 - 1. Manufacturer's specifications and installation instructions.
 - 2. Proposed method for keeping existing concrete surfaces wet prior to placing grout.
 - 3. Forming method for fluid grout placements.

4. Curing method for grout.

B. Laboratory Test Reports and Certificates:

1. Submit copies of reports on quality control tests.
2. Submit certification that materials meet specification requirements.
3. For ordinary cement-sand grout, copies of grout mix design and laboratory strength test reports.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery of Materials: Deliver grout materials from manufacturers in unopened containers and bearing intact manufacturer's labels.

B. Storage of Materials: Store grout materials in a dry shelter and protected from moisture.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Non-shrink, Non-metallic Grout:

1. Prepackaged non-staining cementitious grout which shall meet the minimum requirements of ASTM C1107 and requiring only the addition of water at the jobsite.
2. NSF-61 approved for use with potable water.
3. Product and Manufacturer: Provide one of the following:
 - a. Fluid Grout 161, as manufactured by Five Star Products.
 - b. Or approved equal.

B. Ordinary Cement-Sand Grout: Prepare design mixes of for ordinary cement grout.

1. Cement: Portland cement, ASTM C150, Type II; or blended hydraulic cement, ASTM C595, Type 1P.
2. Aggregates: ASTM C33 and as herein specified.
 - a. Do not use aggregates containing soluble salts or other substances such as iron sulfides, pyrite, marcasite, ochre, or other materials that can cause stains on exposed concrete surfaces.
 - b. Fine Aggregate: Clean, sharp, natural sand, free from loam, clay, lumps or other deleterious substances.
 - 1) Dune sand, bank run sand and manufactured sand are not acceptable.

- c. Coarse Aggregate: Clean, uncoated, processed aggregate containing no clay, mud, loam, or foreign matter, as follows:
 - d. Crushed stone, processed from natural rock or stone.
 - e. Washed gravel, either natural or crushed. Use of slag and pit or bank run gravel is not permitted.
 - f. Coarse Aggregate Size: Size to be ASTM C33, No. 7 for Class B grout. Coarse aggregate not permitted in Class A grout.
3. Admixtures: Provide admixtures produced by established reputable manufacturers and use in compliance with the manufacturer's printed instruction. Do not use admixtures that have not been incorporated and tested in the accepted mixes, unless otherwise authorized in writing by ENGINEER. Refer to Section 03300 - **CAST-IN-PLACE CONCRETE**, for additional admixture requirements. Admixtures shall be NSF-61 approved.
4. Proportioning and Design of Mixes: Prepare design mixes for each class of grout. Mixes are subject to the following limitations:
- a. Specified 28-day Compressive Strength: 4,000 psi.
 - b. Minimum amount of water necessary for the mixture to flow under its own weight.
 - c. Fine Aggregate meeting ASTM C33.
 - d. Air Content Percentage: $\pm 1.5\%$.
 - e. Minimum Cement Content in Pounds per Cubic Yard: 658.
 - f. Slump at point of placement: $5" \pm 1"$.
5. Proportion mixes by either laboratory trial batch or field experience methods, using materials to be employed on the Project for grout required. Comply with ACI 211.1 and provide a complete report, from an independent testing laboratory, to ENGINEER, at least 30 days prior to start of Work. Do not begin grout production until ENGINEER has approved mixes.
6. Laboratory Trial Batches: When laboratory trial batches are used to select grout proportions, prepare test specimens and conduct strength tests as specified in ACI 301, Chapter 3 - Proportioning.
7. Field Experience Method: When field experience methods are used to select grout proportions, establish proportions as specified in ACI 301, Chapter 4.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Examine the substrate and conditions under which grout is to be placed with installer and notify ENGINEER, in writing, of unsatisfactory conditions. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to ENGINEER.

3.2 INSTALLATION

A. General:

1. Mix, place and cure grout as shown and in accordance with manufacturer's instructions. If manufacturer's instructions conflict with the Specifications, do not proceed until ENGINEER provides clarification.
2. When placing grout conform to temperature and weather limitations in Section 03300 - **CAST-IN-PLACE CONCRETE**.

B. Through-bolt and form-tie holes: Fill space with dry pack dense grout hammered in with steel tool and hammer. Coordinate dry pack dense grout application with bonding agent in Section 03251 - **CONCRETE JOINTS**.

C. Columns, Beams and Equipment Bases: Prepare concrete surface by sandblasting, chipping, or by mechanical means to remove any soft material prior to setting base plates and machinery. After shimming columns, beams and equipment indicated to be grouted on the plans to proper grade, securely tighten anchor bolts. Properly form around the base plates allowing sufficient room around the edges for placing the grout. Adequate depth between the bottom of the base plate and the top of concrete base must be provided to assure that the void is completely filled with grout.

D. Guardrails and Railings: After posts and rails have been properly inserted into holes or sleeves, fill the annular space between posts and cast-in-place sleeves and/or below base plates with non-shrink grout. Bevel grout at juncture with post so that moisture flows away from posts.

E. Construction Joints: Ordinary cement-sand grout may be used in place of mortar over the contact surface of the old concrete at the interface of horizontal construction joints as outlined in Section 03251 - **CONCRETE JOINTS**, and Section 03300 - **CAST-IN-PLACE CONCRETE**, of these Specifications.

F. Curing: Cure all grout in accordance with manufacturer's written instructions. Wet cure ordinary cement-sand grout and non-shrink non-metallic grout for a minimum of three (3) days unless directed otherwise by the ENGINEER.

+ + END OF SECTION + +

SECTION 05051
ANCHORS, INSERTS, AND DOWELS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes all post-installed anchors and inserts required to anchor parts of the Work to supporting concrete. This Section also includes adhesives for anchoring reinforcing dowels into existing concrete.

1.2 REFERENCES

- A. American Society for Testing and Materials
 - 1. ASTM A36, Standard Specification for Carbon Structural Steel.
 - 2. ASTM A320, Standard Specification for Alloy-Steel and Stainless Steel Bolting for Low-Temperature Service.
 - 3. ASTM D746, Standard Test Method for Brittleness of Temperature of Plastics and Elastomers by Impact
 - 4. ASTM D1505, Standard Test Method for Density of Plastics by the Density-Gradient Technique
 - 5. ASTM D1525, Standard Test Method for Vicat Softening Temperature of Plastics
- B. 2019 California Building Code (CBC)
- C. American Concrete Institute (ACI)
 - 1. ACI 355.2, Qualification of Post-Installed Mechanical Anchors in Concrete
 - 2. ACI 355.4, Qualification of Post-installed Adhesive Anchors in Concrete

1.3 SYSTEM DESCRIPTION

- A. Provide the size, type, and length of anchor shown on the drawings or, if not shown, as specified in the detailed sections of these specifications.
- B. When the size, length or load carrying capacity of an anchor bolt, expansion anchor, toggle bolt, or concrete insert is not shown or specified, provide the size, length and capacity required to carry the design load times a minimum safety factor of 4.
- C. For equipment anchors, if the design load is not specified by the manufacturer, provide anchors of diameter no less than the diameter of the hole minus 3/16 inch. When the

design load is not specified by the manufacturer, provide structural calculations in accordance with Section 01610.

1.4 SUBMITTALS

- A. Product Data: Submit for approval copies of material certification, manufacturer's specifications, load tables, dimension diagrams and installation instructions for the devices.
- B. Installer's Qualifications: When installing adhesive anchors subject to sustained tension loading or when specifically noted in the Drawings, submit for approval copies of the installer's qualifications certified by the ACI/CRSI Adhesive Anchor Installer Certification program.

1.5 QUALITY ASSURANCE

- A. Post-installed concrete anchors shall be ICC approved for seismic applications in cracked concrete and prequalified in accordance with ACI 355.2 or ACI 355.4.

PART 2 - PRODUCTS

2.1 ANCHOR BOLTS

- A. Nonsubmerged Use in areas of wet use, washdown areas, or areas outside heated buildings:
 - 1. Stainless steel Type 316, unless otherwise shown.
 - 2. Diameter, Length and Bend Dimensions: As required by equipment or machinery manufacturer. Unless otherwise required, provide 3/4-inch minimum diameter by 12-inches long and other geometry as shown.
 - 3. Furnish A320 nuts and washers of same material for each bolt, unless otherwise shown.
 - 4. Provide sleeves as required or as shown for location adjustment.
- B. Submerged Use:
 - 1. Submerged use is defined as any connection 1 foot 6 inches below the normal water surface elevation in a water holding basin.
 - 2. As specified for nonsubmerged use, for equipment, machinery or other connections except as follows:
 - a. Coating of anchor bolt threads is not required.
 - b. Where threads are covered with fusion bonded coating, provide nut of proper size to fit and provide connection of equal strength to embedded bolt.

- C. For anchoring fabricated metalwork, structural steel, or other components where connections will be protected or dry:
 - 1. Galvanized Steel, 36 ksi, minimum.
 - 2. Minimum Size: ¾-inch diameter by 12-inch long, unless otherwise shown.
 - 3. At base plates with grout pads, furnish two nuts and two washers per bolt of same material as bolt, unless otherwise shown.

2.2 ANCHOR BOLT SLEEVE

- A. High Density Polyethylene Plastic:
 - 1. Single unit construction with deformed sidewalls such that the concrete and grout lock in place.
 - 2. The top of the sleeve shall be self-threading to provide adjustment of the threaded anchor bolt projection.
 - 3. Material requirements shall conform to the following:
 - a. Plastic: High density polyethylene.
 - b. Density: 0.956, ASTM D1505.
 - c. Vicant Softening Point: 256°F, ASTM D1525
 - d. Brittleness Temperature: -180°F, ASTM D746
- B. Fabricated Steel Sleeve:
 - 1. Material: A36 steel.
 - 2. Dimensions, welding, and sizes as shown.

2.3 STAINLESS STEEL FASTENERS LUBRICANT (ANTISEIZING)

- A. Provide for stainless steel nuts and machined bolts, anchor bolts, concrete anchors, and all other threaded fasteners.
- B. Lubricant shall be food grade, non-metallic:
 - 1. Loc Tite Co., LB 8014.
 - 2. Or equal

2.4 ADHESIVE (EPOXY) ANCHORS AND DOWELS

- A. Provide adhesive anchors where specifically shown and where adhesive anchors are allowed. Unless otherwise shown, adhesive anchors are allowed for anchoring:

1. Supports for pipe, conduit, and electrical boxes, devices, and panels, on floors and walls
 2. Handrails, guardrails, sunshades, stairs
 3. Fixtures and equipment on floors and walls
 4. Single pipes and conduits <2 inch in diameter to ceilings and soffits
- B. Adhesive shall be epoxy resin. Vinylester resin anchors are NOT allowed.
- C. Product and Manufacturer: Provide one of the following:
1. Installation to Concrete:
 - a. HIT-HY 200 as manufactured by Hilti, Inc.
 - b. SET-3G as manufactured by Simpson Strong-Tie, Inc.
 - c. Or approved equal meeting ACI 355.4.

2.5 EXPANSION ANCHORS

- A. Provide expansion anchors only where specifically shown and where expansion anchors are allowed. Unless otherwise shown, and except as noted below, expansion anchors are allowed for anchoring:
1. Supports for pipe, conduit, and electrical boxes, devices, and panels, to floors and walls
 2. Fixtures and equipment which have no moving parts, to floors and walls
- B. Expansion anchors are NOT allowed in any submerged or chemical containment areas.
- C. Leveling nuts shall not be used with expansion anchors. If leveling nuts are required, provide adhesive anchors, unless otherwise shown.
- D. Wedge anchors: Provide one of the following:
1. Installation to Concrete:
 - a. Hilti Kwik Bolt TZ by Hilti, Inc.
 - b. Strong-Bolt 2 by Simpson Strong-Tie, Inc.
 - c. Or approved equal meeting ACI 355.2.

2.6 ACCESSORIES

- A. Provide Belleville washers, or approved equal, at anchorage connections used to transfer anchorage loads at sheet metal equipment housings.

PART 3 - EXECUTION

3.1 INSTALLATION OF ANCHORS

- A. Obtain anchor bolts in sufficient time so as not to delay concrete or masonry work.
- B. Adhesives shall be stored and installed at the service temperature ranges recommended by the manufacturer.
- C. Locate and accurately set the anchor bolts using templates or other devices as necessary.
- D. Protect threads and shank from damage during installation of equipment and structural steel.
- E. Post-installed anchors are NOT acceptable substitutes for cast-in-place anchor bolts.
- F. Assure that embedded items are protected from damage and are not filled in with concrete.
- G. Unless otherwise shown, the minimum diameter of anchor bolts for structural steel is $\frac{3}{4}$ inch, and for other applications, $\frac{3}{8}$ inch.
- H. Unless otherwise shown, provide the following minimum embedment, where "d" is the nominal anchor diameter:
 - 1. Cast-in-place anchors: 12d.
 - 2. Adhesive anchors: 12d.
 - 3. Expansion anchors: 8d.
- I. Unless otherwise shown, provide a minimum edge distance equal to six times the bolt diameter for adhesive anchors, eight times the bolt diameter for expansion anchors and a bolt spacing equal to twelve times the bolt diameter.
- J. Concrete shall have a minimum age of 21 days at the time of post-installed anchor installation.
 - 1. Concrete temperature at the time of adhesive anchor installation shall be at least 50°F.
- K. Existing reinforcing bars in the concrete structure may conflict with specific anchor locations. Unless noted on the Drawings that the bars can be cut, the contractor shall review the existing structural drawings and shall undertake to locate the position of the reinforcing bars at the locations of the concrete anchors by ferrosan, ground penetrating rebar (GPR), x-ray, chipping or other means.

- L. Drilling equipment used and installation of post-installed anchors shall be in accordance with the manufacturer's printed instructions.
- M. For the adhesive and expansion anchors, CONTRACTOR shall comply with the manufacturer's printed installation instructions on the drilled hole diameter and depth.
- N. CONTRACTOR shall properly clean out the hole utilizing a wire brush and compressed air in accordance with the manufacturer's printed installation instructions to remove all loose material from the hole, prior to installing adhesive or expansion anchors. Drilled and cleaned anchor holes shall be protected from contamination until the anchor is installed. A drilled anchor hole shall be re-cleaned assuming the hole was just drilled, if in the opinion of ENGINEER or Inspector that the hole has become contaminated after initial cleaning.
- O. Unless otherwise indicated by the manufacturer, adhesive shall be dispensed through a tube or cartridge extension, beginning at the maximum depth of the hole and withdrawn as adhesive is injected, followed by insertion and rotating the anchor to the specified depth. Where necessary, spaces around anchors at the surface shall be sealed at horizontal to vertically overhead locations to prevent loss of the adhesive during curing.
- P. Anchors to be installed in the adhesive shall be clean, oil-free, and free of loose rust, paint, or other coatings.
- Q. Installed anchors shall be securely fixed in-place to prevent displacement. Unless shown otherwise on the Drawings, anchors shall be installed perpendicular to the concrete surface.
- R. Reinforcing adhesive dowel bars or all-threaded adhesive bars shall not be bent after being adhesively embedded in hardened, sound concrete.
- S. In lieu of the use of stacked standard washers, if threads of an anchor bolt protrude beyond the attachment, the installers shall use a fabricated filler plate of equal or greater size of the washer. Hole on the filler plate shall be 1/16" (or 2 to 3 mm) greater than the bolt size. Coat as appropriate in accordance with the material and installation location requirements.

3.2 FIELD QUALITY CONTROL

- A. Anchors shall be installed by qualified personnel in accordance with the manufacturer's printed installation instructions. Installation of adhesive anchors shall be performed by personnel trained to install adhesive anchors.
- B. Installation of adhesive anchors horizontally or upwardly inclined to support sustained tension loads shall be performed by personnel certified by the ACI/CRSI Adhesive Anchor Installer Certification program.

- C. OWNER shall employ a special inspector to perform field inspection services in accordance with Chapter 17 of the CBC for all post-installed anchors.
 - 1. The special inspector must be periodically on the jobsite during post-installed anchor installation.
 - 2. Adhesive anchors installed to resist sustained tension loads shall be continuously inspected during installation by an inspector specially approved for that purpose by the building official.
- D. CONTRACTOR shall correct improper workmanship, remove and replace, or correct as instructed by the ENGINEER, all anchors or bars found unacceptable or deficient, at no additional cost to the OWNER.
- E. The independent testing and inspection agency shall complete a report on each area. The report should summarize the observations made by the inspector and be submitted to ENGINEER.
- F. Provide access for the testing agency to places where Work is being produced so that required inspection and testing can be accomplished.

+ + END OF SECTION + +

SECTION 05500

MISCELLANEOUS METALS

PART 1 - GENERAL

1.1 SUMMARY

- A. Work necessary to furnish and install, complete, fabricated metalwork and castings as shown or as required to secure various parts together and provide a complete installation.

1.2 SUBMITTALS

- A. Shop Drawings: Submit Shop Drawings for the fabrication and erection of the miscellaneous metal Work. Include plans, elevations and details of sections and connections. Clearly show all field connections. Show anchorage and accessory items.
- B. Product Data: Submit copies of manufacturer's specifications, load tables, dimensions, diagrams, anchor details, and installation instructions for manufactured products.
- C. Samples: Submit representative samples of manufactured products.
- D. Welding certifications and welding procedures.

1.3 QUALITY ASSURANCE

- A. Field Measurements: Take field measurements prior to preparation of Shop Drawings and fabrication to ensure proper fitting of the Work.
- B. Shop Assembly: Preassemble items in the shop to the greatest extent possible, so as to minimize field splicing and assembly of units at the project site. Disassemble units to the extent necessary for shipping limitations. Clearly mark units for reassembly and coordinated installation.
- C. Qualifications: Qualify welding operators in accordance with requirements of current AWS Standard Performance Qualification Procedures in the applicable structural welding code.
 - 1. Qualification Tests: Performed by a recognized testing laboratory.
- D. Certification: Certify welders of structural and reinforcing steel for all positions of welding in accordance with such procedure.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Like Items of Materials: Provide end products of one manufacturer in order to achieve standardization for appearance, operation, maintenance, replacement, and manufacturer's service.
- B. Lifting Lugs: Provide on equipment and equipment components weighing over 100 pounds.
- C. Furnish miscellaneous items:
 - 1. Miscellaneous metalwork and castings as shown, or as required to secure various parts together and provide a complete installation.
 - 2. Items specified herein are not intended to be all-inclusive. Provide metalwork and castings shown, specified, or which can reasonably be inferred as necessary to complete the project.

2.2 MATERIALS

- A. Carbon steel structural shapes:
 - 1. Wide flange sections: ASTM A992 Grade 50.
 - 2. Steel pipe columns: ASTM A53 Grade B.
 - 3. Hollow Structural Sections (HSS): ASTM A500 Grade B.
 - 4. Plates, Angles, Channels, and S Shapes: ASTM A36.
- B. Stainless Steel:
 - 1. Plates and Sheets: ASTM A240, Type 304L or 316
 - 2. Structural shapes: ASTM A276, A479 or A1069, Type 304L or 316.
 - 3. Fasteners and fittings: ASTM A320, Type 316
 - a. Where stainless steel bolts are in contact with dissimilar metals provide insulating sleeves and phenolic washers to electrically isolate the bolts and nuts.
- C. Aluminum, Structural Shapes and Plates: Alloy 6061-T6, meeting Aluminum Assoc. Specification for Aluminum Structures
- D. Cast Iron: A48, Class 30

- E. High-Strength Threaded Fasteners: Heavy hexagonal structural bolts, heavy hexagon nuts, and hardened washers, as follows:
 - 1. Quenched and tempered medium carbon steel bolts, nuts and washers, complying with ASTM A325 or Quenched and tempered alloy steel bolts, nuts and washers, complying with ASTM A490.
 - 2. Provide two ASTM F436 washers for all bolts.
 - 3. Provide beveled washers at connections of sloped/tapered sections.
 - 4. Unless noted otherwise, high-strength fasteners shall be used for all non-stainless steel fasteners.
- F. Cast-in-Place Anchor Rods:
 - 1. ASTM F1554, Grade 36 with weldability supplement S1, galvanized, unless shown otherwise.
 - 2. Provide ASTM F436 washers at all nuts unless shown otherwise.
 - 3. Provide anchor bolt sleeves as required or as shown for location adjustment.
 - 4. Provide stainless steel anchors where shown on the Drawings or listed in another specific specification section.
- G. Galvanizing:
 - 1. Zinc coated hardware: ASTM A153.
 - 2. Fabrications: ASTM A123.
- H. Surface preparation and Finish:
 - 1. Steel: Where not indicated to be galvanized, steel shall be primed in the shop. Comply with Section 09900, **PAINTING**.

2.3 ANCHOR BOLT SLEEVE

- A. High Density Polyethylene Plastic:
 - 1. Single unit construction with deformed sidewalls such that the concrete and grout lock in place.
 - 2. The top of the sleeve shall be self-threading to provide adjustment of the threaded anchor bolt projection.
 - 3. Material requirements shall conform to the following:
 - a. Plastic: High density polyethylene.
 - b. Density: 0.956, ASTM D1505.

- c. Vicant Softening Point: 256°F, ASTM D1525
- d. Brittleness Temperature: -180°F, ASTM D746

B. Fabricated Steel Sleeve:

- 1. Material: A36 steel.
- 2. Dimensions, welding, and sizes as shown.

2.4 FABRICATIONS

A. Miscellaneous Framings and Supports:

- 1. Fabricate units to the sizes, shapes, and profiles shown, or if not shown, of the required dimensions to receive the adjacent gratings, plates, equipment, or other work to be retained by the framing.
- 2. Except as otherwise shown, fabricate from structural shapes, plates, and bars of compatible material, all-welded construction, using mitered corners, welded brackets and splice plates, and a minimum number of joints for field connection. Cut, drill, and tap units to receive hardware and other items to be anchored to the work.
- 3. Equip units with integrally welded anchors for casting into concrete or integrating into masonry. Furnish inserts for casting in, if units must be installed after concrete or grout is placed. Anchor spacing shall be 24" on-center, unless otherwise shown.
- 4. Galvanize where shown.

B. Miscellaneous Fabricated Metals:

- 1. The following additional items are listed as a guide. Some items on list may not be required, and list may not be all-inclusive. Submittal data for materials and products must be approved before they are incorporated in the work.
 - a. Lifting Eyes
 - b. Pipe Supports
 - c. Grating
 - d. Handrail

C. Stainless Steel Fabrication: Following welding fabrication all stainless steel assemblies shall be cleaned, descaled and passivated in accordance with ASTM A380.

D. Anchors, Fasteners, and Fittings: Provide zinc-coated carbon steel for steel fabrications, and stainless steel for aluminum and stainless steel fabrications, unless shown otherwise.

2.5 EMBEDS

A. Embed Angles for Grating in New Concrete

1. 1/4" thick 316 SST angles with welded anchor bars, refer to applicable Standard Details.

PART 3 - EXECUTION

3.1 FABRICATION

A. General:

1. Exposed Surfaces Finish: Smooth, sharp, well-defined lines.
2. Provide necessary rabbets, lugs, and brackets so work can be assembled in neat, substantial manner.
3. Conceal fastenings where practical.
4. Drill metalwork and countersink holes as required for attaching hardware or other materials.
5. Fabricate materials as specified.
6. Weld connections, except where bolting is directed.
7. Methods of fabrication not otherwise specified or shown shall be adequate for stress and as approved.
8. Grind exposed edges of welds smooth on walkways, guardrails, handrails, stairways, channel door frames, steel column bases and where shown.
9. Round sharp edges to 1/8-inch minimum radius. Grind burrs, jagged edges, and surface defects smooth.

B. Aluminum:

1. Fabricate as shown, and in accordance with the Aluminum Association Standards and manufacturer's recommendations as approved.
2. Grind smooth sheared edges exposed in finished work.

3.2 WELDING

A. General

1. Meet codes for Arc and Gas Welding in Building Construction of the AWS and AISC for techniques of welding employed, appearance, quality of welds made, and the methods of correcting defective work.

2. Welding Surfaces: Free from loose scale, rust, grease, paint, and other foreign material, except mill scale which will withstand vigorous wire brushing may remain.
3. A light film of linseed oil may likewise be disregarded.
4. Do not weld when temperature of base metal is lower than zero degrees F.
5. Finished members shall be true to line and free from twists.
6. Prepare welds and adjacent areas such that there is:
 - a. No undercutting or reverse ridges on the weld bead.
 - b. No weld spatter on or adjacent to the weld or any other area to be painted.
 - c. No sharp peaks or ridges along the weld bead.
7. Grind embedded pieces of electrode or wire flush with adjacent surface of weld bead.

B. Welding Operators: As specified in PART 1, Article 1.3 QUALITY ASSURANCE.

3.3 INSTALLATION

- A. Set units accurately in location, alignment, and elevation, level, plumb, true, and square, measured from established lines and levels. Brace or anchor temporarily in formwork where units are to be built into concrete, masonry, or similar construction.
- B. Anchor securely as shown or as required for the intended use, using concealed anchors wherever possible.
- C. Fit exposed edges accurately together to form tight, hairline joints. Do not weld, cut, or abrade the surfaces of galvanized or anodized units which are intended for bolted or screwed connections.
- D. Field Welding: Where field welding is necessary, grind joints smooth and touch-up the shop paint. Comply with the applicable provisions of AWS D1.1 for the procedures of manual shielded metal-arc welding, the appearance and quality of welds made, and the methods used in correcting welding.
- E. Field Coat all miscellaneous ferrous and steel metals per Specification Section 09900 - **PAINTING**, System 300.
- F. Where aluminum is in contact with dissimilar metals, or embedded in masonry or concrete, protect surfaces with bituminous coating.

+ + END OF SECTION + +

SECTION 05610
ALUMINUM HANDRAILS AND RAILINGS

PART 1 - GENERAL

1.1 SCOPE

- A. This section covers the supply and installation of welded or non-welded mechanical construction aluminum handrails and guardrails.

1.2 SUBMITTALS

- A. Shop Drawings: Submit Shop Drawings for the fabrication and erection of the handrails and guardrails. Include plans, elevations and details of sections and connections. Clearly show all field connections. Show anchorage and accessory items.
- B. Product Data: Submit copies of manufacturer's specifications, dimensions, anchor details, and installation instructions for manufactured products.
- C. Calculations: Provide data supporting design of the railing system to meet the specified loading requirements in this Section.

1.3 QUALITY ASSURANCE

- A. Reference Standards:
 - 1. Aluminum Associate (AA)
 - a. Aluminum Standards and Data
 - b. Specifications for Aluminum Structures
- B. Design Criteria:
 - 1. Fabricate units to support a live load of 50 pounds per linear foot and a non-concurrent load of 200 pounds at the top of the railing, in any direction.
 - 2. Expansion/Contraction:
 - a. Provide linear expansion joints at a maximum spacing of 20'-0" designed for 1/4" expansion and 1/4" contraction.
 - b. Provide expansion joints in handrail and railing systems where systems cross expansion joints in structure.
 - 3. OSHA Compliant

C. Allowable Tolerances:

1. Limit variation of cast-in-place inserts, sleeves and field-drilled anchor and fastener holes to the following:
 - a. Spacing: $\pm 3/8$ -inch.
 - b. Alignment: $\pm 1/4$ -inch.
 - c. Plumbness: $\pm 1/8$ -inch.
2. Minimum Handrails and Railings Systems Plumb Criteria:
 - a. Limit variation of completed handrail and railing system alignment to $1/4$ -inch in 12' - 0" with posts set plumb to within $1/16$ -inch in 3 foot - 0 inches.
 - b. Align rails so variations from level for horizontal members and from parallel with rake of stairs and ramps for sloping members do not exceed $1/4$ -inch in 12' - 0 inches.

D. Obtain all handrails and railings systems components and accessories from the same manufacturer.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Protect aluminum work from abuse, staining, or damage during shipment, storage, erection and installation.
- B. Store in a manner to prevent warping of materials.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Fabricate aluminum to conform to AA standards.
- B. Handrails and railings may be either of welded construction, or non-welded mechanical construction.

2.2 MANUFACTURERS AND PRODUCTS

- A. Golden Railings, Inc.; TCF Bolted System.
- B. Superior Aluminum Products; Series 800 Pipe Railing.
- C. Or Equal.

2.3 MATERIALS

A. Rails and Posts:

1. Conform to ASTM B221.
2. 1-1/2" nominal diameter, minimum
3. Provide Schedule 40 pipe minimum for rails and Schedule 80 pipe minimum for posts, unless conditions of detail and fabrication require heavier pipe weights to comply with performance criteria specified.
4. All rail, posts and components shall be Aluminum Alloy 6005-T5 or 6063-T6
5. Clear satin anodized finish, 0.7 mil minimum (AA-M10-C22-A41).

B. Fittings and Accessories:

1. Either weld rail and post components, or provide mechanical fittings to join rail and post components using bolted connections.
2. Provide floor flanges where indicated.
3. Provide wall brackets with 3-inch minimum clearance between handrail and finished wall surface and as indicated for ladder rails.
4. Fasteners and anchors shall be Type 304 stainless steel and of type as required by substrate.

C. Toeboard (Kick Plate):

1. Extruded, beveled aluminum 4-inch height, aluminum alloy 6063-T6.
2. Furnish required stainless steel clamps and fasteners for complete installation.
3. Manufacturer/Product:
 - a. Crane Veyor Corp., Toeboard No. C43880 with splice plates and corner connectors.
 - b. Or Equal.

D. Weep Holes:

1. Fabricate joints, which will be exposed to the weather so as to exclude water.
2. Provide 15/64-inch diameter weep holes at the lowest possible point on all handrail and railing systems posts.
3. Provide pressure relief holes at closed ends of handrail and railing systems.

PART 3 - EXECUTION

3.1 GENERAL

- A. Conform to applicable AA standards.
- B. At locations where welds will be made (if applicable), the anodizing shall be ground off to ensure a proper weld is made. The weld shall then be ground smooth and burn marks removed. Completed welds shall be painted to match the anodizing of the pipe.
- C. Bituminous Coating:
 - 1. Protect aluminum in contact with other metals, grout and concrete by a heavy brush coat of alkali-resistant bituminous coating or a non-porous tape or gasket.
 - 2. Coating is not required for aluminum in contact with stainless steel bolts.
 - 3. Apply bituminous coating at 15-mil minimum dry film thickness.
 - 4. Manufacturer/Product:
 - a. Carboline – Bitumastic No. 50
 - b. Tnemec – Series 46-465
 - c. Or Equal.

3.2 INSTALLATION

- A. Space posts at a maximum of 6'-0" on center, except when a different spacing may be required based on loading requirements or the installation requirements.
- B. Install toe boards (kick plates) and anchor to each post with clamps and bolts. Allow 1/4-inch space between bottom of toe board and top of floor surface.
- C. Install handrail to walls with brackets.
 - 1. For connecting to concrete walls, use anchors as indicated.
 - 2. For connecting to hollow masonry walls, use toggle bolts having square heads.
- D. Cleaning: Clean all aluminum surfaces, after installation, free of smudges, stains, or other deleterious substances.

+ + END OF SECTION + +

SECTION 05620

GRATING AND CHECKERED PLATE

PART 1 - GENERAL

1.1 SCOPE

- A. Furnish all materials, labor and equipment required to provide all gratings and floor plates in accordance with the Contract Documents.

1.2 SUBMITTALS

- A. Shop Drawings: Submit Shop Drawings for the fabrication and erection of all gratings and checkered plate specified herein. Include plans, elevations and details of sections and connections including hold down hardware and clips.
- B. Setting drawings and templates for location and installation of anchorage devices.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Grating, including support frames, fastenings and all necessary appurtenances for a complete installation shall be furnished as indicated on the Drawings.
- B. All exposed bearing ends of grating shall be enclosed in a perimeter band of the same dimensions and material as the main bars, including ends at all cutouts.
- C. Grating shall be fabricated into easily removable sections. Grating that is identified as "fixed" on the Drawings shall be fastened at each corner and as required with fasteners provided by the grating manufacturer. Provide "E-11" clips, consisting of formed clips which capture two bearing bars with flat countersunk screws. No fasteners shall be permitted to project above the walking surface.
- D. Grating and Checkered Plate shall be designed for a loading of 150 psf, with a maximum deflection of $L/360$, unless otherwise required by the Drawings.
- E. Minimum grating depth shall be as shown on the drawings. Space bearing bars at 1-3/16 inch center to center. Band all edges with minimum 3/16 inch thick banding bar.
- F. Openings in Grating:

1. Cut gratings for penetrations as indicated and as required for installing and operating equipment. Layout grating units to allow grating removal without disturbing items penetrating grating.
2. At openings, notches, and cuts in grating, provide banding of same material and size as bearing bars, unless otherwise indicated. Weld band to each bearing bar.

G. Notching of bearing bars at supports to maintain elevations will not be permitted.

2.2 ALUMINUM GRATING

- A. I-bar type consisting of extruded bearing bars positioned and locked by cross bars.
- B. Material:
1. All supports, cross members, etc. shall be aluminum.
 2. Bearing Bars: Alloy 6061-T6 or Alloy 6063-T6, conforming to ASTM B221.
 3. Cross Bars or Bent Connecting Bars: Alloy conforming to either ASTM B221 or ASTM B210.
 4. Grating shall have bended ends.
- C. Plank clips for grating hold-downs or other required attachments shall be aluminum or Type 304 stainless steel.
- D. Bolts shall be stainless steel Type 316. Where stainless steel bolts are in contact with dissimilar metals provide insulating sleeves and phenolic washers to electrically isolate the bolts and nuts.
- E. Manufacturer/Product:
1. Grating Pacific, "I-Bar 19-SG-4"
 2. Borden Grating, "Squeeze Locked Grating"
 3. Ohio Grating, "I-Bar 19-SG-4"
 4. Or Equal.

2.3 CHECKERED PLATE

- A. Minimum thickness: As shown on the Drawings.
- B. Material:
1. Plate to conform to ASTM B209 with anodized finish.
 2. Stainless steel support angles: Type 316 unless otherwise shown.

- C. Raised Pattern Floor Plate: Provide pattern standard with the manufacturer to provide non-slip surface.
- D. Plates shall be stiffened by tubes welded to the underside as shown on the drawings.
- E. Lifting Handles:
 - 1. Each checkered plate shall be provided with four lifting etes, as shown on the drawings.
- F. Maximum weight of each checkered plate shall be 150 pounds.
- G. Plate shall be provided with brushed finish.

PART 3 - EXECUTION

3.1 FABRICATION

- A. All measurements and dimensions shall be based on field conditions and shall be verified by the CONTRACTOR prior to fabrication. Such verification shall include coordination with adjacent work.
- B. All fabricated work shall be shop-fitted together as much as practicable, and delivered to the field, complete and ready for installation. All miscellaneous items such as stiffeners, fillets, connections, brackets and other details necessary for a complete installation shall be provided.
- C. All work shall be fabricated and installed in a manner that will provide for expansion and contraction, prevent shearing of bolts, screws, and other fastenings, ensure rigidity, and provide a close fit of sections.
- D. Finished members shall conform to the lines, angles and curves shown on the Drawings and shall be free from distortions of any kind.
- E. All shearings shall be neat and accurate, with parts exposed to view neatly finished. Flame cutting is allowed only when performed utilizing a machine.
- F. All shop connections shall be welded unless otherwise indicated on the Drawings or specified herein. All fastenings shall be concealed where practicable.

3.2 INSTALLATION

- A. Assembly and installation of fabricated system components shall be performed in strict accordance with manufacturer's recommendations.

- B. All gratings shall be erected square, plumb and true, accurately fitted, adequately anchored in place, and set a proper elevations and positions.

+ + END OF SECTION + +

SECTION 09900

PAINTING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Scope: Provide and install coatings on all exposed surfaces as indicated herein, in other Specification Sections, and on the Drawings.

1.2 QUALITY ASSURANCE

- A. Regulations: Meet federal, state, and local requirements which apply to the work, including, but not limited to those regulations limiting the emission of volatile organic compounds.
- B. Coatings Manufacturer Recommendations: Coatings Installer shall follow all recommendations of the Coatings Manufacturer regarding storage, handling, surface preparation, application of coatings, recoat times, environmental conditions during storage, preparation and application of coatings, and all other Coatings Manufacturer recommendations.
- C. Warranty: Both Coatings Manufacturer and Coatings Installer shall provide a 1-year complete replacement warranty for all coatings. Manufacturer shall provide 5-year warranty for long-term performance of coatings in addition to 1-year warranty.

1.3 SUBMITTALS

- A. Shop Drawings: Submit for approval the following:
 - 1. Copies of Manufacturer's technical information and application instructions for each material proposed for use. Specify exactly which product is being proposed for each coating type (as specified below). This may be accomplished through a reference table along with information on the various products, or by a separate, tabbed section with information on products being submitted for each system in a separate tab of a binder. Submittal of general Manufacturer's literature without detailing which product is proposed for each paint system will be unacceptable.
 - 2. Copies of Manufacturer's complete color charts for each coating system.
- B. Furnish copies of the final, approved submittal to the Coatings Installer so that it is clear which product is to be used for each system.

1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Protection: Protect all pre-coated items from coating damage during shipping.
- B. Store products in accordance with Manufacturer's directions.
- C. Store products in a neat, orderly fashion. Protect products from damage. Protect storage area from damage from stored products.

PART 2 - PRODUCTS

2.1 PRODUCT AND MANUFACTURER:

A. Provide coating types as listed in the following table, or Equal.

COATING TYPE	DESCRIPTION	OPTION 1	OPTION 2
Polyamide Epoxy	Polyamide Epoxy designed for use on steel or other ferrous metals.	Sherwin-Williams Macropoxy 646-100	Tnemec Series 66HS Hi-Build Epoxoline
Polyurethane	Aliphatic Acrylic Polyurethane designed for exterior weathering, abrasion and corrosion resistance.	Sherwin Williams Hi Solids Polyurethane-100	Tnemec Series 72 Endura-Shield

2.2

2.2 COLOR

- A. Color Pigments: Pure, nonfading, lead-free applicable types to suit the substrates and service indicated.
- B. Provide colors as selected by OWNER from standard color palette provided during submittal process.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

- A. Coatings Installer shall prepare all surfaces to be painted in strict accordance with Coatings Manufacturer's recommendations.

3.2 PROTECTION

- A. Protect all adjacent surfaces from overspray, dripping or other transfer of coatings not intended for those surfaces. Use masking, tape, drop cloths, plastic and other protective materials as appropriate.
1. Remove, mask, or otherwise protect hardware, lighting fixtures, switchplates, aluminum surfaces, stainless steel surfaces, machined surfaces, equipment, nameplates on machinery, and other surfaces not intended to be painted.
 2. Protect working parts of mechanical and electrical equipment from damage during surface preparation and painting process. Mask equipment etc. to prevent coatings from falling inside.
 3. Correct all damages by cleaning, repairing or replacing, and repainting, as acceptable to OWNER.
- B. Completely remove all masking, tape, drop cloths, plastic and other protective materials within 48 hours of completion of application of finish coat.

3.3 APPLICATION

- A. Provide and install Coatings in accordance with the following Table, unless otherwise specified in other Sections:

COATING SYSTEM NO.	SURFACE TO BE COATED	PRIMER COATING	NO OF PRIMER COATS	PRIME COAT THICKNESS (EACH COAT)	FINISH COATING	NO OF FINISH COATS	FINISH COAT THICKNESS (EACH COAT)
300	Exposed Iron / Steel Items	Polyamide Epoxy	2	4-6 MDFT	Polyurethane	2	2-3 MDFT

- B. Table Definitions:

1. MDFT: mil dry film thickness
2. mil: 1/1000 of an inch paint thickness

- C. Surfaces Requiring Painting:

1. Fine screen control panel canopy, carbon steel pipe supports, and other un-coated carbon steel surfaces on equipment provided by the CONTRACTOR.
2. Exterior of exposed steel or ductile iron pipe that is not factory coated.

3.4 RECOAT TIMES:

- A. Coatings Installer shall observe all requirements of the Coatings Manufacturer regarding recoat times.

3.5 CLEANUP

- A. Remove and properly dispose of all unused painting materials.

3.6 WARRANTY INSPECTION

- A. Warranty inspection shall be conducted during the eleventh month following completion of the Work. All defective Work shall be repaired by the CONTRACTOR in accordance with this Specification and to the satisfaction of the OWNER and at the CONTRACTOR'S expense.
- B. Any location where paint has peeled, bubbled, or cracked and any location where rusting is evident shall be considered to be a failure of the system. The CONTRACTOR shall make repair at all points where failures are observed by removing the deteriorated paint, cleaning the surface, and recoating or repainting with the same system. If the area of failure exceeds 25 percent of the total coated or painted surface, the entire coating or paint system may be required to be removed and repainted in accordance with this specification as determined by the OWNER.
- C. All costs for CONTRACTOR'S inspection and all costs for repair shall be borne by the CONTRACTOR.

+ + END OF SECTION + +

SECTION 11100
FABRICATED SLIDE GATES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Scope: This Section describes the design, fabrication, and supply of fabricated stainless steel slide gates, discs, guide frames, stem guides, seats, operating stem, operator, and anchorage. Gate supplier shall provide all materials, equipment, and accessories necessary to furnish and install slide gates as described herein and as shown on Drawings.

1.2 QUALITY ASSURANCE

- A. Reference Standards: Comply with requirements and recommendations of the following references, except as otherwise specified:
1. AWWA C561-04, Fabricated Stainless Steel Slide Gates
 2. NSF/ANSI 61, Drinking Water System Components Health Effects
 3. ASTM A 276, Specification for Stainless Steel Bars and Shapes
 4. American Gear Manufacturers Association (AGMA)
 5. Anti-Friction Bearing Manufacturers Association (ABMA)
- B. Manufacturer's Qualifications: Gate manufacturer shall have a minimum of five years of experience of producing substantially similar equipment and shall be able to show evidence of at least ten installations in satisfactory operation for at least five years.
- C. Unit Responsibility: All equipment specified herein shall be coordinated and provided by a single gate manufacturer. Manufacturer assumes full responsibility for coordination of all components.
- D. Source Quality Control:
1. Shop Tests:
 - a. Test each slide gate fully assembled for proper seating, operation, and for leakage.
 - b. Fully open and close gate disc in its guide system to ensure that it operates freely.
- E. Warranty: Provide a 1-year warranty on all equipment from date of start-up. Warranty shall cover defects in workmanship, design, and materials. If any component should fail during the warranty period, it shall be corrected and the unit restored to service at no expense to the OWNER.

1.3 SUBMITTALS

A. Shop Drawings:

1. Detailed drawings showing component and assembly dimensions, location of mechanical connections, weights of all equipment, installation details, and accessory details.
2. Drawings, templates and directions for installation of anchor bolts and stem couplings.
3. Certificate of Compliance that all material utilized comply with NSF/ANSI 61 Standards.

B. Product Data:

1. Descriptive literature, specifications, and engineering data.
2. Materials of construction for all components and accessories.
3. Force calculations for gate operator and stem, including seismic loading calculations.
4. Shipping, storage, protection and handling instructions.
5. Installation directions.
6. Operation and Maintenance Manual.

C. Shop Test Results:

1. Submit results of the required shop tests.

D. Field Test Results:

1. Submit a written report giving the results of the field tests required.
2. Certify installation prior to testing/startup.

1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Gate manufacturer shall provide any special unloading, storage and handling instructions.

PART 2 - PRODUCTS

2.1 PRODUCT AND MANUFACTURER:

- A. Golden Harvest
- B. Fontaine-Aquanox
- C. Waterman
- D. Or equal

2.2 GOVERNING STANDARD

- A. Except as modified or supplemented herein, fabricated slide gates and their appurtenances shall conform to the applicable requirements of AWWA C561.

2.3 SERVICE CONDITIONS AND PERFORMANCE

A. Performance:

1. Gate Size: 30" square to replace existing slide gate. Contractor shall provide new wall anchorage according to manufacturer's installation instructions. Ensure there will be no conflict between existing anchorage and new anchorage required for new gate. Contractor to document existing wall anchorage, and new anchorage designed to avoid conflict.
2. Closed leakage shall not exceed 0.10 gallons per minute (GPM) per foot of gate periphery under seating or unseating head conditions.
3. Seating / Unseating Head: 4'-0"

2.4 COMPONENTS

A. General:

1. Slide gates and all appurtenances shall be provided by one gate manufacturer.
2. All components of the gates shall have a minimum thickness of ¼-inch.
3. Gates shall be self-contained of the rising stem configuration.
4. The gates for this Project will be wall mounted over existing openings in concrete walls, as shown on the Drawings. No wall thimbles or pipe adaptors are required.
5. Provide upward opening gate, with top seal.

B. Frame:

1. Frame Material: ASTM A-276 Type 316L SS.
2. Designed for maximum rigidity as column to take the thrust developed during the slide gate operation under maximum head.
3. Bolt-together guide frames are not allowed.
4. Guide frame corners shall be factory welded.
5. The guides shall extend above or beneath the opening a sufficient amount to support the disc in the fully open or closed position.
6. The frame configuration shall be of the flush-bottom type and shall allow the replacement of the top and side seals without removing the gate frame from the wall.
7. Provide bolt holes in upper portion of sides of frame for connection to supporting angle.

C. Disc:

1. Material: ASTM A-240 Type 316L SS.
2. Disc shall be reinforced as necessary to limit deflection under the design operating head to less than 1/360 of the gate span.
3. Reinforcing members shall be 316L SS angle or channels welded to the plate.

D. Guides and Seals:

1. The guides shall be provided with frame mounted ASTM D-4020 ultra high molecular weight polyethylene (UHMWPE) seals that contact both sides of the slide disc and shall be of such length as to retain and support two thirds of the vertical height of the slide in the fully open position.
2. Side and top seals shall be ASTM D-4020 UHMWPE, and shall be mechanical and fully adjustable in the field, or shall be self-adjusting type with a continuous compression cord.
3. Lower seals shall be flush bottom resilient neoprene, mounted to the bottom of the disc or to the frame.

E. Yoke and Pedestal (For Self-Contained Gates):

1. Self-contained gates shall be provided with a yoke to support the operating bench stand. The yoke shall be formed by two structural members welded at the top of the guides to provide a one piece rigid frame. The maximum deflection of the yoke shall be 1/360 of the gate's span.

F. Stem:

1. Material: ASTM A-276 Type 316L SS.
2. Diameter shall be 1-1/2 inch minimum, and be sized as necessary to withstand two times the compressive force when 40 pounds of force are applied at the operator.
3. Stem shall be supported such that the L/r ratio for unsupported lengths does not exceed 200.
4. Threaded portions of the stem shall be full-depth ACME type cold rolled threads with a maximum surface roughness of 0.000016 inches. Machine cut threads will not be accepted.
5. Join stems of more than one section by stainless steel or silicon bronze couplings threaded and keyed to the stems. All threaded and keyed couplings of the same size shall be interchangeable.
6. Provide rising stems with an adjustable stop collar on the stem on all gates with manual operators.
7. Connect the stem to the disc by means of a bolted connection with a minimum of two bolts.

G. Stem Guides:

1. Provide Type 316 stainless steel stem guides for installation at 60-inch intervals.

2. Guides shall consist of collar with UHMWPE bushings, and bracket with slotted holes for adjustment in two directions.
 3. Inside diameter of the collar and bushings shall be slightly larger than the gate stem to prevent binding.
- H. Stem Guide Supports: Contractor shall provide stem guide supports, as shown on the Drawings, on 60-inch centers.
- I. Stem Cover (For Rising Stem Gates):
1. Furnish all stems with a clear polycarbonate, lexan or butyrate plastic pipe stem cover. Covers shall be furnished with an adaptor for mounting covers to floor stands. Stem covers shall be designed and furnished with gasketing and vents to eliminate water intrusion into operators and condensation within the covers.
 2. Engrave the covers with legible engraved markings showing, at a minimum, the gate position at 1/4 open, 1/2 open, 3/4 open and full open.
- J. Manual Actuator:
1. Handwheel Type:
 - a. Direct Drive without reduction gearing
 - 1) Maximum handwheel diameter shall be 30 inches.
 2. Furnish threaded bronze lift nut to engage threaded portion of stem.
 - a. Lift nut shall be flanged and supported on roller bearings.
 - b. Lift nut shall be capable of thrust developed during opening and closing of the gate without damage.
 - c. Provide adjustable bronze stop collar for OPEN and CLOSED position limitation.
 - d. Distance from center of handwheel to ground shall be less than 48 inches.
- K. Fasteners and Anchor Bolts:
1. All fasteners necessary for installation and operation shall be furnished by the gate manufacturer.
 2. Fasteners shall be Type 316 stainless steel
 3. Fasteners shall be 1/2-inch diameter minimum, and adequately sized to withstand all operational stresses.
 4. Provide Type 316 stainless steel anchor bolts as required for stem guides, floorstands, and all equipment or appurtenances which must be secured to concrete walls or floors. Anchor bolts shall be of ample size and strength for the purpose intended, and shall be furnished by the gate manufacturer. Anchor bolts shall have a minimum diameter of 1/2-inch. Anchor bolts shall conform to the requirements of Specification Section 05051 – Anchors, Inserts, and Epoxy Dowels.
- L. Spare Parts: Provide the following spare parts:

1. Two bronze stope collars
2. Bronze lift nut
3. Special tools required for servicing operator

M. Identification:

1. Identify each slide gate with gate manufacturer's nameplate stamped with the gate model number. Manufacturer's nameplate shall be permanently fastened to the gate at the factory.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Installation shall be as shown on the Drawings and in accordance with gate manufacturer's written instructions.

3.2 FIELD QUALITY CONTROL

- A. Conduct functional and performance tests under approved simulated operating conditions.

B. Functional Tests:

1. Each slide gate with appurtenances shall be field tested. Tests shall demonstrate to ENGINEER that each part and all parts together function in the manner intended. All necessary testing equipment and manpower shall be provided by CONTRACTOR at his expense. OWNER will furnish all power, and incidental material and labor required for the tests.

C. Leakage Tests:

1. Maximum permissible leakage shall be in accordance with the requirements of Sub-Section 2.3, above. Excess leakage shall be reduced to meet specified requirements by adjusting the gate, or replacement will be required.

- D. In the event that the gate manufacturer is unable to demonstrate to ENGINEER that his equipment meets the requirements of the tests, the deficient equipment will be rejected, and adjustments and/or modifications shall be made. Retest the equipment as often as necessary to meet the specified requirements. No separate payments shall be made for adjustments and/or modifications.

3.3 MANUFACTURER'S FIELD SERVICES:

1. Minimum 1 trips for Manufacturer's Field Services:
 - a. 1 person-day for inspection and installation certification, testing, alignment, and training.

+ + END OF SECTION + +

SECTION 11600

FINE SCREEN

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. The contractor shall furnish, install and place into satisfactory operating condition one (1) in-channel fine screen designed for screening of raw water for potable water treatment.
2. Each unit shall consist of the screen, motor, gear reducer, spray wash system, controls, and control panel for a complete integrated package.
3. Each unit shall be provided complete with all accessories, spare parts, mounting, anchor bolts, and all other appurtenances required or shown on the Drawings.
4. All equipment called for under this Section shall be supplied by a single manufacturer with complete system responsibility.

1.2 QUALITY ASSURANCE

- A. Qualifications: The supplier or manufacturer shall have experience in producing similar equipment and shall show evidence of a minimum of twenty (20) similar screens installed in the United States and show evidence of five (5) installations in satisfactory operation for at least five (5) years.
- B. Screens shall be the manufacturer's standard catalogued product and shall be modified as needed to provide compliance with the drawings, specifications, and the service conditions specified for this project.
- C. All the equipment specified under this Section shall be supplied by a single manufacturer whose Quality Management System is ISO 9001:2015 certified and applicable to the manufacture of water treatment equipment.
- D. Reference Standards
 1. The properties of all materials, design, fabrication and performance of the equipment to be furnished under this section shall be in accordance with the latest issue of applicable standard specifications. The governing authorities of these standards are listed below.
 - a. AICS, American Institute of Steel Construction
 - b. AISI American Iron and Steel Institute
 - c. ANSI, American National Standards Institute
 - d. ASCE, American Society of Civil Engineers

- e. ASME, American Society of Mechanical Engineers
- f. ASTM, American Society of Testing and Materials
- g. AWS, American Welding Society
- h. IBC, International Building Code
- i. IEC, International Electric Code
- j. IEEE, Institute of Electrical and Electronics Engineers
- k. NEC, National Electrical Code
- l. NEMA, National Electrical Manufacturers Association
- m. Underwriters Laboratory (UL and cUL)

1.3 WARRANTY

- A. A written supplier's warranty shall be provided for the equipment specified in this Section.
- B. The warranty shall be for a minimum period of one (1) year from start-up or 18 months from time of equipment shipment, whichever comes first.
- C. Such warranty shall cover all defects or failures of materials or workmanship which occur as the result of normal operation and service.

1.4 SUBMITTALS

- A. Submit copies of all materials required to establish compliance with this Section. Submittals shall include at least the following information:
 - 1. Certified shop and erection drawings showing all important details including materials of construction, dimensions, loads on supporting structures, field connections, and anchor bolt locations.
 - 2. A complete bill of materials of all equipment.
 - 3. Descriptive literature, bulletins and/or catalogs of the equipment, including details of the motor, gear reducer, and lubrication points.
 - 4. Complete data on motors and gear reducers.
 - 5. Wiring diagrams, electrical schematics and control panel drawings for all control equipment to be furnished, for all instruments, and for all field devices and equipment.
 - 6. Parts list including a list of the supplied spare parts.
 - 7. Equipment weights and lifting points, including the total weight of the equipment and the weight of the single heaviest item.
 - 8. Equipment handling and installation requirements manuals.

B. Seismic Anchorage Calculations:

1. Manufacturer shall provide seismic anchorage calculations for the equipment signed by a Civil or Structural Engineer registered in the State of California per **Section 01610 – General Product Requirements** after initial equipment submittals have been approved.

C. Operation and Maintenance Manuals:

1. Submit complete manuals in compliance with **Section 01782 – Operating and Maintenance Materials** including:
 - a. Copies of all approved Shop Drawings
 - b. Test reports
 - c. Complete maintenance parts list, as well as maintenance data and schedules. The manufacturer shall state the amount of and specification for any lubricant required
 - d. Description of operation, including illustrations, specific for the particular installation
 - e. Complete connection, interconnecting and assembly diagrams
 - f. Spare parts information

1.5 DELIVERY AND STORAGE

- A. Refer to equipment delivery and storage requirements described in **Section 01610 - General Product Requirements**.

PART 2 - PRODUCTS

2.1 PRODUCT AND MANUFACTURER:

- A. Provide one of the following:
1. Hydro-Dyne Great White Dual Flow Screen
 - a. Refer to Section 00440 – no Equal allowed to match other PCWA equipment

2.2 GENERAL SYSTEM DESCRIPTION

- A. The fine screen will have a continuous stainless steel belt that automatically rotates within the internal guide system of the static frame.
- B. The fine screen herein specified will be of the dual flow type. The flow enters the outside of the continuous belt on both sides and exits through the center.

- C. The screen will be installed into the channel as shown on the Contract Drawings to accommodate the flow pattern through the screen belt.
- D. The solids will collect as a mat on the outside of the continuous belt. The belt will intermittently rotate and elevate the solids to the discharge point. Larger objects will be picked up by a series of hooks and/or trays placed at regular intervals.
- E. The solids will be removed at the top of the screen by spray bar headers. The screenings will drop into an internal hopper and be fed to the screening discharge pipe.
- F. The continuous belt will be directly driven by drive sprockets that shall support and rotate the grid assembly.
- G. The screen will be totally enclosed and have access covers that will be lightweight and easily removable for maintenance.
- H. All stainless steel (including frame, grid and drive components) shall be T304 stainless steel. All hardware shall be T316 stainless steel.

2.3 SERVICE CONDITIONS AND PERFORMANCE REQUIREMENTS

A. Design Conditions:

Equipment Name	Intake Screen
Number of Screens	1
Peak Design Flow	7.0 MGD
Screen Opening Size	1.0 mm
Primary Screened Material	Fine Algae
Upstream Water Depth @ Peak Flow	56 inches
Minimum Screen Element Width	33 inches
Maximum Headloss	2.0 inches @ 30% blinding at maximum upstream water depth
Channel Width	60 inches
Channel Depth Including Freeboard	88.44 inches
Screen Washwater Requirements	36 GPM @ 60 PSI Maximum
Screen Drive Motor	1.0 HP maximum, 460 volts, 3 ph, 60 Hz Variable Speed

B. Performance:

1. The screen shall be designed to handle the peak flow with the maximum upstream liquid level, including the maximum allowable headloss. Primary material to be screened from the raw water is fine algae which is found in the raw water.

2.4 MATERIALS AND CONSTRUCTION

A. Continuous Screening Belt:

1. The screenings belt will consist of panels manufactured from stainless steel woven mesh that shall maintain the maximum specified opening. The woven mesh shall be reinforced with a stainless steel frame.
2. The stainless steel woven mesh panels will be supported by 12 gauge stainless steel vertical mounted lifting hooks horizontally spaced a maximum of 3 inches apart preventing deflection. The lifting hooks shall support the screening grid and bear tension loads across the entire length and width of the screen belt.
3. The hooks on elements shall form horizontal lifting trays or shelves for removing large solids every 8 inches around the entire screen grid.
4. The stainless steel woven mesh panels will be connected by heavy duty stainless steel axles to form a continuous belt that will rotate within the frame's guide system. The axle design will allow the panels to pivot and create a seal between the woven wire mesh panels to prevent the passage of solids.
5. The axles will include Delrin spacers that will maintain the 3 inch space between the vertical support elements. Delrin spacers will also form a seal between each woven wire panel with clearance not to exceed 0.5mm.
6. The axles will be extended to fix a UHMWPE guide link to the side of each woven wire plate. These guides will interlock to create a continuous guide link system that will slide within the frame.
7. Guide links shall be precision machined from solid virgin UHMWPE. Injection molded links are not acceptable.
8. The heavy duty guide links will be minimum 2 inches thick to protect against undue wear from grit and will be specially machined to form a closure seal between the rotating belt and the static frame.
9. The seal shall be continuous from grade level through the water flow forming an uninterrupted closure between the traveling screen grid and the stationary frame. The seal shall be heavy gauge stainless steel, fixed to the screen frame and be adjustable so it will remain in contact with the rotating screen belt at all times. There shall be no gap in the grid to frame seal larger than 0.5mm.
10. Guide systems that use rollers, stainless or hardened steel chains will not be acceptable.
11. Grid panel sealing systems that use neoprene seals or stainless steel hinges will not be acceptable.
12. Grid to frame sealing systems that use adjustable UHMWPE strips attached to the frame will not be acceptable.

B. Screen Frame:

1. The continuous belt will rotate within a heavy duty stainless steel static support frame that shall be a rectangular box construction. Provide lifting lugs.

2. The guide link system will travel around a stainless steel guide wear track that is integral to the support frame. Top and bottom wear tracks shall be bolt in and field replaceable.
3. There shall be a removable inspection panel located directly beneath the drive allowing easy access to the grid drive sprockets, drive shaft and screenings collection hopper.
4. The design will ensure that the support frame meshes with the closure seal on each guide link to prevent passage of screening material and grit particles.
5. All components of the lower wear tracks shall be bolt in, field replaceable and manufactured from stainless steel.
6. The frame shall accommodate stainless steel protective covers designed to prevent leakage and contain spray wash. All access covers for maintenance will be lightweight and easily removable. Screens with covers requiring neoprene, rubber or plastic seals are not acceptable.
7. The screen manufacturer will supply the stainless steel angled filler plates to connect from the downstream corners of the support frame to the channel walls. Screen manufacturer shall also supply all anchorage components of screen to channel base and walls as required by the seismic anchorage calculations.
8. The back-plate of the screen shall be furnished with a bypass gate that will allow manual removal for complete flow bypass.

C. Screenings Removal:

1. Two stainless steel spray wash headers will be located in the head space of the screen to offload the screenings from the continuous belt.
2. The spray bar will incorporate brass nozzles at 2 inch spaces that can easily be replaced or removed for cleaning.
3. The spray bars will be positioned behind the rotating belt and will backwash the solids into an internal hopper manufactured from stainless steel. The wash water will be used to continuously flush the screenings from the internal hopper into a sloped extended sluice which shall have a bottom discharge into a drain pipe as shown on the Drawings. Provide custom-designed 14" wide enclosed discharge sluice as shown on the Drawings, with removable cover plate.
4. The addition of a rotating or static brush system to aid offloading will not be acceptable.

D. Screen Drive:

1. Each screen will have a maximum 1.0 hp, inverter duty electric motor suitable for a 460/3/60 supply. As a minimum, the motor will be TEFC with an IP55 enclosure rating and will conform to NEMA MG-1 requirements. The motor will be located outside of the screen covers and above the top of the channel.
2. The gear reducer shall be directly coupled to a heavy duty shaft machined from solid stainless steel round bar.
3. The drive shaft shall be supported on both ends by grease filled roller bearings. Separate grease-filled self-contained cartridge seals shall be mounted on drive shaft

between bearings and frame to eliminate spray wash from entering bearings or gear reducer.

4. The continuous belt will be supported and rotated around heavy duty stainless steel sprockets located on the drive shaft in the head space of the screen.
5. These sprockets will have removable bolted-on lugs that transmit torque directly from the gear reducer to notches on the underside of the UHMWPE guide links. Driving forces shall be transmitted to areas located behind the screen's grid to prevent solids from contacting drive surfaces.
6. Chain driven systems or screens with wheels submerged in the water are not acceptable.
7. Drive systems that use an external track and pinion to drive or push the band against grid weight supporting wear tracks will not be acceptable. Drive shall lift, and be capable of bearing, the full weight of the grid.

E. Accessories:

1. The manufacturer will supply the following accessories, with the equipment:
 - a. One (1) lot of necessary anchor bolts
 - b. One (1) 1" NEMA 4X brass body solenoid valve:
 - 1) Two-way internal pilot operated diaphragm type electrically actuated solenoid valve
 - 2) Closed when de energized
 - 3) Resilient seat suitable for air or water
 - 4) Solenoid coil molded epoxy
 - 5) Electrical: NEMA Class A, 120 volts ac, 60 Hz
 - 6) Minimum operating pressure differential no greater than 0 psig, maximum operating pressure differential not less than 350 psig.
 - 7) Provide Asco Series 210, or approved equal.
 - c. One (1) 1.5" wash water strainer
 - d. Two (2) wash water pressure gauge

F. Spare Parts:

1. The manufacturer will supply the following spare parts, per screen supplied, with the equipment:
 - a. Ten (10) hook links and elements spacers
 - b. Two (2) grid axles
 - c. Two (2) guide links
 - d. Two (2) screen panels

- e. Any field replaceable components that would reasonably be expected to be replaced within the first 5 years of operation.

2.5 ELECTRICAL

A. General:

1. The equipment supplier shall furnish all electrical items specifically called for in this specification section.
2. The Contractor shall supply all other electrical items, and interconnecting wiring of proper size, including all conduit and supports required to place the equipment into service.
3. The control system shall be designed and manufactured by the same company that furnishes the mechanical screen.
4. Refer to Project Process and Instrumentation Diagram drawing.

B. Control Panel:

1. The manufacturer will supply one UL listed main control panel that shall automatically control the equipment offered in this section. The control panel shall be installed adjacent to the screen as shown on the Drawings.
2. The control panel shall be provided an ethernet switch to facilitate communication between fine screen control panel and main Plant PLC/SCADA system.
 - a. The unmanaged Ethernet switch shall have minimum 5 ports. Ports shall be 10/100/1000 BASE-T/TX with RJ-45, 8 pin female connectors. Switch shall be suitable for power from 10-30 VDC. Switch shall be N-Tron 108TX, Allen Bradley Stratix 200, or equal.
3. Main control panel shall be NEMA 3R for installation inside of secondary panel enclosure, refer to Drawings and **Section 13330 – Control Panel Enclosures**.
4. Control panel shall consist of the following components:
 - a. Main lockout/fused disconnect switch
 - b. Hand/Off/Auto switch
 - c. Variable frequency screen drive
 - d. Control transformer, 500 VA minimum
 - e. Programmable control relay with minimum of 5 cycle timers
 - f. Fused disconnect
 - g. Hour run meter
 - h. Fuses and breakers
 - i. Motor overload sensor
 - j. Panel power light
 - k. Screen run/fault lights

- l. Reset pushbutton
- m. Emergency stop pushbutton
- n. Current monitors

C. Level Sensors:

1. Ultrasonic level sensors shall be installed upstream and downstream of the screen. In automatic mode, the screen shall operate based on the water level differential between the upstream and downstream sensors.
2. The level sensor shall utilize an ultrasonic beam for measurement of the liquid level and be provided with an LCD display and two C-form contacts corresponding to individual level settings.
3. Manufacturer:
 - a. Siemens HydroRanger 200, or Equal:
 - 1) Sensor (XPS-15, 0-50ft): 7ML1118-0EA30
 - 2) Transmitter: 7ML5034-4AA01
4. Provide backup flow switch upstream of the screen for high level alarm.

D. Variable Frequency Drive: Comply with requirements of **Section 16269 – Variable Frequency Drive Units**. Provide Allen Bradley Powerflex 525 Series.

2.6 SEQUENCE OF OPERATION AND CONTROLS DESCRIPTION:

A. Screen Hand Operation:

1. When the screen selector switch is in the Hand position, the screen will run continuously. Hardwired shutdowns including motor overload and motor over or under current shall be active even when the screen is running in Hand.
2. Turning the screen selector switch to Off will stop the unit.

B. Screen Automatic Operation:

1. To operate in AUTO, the "enable" signal must be received from the Plant PLC/SCADA.
2. When the screen selector switch is in the Auto position, the screen will cycle on demand by the differential level controller.
3. Once an adjustable differential has been reached, a signal in the form of a dry contact closure is generated for starting the screen.
4. Once directed to start, the screen will be cycled on and off by a repeat cycle timer (also adjustable) until the head loss is reduced an adjustable operating differential level.
5. In AUTO the screen shall also receive a signal from the ethernet switch to start and stop operation of the screen based on SCADA timer or differential level setpoints.

C. Fault Conditions:

1. Excessive motor current will trip the starter overload relays, immediately stop the drive motor, and illuminate the alarm indicating light. This fault must be reset by depressing the motor starter overload reset internal to the control panel.
2. Momentary motor over or under current will trip the current monitor, immediately stop the drive motor, and illuminate the alarm indicating light. Pushing the reset pushbutton will reset this fault.

D. Remote Control Input/Output Requirements (via ethernet switch to Plant PLC/SCADA):

1. Input Signals:
 - a. Remote screen start/stop (digital)
 - b. Remote screen enable/disable (digital)
2. Output Signals:
 - a. Screen upstream level (analog)
 - b. Screen downstream level (analog)
 - c. Screen high level alarm (digital)
 - d. Screen in AUTO (digital)
 - e. Screen drive running (digital)
 - f. Screen drive fault (digital)

2.7 SURFACE PREPARATION AND PAINTING

- A. The majority of stainless steel materials, including hardware, flanges and piping shall be pickled by means of a four tank system that is in accordance with ASTMs A380 and A967. This process is for quality control, removal of heat affected discoloration, surface treatment for corrosive environments and to provide a uniform finish to the stainless steel surfaces. Stainless steel components must be fully submerged in the tanks for complete coverage. Electro-chemical wanding is acceptable on weld finishes that cannot be submerged due to size. Sandblasting, pickling pastes and abrasive cleaners will not be accepted as forms of metal finishing. The drive and grid components do not require pickling.
1. Tank 1 - Detergent bath for the removal of soils, greases, oils and dirt
 2. Tank 2 - Rinsing process to remove detergent and residual soils
 3. Tank 3 - Two part acid solution for the removal of tightly adhere oxide films
 4. Tank 4 - Final rinse process to remove all residual acid
- B. All ferrous surfaces (except stainless steel) shall be coated with a pre-primer, primer, and an exterior top coating, or fusion bonded polyester coating suitable for humid/wet environments for superior corrosion protection.

- C. Motor(s) and gearbox(s) shall be surface prepared to withstand humid/wet environments for superior corrosion protection.

PART 3 - EXECUTION

3.1 FACTORY TESTING

- A. The screening system and all components shall be factory assembled and tested for a minimum of 24 hours prior to shipment. The equipment shall be shipped fully assembled and shall be capable of being set in place and field erected by the Contractor with minimal field assembly.
- B. During the factory test period the screening system shall be adjusted as required assuring proper operation on completion of the field installation. The Manufacturer shall supply a certification of the completion of the factory testing of the assembled screening system and appurtenances and shall certify as to the equipment being in satisfactory operating condition at time of shipment. The ENGINEER and/or OWNER may, at their own option and expense, witness the factory test.

3.2 INSTALLATION

- A. The installation of the equipment shall be as indicated on the Drawings and in strict accordance with the Manufacturer's instructions and recommendations.

3.3 FIELD TESTING

- A. After completion of the installation, the equipment shall be inspected and proper installation certified by an authorized representative of the Manufacturer as being in compliance with the Manufacturer's recommendations and requirements. At such time as the Manufacturer has deemed the installation to be acceptable, the Manufacturer's authorized service representative shall make any required adjustments and shall start the equipment to assure proper operation.
- B. The screen shall be field tested in the presence of the OWNER and ENGINEER to confirm and verify the structural and mechanical compliance to the specification. The field acceptance test shall include demonstrating that the screen operates without vibration, jamming, or overheating and does not exceed the specified head loss during operation at the peak design flow rate.

3.4 INITIAL START-UP AND TRAINING

- A. The CONTRACTOR shall provide the services of an authorized service representative for not less than two (2) days, for the following:
 - 1. One (1) day for inspection of installation, start-up instruction, performance testing supervision, and adjustment assistance.

2. One (1) day for training of both OWNER's Operations personnel and OWNER's Maintenance personnel with respect to required preventative maintenance activities.
3. Additional days needed to complete successful testing and startup will be at the Contractor's expense.
4. No additional compensation will be provided for non-consecutive days to complete items required above.

+ + END OF SECTION + +

SECTION 11810
VERTICAL MIXERS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Scope: This Section includes the manufacture, supply, testing, and installation of Vertical Turbine Flocculators and Rapid Mixers for potable water treatment complete and operational.
- B. Equipment Tag Numbers: The following equipment identification numbers have been assigned to the equipment that shall be provided under this Section:
 - 1. M-3001 – Rapid Mixer
 - 2. M-3101 – 1st Stage Flocculator Basin #1
 - 3. M-3102 – 2nd Stage Flocculator Basin #1
 - 4. M-3103 – 3rd Stage Flocculator Basin #1
 - 5. M-3201 – 1st Stage Flocculator Basin #2
 - 6. M-3202 – 2nd Stage Flocculator Basin #2
 - 7. M-3203 – 3rd Stage Flocculator Basin #2

1.2 QUALITY ASSURANCE

- A. Reference Standards: Comply with the requirements and recommendations of the following references, except as otherwise specified:
 - 1. National Electric Code (NEC)
 - 2. National Electrical Manufacturers Association (NEMA)
 - 3. American National Standards Institute (ANSI)
 - 4. ASTM International (ASTM)
- B. Only agitator manufacturers that are a member of American Gear Manufacturers Association (AGMA) will be allowed to supply the mixer assembly. The mixer manufacturer shall have at least 10 years of experience in the manufacture of mixer drives, shafts, and impellers for similar service conditions as those described in this specification. Mixer manufacturer shall supply evidence of such experience at the Engineer's request.
- C. All equipment furnished under this Section shall be of a design and manufacture that has been used in similar applications, and it shall be demonstrated to the satisfaction of the OWNER that the quality is equal to equipment made by the manufacturer(s) specifically named herein.
- D. Provide a factory operational and performance test on the pre-assembled system and documentation of results prior to shipment.
- E. Warranty: Provide a one (1) year warranty on all equipment from date of start-up. Warranty shall cover defects in workmanship, design, and materials. If any component should fail during the warranty period, it shall be corrected and the unit restored to service at no expense to the OWNER.

1.3 SUBMITTALS

- A. Submit the following items to the ENGINEER for approval:

1. Shop Drawings:
 - a. Detailed drawings showing component and assembly dimensions, location of mechanical and electrical connections, weights of all equipment, installation details, and accessory details.
 - b. Power and control wiring diagrams, including terminals and numbers.
 - c. Drawings, templates, and directions for installation of anchor bolts.
2. Product Data:
 - a. Descriptive literature, specifications, and engineering data.
 - b. Materials of construction for all components and accessories.
 - c. Impeller type, number, and size.
 - d. Impeller shaft size, material, and number of sections.
 - e. Type, specifications, details, input and output speeds, exact gear ratios and service factor of gear reducers.
 - f. Ratio of rotation speed to critical speed of shaft.
 - g. Detail of supporting base plate and shaft seal.
 - h. Mixer weight, motor weight, and complete assembly weight.
 - i. Mixer operational bending moment and reaction torque.
 - j. Complete motor nameplate data, as defined by NEMA.
 - k. AGMA gear rating calculations.
 - l. Bearing life calculations.
 - m. Factory finish system.
3. Equipment handling and installation manuals.
4. Operations and Maintenance Manuals: Provide in accordance with **Section 01782 – Operating and Maintenance Materials**.
5. Quality Control Submittals:
 - a. A list of any and all instances where the equipment proposed deviates from these Specifications.
 - b. Names and addresses of the factory authorized service organization nearest the Project Site.
 - c. Upon approval of Shop Drawings, Manufacturer shall provide printed installation instructions.

1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. All equipment and accessories shall be properly protected during shipment such that no damage or deterioration shall occur between shipment and installation.
 1. Finished surfaces shall be protected by wooden blanks.
 2. Finished ferrous metal surfaces not painted shall be protected from corrosion.
 3. Each box and package shall be clearly marked with the contents and total weight.
- B. Manufacturer shall provide any special storage and handling instructions.

1.5 SPARE PARTS

- A. Furnish and deliver the following spare parts carefully boxed or packaged and plainly marked for re-ordering:
 1. One set of special tools required for normal operation and maintenance.
 2. One complete spare set of gaskets, bearings, and oil seals for each size gear reducer.
 3. A complete spare set of all fasteners, bolts, nuts, pins, keys, washers, and the like that are not of standard manufacture.

PART 2 - PRODUCTS

2.1 VERTICAL TURBINE FLOCCULATOR DESIGN REQUIREMENTS:

A. Design Requirements:

Mixer ID	M-3101, M-3201: 1st Stage Flocculator
Liquid Mixed	Chemically Pre-Treated Raw Water
Mixed Liquid Specific Gravity	1.0
Tank Geometry	Rectangular Concrete Basin
Tank Width	13'-6"
Tank Length	9'-0"
Tank Maximum Water Depth	13'-6"
Tank Wall Height	14'-3"
Mounting Geometry	Vertical on support beams as shown
Maximum Velocity Gradient	95 sec ⁻¹
Operate On Variable Speed Drive?	Yes
Floc Zone Volume	12,270 gallons
Liquid Temperature Range	40 – 85 °F
Motor Type and Speed	Variable Speed – 1,200 RPM minimum
Motor Size	1.0 hp
Mixer Shaft	1-1/2" diameter, minimum
Mixer Shaft Speed	37 RPM maximum
Mixer Shaft and Impeller Material	Type 316 SS
Impeller Type & Size	One (1) 58-inch diameter Axial Flow Hydrofoil

Mixer ID	M-3102, M-3202: 2nd Stage Flocculator
Liquid Mixed	Chemically Pre-Treated Raw Water
Mixed Liquid Specific Gravity	1.0
Tank Geometry	Rectangular Concrete Basin
Tank Width	13'-6"
Tank Length	9'-0"
Tank Maximum Water Depth	13'-6"
Tank Wall Height	14'-3"
Mounting Geometry	Vertical on support beams as shown
Maximum Velocity Gradient	50 sec ⁻¹
Operate On Variable Speed Drive?	Yes
Floc Zone Volume	12,270 gallons
Liquid Temperature Range	40 – 85 °F
Motor Type and Speed	Variable Speed – 1,200 RPM minimum
Motor Size	1.0 hp
Mixer Shaft	1-1/2" diameter, minimum
Mixer Shaft Speed	25 RPM maximum
Mixer Shaft and Impeller Material	Type 316 SS
Impeller Type & Size	One (1) 58-inch diameter Axial Flow Hydrofoil

Mixer ID	M-3103, M-3203: 3rd Stage Flocculator
Liquid Mixed	Chemically Pre-Treated Raw Water
Mixed Liquid Specific Gravity	1.0
Tank Geometry	Rectangular Concrete Basin
Tank Width	13'-6"
Tank Length	9'-0"
Tank Maximum Water Depth	13'-6"
Tank Wall Height	14'-3"
Mounting Geometry	Vertical on support beams as shown
Maximum Velocity Gradient	30 sec ⁻¹
Operate On Variable Speed Drive?	Yes
Floc Zone Volume	12,270 gallons
Liquid Temperature Range	40 – 85 °F
Motor Type and Speed	Variable Speed – 1,200 RPM minimum
Motor Size	1.0 hp
Mixer Shaft	1-1/2" diameter, minimum
Mixer Shaft Speed	20 RPM maximum
Mixer Shaft and Impeller Material	Type 316 SS
Impeller Type & Size	One (1) 58-inch diameter Axial Flow Hydrofoil

2.2 RAPID MIXER DESIGN REQUIREMENTS:

A. Design Requirements:

Mixer ID	M-3001: Rapid/Flash Mixer
Liquid Mixed	Chemically Pre-Treated Raw Water
Mixed Liquid Specific Gravity	1.0
Tank Geometry	Rectangular Concrete Basin
Tank Width	6'-0"
Tank Length	6'-0"
Tank Maximum Water Depth	13'-6"
Tank Wall Height	14'-6"
Mounting Geometry	Vertical on support beams as shown
Mixing Time for Complete Blending	30 seconds maximum
Operate On Variable Speed Drive?	No
Rapid Mix Zone Volume	3,600 gallons
Liquid Temperature Range	40 – 85 °F
Motor Type and Speed	Constant Speed – 1,800 RPM minimum
Motor Size	3.0 hp
Mixer Shaft	2-1/2" diameter, minimum
Mixer Shaft Speed	100 RPM maximum
Mixer Shaft and Impeller Material	Type 316 SS
Impeller Type & Size	-Two (2) 34.5-inch dia. Axial Flow Hydrofoils -One (1) 32-inch dia. Axial Flow High Shear Impeller

2.3 PRODUCT AND MANUFACTURER

- A. Chemineer
- B. Or Equal

2.4 MATERIALS AND CONSTRUCTION

- A. Each mixer assembly shall consist of a heavy duty speed reducer, vertical motor connected through a flexible coupling with approved steel guard, support pedestal with integral square baseplate, agitator shaft, and mixing impellers.
- B. Drive units shall be specifically designed for agitator service and shall be suitable for 24 hours per day operation under moderate shock load conditions.
- C. Mechanical details of each component shall be as follows:
 - 1. Gear Drive:
 - a. The mixer gear drive must be built and rated in accordance with the current AGMA Standard 6010-E88.
 - b. The AGMA calculated drive HP rating shall be stamped on drive nameplate.
 - c. Drive housings shall be of high-quality close-grained cast iron, or fabricated steel, stress relieved and reinforced, and shall be provided with lifting lugs or holes.
 - d. Double and triple reductions must be in a single housing.
 - e. Mounting: Each unit shall be provided with an integral or separate baseplate and shall have a minimum 10-inch pedestal base for ease of assembly of the agitator shaft and to facilitate draining of the oil from the gear drive. The base shall mount to a mixer support structure supplied and installed separately by the CONTRACTOR as shown on the Drawings. A minimum of four 3/4-inch diameter mounting holes shall be provided in the baseplate for mounting.
 - f. The agitator gear drive shall be a heavy duty, parallel shaft design utilizing only case-carburized and ground helical gearing.
 - g. It shall not be necessary to remove the motor to perform routine maintenance on the speed reducer.
 - h. Worm gears are not acceptable.
 - i. Gearing shall be of AGMA Quality No. 10 (ten) or better, per AGMA standard 390.03a and ASI-AGMA 2000-A88.
 - j. The full load operating noise levels of the mixer drives shall meet current OSHA Occupational noise levels, and/or AGMA standard 299.1, and shall not exceed 85 dBA at 3 feet from any part of the drive.
 - k. Service Factor:
 - 1) The drive's minimum AGMA service factor shall be 1.5 and based upon motor nameplate horsepower.
 - 2) The service factor shall be based on AGMA Standard 6010-F97 for 24-hour per day moderate shock application.
 - 3) Service factors based on uniform load and motor bhp will not be accepted.
 - 2. Gear Drive Manufacture:
 - a. All components of each gear drive shall be designed, manufactured and assembled in full compliance with all applicable AGMA requirements.
 - b. The gear drive efficiency shall be a minimum of 95%.
 - c. Only mixer gear drives designed and manufactured by the Mixer Supplier shall be acceptable. Gear drives designed and manufactured by a company other than the Mixer Manufacturer are not acceptable.
 - d. Thermal rating of the gear reducer must exceed design mechanical rating. No external cooling devices are allowed.

3. Drive Bearings:
 - a. All drive bearings shall be of antifriction type, ball or roller bearings.
 - b. To accommodate large overhung loads typical in agitator service, the output bearings must have wall section supports, which are at least 1.5 inches thick. Dry well mounted output bearings are specifically excluded.
 - c. All bearings within the drive, including the output shaft bearings, shall have minimum AFBMA L-10 lives of 500,000 hours when operating at full motor nameplate horsepower at design speed, and shall be adequate to support the weight of the shaft and turbine assembly and to withstand the random hydraulic forces of agitation.
4. Lubrication:
 - a. Lubrication of each speed reducer shall be accomplished by all bearings and gears being immersed in oil.
 - b. The drive shall be provided with a sight glass to observe oil level.
 - c. The drive shall incorporate a dry-well around the low speed shaft and include a v-ring seal on the low speed shaft to the top of the dry well housing. Lubrication shall be of the "fail safe" oil splash type.
 - d. Lubricated for life gear reducers are specifically excluded. All reducers must be designed for standard rust & oxidation (R&O) style lubricants. Mandatory requirements for costly synthetic lubricants are prohibited.
 - e. All oil fill and drain lines shall be located so as to be easily accessible.
 - f. A 1/2-inch NPT drain connection with a ball valve suitable for oil service shall be provided.
 - g. All gearing must be contained within a single housing and lubricated by a common oil bath.
 - h. Gear-motor attachments to reduce speed will not be allowed.
5. Output Shaft:
 - a. The mixer gear drive shall be designed with an output shaft system suitable for the loadings imposed by the application.
 - b. The cross-sectional area of the single piece output shaft at the lower output bearing must be at least 1.25 times the cross-sectional area of the largest diameter section of the impeller shaft.
 - c. The output shaft shall be supported by two adapter-type anti-friction bearings.
6. Shaft Coupling:
 - a. The lower mixer shaft shall be connected to the upper, or drive output shaft, by means of a rigid flanged coupling of either the welded or interference-fit hub type.
 - b. Coupling face shall have a rabbeted male and female piloted connection for accurate concentricity and shall not require match marks for alignment.
 - c. The rigid coupling shall be located immediately below the gear reducer to allow easy removal of the shaft system without disturbing the gear drive. The coupling should be recessed into the housing to avoid damage during shipment. Exposure of the gear reducer internals to remove the shaft system will not be acceptable.
7. Shaft:
 - a. The agitator shaft shall be of the material specified in Paragraphs 2.1 and 2.2.
 - b. The shaft shall be designed such that the maximum stress shall not exceed 9,000 psi under maximum operating loads.
 - c. It shall be of overhung design – the use of underwater bearings is not permitted.
 - d. Shaft shall be designed such that the material tensile yield stress is at least 3.0 times the calculated shaft tensile stress and the material shear yield stress is at least 3.5 times the calculated shaft shear stress. Calculations shall consider the combined torsional and bending loads, and shall be submitted upon the ENGINEER's request.
 - e. Lower shaft straightness, rigid coupling squareness, and output shaft accuracy must be such that the maximum total indicated runout at the lower end of the

- shaft does not exceed 1/4 inch for every 10 foot of overhang, as measured when turning over by hand.
- f. Keyways:
 - 1) Extended keyways shall be provided to allow for vertical adjustment of the impeller in 3" increments.
 - 2) Keyways shall allow the impeller to be placed 0.75 D to 1.0 D off of the tank bottom (where D is the impeller diameter).
8. Impellers:
- a. The impeller shall be constructed of the material specified in Paragraphs 2.1 and 2.2
 - b. The impeller shall be of the axial flow type and shall consist of (3) blades bolted to a central hub.
 - c. The hubs shall be attached to the shaft by means of a keyway, hook and pin key arrangement.
 - d. The maximum stress in any impeller component shall not exceed 11,000 psi under maximum operating loads.
 - e. The shaft-impeller system design shall be such that its operating speed shall not exceed 80 percent of its first lateral critical speed. The use of stabilizing rings or fins will not influence this limitation.
 - f. Impellers shall be downward pumping.
 - g. The shaft shall be safe for operation when the liquid level passes through the lower impeller while the mixer is running.
 - h. Calculations supporting all shaft and impeller design criteria (stresses and critical speed) shall, upon request, be supplied with Shop Drawings.
9. Motor:
- a. Motors shall comply with requirements in Section **01610 - General Equipment Requirements**.
 - b. The electric motor driver shall be commercially available standard NEMA C-Face, rated for continuous duty in a humid corrosive environment with full mill and chemical duty features.
 - c. Three phase motors used in conjunction with variable speed drives shall have Class H insulation with a Class B temperature rise at rated nameplate horsepower, and 1.15 service factor.
 - d. Rated for continuous duty at 50°C ambient
 - e. Motors are to be used with AC inverters that shall meet NEMA MG1, part 31 for variable torque, 10:1 turndown operation. Motors shall be provided with insulation systems to withstand 1600-volt spikes, with dV/dT as defined in NEMA MG 1-31.
 - f. Motors shall be the energy high efficiency type, in full compliance with the "Federal Energy Policy Act of 1992".
 - g. Motors shall be squirrel cage induction motors for operation on 3PH, 60 Hz, 460 V current.
 - h. Motor shall be grease-lubricated ball bearing, solid shaft design.
 - i. The connection between the motor and the gear drive shall be made with a flexible coupling, Woods Sureflex type, or approved equal. The drive shall have "built-in" motor to reducer alignment. Drive couplings shall be provided with an approved steel guard. Plastic coupling guards are not allowed.
 - j. Grounding Lugs: Provide motor grounding lug suitable to terminate ground wire.
 - k. Inverter duty motors shall be provided with shaft grounding rings. Rings shall be factory installed, and shall be manufactured by Aegis, or equal. The motor warranty shall include coverage against VFD-induced bearing damage or failure.
 - l. Provide Motor Winding Thermostats: snap action, bi-metallic, temperature-actuated switch. Thermostats shall be provided with one normally closed contact. The thermostat switch point shall be pre-calibrated by the manufacturer. All inverter duty motors shall be provided with winding thermostats.

10. Variable Frequency Drives:

- a. Mixers shall be provided with Variable Frequency Drives where called for in Paragraph 2.1.
- b. Variable Frequency Drives shall be provided separately per Specification Section 16269.

D. Factory Finish System:

1. Prior to painting all surfaces must be thoroughly solvent washed.
2. Exposed carbon steel components of the agitator system shall be painted with a two coat finish system; the first coat to be a 3 to 4 mil DFT (dry film thickness) coat of Sherwin Williams 2.8 VOC catalyzed primer (or Equal), the second coat to be a 2-3 mil DFT coat of Sherwin Williams Polane 8880 Polyurethane paint (or Equal). This paint system may be applied to primed surfaces, to painted surfaces or directly over clean metal surfaces.
3. Steel weldments (gear boxes) may be sand-blasted to remove mill scale and rust. No sand-blasting to machined surfaces will be allowed.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install in accordance with Manufacturer's written instructions.
- B. Check after mixer is installed to ensure alignment and assembly has been unchanged from factory assembly conditions. Make adjustments required to place system in proper operating condition.
- C. Installation shall include furnishing and applying an initial supply of grease and oil, recommended by Manufacturer.
- D. Unit as furnished and installed shall not vibrate or produce noise in excess of Mixer Manufacturer's specifications.
- E. Motor vibration shall not exceed limits as required by latest revision of NEMA MG 1 standards.

3.2 MANUFACTURER'S FIELD SERVICES

- A. A factory trained representative shall be provided for installation inspection and certification, start-up and test services, and operation and maintenance personnel training services. The serviceman shall make at least one (1) visit to the site to inspect the installation, assist with startup, and instruct operations and maintenance personnel.
- B. Field Tests:
 1. Conduct functional and performance tests under approved simulated operating conditions.
 2. Perform vibration testing and confirm that vibration is within manufacturer's specifications.
 3. If any portion of the installation does not function properly, adjust, realign, or modify the installation and retest.
 4. Additional days needed to complete successful testing and startup will be at the Contractor's expense.
 5. No additional compensation will be provided for non-consecutive days to complete items required above.

+ + END OF SECTION + +

SECTION 13310

PRIMARY SENSORS AND FIELD INSTRUMENTS

PART 1 - GENERAL

1.1 SCOPE

- A. CONTRACTOR shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish, install, calibrate, test, adjust and place into satisfactory operation all primary sensors and field instruments furnished under this Section.
- B. CONTRACTOR shall be responsible for installing in-line flow elements and for providing taps in the process piping systems for installation of other flow, pressure and temperature sensing instrumentation.
- C. Drawings and Specifications illustrate and specify functional and general construction requirements of the sensors and field instruments and do not necessarily show or specify all components, wiring, piping and accessories required to make a completely integrated system. CONTRACTOR shall provide all components, piping, wiring, accessories and labor required for a complete, workable and integrated system.
- D. Coordination: Coordinate the installation of all items specified herein and required to ensure the complete and proper interfacing of all the components and systems.
- E. Related work specified elsewhere includes, but is not limited to Section 16050, General Electrical Requirements. Also, refer to requirements for testing, adjusting, and calibration of systems specified elsewhere.

1.2 QUALITY ASSURANCE

- A. Equipment to be furnished under this section shall be the product of firms regularly engaged in the design and manufacture of this type of equipment. Manufacturer shall assume responsibility for and guarantee performance of the equipment furnished. However, this shall not be construed as relieving the CONTRACTOR from responsibility for the proper installation and functioning of the equipment.
- B. Reference standards shall be the latest edition, including addenda, supplements, and revisions. Applicable reference publications include, but not limited to, the following:
 - 1. NEC
 - 2. NEMA

1.3 SUBMITTALS

- A. Submit product information cut sheets containing manufacturer's specifications, operations and maintenance data, instrument enclosure type, installation location, connection diagrams for equipment wiring, and process pressure range to be supplied. Indicate product part number in full.
- B. Provide submittals in accordance with Section 16050, and elsewhere in the Contract Documents.

PART 2 - PRODUCTS

2.1 MAGNETIC INLINE FLOW METER:

- A. Equipment Tag numbers:
 - 1. This specification section refers to flow transmitter numbers as follows:
 - a. FM/FIT-1201 (0-10,000 gpm)
- B. Acceptable Manufacturers:
 - 1. Siemens 5100W flow tube with Mag 5000 transmitter (insert version for panel installation)
 - 2. No equal allowed
- C. The magnetic flow meter shall consist of a flow tube (FM) and a converter (FIT), complete with interconnecting cables. The FIT shall be installed remotely from the flow meter. Provide 300-ft long interconnecting cable.
- D. The magnetic flow meter shall be of the low frequency electromagnetic induction type and shall produce a DC pulse signal directly proportional and linear to the flow rate, with the duration not less than 100 milliseconds. Complete zero stability shall be an inherent characteristic of the metering system. Meters requiring field zero adjustment will not be acceptable. The meter accuracy shall not be affected by changes in fluid pressure, temperature, viscosity, or conductivity.
- E. Accuracy
 - 1. The maximum error of the complete metering system including flow element and flow indicating transmitter shall be 0.30% of actual flowrate (in specified units) and readout over the range of full scale velocity settings from 1 to 30 feet per second. Variations in temperature, voltage, and frequency within the ranges listed herein shall not affect the overall measuring accuracy.
 - 2. The flow meter shall not require more than three diameters of straight pipe length from the center of the meter to upstream or downstream obstructions to obtain specified accuracies.
 - 3. Lack of straight pipe or obstructions to straight length pipe requirements shall not cause overall flowmeter inaccuracies to exceed more than 0.5% of actual flowrate over the range of full scale settings from 1 to 30 feet per second.
- F. Flow Meter (FM)
 - 1. The flow element shall be based on a pipe spool with ANSI class 150 flange connections or be flangeless construction as required by mechanical drawings. The flow element size shall be as shown in the mechanical drawings. Flange type and bolt pattern shall be coordinated with the mechanical Contractor prior to submittal.
 - 2. The flow element shall have Hastalloy C276 coil and grounding electrodes.
 - 3. Stainless steel grounding rings shall be provided at both ends of the flow element for all flowmeter applications. Grounding rings shall be manufactured from stainless steel, 2 mm thickness with grounding tab for electrical wire connection, and fit within the flange bolt circle. Grounding rings shall be self centering within the pipe.
 - 4. The flow element internal liner material shall be EPDM.
 - 5. Flow tube shall be NSF-61 listed for potable water.
- G. Flow Indicating Transmitter (FIT)

1. The electronic flow indicating transmitter shall be mounted remotely from flow tube as shown on the Contract Drawings (see Drawing E-103 Notes 3,4,5).
 2. Contractor shall provide and install manufacturer's cable of necessary length between flow tube and transmitter.
 3. The electronic transmitter shall be provided in a NEMA rated enclosure.
 4. The transmitter shall be microprocessor controlled, utilizing digital signal processing with automatic zero correction to provide a linear 4-20 mA signal proportional to flow rate.
 5. The transmitter shall incorporate a high impedance amplifier of 100,000 Megaohms or greater.
 6. The transmitter shall contain a self test mode to allow the operator to manually simulate the output 4-20 mA signal value between 0% to 100% to check out any driven devices in the loop.
 7. Rate indicator and totalizer: an alphanumeric LCD backlit display shall be provided to continuously display the flowrate and totalizer with units and all programming functions.
 8. All programming configuration of the Flowmeter shall be completed through the transmitter's pushbutton interface.
 9. The transmitter shall be designed for operation from a power source of 120 volts AC. The flow element shall be powered from the transmitter.
 10. The transmitter shall operate continuously without fault in an ambient temperature range from 14 to 140° F.
 11. The following configurable parameters shall be provided at a minimum:
 - a. Field adjustable flow signal dampening.
 - b. Low flow cutoff (forces zero flow signal) between 0.0 to 5.0% of full scale.
 - c. Empty pipe detection.
 - d. Selection of forward/reverse flow.
- H. Flow Indicating Transmitter (FIT) I/O Interface
1. The transmitter output(s) shall be integral to the magnetic flowmeter transmitter electronics; and must be located within the transmitter housing. Using an external signal converter is not acceptable.
 2. Flow Signal: 4-20 mA signal proportional to the flow. The signal shall be field configurable for the flow calibration specified and others within the flow tube accuracy range.
 3. Contractor shall field verify existing FIT to be replaced and confirm wiring requirements to existing PLC and incorporate into submittal information.
- I. The manufacturer shall provide all cabling between flow meter and remote flow indicating transmitter. Refer to Drawings and coordinate with Contractor for required cable length.
- J. All mounting hardware necessary to complete the installation shall be provided by the manufacturer at no additional cost to the Owner. Contractor shall field verify existing FIT to be replaced and confirm installation requirements for new FIT and incorporate into submittal information.
- K. The meter shall be hydraulically calibrated at a facility located in the United States and the calibration shall be traceable to the National Bureau of Standards. A certified copy of the calibration test results shall be submitted to the Owner prior to shipment of the meter.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Equipment and materials specified in this section shall be installed and connected as specified and shown on the Drawings. CONTRACTOR shall coordinate with mechanical and piping to ensure proper connection to piping and/or other mechanical equipment.
- B. The CONTRACTOR shall calibrate the instruments to the proper ranges, as required by the Owner and the ENGINEER. Where analog signals are connected to local, or remote monitoring equipment, the CONTRACTOR shall verify that the calibrated ranges and scaling of the local and remote indicators are correct.

3.2 ACCEPTANCE

- A. As a condition precedent to Final Acceptance of the work, the CONTRACTOR shall certify the equipment and installation included under this section to be free of defects, and suitable for trouble-free operation under the conditions set forth in these specifications. This requirement is in addition to the manufacturer's guarantee.

3.3 SPARE PARTS

- A. Provide the OWNER with a list of the manufacturers' recommended spare parts.

++ END OF SECTION ++

SECTION 13330

CONTROL PANEL ENCLOSURES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and place into satisfactory operation control panels and/or enclosures. The control panel enclosure specified herein shall house the manufacturer-supplied control panel for the raw water fine screen specified in **Section 11600 – Fine Screen**. Coordinate supply of this enclosure with fine screen equipment.

1.2 QUALITY ASSURANCE

A. Standards, Codes and Regulations:

1. Construction of panels and the installation and interconnection of all equipment and devices mounted within shall comply with applicable provisions of the following standards, codes and regulations:
 - a. National Fire Protection 79, Electrical Standard for Industrial Machinery (NFPA 79).
 - b. National Electrical Code (NEC).
 - c. National Electrical Manufacturer's Association Standards (NEMA).
 - d. American Society for Testing and Materials (ASTM).
 - e. Operational Safety and Health Administration (OSHA) Regulations.
 - f. State and Local code requirements.
 - g. Where any conflict arises between codes or standards, the more stringent requirement shall apply.
2. All electrical materials and equipment shall be new and shall bear the label of the Underwriters' Laboratory (UL), Inc., Factory Mutual (FM) or equivalent where standards have been established and label service regularly applies.

B. General Design Requirements:

1. Comply with the requirements of **Section 16050 – General Electrical Work**.

1.3 SUBMITTAL

- A. Comply with the requirements of **Section 16050 – General Electrical Work**.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Comply with the requirements of **Section 16050 – General Electrical Work**.

PART 2 - PRODUCTS

2.1 GENERAL CONSTRUCTION REQUIREMENTS

- A. Provide all electrical components and devices, support hardware, fasteners, interconnecting wiring and/or piping required to make the control panels and/or enclosures complete and operational.
- B. Locate and install all devices and components so that connections can be easily made and that there is ample room for servicing each item.
- C. Panel layouts shall be submitted for approval in accordance with Section 16050.
- D. Where permitted by location and layout as shown, panels and enclosures shall have full height rear access doors. Where rear doors are not possible, panels shall have full or half height front access doors.
- E. Adequately support and restrain all devices and components mounted on or within the panel to prevent any movement.
- F. Provide sub-panels for installation of all relays and other internally mounted components.
- G. All wiring to panel connections from field instruments, devices, and other panels shall be terminated at master numbered terminal strips, unless otherwise specified.
- H. Provide copper grounding studs for all panel equipment.
- I. Provide the following convenience accessories inside of each control panel:
 - 1. One 120 VAC, 20A duplex, grounding type receptacle.
 - 2. One 120 VAC LED light fixture with 40 watt (fluorescent equivalent) lamp and protective plastic shield.
 - 3. One 120 VAC, 20A, snap switch, to turn on the light, mounted in an outlet box with a cover and located so that it is easily accessible from access door.
 - 4. Service light with switch and duplex receptacle shall have its own circuit breaker and separate power feed.
- J. The bottom 12-inches of free standing panels shall be free of all devices, including terminal strips, to provide ease of installation and testing.
- K. No device shall be mounted less than 36-inches above the operating floor level, unless otherwise specified.

2.2 IDENTIFICATION

- A. Provide laminated plastic nameplates for identification of panels and components mounted thereon as follows:
 - 1. Nameplates shall be of 3/32-inch thick laminated phenolic type with black matte finish surface and white letter engraving.
 - 2. Panel identification nameplates to have 1/2-inch high letter engravings.
 - 3. Panel mounted component identification (e.g., control devices, indicating lights, selector switches, etc.) nameplates to have 1/4-inch high letter engravings.
 - 4. Nameplates shall be attached to the panel face with two stainless steel self-tapping screws.

5. Nameplate engravings shall include the instrument or equipment tag number and descriptive title as shown and specified.
- B. Tag all internally mounted components in accordance with the following requirements:
 1. Tag numbers shall be as shown.
 2. The identifying tag number shall be permanently etched.
 3. Identification tag shall be installed so that the numbers are easily visible to service personnel.
 4. Front of panel mounted instruments shall have the tag attached to rear of device.
- C. Tag all electrical components and devices mounted within control panels and enclosures with embossed plastic tape labels.
- D. Numerically code terminals on terminal strips using a Brady LS2000 Labeling System, or equal.
- E. Color code and/or numerically code wiring as required by applicable standards. Wires shall be identified at each end with permanent number codes using a Brady LS2000 Labeling System, or equal.

2.3 PANELS AND ENCLOSURES

- A. General:
 1. Panels and enclosures shall meet the NEMA requirements for the type specified.
 2. Sizes shown are estimates. CONTRACTOR shall furnish panels and enclosures amply sized to house all equipment, instruments, front panel mounted devices, power supplies, power distribution panels, wiring, tubing and other components installed within.
- B. Construction Features:
 1. Control panels located in field shall be NEMA 4X rated. Panels shall be metallic as shown on the Drawings.
 - a. Metallic Panels:
 - 1) Panels shall be Type 316 stainless steel construction with a minimum thickness of 12 gauge for all surfaces (except those areas requiring reinforcement) having a smooth brushed finish.
 - 2) Stainless steel fast-operating clamp assemblies on three sides of each door.
 - 3) Rolled lip around three sides of door and along top of enclosure opening.
 - 4) Hasp and staple for padlocking.
 - 5) Provide a clear plastic, gasketed lockable hinged door to encompass all non-NEMA 4 front of panel instruments.
 - 6) Provide 3-inch high channel base assembly, with solid bottom, drilled to mate the panel to its floor pad for free-standing panel.
 2. Product and Manufacturer:
 - a. Hoffman A30S4 – 72" tall, 60" wide, 36" deep
 - b. Engineer approved equal.
- C. Electrical Systems:
 1. Power Source and Internal Power Distribution:
 - a. General: Control panel power supply source, type, voltage, number of circuits and circuit ratings shall be as shown.

2. Electrical Systems:

- a. Internal wiring shall be Type THHN stranded copper wire with thermoplastic insulation rated for 600 V at 85 deg C for single conductors, color coded and labeled with wire identification.
- b. For DC panel signal wiring, use No. 16 minimum AWG shielded. For DC field signal wiring, terminal strips shall be capable of handling No. 12 wiring (minimum).
- c. For AC power wiring, use No. 12 minimum AWG. For AC signal and control wiring, use No. 14 minimum AWG. For wiring carrying more than 15 amps, use sizes required by NEC and JIC standards.
- d. Wire Color Code Table:

Description	Phase / Code Letter	Field Wire or Tape Color	Non-Field Wire Color
480V, 3 PH	A	Brown	Brown
	B	Orange	Orange
	C	Yellow	Yellow
240V or 208V, 3 PH	A	Black	-
	B	Red (Orange if high leg)	-
	C	Blue	-
	Neutral	White	White
240/120V, 1 PH	L1	Black	Black
	L2	Red	-
24V Positive	24+	Blue	Pink
24V Negative	24-	Gray	Gray
12V Positive	12+	Blue	Red
12V Negative	12-	Black	Black
AC Control		Red	Red (Yellow for foreign circuits)
DC Control		Blue	Blue
Ground	G	Green	Green
Shielded Pair	+	Red, Clear, or White	Clear or White
	-	Black	Black

- e. Group or bundle parallel runs of wire using covered troughs. Maximum bundle size to be 1-inch. Troughs shall have 40 percent spare capacity.
- f. Install wire troughs along horizontal or vertical routes to present a neat appearance. Angled runs are not acceptable.
- g. Adequately support and restrain all wiring runs to prevent sagging or other movement.
- h. Terminate all field wiring using forked, insulated, crimp-on connectors (soldered type not acceptable) at 600 V rated barrier type terminal strips with screwed connections and permanently affixed numeric identifiers beside each connection. Identifiers to be self-stick plastic tape strips with permanent type, machine printed numbers.
- i. All wiring shall be installed such that if wires are removed from any one device, power will not be disrupted to any other device.
- j. All alarms generated external to the panel, spare alarm, and repeat contacts shall be wired out to terminal blocks.
- k. For internal component to component wiring only, compression type terminal blocks are acceptable.
- l. Provide spare terminals equal in number to 20 percent of the terminals used for each type of wiring (e.g., DC signal and AC power).

- m. Provide a separate terminal for grounding each shielded cable.
 - n. Use separate 5/16-inch diameter copper grounding studs for instrument signal cable shields and AC power.
 - o. Where wires pass through panel walls, provide suitable bushings to prevent cutting or abrading of insulation.
 - p. When DC power and/or low voltage AC power is required, provide and install the necessary power supplies and transformers in the panel.
 - q. Provide complete wiring diagram showing "as-built" circuitry. Diagram shall be enclosed in transparent plastic and placed in easily accessible pocket built into panel door.
- D. Panel Enclosure Air Conditioning Unit:
- 1. Provide panel air condition unit for enclosure housing the Fine Screen Control Panel
 - 2. 8,000 BTU/hr
 - 3. Housing Material: Stainless Steel
 - 4. Direct mount to control panel using built-in mounting flanges.
 - 5. NEMA 4X enclosure.
 - 6. Electro-mechanical thermostat
 - 7. 120V single phase power with terminal block power connection.
 - 8. Integrated active condensate evaporator with heater strip.
 - 9. Cooling Method: Water/Glycol
 - 10. Product and Manufacturer:
 - a. Hoffman SpectraCool G52
 - b. Or Equal

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install equipment in conformance with NEC.
- B. Securely mount all legs or panel bases to concrete pad.
- C. Install and interconnect all equipment, devices, electrical hardware, instrumentation and controls and process controller components into and out of and among the enclosures as shown on the Drawings.

3.2 TESTING AND ADJUSTMENTS

- A. Perform system testing and make any adjustments necessary to provide a complete accurate operating system as shown on the contract drawings.
- B. Perform power supply, voltage adjustments to tolerances required by the appurtenant equipment.

+ + END OF SECTION + +

SECTION 15010
PIPING SUPPORT SYSTEMS

PART 1 - GENERAL

1.1 SUBMITTALS

- A. Shop Drawings:
 - 1. Details of each pipe support type used.

PART 2 - PRODUCTS

2.1 SUPPORT SYSTEMS:

- A. Channel-type support systems:
 - 1. 304 Stainless Steel
 - a. Unistrut
 - b. B-Line
 - c. Or Equal.
- B. Stanchion-type support systems:
 - 1. B-Line
 - 2. Anvil
 - 3. Or Equal
- C. Adjustable pipe saddle support:
 - 1. B-Line, Figure B-3092
 - 2. Or Equal

PART 3 - EXECUTION

3.1 INSTALLATION

- A. In addition to the pipe supports specifically called for on the drawings, CONTRACTOR shall provide pipe supports as required to fully support all piping systems.
- B. CONTRACTOR shall design, supply and install pipe support system using manufacturer's standard available pipe support hardware.
- C. Pipe supports shall, at a minimum, be installed at the following locations:
 - 1. On both sides of each valve, piece of equipment or other appurtenance, such that allowance is made for removal of the valve, piece of equipment, or other appurtenance while leaving the pipe system fully supported. Support piping connections to equipment by pipe support and not by the equipment.

2. Along straight runs of pipe, the maximum distance between supports shall be as listed below:

Pipe Diameter	Maximum Distance Between Supports
2" and smaller	6-feet
2-1/2" to 6"	8-feet

3. At least two supports on each side of flexible couplings or flanged coupling adapters to provide that no load is applied to the flexible coupling.
 4. On the pipe within two pipe diameters of each side of elbows and each branch of tees and crosses.
 5. Where piping passes through walls, such that no load is transferred to the wall.
- D. Install support systems in accordance with MSS SP 69, Pipe Hangers and Supports-Selection and Application and MSS SP 89, Pipe Hangers and Supports-Fabrication and Installation, unless shown otherwise.
1. Support no pipe from the pipe above it.
 2. Do not install pipe supports and hangers in equipment access areas or bridge crane runs.
- E. Support Types:
1. Piping Supported From Walls:
 - a. Single Pipes: Channel attached to wall with anchors.
 - b. Insulated piping shall have the insulation removed in the vicinity of pipe supports to allow only direct pipe wall contact with the support system.
 2. Horizontal Piping Supported From Floors:
 - a. Stanchion Type:
 - 1) Pedestal type; adjustable with stanchion, saddle, and anchoring flange.
 - 2) Use yoked saddles for piping whose centerline elevation is 18 inches or greater above the floor and for all exterior installations.
 - 3) Provide neoprene waffle isolation pad under anchoring flanges, adjacent to equipment or where otherwise required to provide vibration isolation.
 - b. Floor-Mounted Channel Supports:
 - 1) Use for piping smaller than 3-inch nominal diameter running along floors and in trenches at piping elevations lower than can be accommodated using pedestal pipe supports.
 - 2) Attach channel framing to floors with anchor bolts.
 - 3) Attach pipe to channel with clips or pipe clamps.
- F. Isolation:
1. Install elastomeric inserts designed to isolate piping from pipe supports where copper pipe is run in stainless steel supports, or where other dissimilar metals are in contact with pipe supports.
- G. Materials:
1. Channel-type support systems and pipe racks constructed of channel systems:
 - a. Provide type 304 stainless steel support systems and fasteners.
 2. Stanchion-type support systems:
 - a. Provide steel and ductile iron stanchion components.
 - b. Coat stanchions after assembly per Specification Section 09900 - **PAINTING**.

+ + END OF SECTION + +

SECTION 15080

PIPING INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. The CONTRACTOR shall furnish and install all pipe insulation, complete and operable, in accordance with the requirements of the Drawings and Pipe Schedule.

1.2 SUBMITTALS

- A. Shop Drawings:
 - 1. Manufacturer's data on materials, construction, end connections, ratings, overall lengths, etc.
 - 2. Manufacturer's certification that the proposed materials comply with the Specification shall be submitted.

PART 2 - PRODUCTS

2.1 PIPE AND FITTING INSULATION

- A. **INS-01:** Rigid Fiberglass with Aluminum Jacket
 - 1. Material:
 - a. Insulation: Molded-type, made from glass fibers and bonded with a thermosetting resin
 - b. Minimum k-factor of 0.23 BTU-in/hr-ft² at 75° F average temperature
 - c. Thickness: 1"
 - d. Vapor Barrier Jacket: Kraft paper with aluminum foil with pressure sensitive adhesive lap
 - e. Cover: Aluminum lagging with preformed aluminum fittings shall be banded to the insulation
 - 1) All joints shall be sealed with silicon mastic to provide a continuous, air and weathertight joint.
 - 2) Jacket shall have a factory-attached moisture barrier.
 - 3) Metal jacketing shall be overlapped 2-3" and held in place with 1/2" wide, stainless steel bands.
 - 4) Allowance shall be made for thermal expansion.
 - 2. Temperature Rating: 0 degrees to 850 degrees Fahrenheit
 - 3. Minimum water vapor transmission of 0.02 perm-inch per ASTM E96
 - 4. Flame Spread Rating: Less than 25 per ASTM E84
 - 5. Fittings and Valves:
 - a. Insulate with fabricated sections of insulation
 - b. Wrap with vapor barrier jacket
 - c. Provide aluminum cover specifically designed for fitting or valve
 - 6. Manufacturers and Products:
 - a. Owens-Corning Fiberglass Corp.
 - b. CertainTeed Corp.
 - c. Johns Manville
 - d. Or Equal.

2.2 LOCKABLE INSULATION BLANKET BAG FOR BACKFLOW PREVENTERS

- A. Sized to fit backflow prevention device for fine screen.
- B. 14 oz. vinyl fabric cover treated with anti-mildew and UV inhibitors. Edges reinforced with double row of machine stitching.
- C. Insulation shall be ASTM C177 compliant, industrial grade, resilient, crushable, compressed fiberglass, R-30.
- D. Reinforced grommets on bottom seam for installation of padlock.
- E. RP relief valve discharge venting shall be un-impeded, even when bottom seams are padlocked together.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Insulate all piping where insulation is called for on the Drawings, Pipe Schedule, or as required above.
- B. Install insulation according to manufacturer's instructions:
 - 1. Install insulation only after piping system has passed pressure testing.
 - 2. Use accessories, adhesives and tapes per manufacturer's recommendations.
 - 3. Do not "gap" insulation at pipe supports. Trim insulation to allow for pipe support while providing continuous insulation of piping in those parts of the pipe not in contact with pipe support.
 - 4. Install removable/replaceable insulation sections and cover panels over fittings or valves which require maintenance access.
- C. Finishing:
 - 1. Overall installation shall result in smooth, straight, neat and clean piping insulation system. No frayed ends, irregular lumps or other unsightly installation result will be acceptable.

+ + END OF SECTION + +

SECTION 15100
PIPE AND FITTINGS

PART 1 - GENERAL

1.1 SUBMITTALS

A. Shop Drawings:

1. Product data sheets for each piping system.
 - a. Include information on pipe, coatings, fittings and joint systems.
2. Detailed fabrication shop drawings for ductile iron and welded steel pipe.
3. Complete catalog information, descriptive literature, specifications, and identification of materials of construction.
4. Complete descriptions and data for all coatings and linings.
5. Tests and inspection data for pipe and coatings/linings.
6. Qualifications for welders and/or technicians performing shop fabrication.

1.2 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. The Contractor shall use appropriate quality control procedures to ensure that all pipe and fittings shall be of the first grade and quality conforming to these Specifications. Pipe shall be stored and transported in a proper manner and kept clean after delivery to the job site. All work on pipe shall be performed in a skillful and professional manner.

PART 2 - PRODUCTS

2.1 PIPING SYSTEM DATA SHEETS

- A. Piping system data sheets (PSDS) have been attached to this Specification and are incorporated herein by reference. Provide piping systems in accordance with piping system data sheets.

2.2 THRUST RESTRAINT

- A. Provide rigid or restrained joints and fittings for all piping systems unless specifically shown otherwise.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Inspect pipe and fittings before installation, clean ends thoroughly, and remove foreign matter and dirt from inside.
- B. Repair any coatings or linings which were damaged during shipping and handling using manufacturer-approved coating and lining repair materials in accordance with manufacturer's instructions.

3.2 INSTALLATION

A. General:

- 1. Join pipe and fittings in accordance with manufacturer's instructions, unless otherwise shown or specified.

B. Joint Assembly:

1. Flanged Joints (FLG):

- a. Bolt Holes: Straddle vertical centerlines, aligned with connecting equipment flanges or as shown.
- b. Follow a bolt tightening pattern which produces uniform bearing pressure.
- c. Do not over-tighten bolts. Follow manufacturer's recommendation for bolt torque.
- d. Provide gasket at every flanged joint.
- e. Provide insulating flange kit where indicated on Drawings and required in this Specification.

2. Threaded and Coupled Joints (THR):

- a. Conform to ANSI B1.20.1.
- b. Produce sufficient thread length to ensure full engagement when screwed home in fittings.
- c. Ream pipe ends and clean chips and burrs after threading.
- d. Make connections with not more than three threads exposed.
- e. Lubricate male threads only with thread lubricant or tape as specified on Piping Data Sheets.
- f. PVC Threaded Joints:
 - 1) Provide Schedule 80 threaded nipple where necessary to connect to threaded valve or fitting.
 - 2) Use strap wrench for tightening threaded plastic joints. Do not overtighten fittings.

- g. Provide dielectric union or insulating coupling where indicated on Drawings and required in this Specification.
3. Soldered Joints (SLD):
- a. Before soldering, remove stems and washers from solder joint valves.
 - b. Use only solder specified for particular service.
 - c. Cut pipe ends square and remove fins and burrs.
 - d. Protect adjacent surfaces from damage during soldering.
 - 1) Protect from high temperatures due to flame
 - 2) Protect from damage due to dripping flux or solder
 - e. After thoroughly cleaning pipe and fitting of oil and grease using solvent and emery cloth, apply noncorrosive flux to the male end only.
 - f. Solder joint using approved lead-free solder approved for potable water.
 - g. Wipe excess solder from exterior of joint before hardened.
4. Solvent Welded Joints (SLV):
- a. Use only solvent cement which is rated for use in the service intended. Check compatibility of solvent cement with service, especially in pipelines which carry chemicals.
 - b. Observe all manufacturer's requirements for environmental conditions for use of solvent cement.
 - c. Cut pipe ends square and remove fins and burrs.
 - d. Apply appropriate primer.
 - e. Apply solvent cement and assemble joint.
 - 1) Hold in place long enough for solvent cement to set-up and hold joint, as assembled, until solvent cement has cured.
 - f. Wipe excess solvent cement from exterior of joint before hardened.
5. Restrained Mechanical Joints (RMJ):
- a. Mechanical joint piping shall be restrained using Restrained Mechanical Joint (RMJ) Glands as specified in Section 15120, **PIPING SPECIALTIES**. Field welding of retainer weldment or use of retaining (gripper) gaskets will not be allowed.
6. Welded Steel and Stainless Steel Joints (WLD)
- a. Field welded joints shall be in accordance with AWWA C206
 - b. Welder Qualifications:
 - 1) All welding shall be done by skilled welders, welding operators, and tackers who have had adequate experience in the methods and materials to be used.
 - 2) Welders shall be qualified by the CONTRACTOR under the provisions of ASME BPVC for shop welds and ANSI/AWS D1.1 for field welds.

- 3) Furnish all material and bear the expense of qualifying welders.
- c. Backing rings will not be permitted for 30-inch and smaller pipe. Single field-welded butt joints with outside backing rings may be used for pipe larger than 30 inches in diameter.
- d. Where exterior welds are performed, adequate space shall be provided for welding and inspection of the joints.
- e. Prior to the backfilling or beginning the welding procedure, any tack welds or joint stops used to position the pipe during laying shall be removed. Any annular space between the faying surfaces of the bell and spigot shall be equally distributed around the circumference of the joint by shimming, jacking, or other suitable means. The weld shall then be made in accordance with ANSI/AWWA C206. Where more than one pass is required, all dirt, slag, and flux shall be removed before the succeeding bead is applied.
- f. Repair of Welds: All welds that are defective shall be repaired by the CONTRACTOR to meet the requirements of this section at no additional cost to the OWNER. Defects in welds or defective welds shall be removed, and that section of the joint shall then be re-welded. Only sufficient removal of defective material that is necessary to correct the defect is required. After the repair is made, the joint shall be checked by repeating the original test procedure. Welds deficient in size shall be repaired by adding weld metal.

C. Insulating Flanges, Couplings, and Dielectric Unions:

1. Applications: Provide insulating flange, coupling or di-electric union for all joints at the following locations:
 - a. Dissimilar metal piping connections.
 - b. Submerged to unsubmerged metallic piping connections.
 - c. Where required for electrically insulated connection.
2. Installation:
 - a. Insulating joints connecting immersed piping to non-immersed piping shall be installed above maximum water surface elevation.
 - b. Align and install insulating joints according to manufacturer's recommendations to avoid damaging insulating materials.
3. Manufacturer:
 - a. Calpico Type F, Option #2.

D. Exposed Piping Installation:

1. Piping Runs:
 - a. Parallel to building or column lines and perpendicular to floor, unless shown otherwise.
2. Supports: As specified in Section 15010, **PIPING SUPPORT SYSTEMS**.

3. Group piping wherever practical at common elevations; install to conserve building space and not interfere with use of space and other work.
4. Provide unions or flanges at each piping connection to equipment or instrumentation on equipment side to facilitate installation and removal.
5. Install piping so that no load or movement in excess of that stipulated by equipment manufacturer will be imposed upon equipment connection.
6. Install piping to allow for contraction and expansion without stressing pipe, joints, or connected equipment.
7. Piping clearance, unless otherwise shown:
 - a. Overhead: Minimum of 7 feet 6 inches, measured from walking surface or stair tread to lowest extremity of piping system including flanges, valve bodies or mechanisms, insulation, or hanger/support systems.
 - b. Between Equipment or Equipment Piping and Adjacent Piping: Minimum 3 feet 0 inch, measured from equipment extremity and extremity of piping system including flanges, valve bodies or mechanisms, insulation, or hanger/support systems.
 - c. From Adjacent Work: Minimum 1 inch from nearest extremity of completed piping system including flanges, valve bodies or mechanisms, insulation, or hanger/support systems.
 - d. Do not route piping in front of or to interfere with access ways, ladders, stairs, platforms, walkways, openings, doors, or windows.
 - e. Headroom in front of openings, doors, and windows shall not be less than the top of the opening.
 - f. Do not route piping over, around, in front of, in back of, or below electrical equipment including controls, panels, switches, terminals, boxes, or other similar electrical work unless specifically shown on the Drawings.

E. Buried Pipe Installation:

1. Pipe Placement:
 - a. Keep trench dry until pipe laying and joining are completed.
 - b. Each section of pipe shall be thoroughly cleaned before it is lowered into the trench.
 - c. Exercise care when lowering pipe into trench to prevent twisting or damage to pipe.
 - d. Prevent foreign material from entering pipe during placement.
 - 1) If clean pipe sections and fittings cannot be placed in the trench without getting dirt into open pipe, the Engineer may require a piece of material to be tied over the ends of the pipe or fitting until it has been lowered into position in the trench. After the pipe has been lowered into the trench, all foreign matter shall be completely brushed from the pipe ends before assembly.

- 2) Temporary water tight plugs shall be provided for closure of the open ends of the pipelines each time pipe laying activity stops and at the end of each working day to prevent the entry of dirt and/or other contaminants.
 - 3) The pipe shall be cut to provide closure pieces of correct lengths to permit the proper location of the pipe sections, or to locate valves, fittings, and appurtenant structures where specified on plans.
- e. Secure pipe which has been placed from movement or damage while placing the next section of pipe.
 - f. The pipe and fittings shall be laid to the lines and grades specified on plans, and centered in the trench. All pipe to be laid upgrade for grades in excess of 10%.
 - g. Prevent movement of pipe prior to backfilling.
 - h. Bedding and backfill in pipe trenches shall be of the type, placement and compaction as shown on the Drawings and specified in Section 02300, **EARTHWORK.**
 - i. All backfill shall be carefully placed and spread in uniform horizontal layers (lifts) not exceeding 8 inches. Backfill shall be placed to about the same elevation on both sides of the pipe to prevent unequal loading and displacement of pipe. Backfill shall be placed to minimum depth of 30 inches above the top of the pipe unless shown otherwise on plans.

F. Cleaning:

1. Following assembly and testing, and prior to disinfection and final acceptance, flush pipelines 3" and smaller with water at 2.5 fps minimum flushing velocity until foreign matter is removed. At a minimum, flush for a period of time which will flush the entire pipeline volume three times.
2. Provide temporary means of removing flushing water from pipeline during flushing.

G. Disinfection:

1. Complete disinfection as required by Section 15995, **DISINFECTION OF POTABLE WATER SYSTEMS** for potable water ("W") piping only.

3.3 TESTING

- A. Pressure test piping in accordance with the Pipe Schedule, and Section 15990, **PRESSURE TESTING OF PIPING SYSTEMS.**
- B. The CONTRACTOR shall test for the continuity of the locating wire at time of final walk-thru. The CONTRACTOR shall provide all labor, equipment, and materials required for testing the continuity of the locating wire. Should continuity not be present and/or observed, the CONTRACTOR shall repair, replace, and retest as necessary, entirely at CONTRACTOR's expense.

3.4 SUPPLEMENTS

A. The following supplements are attached to this Specification section and incorporated herein by reference:

1. 15100 PS – Pipe Schedule
2. 15100 PSDS CHE – Chemical Tubing and Conduit
3. 15100 PSDS COP – Copper Pipe
4. 15100 PSDS DIP – Ductile Iron Pipe
5. 15100 PSDS PVC1 – Solvent Welded Polyvinyl Chloride Pipe
6. 15100 PSDS SSTP – Threaded Stainless Steel Pipe
7. 15100 PSDS WSP – Welded Steel Pipe

+ + END OF SECTION + +

SECTION 15100 PS

PIPE SCHEDULE

1.1 DESCRIPTION

A. General:

1. This schedule is provided for the convenience of the CONTRACTOR. Some flow streams may be shown on the drawings, but not listed here.

B. Flow Stream IDs:

1. ALUM – Aluminum Sulfate
2. CS – Caustic Soda
3. PAC – Powder Activated Carbon Slurry
4. PACL – Poly-Aluminum Chlorohydrate
5. RW – Raw Water
6. RWS – Raw Water Sample
7. WW – Wash Water
8. W – Potable Water
9. WR – Washwater Recycle

C. Pipe Materials:

1. COP – Copper Pipe
2. CHE – Chemical Tubing
3. WSP – Welded Steel Pipe
4. DIP – Ductile Iron Pipe
5. PVC1 - Solvent Welded Polyvinyl Chloride Pipe
6. SSTP – Stainless Steel Pipe

D. Joint Types:

1. FLG – Flanged
2. MJ – Mechanical Joint
3. RMJ – Restrained Mechanical Joint
4. SLV – Solvent Welded Socket
5. SLD – Soldered Socket
6. THR – Threaded
7. WLD – Butt Welded

E. Lining Systems:

1. CM – Cement Mortar
2. Epoxy

F. Coating Systems:

1. Factory Epoxy – Refer to Section 15100 PSDS – WSP
2. Poly Wrap - Refer to Section 15100 PSDS – WSP
3. Asphaltic + Poly Wrap - Refer to Section 15100 PSDS – DIP

1.2 PIPE SCHEDULE

Contractor shall install piping systems in accordance with the following pipe schedule:

FLOW STREAM I.D.	DESCRIPTION	SERVICE	EXPOSURE	SIZE RANGE	MATERIAL	JOINT TYPE	TEST PRESSURE	LINING	COATING SYSTEM/ COLOR	NOTES
ALUM	Alum. Sulfate	48% Alum. Sulfate	Exposed	1"	PVC1 / Chem. Tubing	SLV / Barbed	50 psi	None	None	
CS	Caustic Soda	25% Sodium Hydroxide	Buried	3" Carrier x 1" Tubing	PVC1 Conduit W/ Chem. Tubing	SLV / Barbed	N/A	N/A	N/A	
PAC	Powder Activated Carbon	Carbon Slurry	Exposed/ Buried	2"	SSTP	THR	25 psi	None	None	
PACL	Polyaluminum Chlorohydrate	Proprietary Coagulant	Exposed	1"	PVC1 / Chem. Tubing	SLV / Barbed	50 psi	None	None	
RW	Raw Water	Water	Buried	27"- 30"	WSP	FLG/WLD	25 psi	Factory Epoxy	Factory Epoxy + Poly Wrap	Note 1
				30"	DIP	FLG/RMJ	25 PSI	Cement Mortar	Asphaltic + Poly Wrap	Note 2
RWS	Raw Water Sample	Water	Buried	1"	PVC1	SLV	100 psi	None	None	Note 4

FLOW STREAM I.D.	DESCRIPTION	SERVICE	EXPOSURE	SIZE RANGE	MATERIAL	JOINT TYPE	TEST PRESSURE	LINING	COATING SYSTEM/ COLOR	NOTES
WW	Wash Water	Water	Exposed and Buried	6"	PVC1	SLV	N/A	None	None	
W	Water	Potable Water	Buried and Exposed	1"-3"	COP or DIP	SLD/THR FLG/RMJ	150 psi	None	Asphaltic + Poly Wrap for buried DIP	Note 3
WR	Washwater Recycle	Water	Buried	6"	DIP	FLG/RMJ	25 PSI	Cement Mortar	Asphaltic + Poly Wrap	Note 2

1. Refer to Section 15100 PSDS – WSP for factory epoxy coating requirements.
2. Refer to Section 15100 PSDS – DIP for pipe coating and poly wrap requirements.
3. Insulate all exposed outdoor Water piping per Section 15080.

SECTION 15100 PSDS CHE

PIPING SYSTEM DATA SHEET – CHEMICAL TUBING AND CONDUIT

ITEM	DESCRIPTION						
General	For liquid chemical service or sample tubing, provide LLDPE tubing where shown on Drawings. Install tubing in PVC1 conduit as shown on the Drawings for ease of installation/replacement as well as non-pressure rated secondary containment. Tubing manufacturer shall confirm chemical compatibility of tubing with chemical system being served and documentation of NSF certification						
Tubing	Provide tubing with the following corresponding <u>outside diameter</u> and pressure rating: <table><tr><th>OUTSIDE DIAMETER</th><th>INSIDE DIAMETER</th><th>WORKING PRESSURE @ 70 DEG. F</th></tr><tr><td>1"</td><td>3/4"</td><td>154 PSI</td></tr></table> Tubing Characteristics: • Specific Gravity (ASTM D792): <0.920 • Tensile strength (ASTM D638): 2800 psi @ 73 deg. F • Elongation (ASTM D638): 530% • Hardness (ASTM D785): 44D Rockwell Durometer • Heat Distortion (ASTM D648): 120 deg. F @ 66 psi • NSF 51/61 Approved For all tubing runs, use continuous lengths of tubing with no splices. Tubing Manufacturers: Hudson Extrusions, United States Plastic Corp., or Equal.	OUTSIDE DIAMETER	INSIDE DIAMETER	WORKING PRESSURE @ 70 DEG. F	1"	3/4"	154 PSI
OUTSIDE DIAMETER	INSIDE DIAMETER	WORKING PRESSURE @ 70 DEG. F					
1"	3/4"	154 PSI					
Conduit	Conduit for chemical tubing shall be PVC1. Sizes as called for on Drawings.						
Fittings	Provide all necessary fittings, clamps and adapters for connection of tubing to piping or valves. Provide barbed- or compression-style fittings, specifically designed for use with the tubing being provided, and compatible with the service (both with the fluid being carried in pipe and pressure rating). Fittings shall be located so that they are accessible at all times. No fittings shall be located in the carrier pipe. All connections shall be constructed per tubing manufacturer's recommendations to provide a connection which is equal to or greater than tubing pressure rating. All parts or fittings in contact with the fluid in the tubing shall be compatible with the chemical being carried.						

SECTION 15100 PSDS COP

PIPING SYSTEM DATA SHEET – COPPER PIPE

ITEM	DESCRIPTION
Tubing	Seamless, conforming to ASTM B88 as follows: Potable water (buried) Type K, soft or hard temper Potable water (exposed) Type L, hard drawn
Fittings	Commercially pure wrought copper, socket joint, conforming to ASTM B75, dimensions conforming to ANSI B16.22.
Flanges	Commercially pure wrought copper, socket joint, conforming to ASTM B75, faced and drilled 150-pound ANSI B16.24 standard.
Bolting	ASTM A307, carbon steel, Grade A hex head bolts, and ASTM A563 Grade A hex head nuts.
Gaskets	1/16-inch thick nonasbestos compression type, full face, Cranite, John Manville.
Solder	Joins 2-1/2 Inch and Smaller: Wire solder (95 percent tin), conforming to ASTM B32 Alloy Grade Sn95. Do not use cored solder. Joins Larger Than 2-1/2 Inch: Wire solder, melt range approximately 440 degrees F to 660 degrees F, conforming to ASTM B32 Alloy Grade HB or HN. Do not use cored solder.

SECTION 15100 PSDS DIP

PIPING SYSTEM DATA SHEET – DUCTILE IRON PIPE

ITEM	DESCRIPTION
Pipe	Buried Piping: • All pipe 12" diameter and smaller shall be pressure class 350. • All pipe 14" through 20" shall be pressure class 250. • All pipe larger than 20" shall be pressure class 200. Pressure class shall be per AWWA C150/A21.50 and AWWA C151/A21.51.
Lining	Water: Cement-Mortar: AWWA C104/A21.4.
Coating	Unless otherwise specified in the Pipe Schedule, piping shall be coated as follows: Buried Piping: • AWWA C151/A21.51: Minimum 1-mil asphaltic coating. • AWWA C105/A21.5: Polyethylene encasement, 8-mil linear-low density, black color. Wrap all ductile iron pipe and fittings, and all steel pipe that is also buried and connected to ductile iron pipe.
Fittings	Lined and coated same as pipe. Mechanical (MJ): AWWA C110/A21.10, C111/A21.11, and C153/A21.53 gray or ductile iron, 250 psi minimum working pressure. Follower glands shall be ductile iron. Restrained Mechanical Joint (RMJ): Standard MJ Fittings with RMJ Gland conforming to requirements of Section 15120 – Piping Specialties. Flange (FLG): AWWA C110/A21.10 ductile iron, flat faced and drilled. Gray cast iron will not be allowed.
Joints	Mechanical (MJ): 250 psi minimum working pressure. Restrained Mechanical Joint (RMJ): Standard MJ Joint with RMJ gland conforming to requirements of Section 15120 – Piping Specialties. Flange (FLG): 125-pound flat face, ductile iron, threaded conforming to AWWA C115/A21.15. Gray cast iron will not be allowed. Branch connections 3 inches and smaller, shall be made with service saddles as specified in Section 15120 – Piping Specialties.

ITEM	DESCRIPTION
Bolting	For Exposed Installations: T-Bolts and other specialty bolts: Manufacturer's standard. Hex Bolts: ASTM A307, Grade B carbon steel hex head bolts. Nuts: ASTM A563, Grade A carbon steel hex head nuts. For Buried Installations: Nuts and bolts shall be fluoropolymer coated high strength low alloy steel, hex head.
Gaskets	Mechanical Joints: Red Rubber (SBR) conforming to ANSI/AWWA C111/A21.11. Flanged: 1/8 inch-thick, red rubber (SBR), rated to 150 °F. Flanged gaskets shall conform to ANSI/AWWA C111/A21.11 and shall be the high performance type also satisfying the special requirements of ANSI/AWWA C111/A21.11 Appendix C, Sec. C.2 and have at least (3) bulb type rings molded into both faces of the gasket. NSF-61 certified. U.S. Pipe Ring Flange-Tyte gasket, or approved equal. Full face for 125-pound flat-faced flanges. Blind flanges shall be gasketed covering the entire inside face with the gasket cemented to the blind flange. Gasket pressure rating to equal or exceed the system hydrostatic test pressure.
Joint Lubricant	Manufacturer's standard.

SECTION 15100 PSDS PVC1

PIPING SYSTEM DATA SHEET – SOLVENT WELDED POLYVINYL CHLORIDE PIPE

ITEM	DESCRIPTION
Pipe	Schedule 80 Polyvinyl Chloride (PVC), unless indicated otherwise. Type I, Grade I or Class 12454-B conforming to ASTM D1784 and ASTM D1785. Pipe shall be manufactured with 1% titanium dioxide for ultraviolet protection.
Fittings	Schedule to match pipe above, ASTM D2466 and ASTM D2467 for socket weld type and Schedule 80 ASTM D2464 for threaded type. Fittings shall be manufactured with 1% titanium dioxide for ultraviolet protection.
Joints	Solvent socket weld except where connection to threaded valves and equipment may require future disassembly.
Flanges	One piece, molded hub type PVC flat face flange in accordance with Fittings above, 125-pound ANSI B16.1 drilling
Bolting	Hex Bolts: ASTM A193 B8, Type 304 stainless steel Nuts: ASTM A194 Grade 8, Type 304 stainless steel
Gaskets	Flat-Face Mating Flange: Full-faced 1/8-inch thick EPDM rubber.
Solvent Cement	As recommended by the pipe and fitting manufacturer conforming to ASTM D2564.
Thread Sealant	Teflon Tape.

SECTION 15100 PSDS SSTP

PIPING SYSTEM DATA SHEET – THREADED STAINLESS STEEL PIPE

ITEM	SIZE	DESCRIPTION
Pipe	2 inch & smaller	Austenitic stainless steel, ASTM A312, Grade TP 316 seamless, or welded, Schedule 80.
Joints	2 inch & smaller	Threaded or flanged at valves and equipment.
Couplings		Threaded, Type 316 Stainless Steel, Class 3000: LF2 ASME B16.11, SA182.
Flanges		Class 150, F316/316L, ASTM A102, ANSI B16.5 Class 150 or Class 300, threaded, 1/16-inch raised face.
Unions		Threaded Type 316 Stainless Steel, Class 3000: MSS SP83 ,SA182.
Plugs		Threaded Type 316 Stainless Steel, Class 3000: Threads conform to ASME B1.20.1 NPT; Materials conform to ASTM A182, Dimension conform to ASME B16.11.
Bolting		Hex Bolts: ASTM A320/A320M, Type 316 stainless steel, grade 5 Nuts: ASTM F594, Type 316 stainless steel, grade 5
Gaskets	All Flanges	1/8-inch thick, red rubber (SBR), hardness 80 (Shore A), rated to 200 degrees F., conforming to ANSI B16.21, AWWA C207, and ASTM D1330, Grades 1 and 2. Blind flanges shall be gasketed covering the entire inside face with the gasket cemented to the blind flange.
Thread Lubricant	2 inch & smaller	Heavy duty anti-seize joint lubricant for stainless steel threads that is insoluble in water.

SECTION 15100 PSDS WSP

PIPING SYSTEM DATA SHEET – WELDED STEEL PIPE

ITEM	DESCRIPTION
Pipe	Carbon steel ASTM A283/A283M Rev A Grade C or ASTM A285/A285M Grade C, sheet or coil, fabricated in accordance with AWWA C200, straight or spiral seam, minimum thickness 1/4-inch, sizes are to be nominal outside diameters conforming to ASME B36.10M.
Linings/Coatings	Factory Applied Lining and Coating: Fusion Bonded Epoxy per AWWA C-213, 16 mil thickness. 3M Scotchkote 134, or equal. NSF-61 certified. AWWA C105/A21.5: Polyethylene encasement, 8-mil linear-low density, black color. Wrap all buried welded steel pipe and fittings, and all ductile iron pipe that is also buried and connected to welded steel pipe.
Joints	Full penetration butt-welded and flanged.
Fittings	Exposed fittings 24" and smaller shall be forged. Buried fittings 8" to 24" may be fabricated or forged. Buried fittings larger than 24" shall be fabricated. Fabricated: Carbon steel fabricated from pipe in accordance with AWWA C208; elbows to have a 22.5-degree maximum miter section angle and a radius of 2.5 times the diameter, unless shown otherwise; wyes, tees, crosses, and outlets to be reinforced in accordance with AWWA M-11. Fitting wall thickness shall be equal to or greater than adjoining pipe. Forged: Butt-welding fittings, ASTM A234/A234M, Grade WPB meeting the requirements of ANSI B16.9. Fitting wall thickness to match adjoining pipe. Elbows to be long radius unless shown otherwise.
Connections	All connections to welded steel pipe shall be factory fabricated and welded thread-o-let or flanged stubs as shown on the Drawings. No field installation of connections to welded steel pipe shall be allowed.
Flanges	AWWA C207, Class D (150 psi) hub or ring type. Pressure class to match pipe.

ITEM	DESCRIPTION
Bolting	For Exposed Installations: Carbon steel ASTM A307, Grade A hex head bolts and ASTM A563, Grade A hex head nuts. For Buried Installations: Nuts and bolts shall be fluoropolymer coated high strength low alloy steel, hex head.
Gaskets	Flanged: 1/8 inch-thick, red rubber (SBR), rated to 150 °F. Flanged gaskets shall conform to ANSI/AWWA C111/A21.11 and shall be the high performance type also satisfying the special requirements of ANSI/AWWA C111/A21.11 Appendix C, Sec. C.2 and have at least (3) bulb type rings molded into both faces of the gasket. NSF-61 certified. U.S. Pipe Ring Flange-Tyte gasket, or approved equal.

SECTION 15120
PIPING SPECIALTIES

PART 1 - GENERAL

1.1 SUBMITTALS

- A. Shop Drawings:
 - 1. Manufacturer's data on materials, construction, end connections, ratings, overall lengths, etc.

PART 2 - PRODUCTS

2.1 SERVICE SADDLES

- A. Double-Strap Iron:
 - 1. Pressure Rating: Capable of withstanding 150 psi internal pressure without leakage or over stressing.
 - 2. Run Diameter: Compatible with outside diameter of pipe on which saddle is installed.
 - 3. Taps: Iron pipe threads.
 - 4. Materials:
 - a. Body: Malleable or ductile iron with fusion bonded epoxy finish.
 - b. Straps: Galvanized steel or silicon bronze.
 - c. Hex Nuts and Washers: Cast bronze.
 - d. Seal: NBR Rubber NSF-61 certified.
 - 5. Manufacturers and Products:
 - a. Smith-Blair; Series 313.
 - b. Mueller BR2B
 - c. Or Equal

2.2 FLEXIBLE COUPLINGS

- A. Flanged Coupling Adapters (FCA)
 - 1. Features:
 - a. Description: One end of adapter shall be flanged and the other end shall have a sleeve type flexible coupling.
 - b. Pressure and Service: Same as connected piping.
 - c. Adapter body material: Ductile Iron ASTM A 536 with fusion bonded epoxy finish.
 - d. Gasket: EPDM
 - 1) Contractor shall field measure the outside diameter of pipes to be coupled and order correct gaskets corresponding to the pipe outside diameters.
 - e. Bolts and Nuts: High strength low alloy steel, fluoropolymer coated.
 - 2. Manufacturers and Products:
 - a. 18" Size for Steel Pipe:
 - 1) Romac FCA Style 501
 - 2) Or Equal
 - b. 27" Size for Steel Pipe:
 - 1) Custom measured and fabricated as required for this application, Baker Coupling, Smith Blair, or approved Equal.

2.3 RESTRAINED COUPLINGS AND GLANDS

A. Restrained Flanged Coupling Adapter (RFCA)

1. Description: One end of adapter shall be flanged and the other end shall have a sleeve type flexible coupling.
2. 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.
3. Pressure and Service: Same as connected piping.
4. Adapter body material: Ductile iron conforming to ASTM A536.
5. 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 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.
6. Gasket: EPDM
7. Bolts and Nuts: High strength low alloy steel, fluoropolymer coated.
8. Restraint for the 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.
9. All wedge assemblies and related parts shall be processed through a phosphate wash, rinse and drying operation prior to coating application. The coating shall consist of a minimum of two coats of liquid thermoset epoxy coating with heat cure to follow each coat.
10. Manufacturers and Products:
 - a. EBAA Iron 2100 Megaflange
 - b. Or Equal.

B. Restrained Mechanical Joint Glands (RMJ)

1. Pressure Rating:
 - a. Minimum Working Pressure Rating: Not less than 150 psi.
 - b. Safety Factor: Not less than two times working pressure and shall be supported by manufacturer's proof testing.
2. RMJ gland shall be designed for use with standard mechanical joint pipe. Pipe restraint products designed for use with push-on joints will not be acceptable.
3. Thrust Restraint:
 - a. Provide hardened steel wedges that bear against and engage outer pipe surface, and allow articulation of pipe joint after assembly while wedges remain in their original setting position on pipe surface.
 - b. Products employing set screws that bear directly on pipe will not be acceptable.
4. The restraint shall be manufactured of ductile iron conforming to ASTM A536.
5. Provide liquid thermoset epoxy and/or electrostatically applied polyester powder coating.
6. Bolts and Nuts: Xylan (or equal) coated restraining bolts and lugs.
7. Manufacturer and Product:
 - a. Ductile Iron Pipe Only:
 - 1) EBAA Iron Sales: Megalug Series 1100.
 - 2) Romac Industries Inc.: RomaGrip

2.4

2.4 PRESSURE GAUGES

- ### A. Type: Direct mounted, dial type pressure gage.
1. Construction: Weatherproof.
 - a. Case:

- 1) 4-1/2 inch diameter
 - 2) Solid front case, liquid filled Glycerin
 - 3) Bottom 1/4-inch N.P.T. connection.
 - b. Dial: White face, black numbers and graduations.
 - c. Window: Laminated safety glass or clear acrylic plastic.
 - d. Pointer: Micrometer type, black finish, red tip.
 - e. Movement: 400 SS, Teflon coated pinion gear and segment.
 - f. Bourdon Tube: Seamless phosphor bronze, Grade A over-pressured and stress-relieved.
 - g. Socket and Tip: Forged brass, alloy steel and Type 316 stainless steel.
 2. Accuracy: 1 percent minimum.
 3. Range: 0 to 160 psi.
 4. Gage Cocks: Provide brass tee handle cock before each gage.
 5. Provide snubber or pulsation dampener to protect gage.
 6. Accuracy: $\pm 0.5\%$ full scale (ASME B40.100 Grade 2A)
- B. Product and Manufacturer:
1. Ashcroft 1279 Duragauge
 2. Or Equal

2.5 NON-METALLIC CORPORATION STOP WITH INJECTION QUILL

- A. Type: Complete assembly of corporation stop, injection quill, and safety chain, designed for use on process pipes 4" or larger. Construction shall be fully compatible with service conditions.
- B. Corporation Stop:
1. Process Connection: 1" Male NPT.
 2. Rated 150 psi at 195 degrees F.
 3. ASTM D1784, Type I, Grade 1 chlorinated polyvinyl chloride body, ball, and stem, end entry.
 4. Threaded ends.
 5. Viton or Teflon seat.
 6. Viton O-rings and stem seals.
- C. Injection Quill:
1. Process Connection: 1/2" female NPT.
 2. Dimensions:
 - a. Tapered injector tip, oriented to maximize chemical dispersion.
 - b. Select injection quill length such that tip of quill extends into process pipe between one-third and one-half of process pipe diameter. Minimum distance from pipe wall to injector tip shall be 2-inches.
 3. Materials:
 - a. Solution Tube Assembly: CPVC.
 - b. Ring, Sleeve and Capture Nut: PVDF.
 4. Minimum Pressure Rating: 150 psi.
- D. Safety Chain:
1. Designed to prevent injection quill withdrawal before corporation stop is closed.
- E. Manufacturers and Products:
1. SAF-T-FLO Model EB-164
 2. Or Equal

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General
 - 1. Follow all manufacturer's directions.
- B. Flanged Coupling Adapters (FCA)
 - 1. Follow all manufacturer's directions
 - 2. No more than 1-inch gap between pipe plain end and flange face
 - 3. Tighten flange bolts prior to tightening coupling bolts
 - 4. Tighten bolts in an alternating pattern to provide even tension around the coupling
 - 5. Tighten bolts to specified torque
 - 6. In buried installations, wrap coupling with plastic fastened to pipe to protect bolts and coupling from backfill material
- C. Restrained Mechanical Joint Glands (RMJ)
 - 1. Follow all manufacturer's directions.
 - 2. Tighten mechanical joint gland bolts before tightening restraint lugs.
 - 3. Tighten restraint lugs until torque head breaks off.
 - 4. In buried installations, wrap joint with plastic fastened to pipe to protect bolts and coupling from backfill material.

+ + END OF SECTION + +

SECTION 15200
VALVES AND OPERATORS

PART 1 - GENERAL

1.1 SUBMITTALS

- A. Shop Drawings:
 - 1. Product data sheets for make and model.
 - 2. Complete catalog information, descriptive literature, specifications, and identification of materials of construction.
 - 3. Certificate of Compliance for: Butterfly valves; full compliance with AWWA C504.
- B. Tests and inspection data.
- C. Operation and Maintenance Data as specified in Section 01330, **SUBMITTAL PROCEDURES**.

1.2 QUALITY ASSURANCE

- A. 30" Butterfly Valve shall be factory or shop tested in both directions against leakage at the rated pressure, in accordance with AWWA C504. Submit certified test reports.

1.3 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. In accordance with manufacturer's directions.

PART 2 - PRODUCTS

2.1 GENERAL

- A. All valves shall be the same size as the pipe in which they are installed, unless specifically noted otherwise on the Drawings.
- B. All valves shall include all appurtenant parts (operators, valve stems, gear boxes, operating nut, etc.) for a complete operating valve.
 - 1. Valve shall be, as much as practical, fully factory assembled.
- C. All valves shall open by turning counter-clockwise. Maximum force required for operation shall be 40 foot-pounds of torque or 40 pounds of force at the rim of the wheel or lever under any operating condition.
- D. Where Lead-Free Bronze or Brass is specified, materials shall be in compliance with California Health & Safety Code Section 116875. Not more than a weighted average of 0.25 percent of the wetted surface of the valve shall be lead. Valve shall be provided with a "hang tag" or other marking that easily identifies the valve as Lead-Free.
- E. Coatings and Linings:
 - 1. Provide factory-applied coatings as described herein.
 - 2. Where liquid epoxy coatings are specified, coatings shall conform to AWWA C550.

F. Nuts and Bolts:

1. Nuts and bolts shall be fluoropolymer coated high strength low alloy steel, hex or T-head, unless otherwise noted. Threads shall be coated with anti-seize lubricant. The bolt shall extend at least 3 threads through the nut when tightened to proper torque.

2.2 BUTTERFLY VALVES

A. **BFV-10:** Butterfly Valve

1. Service: Water.
2. Features:
 - a. Flanged end, short body type or mechanical joint.
 - b. AWWA C504, Class 150B.
 - c. Features:
 - 1) Body:
 - a) Cast iron ASTM A126 Class B.
 - 2) Disc:
 - a) Valve disc shall be an offset design to allow 360 degree seating.
 - b) Ductile Iron ASTM A536 with a stainless steel seating edge.
 - c) Provide non-hollow disc.
 - 3) Shaft:
 - a) Type 304 stainless steel shaft.
 - b) Self-adjusting V-type or O-ring shaft seals.
 - 4) Seat:
 - a) EPDM seat retained within a dovetail groove in the valve body and mechanically locked in place by use of an epoxy filler.
 - b) Valve to be adjustable from either side.
 - c) Valves using seat fasteners or retaining rings are not allowed.
 - d) Provide stainless steel seating surface.
 - 5) Coatings and Linings:
 - a) Fusion bonded epoxy, 8 mil minimum, for valve interior per AWWA C550.
 - b) Fusion bonded epoxy, 8 mil minimum, for valve exterior per AWWA C213.
 - c) Epoxy lining shall be NSF 61 approved.
 - d. Valve shall be suitable for throttling operations and infrequent operation after periods of inactivity.
 - e. Valve shall be bubble-tight with rated pressure applied from either side.
 - f. Smooth flow stream on valve body interior:
 - 1) No travel stops for disc on interior of body.
 - 2) Isolate metal-to-metal thrust bearing surfaces from flowstream.
 - g. Valve Actuator:
 - 1) For Buried Service:
 - a) Valve shall be manually operated with a two-inch operating nut.
 - b) Actuator shall be fully grease packed and have stops in the open/close position. The actuator shall have a mechanical stop which will withstand an input torque of 450 ft. lbs. against the stop.
 - c) Actuator shall be traveling nut design, machine cut steel for smooth operation. Lever or slot mechanism shall be constructed to eliminate the possibility of slipping and jamming.
 - d) Actuator shall be in compliance with AWWA C504 and shall be specifically designed for buried service.
 - e) Output shaft shall be perpendicular to the valve shaft.
 - f) Provide stem extension, valve bonnet, valve box and 2" AWWA operating nut such that operating nut is within 12" of adjacent finished grade.

- 2) For Exposed Service:
 - a) Provide valve with mounting and adapter for actuation by an existing AUMA SAR motor operated actuator. CONTRACTOR and Valve Supplier shall coordinate existing valve actuator with new valve.
3. Manufacturers and Products:
 - a. Mueller Lineseal III
 - b. Henry Pratt Company: Groundhog
 - c. M&H AWWA C504
 - d. Or Equal.

2.3 BALL VALVES

A. **BAV-01:** Lead-Free Ball Valve

1. Service: Potable Water
2. Features:
 - a. Two-piece, end-entry type
 - b. Lead-Free Brass & Bronze Materials in compliance with California Health & Safety Code Section 116875. Not more than a weighted average of 0.25 percent of the wetted surface of the valve shall be lead. Valve shall be provided with a "hang tag" or other marking that easily identifies the valve as Lead-Free.
 - c. Lead-Free Bronze (Alloy C89836, C89833 or C69300) body
 - d. Chrome-plated lead-free brass (Alloy C27450 or C69300) ball
 - e. RTFE or PTFE seats and packing
 - f. Zinc-coated steel hand lever operator (1/4-turn) with vinyl grip
 - g. Rated 600-psig WOG, 150-psig SWP.
3. Manufacturer and Products:
 - a. Threaded:
 - 1) Apollo 70LF100 Series
 - 2) Milwaukee; UPBA100
 - 3) Nibco T-685-80-LF
 - 4) Or Equal

B. **BAV-02:** Steel Ball Valve

1. Service: Water
2. Features:
 - a. Full port ball valve
 - b. ANSI Class 150 Flanged Ends
 - c. Split bolted steel or ductile iron body
 - d. Hard chrome-plated steel ball
 - e. Reinforced PTFE seats
 - f. O-ring or adjustable chevron packing
 - g. Removable operating lever (1/4-turn)
 - h. Valves shall be drip-tight in both directions
 - i. Coatings and Linings:
 - 1) Liquid epoxy, 12 mil minimum, for valve interior and exterior.
 - 2) For potable water applications, epoxy lining shall be NSF 61 approved.
3. Manufacturers and Products:
 - a. Apollo; 88A-200 Series
 - b. Or Equal

C. **BAV-03:** Stainless Steel Ball Valve

1. Service: Water, air.
2. Features:
 - a. Threaded ends

- b. Rated minimum 800 psig WOG (Water-Oil-Gas)
- c. Stainless steel body
- d. Polished stainless steel ball
- e. PTFE seat
- f. Stainless steel lever-type handle
- 3. Manufacturers and Products:
 - a. Apollo, Type 76
 - b. Watts Type S-FBV-1
 - c. Or Equal

D. **BAV-06:** CPVC Ball Valve

- 1. Service: Water, Chemical Duty.
- 2. Features:
 - a. Rated 150 psi at 73 degrees F
 - b. ASTM D1784, Type I, Grade 1 chlorinated polyvinyl chloride body, ball, and stem, end entry
 - c. Double union design
 - d. Solvent-weld socket ends
 - e. FKM or PTFE seat
 - f. FKM O-rings and stem seals
- 3. Manufacturers and Products:
 - a. Nibco; Chemtrol Tru-Bloc.
 - b. ASAHI/America; Type 21/21A.
 - c. Or Equal.

2.4 CHECK VALVES

A. **CKV-06:** CPVC Ball Check Valve

- 1. Service: Water, chemical duty
- 2. Features:
 - a. Materials:
 - 1) CPVC body and ball, conforming to ASTM D1784 Cell Classification 23567-A.
 - 2) FKM uni-seats and seal
 - b. Connections: True union
 - c. 150 psi minimum pressure rating
 - d. 5 psi minimum shutoff
- 3. Manufacturers and Products:
 - a. Asahi/America Inc.
 - b. Or Equal

2.5 GATE VALVES

A. **GAV-01:** Resilient-Seated Gate Valve:

- 1. Service: Water.
- 2. Features:
 - a. Conforms to AWWA C509.
 - b. ANSI/NSF 61 Certified.
 - c. Iron body.
 - d. Resilient seat.
 - e. Full port.
 - f. Valve Ends: flanged, MJ, or threaded as required.
 - g. Non-rising stem.
 - h. Actuator for Buried Service:
 - 1) Stem extension, as required, to bring operating nut to within 12" of ground surface.

- 2) 2-inch operating nut
- i. Design working water pressure: 250 psig
- j. Coatings and Linings:
 - 1) Liquid epoxy, 10 mil minimum, for valve interior and exterior.
 - 2) Epoxy lining shall be NSF 61 approved.
- 3. Manufacturers and Products:
 - a. Mueller 2360
 - b. Or Equal.

2.6 BACKFLOW PREVENTERS

A. **BFP-01:** Double Check Valve Backflow Preventer Assembly:

- 1. Service: Water.
- 2. Size: 3"
- 3. Orientation: Horizontal mount
- 4. Features:
 - a. Two modular check assemblies. Seats shall be replaceable.
 - b. Two resilient-seated isolation gate valves or ball valves.
 - c. Test cocks, in accordance with AWWA C511.
 - d. Rated 175 psi maximum working pressure.
 - e. Provide valve coatings as recommended by the manufacturer for corrosion protection.
 - f. Meets requirements of USC Foundation For Cross-Connection Control and Hydraulic Research.
 - g. Maximum 4 psi pressure drop at 60 gpm for 3" valve.
 - h. Lead-Free construction.
- 5. Manufacturers and Products:
 - a. Ames; Deringer 20G
 - b. Watts; Model LF709
 - c. No equal

2.7 OPERATORS:

- ### A. General:
- 1. Operator force not to exceed 40 pounds under any operating condition, including initial breakaway. Provide gear reduction operator when force exceeds 40 pounds.
 - 2. Provide traveling nut type gear actuators where required, with the output shaft perpendicular to the valve shaft. Threaded rod and traveling nut shall be machine-cut steel designed for smooth operation. Lever or slot mechanism shall be constructed to eliminate the possibility of slipping and jamming.
 - 3. Actuator shall be capable of being removed from the valve without dismantling the valve or removing the valve from the line.
 - 4. Operator self-locking type or equipped with self-locking device.
 - 5. Provide position indicator on all valves and adjustable stops for all above grade gear actuators.
 - 6. Valve handles, wheels, etc. to be designed to accommodate a padlock.

PART 3 - EXECUTION

3.1 PREPARATION

A. Cleaning:

1. Clean all mating faces of valve (threads, flange faces, etc.) prior to assembly.
 2. Remove all debris from valve body prior to assembly.
 3. Take extra care to clean mating faces of existing pipe and fittings which may have corrosion, dirt, debris and mineral build-up which should be removed for a proper fit.
- B. Apply joint compound, lubricant, etc. as recommended by valve manufacturer for proper installation prior to installation.
- C. Verify valve coating and lining is not damaged and is pinhole free. Touch up valve coating and lining as necessary in accordance with valve manufacturer's recommendations.

3.2 INSTALLATION

- A. Install valves per manufacturer's recommendations.
- B. Install valves so handles operate from fully open to fully closed without encountering obstructions.
- C. Install valves in location and orientation for easy access for routine operation and maintenance. Access should be such that an operator can operate the valve by reaching a handle, chain, etc. at a height between 2'-6" and 5'-0" above adjacent work surface (for buried valves, this is accomplished with a t-handle wrench and the operating nut being within 12" of finished grade).

3.3 TESTS AND INSPECTION

- A. Valve may be either tested while testing pipelines, or as a separate step.
- B. Test that valves open and close smoothly under operating pressure conditions. Test that two-way valves open and close smoothly under operating pressure conditions from both directions.
- C. Fully open and close butterfly valve and count and record number of turns to open and close valve on Record Drawings, account for any discrepancies with manufacturer's data.
- D. Automatic valves to be tested in conjunction with control system testing. Set all opening and closing speeds, limit switches, as required or recommended by the ENGINEER.

+ + END OF SECTION + +

SECTION 15990

TESTING OF PRESSURE PIPING SYSTEMS

PART 1 - SUBMITTALS

1.1 TESTING PLAN

- A. Testing Plan: Submit prior to testing and include at least the information that follows:
 - a. Testing dates.
 - b. Piping systems and section(s) to be tested.
 - c. Test type.
 - d. Method of isolation.
2. Certifications of Calibration: Testing equipment.
3. Certified Test Report.

1.2 REFERENCE

- A. Reference Section 15100 PS for test pressure.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 NOTIFICATION

- A. Notify Construction Manager in writing 5 days in advance of testing. Perform testing in presence of Construction Manager.

3.2 PRESSURE TESTING

- A. General:
 1. Complete installation of piping system, including all thrust restraint, prior to pressure testing.
 - a. If thrust blocking is specified, wait 5 days minimum after concrete thrust blocking is installed to perform pressure tests. If high-early strength cement is used for thrust blocking, wait may be reduced to 2 days.
 2. Prior to test, remove and replace with pipe spools or suitably isolate appurtenant instruments or devices that could be damaged by pressure testing.
 3. New Piping Connected to Existing Piping: Isolate new piping with grooved-end pipe caps, spectacle blinds, blind flanges, or as acceptable to ENGINEER.
 4. Piping to be Pressure Tested and Test Pressure: as indicated on Piping Schedule.
- B. Testing with Water:
 1. Fluid: Clean, potable water.
 2. Pipeline Protection:
 - a. Maximum Filling Velocity: 0.25 foot per second, applied over full area of pipe.
 - b. Vent piping during filling. Open vents at high points of piping system or loosen flanges, using at least four bolts, or use equipment vents to purge air pockets.
 3. Exposed Piping:
 - a. Perform testing on insulated piping prior to application of insulation.

- b. Maintain hydrostatic test pressure continuously for 60 minutes, minimum, and for such additional time as necessary to conduct examinations for leakage.
- c. Examine joints and connections for leakage.
 - 1) Correct visible leakage and retest as specified.
 - 2) Empty pipe of water prior to final cleaning or disinfection.
- 4. Buried Piping:
 - a. Test after backfilling has been completed.
 - b. Expel air from piping system during filling.
 - c. Apply and maintain specified test pressure with hydraulic force pump. Valve off piping system when test pressure is reached.
 - d. Maintain hydrostatic test pressure continuously for 2 hours minimum, reopening isolation valve only as necessary to restore test pressure.
 - e. Confirm that there is no detectable leakage.
 - f. Correct any leakage, and retest as specified.

3.3 PIPE PRESSURE TESTING LOG

- A. All pressure tests shall be witnessed by the Construction Manager. CONTRACTOR shall keep a pipe pressure testing log to document the pressure testing and Construction Manager's approval of such.
 - 1. Specific details of the contents and format of the pipe pressure testing log shall be determined by the CONTRACTOR and approved by the Construction Manager.
 - 2. At a minimum, pipe pressure testing log shall record, on a daily basis for any day when pipe pressure testing is performed:
 - a. Test Report Documentation:
 - 1) Test date.
 - 2) Description and identification of piping tested.
 - 3) Test fluid.
 - 4) Test pressure.
 - 5) Remarks, including:
 - a) Leaks (type, location).
 - b) Repair/replacement performed to remedy leakage.
 - 3. Pipe pressure testing log shall be kept on-site. Pipe pressure testing log shall be signed on a daily basis, for any day when pipe pressure testing log work is performed, by the supervisor of the CONTRACTOR's field crew and by the Construction Manager.
 - 4. Any piping system which was pressure tested, but which was not recorded in the pipe pressure testing log shall be re-tested at the Construction Manager's discretion.

+ + END OF SECTION + +

SECTION 15995

DISINFECTION OF POTABLE WATER PIPING

PART 1 - GENERAL

1.1 SUBMITTALS

- A. Informational Submittals:
 - 1. Plan describing and illustrating conformance to appropriate AWWA standards and this Specification.
 - 2. Procedure and plan for cleaning system.
 - 3. Procedures and plans for disinfection and testing.
 - 4. Proposed locations within system where samples will be taken.
 - 5. Type of disinfecting solution and method of preparation.
 - 6. Certification that employees working with concentrated chlorine solutions or gas have received appropriate safety training.
 - 7. Method of disposal for highly chlorinated disinfecting water.

PART 2 - PRODUCTS

2.1 WATER FOR DISINFECTION

- A. Clean, uncontaminated, and potable.

2.2 CONTRACTOR'S EQUIPMENT

- A. Furnish chemicals and equipment, such as pumps and hoses, to accomplish disinfection.
- B. Water used to fill pipeline may be supplied using a temporary connection to existing water system. Provide protection against cross-connections as required by AWWA C651.
- C. The CONTRACTOR shall make the necessary piping connections and furnish and install all necessary equipment required for the high velocity flushing operations. The CONTRACTOR shall remove all temporary flushing facilities when work is complete. All costs for chlorination and flushing shall be paid by the CONTRACTOR.

PART 3 - EXECUTION

3.1 GENERAL

- A. Conform to AWWA C651.
- B. Disinfect the following items installed or modified under this Project:
 - 1. 2" - 3" W Piping
- C. Allow freshwater and disinfectant solution to flow into pipe at a measured rate so chlorine-water solution is at specified strength. Do not place concentrated liquid commercial disinfectant in pipeline or other facilities to be disinfected before it is filled with water.

3.2 PIPING

- A. Cleaning:
 - 1. Before disinfecting, clean all foreign matter from pipe in accordance with AWWA C651.
- B. Flush pipelines with potable water until clear of suspended solids and color.
- C. Operate valves during flushing process at least twice during each flush.
- D. After successful completion of pressure testing, the CONTRACTOR shall chlorinate the pipeline per AWWA C651 by completely filling the pipeline and appurtenances with water having a minimum of 25 parts per million (ppm) and a maximum of 50 parts per million (ppm) of available chlorine from calcium hypochlorite. The only disinfection method allowed shall be the continuous-feed method.
- E. The chlorinated water shall be retained in the line for at least 24 hours. At the end of this 24 hour period the treated water in all portions of the main and appurtenances shall have a residual of not less than 10 parts per million (ppm).
- F. After chlorination the pipeline shall be flushed per AWWA C651. The water shall then remain unmoved for a minimum of forty eight (48) hours after which the OWNER shall collect bacteriological samples which shall be tested for coliform of less than 2.2 most probably number (MPN). The number and location of samples shall be determined by the Construction Manager and shall be at randomly chosen locations. Failed tests will necessitate repeating the disinfection and testing procedure.

+ + END OF SECTION + +

SECTION 16050
GENERAL ELECTRICAL WORK

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. Provide the electrical WORK, complete and operable, as indicated in accordance with the Contract Documents.
- B. The provisions of this Section shall apply to all Sections in Division 16, except as otherwise indicated by respective specification.
- C. Work included:
 - 1. Furnish and install MCC with all required electrical provisions required for fully functional system to operate VFD driven Flocculation Mixers.
 - 2. Furnish and install electrical above/below grade raceways, wires, cables, grounding and accessories to power/control Flocculation Mixers and vendor provided Fine Screen Control Panel, drives, and analytical devices.
 - 3. Install flow meter FM1201/FIT1201, pull manufacturer supplied cables, and modify existing panel located in control room.
 - 4. Modify existing PANEL-EM to service new exhaust fan for Lower Level – Electrical Room. Provide all electrical provision for fully functional system.
 - 5. The WORK of this Section is required for operation of electrically-driven equipment provided under Specifications in other Divisions.
- D. Work exclusions:
 - 1. SCADA/PLC programming and integration shall be performed by the OWNER and is excluded from the CONTRACTOR'S scope.
 - 2. Networks configuration shall be performed by the OWNER and is excluded from the CONTRACTOR'S scope.

1.02 RELATED WORK

- A. Section 01140 Work Restrictions
- B. Section 01330 Submittal Procedures
- C. Section 01782 Facility Operation and Maintenance Manuals
- D. Division 16 Electrical Specifications
 - 1. The CONTRACTOR'S attention is directed to the requirement for proper coordination of the WORK of this Section with the WORK of equipment Specifications.
 - 2. Concrete, excavation, backfill, and steel reinforcement required for encasement, installation, or construction of the WORK of the various Sections of Division 16 is included as a part of the WORK under the respective Sections, including duct banks, manholes, handholes, equipment housekeeping pads, and light pole bases.

1.03 REGULATORY AGENCIES AND STANDARDS

- A. Regulatory Agencies: Installation, materials, equipment and workmanship shall conform to the latest provisions of the following agencies:
 - 1. CBC California Building Code
 - 2. CCR (TITLE 24 – PART 3) California Electrical Code
 - 3. NEC (NFPA 70) National Electrical Code: 2020 Edition
 - 4. OSHA Occupational Safety and Health Act
 - 5. Title 8, Subchapter 5, California Administrative Code Electrical Safety Orders

6. UBC

Uniform Building Code

- B. Electrical equipment shall be listed by and shall bear the label of Underwriters' Laboratories, Inc. (UL) or an independent testing laboratory acceptable to the local code enforcement agency having jurisdiction.
- C. Installation of electrical equipment and materials shall comply with OSHA Safety and Health Standards (29 CFR 1910 and 29 CFR 1926, as applicable), state building standards, and applicable local codes and regulations.
- D. Standards: Where referenced in these specifications or on the drawings, the publications and standards of the following organizations apply:
 - 1. AEIC Association of Edison Illuminating Companies
 - 2. ANSI American National Standards Institute
 - 3. ASTM American Society of Testing and Materials
 - 4. ICEA Insulated Cable Engineers Association
 - 5. IEEE Institute of Electrical and Electronics Engineers
 - 6. NEMA 250 Enclosure for Electrical Equipment (1000 Volts Maximum)
 - 7. NFPA National Fire Protection Association
 - 8. NETA International Electrical Testing Association
- E. Where the requirements of the specifications conflict with UL, NEMA, NFPA, or other applicable standards, the more stringent requirements shall govern.

1.04 SUBMITTALS

A. General

- 1. Furnish submittals in accordance with the requirements of Section 01330 – Submittal Procedures.
- 2. Custom-prepare Shop Drawings.
- 3. Drawings or data indicating "optional" or "as required" equipment will not be accepted.
- 4. Cross out options not proposed or delete from the Shop Drawings.

B. Shop Drawings

- 1. Shop drawings shall include the following:
 - a. Complete material lists stating manufacturer and brand name of each item or class of material.
 - b. Shop Drawings for grounding WORK not specifically indicated
 - c. Front, side, rear elevations, and top views with dimensional data
 - d. Location of conduit entrances and access plates
 - e. Component data
 - f. Connection diagrams, terminal numbers, internal wiring diagrams, conductor size, and cable numbers
 - g. Method of anchoring, seismic requirements, weight
 - h. Types of materials and finish
 - i. Nameplates
 - j. Temperature limitations, as applicable
 - k. Voltage requirement, phase, and current, as applicable
 - l. Front and rear access requirements

- m. Test reports
- n. Grounding requirements

C. Catalog Cuts

1. Submit catalog cuts or photocopies of applicable pages of bulletins or brochures for mass produced, non-custom manufactured material.
2. Stamp the catalog data sheets in order to indicate the Project name, applicable Specifications Section and Paragraph, model number, and options.

D. Materials and Equipment Schedules

1. Within 60 Days of the commencement date in the Notice to Proceed, deliver to the ENGINEER a complete list of materials, equipment, apparatus, and fixtures that are proposed for use.
2. Include in the list the type, size, name of manufacturers, catalog number, and such other information as required to identify the item.

E. Include with each submittal a copy of this specification section, with addenda updates included, and all referenced and applicable sections included, with each paragraph check-marked to indicate specification compliance or marked to indicate requested deviations from specification requirements. Check marks (✓) shall denote full compliance with a paragraph as a whole. If deviations from the specifications are indicated, and therefore requested by the CONTRACTOR, each deviation shall be underlined and denoted by a number in the margin to the right of the identified paragraph, referenced to a detailed written explanation of the reasons for requesting the deviation. The ENGINEER shall be the final authority for determining acceptability of requested deviations. The remaining portions of the paragraph not underlined will signify compliance on the part of the CONTRACTOR with the specifications. Failure to include a copy of the marked-up specification sections, along with justification(s) for any requested deviations to the specification requirements, with the submittal shall be sufficient cause for rejection of the entire submittal with no further consideration.

1.05 FACILITY OPERATION AND MAINTENANCE MANUALS

A. General

1. Submit complete operation and maintenance manual in accordance with the requirements of Section 01782 – Facility Operation and Maintenance Manuals.

1.06 As-Built Drawings

1. Prepare as-built drawings, including but not limited to showing invert and top elevations and routing of duct banks and exact location of concealed below-grade electrical installations, and color coding of each individual control conductor.
2. Maintain as-built drawings and update in conjunction with construction progress of installation. As-built drawings shall be a full-sized set of drawings marked to reflect deviations, modifications and changes.
3. Furnish the drawings to the ENGINEER in accordance with the requirements of Section 01330 – Submittal Procedures.

1.07 IDENTIFICATION FOR ELECTRICAL SYSTEMS

A. Identification

1. Provide danger, caution, and warning signs and equipment identification markings in accordance with applicable federal, state, OSHA, and NEC requirements.

B. Local Disconnect Switches

1. Legibly mark each local disconnect switch for motors and equipment in order to indicate its purpose, unless the purpose is indicated by the location and arrangement.

C. Warning Signs

1. 600 Volts Nominal, or Less

- a. Mark entrances to rooms and other guarded locations that contain live parts with conspicuous signs prohibiting unqualified persons from entering.

D. Isolating Switches

- 1. Provide isolating switches not interlocked with an approved circuit-interrupting device with a sign warning against opening them under load.

1.08 INTERCONNECTION DIAGRAMS

- A. Interconnection diagrams – Prepare and provide interconnection diagrams depicting all cable requirements together with their actual terminations. Interconnection diagrams shall indicate wiring between equipment panels, terminal boxes, pull boxes, remotely mounted devices, motor starters, etc. The diagrams shall interface with the manufacturer's internal connection diagrams for panels. The diagrams shall indicate the terminations to terminal blocks of field devices at each end of the cable, the raceway and cable number, the number of conductors in the cable, the size of wire, and the number of spare conductors. For each termination, indicate the terminal number, wire color, and wire number as it appears on the wire marker. All terminal blocks, including spares, shall be indicated on the diagrams. Interconnection diagrams shall be provided prior to installation of equipment.
- B. Provide interconnection diagrams showing the physical routing of wiring between terminals of equipment and devices. Interconnection diagrams shall show the physical arrangement of terminal blocks, devices and device terminal blocks as it would appear to a person serving the equipment. Terminal blocks shall be shown in sequential physical order including all spares.
- C. Show conductors as a continuous line between their termination point. Show the direction of conductor entry into devices and conductor bundles.
- D. Interconnection Diagrams: Furnish Interconnection diagrams for each field wired cable and conductor.
- E. Interconnection diagrams shall show connection point descriptions and field routing only. This includes terminal blocks, field wiring with numbers, junction boxes, conduit material with sizes, and conduit numbers.
- F. Each conduit in the Conduit and Wire Schedule shall be shown on at least one interconnection diagram. Multiple conduits may be shown on a single interconnect and a conduit may appear on multiple interconnects.
- G. All terminations points on the diagram shall be shown with the actual equipment identification terminal number or letter.
- H. Interconnections between equipment shall be shown terminal to terminal with conduit lines in between. Wires within the same conduit shall be bundled and shown as a single line and labeled with the conduit name and wire fill. If not all wires within a conduit are used on a particular interconnection diagram, then the fill shall be noted as XX of XXX wires.
- I. Conduit shall be shown as routed through junction boxes and pull boxes. Wire fill leading into a pull box shall be equal to the combined outgoing conduit wire fill.
- J. Indicate wire number and wire color for all terminations. Spare wires may be shown as a list of wire numbers located near the end point of the wire.
- K. The diagrams shall show all other CONTRACT and System Supplier drawing numbers, for reference, that are associated with each device that is interconnected. Attached with each interconnect, a copy of all the support documents used in preparing interconnects. This includes current issues of panel schematics, connection diagrams, terminal block diagrams, submittals, contract drawings, vendor drawings and all other data used to develop the interconnection diagram as noted in the "Reference Documents" corner of interconnect drawings.

- L. Provide a notes section on each interconnect drawing. In the note section list any variances from the Contract conduit schedule necessary for completing the interconnections. Change orders regarding wire fill, conduit schedule and errors in plans regarding conduits and wires may not be processed until interconnect drawings have been received for such work.
- M. Update interconnection drawings to show as-built conditions after start-up and prior to project completion.
- N. Field wiring shall not start before the interconnection drawing have been submitted by the Contractor and approved by the Engineer.

1.09 PERMANENT PUBLIC UTILITIES REQUIREMENTS

- A. No servicing utility interfaces, requirements, or fees.

1.10 AREA DESIGNATIONS

- A. General

- 1. Designations for raceway system enclosures shall comply with the requirements of Section 16110 – Electrical Raceway Systems.
- 2. Designations for electrical WORK specifically indicated in other Sections shall comply with the requirements of those Sections unless indicated otherwise.
- 3. Designations for other electrical WORK not included in the above Paragraphs shall be as follows:

AREA	NEMA ENCLOSURE CLASSIFICATION						Notes
	1	3R	4	7	9	12	
LOWER LEVEL – ELECTRICAL ROOM	X						
INSIDE FINE SCREEN CONTROL PANEL ENCLOSURE		X					
OUTSIDE AREAS AND BURIED VAULTS			X				
FLOCCULATION BASIN			X				
FILTER GALLERY			X				
UPPER LEVEL – CONTROL ROOM	X						

- 4. Designations for electrical WORK not included in the above Paragraphs shall be NEMA 4X.

- B. Material Requirements

- 1. Construct NEMA 4/4X enclosures of 316 stainless steel.
 - a. Do not coat NEMA 4X enclosures.
- 2. Construct NEMA 1, 3R, and 12 enclosures of steel, and prime and coat with ANSI 61 light grey paint.

1.11 TESTS

- A. The CONTRACTOR shall be responsible for factory and field tests indicated in Division 16, as required by the ENGINEER, and as required by other authorities having jurisdiction.
- B. Furnish necessary testing equipment.

- C. Pay the costs of the tests, including replacement parts and labor, due to damage resulting from damaged equipment or from testing and correction of a faulty installation.
- D. Reporting
 - 1. Where test reporting is indicated, submit proof-of-design test reports for mass-produced equipment with the Shop Drawings.
 - 2. Submit factory performance test reports for custom-manufactured equipment for approval prior to shipment.
 - 3. Submit field test reports for review prior to Substantial Completion.
- E. Remove and replace equipment or material that fails a test, or, if the ENGINEER approves, repair and retested for compliance.
- F. Corrections to equipment or materials with a factory warranty shall be as recommended by the manufacturer and shall be performed in a manner that does not void the warranty.

1.12 CONSTRUCTION SEQUENCING

- A. General
 - 1. Submit a written sequencing request, including the sequence and duration of activities to be performed during plant shutdown. Schedule of WORK, shall be subject to OWNER and Engineer approval, to minimize required shutdown time.
 - 2. Switching, safety tagging, and lock-out, as required for plant shutdown or to isolate existing equipment, shall be performed by the CONTRACTOR under the direction of OWNER.
- B. Modifications
 - 1. Perform modifications or alterations to existing electrical facilities as required to successfully install and integrate the proposed electrical equipment as indicated.
 - 2. Perform modifications to existing equipment, panels, and cabinets in a professional manner.
 - 3. Repair coatings to match existing.
 - 4. The costs for modifications to existing electrical facilities that are required for a complete and operating system shall be included as part of the WORK.
- C. Field Verifications
 - 1. Visit the Site before submitting a Bid to become better acquainted with the WORK of this Contract.
 - 2. The lack of knowledge will not be accepted as justification for extra compensation to perform the WORK.
 - 3. The CONTRACTOR shall be responsible for identifying available existing circuit breakers in lighting panels for the intended use as required.
 - 4. The CONTRACTOR shall be responsible for field verifying the available space in substation switchboards to integrate new power circuit breakers.
 - 5. The cost for the above verifications shall be included as part of the WORK.

PART 2 - MATERIALS

2.01 GENERAL

- A. Provide equipment and materials that are new and are the products of experienced and reputable manufacturers in the industry.
- B. Provide equipment and materials listed by UL and bearing the UL label, where UL requirements apply.
- C. Furnish equipment and material products of the same manufacturer. Equipment and materials shall be of industrial grade standard of construction.

D. Temperature Ratings of Equipment Terminations

1. Provide terminations and lugs rated for use with 75-degree C conductors.
2. Wire sizes in the Contract Documents are based on NEC ampacity tables using the 75-degree C ratings.
3. Provide equipment and materials suitable for storage, installation and operation in an ambient of 0°C to 50°C up to an elevation of 3,300 feet above sea level, except where more stringent conditions are stated in individual equipment specifications.

E. Furnish factory finished electrical equipment, wireways and panels with manufacturer's standard primer and enamel topcoats, unless stated otherwise in the individual equipment specifications.

1. Provide 1 pint of the equipment manufacturer's touch-up paint per 500 square feet of painted surface for repair of damaged enamel topcoats.

2.02 ELECTRICAL IDENTIFICATION

A. Nameplates

1. Fabricate nameplates from white-letter, black-face laminated plastic engraving stock, such as **Formica Type ES-1** or equal.
2. Securely fasten each nameplate, using fasteners constructed of brass, cadmium-plated steel, or stainless steel, and screwed into inserts or tapped holes as required.
3. Provide engraved characters of the block style, with no characters smaller than 1/8-inch top to bottom.
4. Provide nameplates for field mounted devices and instruments, such as pressure switches, limit switches, flow meters, etc. Identify the name of the device and its unique identifier:

Examples:	Pressure Switch	Limit Switch
	PS-1	LS-1

5. Where it is impractical to attach laminated nameplates to field devices, provide 19-gauge, 2-inch square brass tags with 1/4-inch black filled engraving. Provide Seton Standard Brass Valve tags or equivalent. Attach tags with No. 16 brass jack chain.

B. Conductor and Equipment Identification

1. Provide heat shrink sleeve markers, Brady Permasleeve or approved equal.

2.03 PROTECTIVE MATTING

A. Provide full-width, high-voltage switchboard matting in front of indoor switchgear, service equipment, panelboards and motor control centers.

B. For 600-volt equipment, provide matting that is 1/4-inch-thick and 36-inches wide.

C. Matting Manufacturer, or Equal

1. W.H.Salisbury and Company; Mats, Inc.; Rhino

PART 3 - EXECUTION

3.01 INSTALLATION

A. Provide materials and provisions required for a complete and operable system, even if not required explicitly by the Contract Documents.

B. Typical provisions include terminal lugs not furnished with vendor-supplied equipment, compression connectors for cables, splices, junction and terminal boxes, and control wiring required by vendor-furnished equipment to connect with other equipment indicated in the Contract Documents.

- C. The Drawings diagrammatically indicate the desired location and arrangement of outlets, conduit runs, equipment, and shall be used as closely as possible.
- D. Exact locations shall be determined by the CONTRACTOR in the field, based on the physical size and arrangement of equipment, finished elevations, and other obstructions.
- E. Conduits
 - 1. Where conduit development drawings or "home runs" are indicated, route the conduits in accordance with those requirements.
 - 2. Provide exposed or encased routings as indicated, except conceal conduit in finished areas unless indicated otherwise.
 - 3. Size conduits encased in a slab for conduit OD not to exceed 1/3 of the slab thickness, and lay out and space as to not impede concrete flow.
- F. Placement
 - 1. Install conduit and equipment as to avoid obstructions, to preserve headroom, and to keep openings and passageways clear.
 - 2. Locate luminaires, switches, convenience outlets, and similar items within finished rooms as indicated.
 - 3. Where exact locations are not indicated, such locations will be determined by the ENGINEER.
 - 4. If equipment is installed without instruction and must be moved, the cost of moving shall be included as part of the WORK.
 - 5. Adjust luminaire locations in order to avoid obstructions and to minimize shadows.
- G. Circuits
 - 1. Wherever conduits and wiring for lighting and receptacles are not indicated, it shall be the CONTRACTOR'S responsibility to provide lighting and receptacle-related conduits and wiring as required, based on the actual installed fixture layout and the circuit designations as indicated.
 - 2. Provide No. 12 AWG minimum wiring, and 3/4-inch minimum conduits (exposed) and one-inch minimum conduits (encased).
 - 3. Where circuits are combined in the same raceway, de-rate conductor ampacities in accordance with NEC requirements.
- H. Workmanship
 - 1. Install materials and equipment in strict accordance with the printed recommendations of the manufacturer, and using workers skilled in the WORK.
 - 2. Coordinate installation in the field with other trades in order to avoid interferences.
- I. Protection of Equipment and Materials
 - 1. Fully protect materials and equipment against damage from any cause.
 - 2. Cover materials and equipment, both in storage and during construction, in such a manner that no finished surfaces will be damaged, marred, or splattered with water, foam, plaster, or paint.
 - 3. Keep moving parts clean and dry.
 - 4. Replace or refinish damaged materials or equipment, including faceplates of panels and switchboard sections, as part of the WORK.
- J. Starters shall be in accordance with the requirements of Section 16445 – Low Voltage Motor Control Center for starters in MCC'S, and with Section 16420 – Industrial Control Panels for starters not in MCC'S.

3.02 CORE DRILLING

- A. Perform core drilling as required for the installation of raceways through concrete walls and floors.
- B. Base the locations of floor penetrations, as may be required, on field conditions.
- C. Verify exact core drilling locations based on equipment actually furnished as well as exact field placement.
- D. To the extent possible, identify the existence and locations of encased raceways and other piping in existing walls and floors with the OWNER prior to any core drilling activities.
- E. Repair damage to encased conduits, wiring, and piping as part of the WORK.

3.03 EQUIPMENT IDENTIFICATION

- A. Provide nameplates for panelboards, control and instrumentation panels, starters, switches, and pushbutton stations.
- B. In addition to nameplates, equip control devices with standard collar-type legend plates.
- C. Identify control devices within enclosures as indicated and similar to the subparagraph above.
- D. Provide suitable inscribed finish plates for toggle switches that control loads out of sight of switches and for multi-switch locations of more than 2 switches.
- E. Use equipment names and tag numbers, where indicated, on nameplates.
- F. Provide typewritten circuit directories for panelboards, that accurately reflect the outlets connected to each circuit.
- G. Terminal Blocks
 - 1. Label termination points on terminal blocks by identifiers on the blocks.
 - 2. Provide identifiers that have been preprinted by the terminal manufacturer or custom-printed.
 - 3. Hand-lettered markers will not be accepted.
- H. Provide arc-flash labels for all distribution equipment, stand-alone disconnects, starters, and VFDs. Fill in all values as required by NFPA 70E, and as calculated as part of the Protective Device Study. Verify that all settings as prescribed by the approved Protective Device Study have been implemented in the field.

3.04 CLEANING

- A. Before final acceptance, thoroughly clean the electrical WORK of cement, plaster, and other materials.
- B. Remove temporary tags, markings, stickers, and the like.
- C. Remove oil and grease spots with a non-flammable cleaning solvent by carefully wiping and scraping cracks and corners.
- D. Apply touch-up paint to scratches on panels and cabinets.
- E. Vacuum clean electrical cabinets and enclosures. Do not use compressed air to clean cabinets.
- F. Clean luminaires inside and out. Replace failed lamps.
- G. Properly dispose cleaning debris and refuse off-site.

END OF SECTION

SECTION 16060
ELECTRICAL TESTS

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. This Section specifies the WORK necessary to test, commission, and demonstrate that the electrical work satisfies the criteria of these Specifications and functions as required by the Contract Documents.
- B. The WORK of this Section includes furnishing the labor, equipment, and power required to support the testing indicated in other Divisions of these Specifications. Electrical testing indicated herein and functional testing of power and controls shall be completed before commencement of the 5 Day test. This scope may require the CONTRACTOR to activate circuits, shutdown circuits, run equipment, make electrical measurements, replace blown fuses, and install temporary jumpers, etc.
- C. The requirements of Section 16050 – General Electrical Work, apply to the WORK of this Section.
- D. Carry out tests indicated herein for individual items of materials and equipment in other Sections. Testing shall be done in accordance with the manufacturer's instructions, these Specifications, and applicable NETA Acceptance Testing Specifications, NEMA, ANSI, NFPA, and ASTM Standards.

1.02 RELATED WORK

- A. Section 01330 Submittal Procedures
- B. Section 16050 General Electrical Work
- C. Section 16420 Industrial Control Panels
- D. Section 16120 Wire and Cabling
- E. Section 16450 Grounding
- F. Section 16110 Electrical Raceway Systems
- G. Section 16115 Underground Raceway Systems
- H. Section 16445 Low-Voltage Motor Control Centers
- I. Section 16269 Variable Frequency Drive Units

- 1. The CONTRACTOR'S attention is directed to the requirement for proper coordination of the WORK of this Section with the WORK of equipment Specifications.

1.03 REGULATORY AGENCIES AND STANDARDS

- A. Regulatory Agencies: Testing shall conform to the latest provisions of the following agencies:
 - 1. NEC (NFPA 70) National Electrical Code: 2020 Edition
- B. Standards: Where referenced in these specifications or on the drawings, the publications and standards of the following organizations apply:
 - 1. ANSI American National Standards Institute
 - 2. IEEE Institute of Electrical and Electronics Engineers
 - 3. IEEE 400 – 2001, Guide for Field Testing and Evaluation of the Insulation of Shielded Power Cable Systems
 - 4. IEEE 576 – 2000, Recommended Practice for Installation, Termination, and Testing of Insulated Power Cable as Used in Industrial and Commercial Applications
 - 5. NETA International Electrical Testing Association
 - 6. NETA ATS, Acceptance Testing Specifications for Electrical Power Equipment and Systems.

7. NETA MTS, Maintenance Testing Specifications for Electrical Power Equipment and Systems.

C. The publications listed above form a part of this specification to the extent referenced.

D. Where a date is given for reference standards, the edition of that date shall be used. Where no date is given for reference standards, the latest edition available on the date of the Notice Inviting Bids shall be used.

1.04 SUBMITTALS

A. Submit in accordance with Section 01330 – Submittal Procedures.

B. Submit complete system test procedures for review. Test procedures shall include but not be limited to:

1. Detailed procedures in sufficient detail to verify conformance with these Specifications.

2. Incorporation of the Test Record Sheets included at the end of this Section.

3. Detailed comprehensive testing schedule including:

a. Each major piece of electrical distribution equipment.

b. Each major electrical subsystem.

c. Duration of each test.

d. Milestone test completion date.

e. Ambient Conditions at time of test

f. Date of test results submittals following completion of the tests.

g. Names and qualifications of the individual(s) responsible for performing the testing.

C. Following completion of the test submit the completed test results to the Engineer for review. The results shall include a dedicated section with the “as-left” settings of all devices, relays, circuit breakers, etc.

D. Test result shall be submitted in one submittal

E. Test reports shall be based on NETA's latest Acceptance Testing Specifications having a sign-off, pass/fail data filed for each line item covered by NETA's Acceptance Testing Specifications latest edition.

1.05 COMMISSIONING

A. Commissioning during the 5 Day test in Section 01700 shall not be attempted until all subsystems have been found to operate satisfactorily.

B. Commissioning shall only be attempted as a function of normal plant operation in which plant process flows and levels are routine and equipment operates automatically in response to flow and level parameters or computer command, as applicable. Simulation of process parameters shall be considered only upon receipt of a written request by the CONTRACTOR.

1.06 TESTING ORGANIZATION QUALIFICATIONS

A. Testing organization shall meet Federal OSHA criteria for accreditation of testing laboratories, Title 29, Part 1907, 1910 and 1936. Membership in the National Electrical Testing Association constitutes proof of meeting such criteria.

B. Testing organization shall provide all materials, equipment, labor and technical supervision to perform inspections and tests.

1.07 SAFETY AND PRECAUTIONS

A. Safety practices shall include, but are not limited to, the following requirements:

1. Occupational Safety and Health Act.

2. Accident Prevention Manual for Industrial Operations, National Safety Council.

3. Applicable state and local safety operating procedures.
 4. Owner's safety practices.
 5. National Fire Protection Association - NFPA 70E
 6. American National Standards for Personnel Protection
- B. All tests shall be performed with apparatus de-energized. Exceptions must be thoroughly reviewed to identify safety hazards and devise adequate safeguards.

PART 2 - TESTING & REPORTS

2.01 PRE-ENERGIZATION AND OPERATING TESTS

- A. The complete electrical system shall be performance tested when first installed on-site. Each protective, switching, and control circuit shall be adjusted in accordance with the recommendations of the protective device study and tested by actual operation using current injection or equivalent methods as necessary to ensure that each and every such circuit operates correctly to the satisfaction of the authority having jurisdiction.
1. Instrument Transformers. All instrument transformers shall be tested to verify correct polarity and burden.
 2. Switching Circuits. Each switching circuit shall be observed to operate the associated equipment being switched.
 3. Control and Signal Circuits. Each control or signal circuit shall be observed to perform its proper control function or produce a correct signal output.
 4. Acceptance Tests. Complete acceptance tests shall be performed, after the station installation is completed, on all assemblies, equipment, conductors, and control and protective systems, as applicable, to verify the integrity of all the systems.
- B. Test Report. A test report covering the results of the tests required in the Pre-Energization and Operating Tests shall be delivered to the authority having jurisdiction prior to energization. Acceptance Testing shall be in accordance with NETA ATS, Electrical Power Equipment and Systems.

PART 3 - EXECUTION

- A. The following test requirements supplement test and acceptance criteria that may be stated elsewhere.
- B. Perform Electrical Tests after electrical installation is 100% completed.

3.02 LOW-VOLTAGE CABLES-600V MAXIMUM

- A. Visual and Mechanical Inspection
1. Compare cable data with drawings and specifications.
 2. Inspect exposed sections of cables for physical damage and proper connection in accordance with single-line diagram.
 3. Inspect bolted electrical connections for high resistance using one of the following methods:
 - a. Use of low-resistance ohmmeter
 - b. Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or NETA ATS, Table 100.12.
 4. Inspect compression-applied connectors for correct cable match and indentation.
 5. Inspect for correct identification, arrangements, and cable color coding.
 6. Inspect cable jacket insulation and condition.
- B. Electrical Tests

1. Perform insulation-resistance test on each conductor with respect to ground and adjacent conductors. Applied potential shall be 500 volts dc for 300 volt rated cable and 1000 volts dc for 600 volt rated cable. Test duration shall be one minute.
 - a. Motor feeders shall be tested with motors disconnected and controller open.
 - b. Motor control circuits shall be tested and verified for proper operation with control stations and overcurrent devices connected.
 - c. Panelboard feeders shall be tested with feeder breaker open and panel-board connected. If a lighting transformer is associated with the panelboard, it shall be connected and the test made for both primary and secondary sides.
 - d. Conductors of main lighting feeders, including lighting panel shall be tested with branch circuits open.
 2. Prior to performing insulation resistance tests on cables, verify that they are not connected to a solid-state device.
 - a. Equipment shall be disconnected to avoid damage during prior to testing.
 - b. The CONTRACTOR shall notify Engineer if minimum insulation values cannot be obtained.
 3. Perform resistance measurements through all bolted connections with low-resistance ohmmeter, if applicable.
 4. Perform continuity test to insure correct cable connection.
- C. Test Values – Visual and Mechanical
1. Compare bolted connection resistance to values of similar connections. Investigate values which deviate from those of similar bolted connections by more than 50 percent of the lowest value.
 2. Bolt-torque levels should be in accordance with NETA ATS, Table 100.12 unless otherwise specified by the manufacturer.
- D. Test Values – Electrical
1. Compare bolted connection resistance values to values of similar connections. Investigate values which deviate from those of similar bolted connections by more than 50 percent of the lowest value.
 2. Insulation-resistance values shall be in accordance with manufacturer's published data. In the absence of manufacturer's published data, use NETA ATS Table 100.1. Values of insulation resistance less than this table or manufacturer's recommendations shall be investigated to determine cause of deviations.
 3. Cable shall exhibit continuity.
 4. Deviations in resistance between parallel conductors shall be investigated to determine cause of deviations.

3.03 CIRCUIT BREAKERS - LOW-VOLTAGE - INSULATED-CASE

A. Visual and Mechanical Inspection

1. Check circuit breaker for proper mounting and compare nameplate data to drawings and specifications.
2. Operate circuit breaker to ensure smooth operation.
3. Inspect case for cracks or other defects.
4. Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or NETA ATS- 2017, Table 100.12.

B. Electrical Tests

1. Perform a contact-resistance test.
2. Perform insulation-resistance test on each conductor with respect to ground and adjacent conductors. Applied potential shall be 500 volts dc for 300 volt rated cable and 1000 volts dc for 600 volt rated cable. Test duration shall be one minute.
3. Determine long-time minimum pickup current by primary current injection where practical.
4. Perform long-time delay time-current characteristic test by passing three hundred percent (300%) rated current through each pole separately. Record trip time.
5. Determine short time pickup and delay by primary current injection.
6. Determine ground-fault pickup and time delay by primary current injections.
7. Determine instantaneous pickup current by primary injection using run-up or pulse method.

C. Test Values

1. Compare contact resistance or millivolt drop values to adjacent poles and similar breakers. Investigate deviations of more than fifty percent (50%). Values of resistance less than this table or manufacturer's recommendations shall be investigated to determine cause of deviations.
2. Insulation resistance shall not be less than 100 megohms.
3. Trip characteristic of breakers shall fall within manufacturer's published time-current characteristic tolerance band, including adjustment factors.
4. All trip times shall fall within Table ICO. Circuit breakers exceeding specified trip time at three hundred percent (300%) of pickup shall be tagged defective.
5. Instantaneous pickup values shall be within values shown on Table ICI.

Table ICO Insulated-Case Circuit Breaker Overcurrent Trip Test (At 300% of Rated Continuous Current of Circuit Breaker)		
Maximum Breaker Voltage Volts	Range of Related Continuous Current Amperes	Maximum Trip Time in Seconds*
240	15-45	50
240	50-100	70
600	15-45	70
600	50-100	125
240	110-225	200
240	250-400	300
600	110-225	250
600	250-400	300
600	450-600	350
600	700-1200	500
600	1400-2500	600
600	3000-5000	650

*For integrally-fused circuit breakers, trip times may be substantially longer if tested with the fuses replaced by solid links (shorting bars).

Table ICI Insulated-Case Circuit Breaker Instantaneous Trip Tolerances		
Frame Size, Amperes	Tolerances of High and Low Settings	
	High	Low
<250	+40% -25%	+40% -30%
>400	+25%	+30%

3.04 CIRCUIT BREAKERS - LOW-VOLTAGE - POWER

A. Visual and Mechanical Inspection

1. Inspect for physical damage and compare nameplate data with drawings and specifications.
2. Perform mechanical operation test in accordance with manufacturer's instructions.
3. Check cell fit and element alignment and proper operation of racking interlocks.
4. Bolt-torque levels should be in accordance with NETA ATS, Table 100.12 unless otherwise specified by the manufacturer.
5. Check arc chutes for damage.
6. Clean entire circuit breaker using approved methods and materials.
7. Lubricate as required.

B. Electrical Tests

1. Perform a contact-resistance test.
2. Perform an insulation-resistance test at 1000 volts dc from pole-to-pole and from each pole-to-ground with breaker closed and across open contacts of each phase.
3. Determine long-time minimum pickup current by primary current injection.
4. Determine long-time delay by primary injection.
5. Determine short-time pickup and delay by primary current injection.
6. Determine ground-fault pickup and delay by primary current injection.
7. Determine instantaneous pickup value by primary current injection.
8. Make adjustments for final settings in accordance with breaker setting sheet.
9. Activate auxiliary protective devices, such as ground-fault or under voltage relays, to ensure operation of shunt trip devices. Check the operation of electrically-operated breakers in their cubicle.
10. Check charging mechanism.

C. Test Values

1. Compare contact resistance or millivolt drop values to adjacent poles and similar breakers. Investigate deviations of more than fifty percent (50%).
2. Insulation resistance shall not be less than 100 megohms. Investigate values less than 100 megohms.
3. Trip characteristics of breakers when adjusted to setting sheet parameters shall fall within manufacturer's published time-current tolerance band.

3.05 GROUNDING SYSTEMS

A. Visual and Mechanical Inspection:

1. Inspect ground system for compliance with contract documents and NFPA 70 National Electrical Code Article 250.

2. Inspect physical and mechanical conditions.
3. Inspect bolted electrical connection for high resistance using one or more of the following methods:
 - a. Use of low-resistance ohmmeter
 - b. Verify tightness of accessible bolted electrical connections by calibrated torque-wrench methods in accordance with manufacturer published data and NETA ATS Table 100.12.
4. Inspect anchorage.

B. Electrical Tests

1. Perform ground-impedance measurements utilizing the fall-of-potential method per ANSI/IEEE Standard 81 "IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System." Instrumentation utilized shall be as defined in Section 12 of the above guide and shall be specifically designed for ground impedance testing. Provide sufficient spacing so that plotted curves flatten in the 62% area of the distance between the item under test and the current electrode.
2. Perform point-to-point tests to determine the resistance between the main grounding system and all major electrical equipment frames, system neutral, and derived neutral points.

C. Test Values

1. Compare bolted connection resistance values to values of similar connections. Investigate values which deviate from those of similar bolted connections by more than 50 percent of the lowest value.
2. The resistance between the main grounding electrode and ground shall be no greater than five ohms for large commercial or industrial systems and one ohm or less for generating or transmission station grounds unless otherwise specified by the owner. (Reference ANSI/IEEE Standard 142).
3. Investigate point-to-point resistance values that exceed 0.5 ohm.

3.06 AC MOTORS

A. Visual and Mechanical Inspection

1. Inspect for physical damage and compare nameplate data with drawings and specifications.
2. Inspect for proper anchorage, mounting, grounding, connection, and lubrication.
3. When applicable, perform special tests such as air gap spacing and pedestal alignment.
4. Check for unusual mechanical or electrical noise or signs of overheating during initial test run.

B. Electrical Tests - Induction Motors

1. Perform insulation-resistance tests in accordance with ANSI/IEEE Standard 43.
2. Motor 200 HP and Less - Test duration shall be one minute with resistances tabulated at thirty and sixty seconds. Calculate the dielectric absorption ratio.
3. Perform insulation-resistance test on pedestal per manufacturer instructions.
4. Test motor starter prior to energizing the motor.
5. Check resistance temperature detector (RTD) circuits for conformance with drawings. Check that metering or relaying devices using the RTD's are of the proper rating.
6. Check that the motor space heater circuit is in proper operating condition and in accordance with drawings and specifications.
7. Check all protective devices in accordance with other sections of these specifications.
8. Perform a rotation test to ensure proper shaft direction.

9. Measure running current and evaluate relative to load conditions and nameplate full-load amperes.
10. Perform vibration tests: Motors Larger than 200 HP - Perform vibration base-line test. Amplitude shall be plotted versus frequency. For motors 200 HP and less perform vibration and amplitude test.

C. Test Values

1. Perform insulation-resistance tests at the test voltage listed in NETA ATS, Table 100.1. Investigate dielectric absorption ratios less than 1.4 and polarization index ratios less than 1.5 for Class A insulation and 2.0 for Class B insulation.
2. Vibration amplitudes shall not exceed values shown in Table MAV.
3. Salient pole voltage drop should be equal for each pole. Investigate values that differ by more than ten percent (10%).

Table MAV Maximum Allowable Vibration Per NEMA MG-1	
Speed RPM	Amplitude Inches Peak-to-Peak
3000 and above	0.001
1500-2999	0.0015
1000-1499	0.002
999 and below	0.0025

3.07 LOW-VOLTAGE MOTOR CONTROL CENTERS

A. Visual and Mechanical Inspection

1. Inspect for physical damage, proper anchorage, and grounding.
2. Inspect equipment for compliance with drawings and specifications.
3. Motor-running protection:
 - a. Compare overload heater rating with motor full-load current rating to verify proper sizing. (Adjust as necessary if power factor correction capacitors are connected on load side of heaters.)
4. Check tightness of bolted connections using calibrated torque wrench.

B. Electrical Tests

1. Insulation tests:
 - a. Measure insulation resistance of each bus section phase-to-phase and phase-to-ground for one (1) minute. Test voltage shall be in accordance with NETA ATS, Table 100.1.
 - b. Measure insulation resistance of each starter section phase-to-phase and phase-to-ground with the starter contacts closed and the protective device open. Test voltage shall be in accordance with NETA ATS, Table 100.1.
 - c. Measure insulation resistance of each control circuit with respect to ground. Refer to NETA ATS, Table 100.1. Do not perform this test on wiring connected to solid-state components.
2. Test motor overload units by injecting current through overload unit and monitoring trip time at three hundred percent (300%) of motor full-load current.
3. Test molded-case breakers per Low Voltage Insulated Case Circuit Breakers paragraphs.
4. Perform operational tests by initiating control devices to affect proper operation.
5. Determine accuracy of all meters per Metering and Instrumentation paragraphs.

6. Test protective devices in accordance with Protective Relay paragraphs.

C. Test Values

1. Bolt-torque levels should be in accordance with NETA ATS, Table 100.12 unless otherwise specified by the manufacturer.
2. Insulation-resistance test results shall conform with NETA ATS, Table 100.1.
3. Control wiring-insulation test voltage shall be 500V dc for 300-volt rated cables and 1000V dc for 600-volt rated cables. Do not perform this test on wiring connected to solid-state components.
4. Perform overload tests at three hundred percent (300%) of motor full-load current. Trip times shall be in accordance with manufacturer's tolerances. Investigate values in excess of one hundred twenty (120) seconds.

3.08 VARIABLE FREQUENCY DRIVES

- A. Provide VFD Manufacturer's Services as specified in Section 16269 Part 3. Submit report detailing all actions performed by this individual, all findings and recommendations. Report must state that manufacturer's representative has certified the installation in compliance with manufacturer's requirements.
- B. The authorized service representative shall supervise the following and shall certify that the equipment and controls have been properly installed, aligned, and readied for operation:
 1. installation of the equipment
 2. inspection, checking, and adjusting the equipment
 3. startup and field testing for proper operation
 4. performing field adjustments such that the equipment installation and operation comply with requirements
- C. Configure all drive parameters required for proper operation. Submit to Owner or Owner's Representative a configuration and startup report documenting all drive settings and containing the following information:
 1. Date of startup/configuration
 2. Name of technician
 3. Tag number and name of drive
 4. Complete list of all configured parameters.
 5. If parameters have been downloaded to a computer, submit a CD with this configuration file and labeled with the information required above.

3.09 TEST REPORTS

- A. The test report shall include the following:
 1. Summary of project.
 2. Description of equipment tested.
 3. Description of test.
 4. Test data.
 5. Analysis and recommendations.
- B. Test data records shall include the following minimum requirements:
 1. Identification of the testing organization.
 2. Equipment identification.
 3. Humidity, temperature, and other atmospheric conditions that may affect the results of the tests/calibrations.

4. Date of inspections, tests, maintenance, and/or calibrations.
 5. Identification of the testing technician.
 6. Indication of inspections, tests, maintenance, and/or calibrations to be performed and recorded.
 7. Indication of expected results when calibrations are to be performed.
 8. Indication of “as-found” and “as-left” results.
 9. Sufficient spaces to allow all results and comments to be indicated.
- C. The testing firm shall furnish a copy or copies of the complete report to the owner as required in the acceptance contract.

PART 1 -- TEST RECORD SHEETS

The test record sheets listed below shall be used to record testing of electrical equipment and of the electrical installation as required by these specifications. Sample copies of each sheet are attached.

Sheet No.	Title
1	Insulation Resistance (Power, Control Wire, and Cable) Test Record
2	Insulation Resistance (Instrument Wire and Cable) Test Record
3	Ground Electrode Testing Test Record
4	Bonding Resistance Readings (Electrical Equipment) Test Record
5	Insulation Resistance (Equipment) Test Record
6	Insulation Resistance (Rotating Equipment) Test Record
7	Equipment Absorption Ratio and Polarization Index Test Record
8	Record Feeder Breaker (480 V MCC) Test Record
9	Breaker/Contactor (480 V MCC) Test Record
10	460 V Motor Circuit (480 V MCC) Test Record
11	Electric Motor Run-In Test Record

AMBIENT TEMPERATURE: °C °F DATE:

- [illegible]

Resistance When
Cable Connected to
Equipment
(ohms)

CONTRACTOR/Date

AMBIENT TEMPERATURE: _____ °C _____ °F DATE: _____

5. Readings will vary with temperature and cable length.*

[illegible]

CONTRACTOR/Date

REFERENCE DRAWING:

- [illegible]

CONTRACTOR/Date

BONDING RESISTANCE READINGS (ELECTRICAL EQUIPMENT) TEST RECORD

TEST EQUIPMENT USED: _____ WEATHER: _____

NOTES: 1. Electrical equipment bonded to the main grounding system or dedicated ground rod, as indicated on drawings listed below.

2. Measure resistance from ground wire tap to tagged equipment bus bars, tagged equipment enclosures, and any other points indicated on the drawings.

[illegible]

DISTRIBUTION:

CONTRACTOR/Date

REFERENCE DRAWING: _____ REF. SEC.: _____

- NOTES: 1. Use 1,000-V test set for equipment rated 600 volts and below, 2,500/5,000-V test set for equipment rated over 600 volts.
2. For equipment with solid state control circuits, consult manufacturer's literature for maximum test voltages.

[illegible]

*Minimum acceptable values:

EQUIPMENT VOLTAGE CLASS
(megohms)

RESISTANCE

TESTER'S INITIALS/DATE

DISTRIBUTION:

CONTRACTOR/Date

INSULATION RESISTANCE (ROTATING EQUIPMENT) TEST RECORD

TEST EQUIPMENT: _____ TEST VOLTAGE: _____
 AMBIENT TEMPERATURE: _____ °C _____ °F DATE: _____
 EQUIP. TEMP., IF KNOWN: _____ °C _____ °F HOW KNOWN: _____

- NOTES: 1. Use 1,000-V test set for equipment 600-volt and below, 2,500/5,000-V test set for equipment rated over 600 volts.
2. Test duration shall be 1 minute, note if otherwise: _____.
3. Isolate all motor leads from one another and from frame, test phase separately, wherever practical.
4. Document testing of low voltage and medium voltage equipment on separate sheets.
5. Readings will vary inversely with temperature. When the use of temperature correction factors is specified, attach second sheet with computed values. Indicate on each sheet "measured" or "temperature corrected."

Equipment Tag No.	INSULATION RESISTANCE (megohms) *						Rated Voltage	Equipment Initial/Date
	ØA to G	ØB to G	ØC to G	ØA to ØB	ØB to ØC	ØC to ØA		

*Minimum acceptable values:

VOLTAGE CLASS

RESISTANCE (megohms)

DISTRIBUTION:

CONTRACTOR/Date _____

EQUIPMENT ABSORPTION RATIO AND POLARIZATION INDEX TEST RECORD

TEST EQUIPMENT: _____ TEST VOLTAGE: _____

AMBIENT TEMPERATURE: _____ °C _____ °F DATE: _____

EQUIP. TEMP., IF KNOWN: _____ °C _____ °F REL. HUMIDITY: _____

NOTES: 1. Perform test as indicated on Test Records for each individual equipment type. Reference the following sheets:

Transformers 8
Equipment 9
Motors and Generators 10

2. Absorption Ratio = $\frac{\text{1-Minute Resistance Value}}{\text{30-Second Resistance Value}}$

3. Polarization Index = $\frac{\text{10-Minute Resistance Value}}{\text{1-Minute Resistance Value}}$

OHMS TO GROUND 30-SECOND READING ØA TO GROUND	OHMS TO GROUND 1-MINUTE READING ØA TO GROUND	OHMS TO GROUND 10-MINUTE READING ØA TO GROUND	DIELECTRIC ABSORPTION RATIO	POLARIZATION INDEX
OHMS TO GROUND 30-SECOND READING ØB TO GROUND	OHMS TO GROUND 1-MINUTE READING ØB TO GROUND	OHMS TO GROUND 10-MINUTE READING ØB TO GROUND	DIELECTRIC ABSORPTION RATIO	POLARIZATION INDEX
OHMS TO GROUND 30-SECOND READING ØC TO GROUND	OHMS TO GROUND 1-MINUTE READING ØC TO GROUND	OHMS TO GROUND 10-MINUTE READING ØC TO GROUND	DIELECTRIC ABSORPTION RATIO	POLARIZATION INDEX

----- TESTER'S INITIALS/DATE -----
DISTRIBUTION: _____

CONTRACTOR/Date _____

FEEDER BREAKER (480 V MCC) TEST RECORD

EQUIPMENT DESIGNATION			
LOAD (kW/kVA)		VOLTAGE	F.L.A.
CIRCUIT BREAKER MFG.		RATING	SETTING
CONDUCTOR SIZE	POWER	GROUND	

1. Check nameplate data of breaker against approved vendor drawings. _____
2. Check breaker components for cleanliness. _____
3. Check mechanical function of breaker. _____
4. Check wiring for proper identification. _____
5. Check conduits/cables for tagging. _____
6. Check components for identification. _____
7. Check equipment for conformance of area classification. _____
8. Check installation for seals, breathers, and drains. _____
9. Verify power conductor continuity. _____
10. Check that power cable insulation resistance test (megger) is completed. _____

DISTRIBUTION: _____

CONTRACTOR/Date _____

BREAKER/CONTACTOR (480 V MCC) TEST RECORD

EQUIPMENT DESIGNATION			
LOAD (kW/kVA)		VOLTAGE	F.L.A.
CIRCUIT BREAKER MFG.		RATING	SETTING
CONTACTOR MFG.		SIZE	
CONDUCTOR SIZE	POWER	CONTROL	GROUND

1. Check nameplate data of breaker, contactor fuses and relays against approved vendor drawings. _____
2. Check main and auxiliary contacts. _____
3. Check contactor/breaker components for cleanliness. _____
4. Check control fuses, CPT rating, and coil voltage. _____
5. Check mechanical function of contactor and breaker. _____
6. Check wiring for proper identification. _____
7. Check conduits/cables for tagging. _____
8. Check components for identification. _____
9. Check equipment for conformance to area classification. _____
10. Check installation for seals, breathers, and drains. _____
11. Verify continuity of all power and control leads. _____
12. Check that power and control cable Insulation Resistance Test (megger) is completed. _____
13. Complete functional operation check of the control circuit using contract drawings and approved vendor drawings. Close and open the contactor using all control devices. _____

DISTRIBUTION:

CONTRACTOR/Date _____

**460 V MOTOR CIRCUIT (480 V MCC)
TEST RECORD**

EQUIPMENT DESIGNATION		
MOTOR TAG NO.	VOLTAGE	F.L.A.
KW/HP	RPM	S.F.
CIRCUIT BREAKER MFG.	RATING	SETTING
STARTER MFG.	SIZE	O/L HTR. SIZE
C.T. RATIO	O/L RELAY SETTING	
CONDUCTOR SIZE	POWER	GROUND

1. Check motor starter for cleanliness. _____
2. Check nameplate data and tagging of motor starter components for conformance to approved vendor drawings. _____
3. Check conduits and/or cables for correct tagging. _____
4. Check equipment and installation for conformance to area classification. _____
5. Check main and auxiliary contacts of breaker and contactors. _____
6. Manually check mechanical operation of breaker, contactor, O/L relay, and O/L reset device. _____
7. Check continuity of power and control cables. _____
8. Complete functional operation check of the motor control circuit using the contract drawings and approved vendor drawings. Close and open the starter using all control devices. _____
9. Verify proper operation of motor winding space heater unit. _____

DISTRIBUTION:

CONTRACTOR/Date _____

ELECTRIC MOTOR RUN-IN TEST RECORD

TEST EQUIPMENT: _____ REFERENCE DRAWING: _____

NOTES: 1. Duration of tests to comply with specifications.

TEST	REMARKS	INITIALS/DATE
RESISTANCE: Bonding resistance measured from motor frame to main ground/earth system tap. _____ ohms		
VOLTAGE: Actual voltage measured at Motor Control Center. _____ volts		
ROTATION CHECK: Bump motor to verify rotation. Motor to be uncoupled.		
NO LOAD CURRENT: At beginning of test _____ amps At end of test _____ amps		
TEMPERATURE OF BEARING: Check bearing for high temperature: Before 15 minutes after start: 30 minutes after start 1 hour after start 2 hours after start 3 hours after start		
VIBRATION: Make visual inspection during run-test. Record any unusual vibration in remarks column.		
NOISE: Record any unusual noise in remarks column.		

DISTRIBUTION:

CONTRACTOR/Date _____

SECTION 16070
SEISMIC RESTRAINTS AND SUPPORTS

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. The CONTRACTOR shall provide seismic restraint devices for electrical systems, complete and operable, in accordance with the Contract Documents.

1.02 SUBMITTALS

- A. Submittals shall be in accordance with Section 16050 – General Electrical Work.
- B. Submit seismic anchoring calculations with equipment and raceway submittals. Calculations and determination of anchor types shall be performed and stamped by a licensed structural engineer registered in the State of California. Engineer shall either be employed by the equipment manufacturer or the equipment manufacturer shall hire an independent consultant to perform these services.
- C. Submit equipment anchoring methods. Include anchoring locations, anchor types and minimum anchor embedment depths.
- D. Submit catalog cuts and material list for each anchor type.
- E. Submit recommended torque values for bolting.

PART 2 - MATERIALS

2.01 SEISMIC ANCHORING AND RESTRAINTS

- A. Equipment Anchors:
 - 1. Securely anchor electrical equipment. Anchoring shall have the capability of withstanding seismic forces as defined in Section 01610.
- B. Raceway Supports:
 - 1. Seismically support raceways (conduit, cable tray, busway, etc.) 2.5 inches inside diameter and larger and suspended 12 inches or more from the top of the raceway to the bottom of the support for the hanger. Raceway supports shall have the capability of withstanding seismic forces as defined in Section 01610.
 - 2. Seismically supported raceway systems shall currently be pre-approved by the California Office of Statewide Health Planning and Development.

2.02 MOUNTING HARDWARE

- A. Miscellaneous Hardware
 - 1. Provide nuts, bolts, and washers constructed of stainless steel.
 - a. Materials
 - All Areas: Anchor bolts and screws shall be Type 316 ASTM A276 stainless steel. Nuts shall be hex Type 316 stainless steel, ASTM A194, Grade 8M, or ASTM F594, Type 316 stainless steel.
 - 2. Provide threaded rods for trapeze supports constructed from continuous threaded steel, 3/8-inch diameter minimum.
 - a. Materials
 - All Areas: ASTM A276, Type 304 stainless steel.
- B. Struts
 - 1. Construct struts for mounting of conduits and equipment of 304 stainless steel.
 - 2. Where contact with concrete or dissimilar metals may cause galvanic corrosion, use suitable non-metallic insulators in order to prevent such corrosion.

3. Aluminum strut for free-standing support frames are not permitted.

4. Strut Manufacturer, or Equal: **Unistrut; B-Line**

C. End Caps

1. Provide plastic protective end caps for all exposed strut ends.

2. End Caps Manufacturer, or Equal: **Unistrut, Model P2860**

D. Anchors

1. Provide stainless steel expansion anchors for attaching equipment to concrete walls, floors, and ceilings.

2. Wood plugs will not be accepted.

3. Anchor Manufacturer, or Equal: **"Power-Bolt"** or **"Power-Stud"** as manufactured by **Power Fasteners, Inc.**; similar by **Star**.

PART 3 - EXECUTION

3.01 INSTALLATION

A. The CONTRACTOR shall provide and install equipment anchors and raceway supports in accordance with the final shop drawings and manufacturer's recommendations. Properly torque all bolts to the recommended values.

END OF SECTION

SECTION 16110
ELECTRICAL RACEWAY SYSTEMS

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. Provide electrical raceway systems, complete and in place, as indicated in accordance with the Contract Documents.
- B. In the event that individual equipment loads provided are larger than indicated in the Contract Documents, revise raceways, conductors, starters, overload elements, and branch circuit protectors as necessary in order to control and protect the increased connected load in conformance to NEC requirements as part of the WORK.

1.02 SUBMITTALS

- A. Furnish submittals in accordance with Section 01330 – Submittal Procedures, and Section 16050 – General Electrical Work.
- B. Shop Drawings
 - 1. Submit complete catalog cuts of raceways, fittings, boxes, supports, and mounting hardware, marked where applicable to show proposed materials and finishes.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Pull and junction boxes, fittings, and other indicated enclosures that are dedicated to the raceway system shall comply with the requirements of this Section.

2.02 CONDUIT

- A. Rigid Galvanized Steel (RGS) Conduit
 - 1. Provide rigid steel conduit manufactured from mild steel, hot-dip galvanized inside and out.
 - 2. Provide rigid steel conduit manufactured in accordance with NEMA C80.1 – Electrical Rigid Steel Conduit, and UL-6 – Electrical Rigid Metal Conduit - Steel.
- B. PVC Rigid Non-Metallic Conduit
 - 1. Provide rigid non-metallic conduit manufactured from Schedule 40 PVC, as indicated, and sunlight-resistant.
 - 2. Provide rigid non-metallic conduit manufactured in accordance with NEMA TC-2 - Electrical Plastic Tubing and Conduit, and UL-651 - Standard for Rigid Non-metallic Conduit.
- C. Liquid-Tight Flexible Conduit
 - 1. Provide liquid-tight flexible conduit constructed of a flexible galvanized metal core with a sunlight-resistant thermoplastic outer jacket.
 - 2. Provide liquid-tight flexible conduit manufactured in accordance with the requirements of UL-360 - Steel Conduits, Liquid-Tight Flexible.
- D. Electrical Metallic Tubing (EMT) or Intermediate conduit (IMC) will not be accepted.

2.03 FITTINGS AND BOXES

- A. General
 - 1. For use with metallic conduit, provide cast and malleable iron fittings of the threaded type with 5 full threads.
 - 2. Fittings and Boxes

- a. Provide fittings and boxes with neoprene gaskets and non-magnetic stainless steel screws.
 - b. Attach covers by means of holes tapped into the body of the fitting.
 - c. Covers for fittings attached by means of clips or clamps will not be accepted.
 - d. Provide surface-mounted switches and receptacles shall be housed in FD-type weatherproof conduit fittings. Bell type are not permitted.
- 3. Provide boxes larger than standard cast or malleable types manufactured of Type 316 stainless steel, NEMA 4.
- 4. Terminations
 - a. In indoor and outdoor areas, terminate conduit in rain-tight hubs.
 - b. Manufacturer, or approved equal,
 - Myers
 - O.Z. Gedney
 - Appleton
 - c. In other than outdoor areas, provide sealed locknuts and bushings.
- B. Malleable Iron Fittings and Boxes
 - 1. For use with galvanized steel conduit, provide fittings and boxes constructed of malleable iron or gray-iron alloy with zinc plating.
 - 2. Manufacturer, or Equal
 - a. Crouse-Hinds (EATON) Form 5
 - b. Equivalent by **O.Z. Gedney**
 - c. Equivalent by **Appleton**
- C. PVC Fittings and Boxes
 - 1. For use with rigid non-metallic conduit, provide fittings manufactured of solvent-welded PVC.
 - 2. Provide boxes manufactured of PVC.
 - 3. Manufacturer, or approved equal,
 - a. Hoffman
 - b. Crouse-Hinds (EATON)
 - 4. Provide welding solvent as required for the installation of non-metallic conduit and fittings.
- D. Stainless Steel Boxes
 - 1. Provide stainless steel boxes with RGS conduit and where indicated.
 - 2. Provide NEMA 4 stainless steel boxes, constructed of Type 316 stainless steel.
 - 3. Provide stainless steel of a minimum of 14-gauge thickness, with a brushed finish.
 - 4. Door Hinges
 - a. Provide doors with full-length stainless steel piano hinges.
 - b. Non-hinged boxes will not be accepted.
 - 5. Manufacturer, or approved equal
 - a. Hoffman
 - b. Rittal

2.04 WIREWAY

A. General

1. Provide wireway of the lay-in type and NEMA-rated for the area in which it is to be installed in accordance with the requirements of Section 16050 – General Electrical Work.
 2. Separate power, control, signal and communications cables by grounded metallic dividers in wireways or run in separate wireways.
- B. Fittings and Covers
1. Provide fittings and sections with non-magnetic stainless steel screws.
 2. Attach covers by hinges and clamps to the bodies.
 3. Covers attached by means of clips or screws will not be accepted.
 4. Provide covers and bodies constructed of aluminum or minimum 14-gauge steel.
- C. Grounding
1. Ground the steel and aluminum wireway bodies.
 2. Provide steel dividers with steel wireways or aluminum dividers with aluminum wireways, and ground by means of an individual grounding conductor.
 3. Non-metallic dividers will not be accepted.
- D. Terminations
1. In indoor and outdoor areas, terminate conduit in rain-tight hubs as manufactured by Myers, O.Z. Gedney, or equal.
 2. Manufacturer, or Equal
 - a. Myers
 - b. O.Z. Gedney

PART 3 - EXECUTION

3.01 GENERAL

- A. Run wiring in raceway unless indicated otherwise.
- B. Install raceways between equipment as indicated.
- C. Provide raceway systems that are electrically and mechanically complete before conductors are installed.
- D. Bends and Offsets
1. Provide bends and offsets that are smooth and symmetrical, and accomplished with tools designed for this purpose.
 2. Provide factory elbows wherever possible.
- E. Routing
1. Where raceway routings are indicated, follow those routings to the extent possible.
 2. Where raceways are indicated but routing is not indicated, such as home runs or on conduit developments and schedules, raceway routing shall be the CONTRACTOR's choice and provided in strict accordance with the NEC as well as customary installation practice.
 3. Provide the raceway encased, exposed, concealed, or under-floor as indicated, except conceal conduit in finished areas unless specifically indicated otherwise.
 4. Adjust routings in order to avoid obstructions.
- F. Coordination
1. Coordinate between trades prior to installing the raceways.
 2. The lack of such coordination shall not be justification for extra compensation, and any costs for removal and re-installation to resolve conflicts shall be part of the Contract Price.

G. Install exposed raceways parallel or perpendicular to structural beams.

H. Expansion Fittings

1. Install expansion fittings with external bonding jumpers wherever exposed raceways cross building expansion joints.

2. Install expansion/deflection fittings where conduit movement is expected in more than one dimension, and where conduits transition out of structures in locations where differential settlement may occur.

3. Encased Expansion Fittings

a. Install encased expansion fittings wherever encased conduits cross building expansion joints.

b. Deflection type fittings shall not be required for encased conduits crossing an expansion joint within a single structure.

4. Provide expansion and expansion/deflection fittings constructed of the same material as the raceway to which they are installed.

I. Install expansion fittings with bonding jumpers wherever raceways cross building expansion joints.

J. Install exposed raceways at least 1/2 inch from walls or ceilings except that at locations above finished grade where damp conditions do not prevail, install exposed raceways at least 1/4 inch from the face of walls or ceilings by the use of clamp backs or struts.

K. Wherever contact with concrete or dissimilar metals can produce galvanic corrosion of equipment, provide a means of suitable insulation in order to prevent such corrosion.

3.02 CONDUIT

A. Provide exposed conduit manufactured of rigid galvanized steel, except as follows and unless indicated otherwise:

1. For conduit containing only grounding system bonding conductors, provide Schedule 40 PVC conduit.

B. Underground Raceways

1. Power conduit encased in concrete shall be constructed of Schedule 40 PVC.

2. Analog control or instrumentation conduit shall be Schedule 40 PVC.

C. Size

1. Provide exposed conduit of 3/4-inch minimum trade size.

2. Provide encased conduit of one-inch minimum trade size.

D. Install supports at distances required by the NEC.

E. Concrete cover for conduit and fittings shall not be less than 1-1/2 inches for concrete exposed to earth or weather, or less than 3/4 inch for concrete not exposed to weather or in contact with the ground.

F. Penetrations

1. Provide conduit passing through walls or floors with plastic sleeves.

2. Perform core drilling in accordance with the requirements of Section 16050 – Electrical Work, General.

3. Conduits passing through a slab, wall, or beam shall not significantly impair the strength of the construction.

G. Conduits embedded within a slab, wall, or beam (other than those merely passing through) shall meet the following requirements:

1. Conduits with their fittings embedded within a column shall not displace greater than 4 percent of the gross area of cross section;
 2. Conduits shall not be larger in outside dimension than 1/3 the overall thickness of the slab, wall, or beam in which it is embedded; and,
 3. Conduits shall not be spaced closer than 3 outside diameters on centers.
- H. Place the conduit such that cutting, bending, or displacing reinforcement from its proper location will not be required.
- I. Coat threads with a conductive lubricant before assembly.
- J. Joints
1. Provide joints that are tight, thoroughly grounded, secure, and free of obstructions in the pipe.
 2. Adequately ream the conduit in order to prevent damage to the wires and cables inside.
 3. Use strap-wrenches and vises to install the conduit, in order to prevent wrench marks on the conduit.
 4. Replace conduit with wrench marks.
 5. Where installed in chemical or fuel containment areas, the conduit shall not have joints or fittings located below the top of the containment area to prevent entry of chemicals or fuel into the conduit system.
- K. Slope
1. Wherever possible, slope the conduit runs to drain at one or both ends of the run.
 2. Wherever conduit enters a substructure below grade, slope the conduit in order to drain water away from the structure.
 3. Take extreme care in order to avoid pockets or depressions in the conduit.
- L. Connections
1. Make connections to lay-in-type grid lighting fixtures by using flexible metal conduit not exceeding 4 feet in length.
 2. Make connections to motors and other equipment subject to vibration by using liquid-tight flexible conduit not exceeding 3 feet in length.
 3. Provide equipment subject to vibration that is normally provided with wiring leads with a cast junction box for the make-up of connections.
- M. Duct sealant shall be foam duct sealant such as **Polywater FST or approved equal**. Provide duct sealant at the following locations:
1. Where required by NEC Article 300.7.
- N. Empty Conduits
1. Tag empty conduits at both ends to indicate the final destination.
 2. Where it is not possible to tag the conduit, identify the destination by means of a durable marking on an adjacent surface.
 3. Install a pull-cord in each empty conduit in floors, panels, manholes, equipment, and the like.
 4. Install a removable plug on empty conduits that terminate below grade, in vaults, manholes, handholes, and junction or pullboxes.
- O. Identification of Conduits
1. Identify conduits at ends and at pulling points.
 2. Identification shall be the unique conduit number assigned in the Contract Documents.

3. Other than 120 VAC panelboard circuits, if a conduit has not been assigned a unique number in the Contract Documents, assign a unique number following the numbering scheme used in the Contract Documents.
 4. Assign a unique number to 120 VAC panelboard circuits, similar to the cable numbering scheme used in the Contract Documents.
 5. Provide conduit identification by a stamped or engraved non-corroding metal tag attached to the conduit bushing.
 6. Provide an engraved phenolic nameplate in accordance with the requirements of Section 16050 – Electrical Work, General, or a computer printed self-adhesive label attached to the equipment or enclosure inside which the conduit terminates.
 7. Markings with a pen or paint will not be accepted.
- P. Identification of Pullboxes and Junction Boxes
1. Identify pullboxes and junction boxes.
 2. Identification shall be the unique conduit number assigned in the Contract Documents, or if not assigned a unique number the CONTRACTOR shall assign one following the numbering scheme used in the Contract Documents.
 3. Provide box identification by a stamped or engraved non-corroding metal tag or an engraved phenolic nameplate, in accordance with the requirements of Section 16050 – Electrical Work, General, and attached to the box or enclosure.
 4. Markings with a pen or paint will not be accepted.
- Q. Provide conduit for data cables in accordance with the equipment manufacturer's recommendations, especially regarding separation from low- and medium-voltage power raceways.

END OF SECTION

SECTION 16115
UNDERGROUND RACEWAY SYSTEMS

PART 1 - GENERAL

1.01 THE SUMMARY

- A. Provide underground raceway systems, complete and in place, as indicated in accordance with the Contract Documents.
- B. Pullboxes, and fittings that are dedicated to the underground raceway system shall comply with the requirements of this Section.

1.02 CONTRACTOR SUBMITTALS

- A. Furnish submittals in accordance with the requirements of Section 01330 – Submittal Procedures, and Section 16050 – General Electrical Work.
- B. Shop Drawings
 - 1. Submit complete catalog cuts of all raceways, fittings, pullboxes, marked where applicable in order to show proposed materials and finishes.

PART 2 - PRODUCTS

2.01 UNDERGROUND RACEWAYS

- A. Raceways shall be constructed of Schedule 40 PVC with minimum 1" diameter.
- B. Grounding
 - 1. Raceway shall contain a No. 4/0 bare stranded copper ground wire.
 - 2. The ground wire shall be continuous through the underground trench and terminate at power distribution equipment and the existing grounding grid.
- C. Identification Tape
 - 1. Provide continuous lengths of underground warning tapes located 12 inches above and parallel to the ductbanks.
 - 2. Provide tape consisting of 6-inch wide polyethylene film, imprinted with "CAUTION - ELECTRIC UTILITIES BELOW."
 - 3. Manufacturer, or Equal
 - a. Brady

PART 3 - EXECUTION

3.01 GENERAL

- A. Install underground raceways between pullboxes as indicated.
- B. Raceway systems shall be electrically and mechanically complete before conductors are installed.
- C. Provide bends and offsets that are smooth and symmetrical, and fabricated with tools designed for this purpose.
- D. Use factory elbows wherever possible.
- E. To the extent possible, follow the raceway routings as indicated on the Drawings.
- F. Adjust the indicated routings as necessary in order to avoid obstructions.
- G. Coordination with Other Trades
 - 1. Coordinate with other trades prior to installation of raceways.
 - 2. The lack of coordination shall not be justification for extra compensation.

3. Perform removal and re-installation to resolve conflicts as part of the WORK.

3.02 UNDERGROUND RACEWAYS

A. Provide watertight conduit penetrations through walls of pullboxes below grade.

END OF SECTION

SECTION 16120
WIRE AND CABLING

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. The CONTRACTOR shall provide wire and cable, complete and operable, in accordance with the Contract Documents.
- B. In the event that motors provided are larger horsepower than the motors indicated, raceways, conductors, starters, overload elements, and branch circuit protectors shall be revised as necessary to control and protect the increased motor horsepower. Revisions are part of the WORK of this Section.

1.02 SUBMITTALS

- A. The CONTRACTOR shall submit Shop Drawings in accordance with Sections 01330 – Submittal Procedures and 16050 – General Electrical Work.
- B. Submit catalog cuts and material list for each conductor type. Indicate insulation material, conductor material, voltage rating, manufacturer and other data pertinent to the specific cable, such as type shielding, number of pairs and applicable standards.
- C. Submit cable test results in accordance with this Section as well as Section 16060 – Electrical Tests.

1.03 DELIVERY, STORAGE AND HANDLING

- A. The CONTRACTOR shall protect all cables from damage at all times.
- B. Cable ends shall be protected from water entry in accordance with the manufacturer's recommended procedures. Cable ends shall not be left open in manholes or other locations subject to submergence. If the cable ends become submerged prior to splicing or termination, the cables shall be replaced in their entirety.
- C. Cables shall be pulled into raceways in accordance with the manufacturer's requirements. Under no circumstances shall cable pulling tensions exceed the manufacturer's written instructions.
- D. Pulling tensions on raceway cables shall be within the limits recommended by the cable manufacturer. Wire pulling lubricant, where needed, shall be UL approved.

PART 2 - MATERIALS

2.01 GENERAL – LOW-VOLTAGE CABLE

- A. Conductors, include grounding conductors, shall be stranded copper. Aluminum conductor and/or solid conductor wire and cable will not be permitted. Insulation shall bear the UL label, the manufacturer's trademark, and identify the type, voltage, and conductor size. Conductors except flexible cords and cables, fixture wires, and conductors that form an integral part of equipment such as motors and controllers shall conform to the requirements of Article 310 of the National Electric Code, latest edition, for current carrying capacity. Flexible cords and cables shall conform to Article 400, and fixture wires shall conform to Article 402. Wiring shall have wire markers at each end.

2.02 LOW-VOLTAGE POWER AND LIGHTING CONDUCTORS

- A. Wire rated for 600 volts in duct or conduit for power and lighting circuits shall be single conductor, Class B Type XHHW-2 cross-linked polyethylene conforming to UL-44 - UL Standard for Thermoset-Insulated Wires and Cables.
 - 1. THHN/THWN wire shall not be permitted to be used for any power or control wiring in this project.
- B. Conductors for feeders as defined in Article 100 of the NEC shall be sized to prevent a voltage drop exceeding 3 percent at the farthest outlet of power, heating, and lighting loads, or

combinations of such loads, and where the maximum total voltage drop on both feeders and branch circuits to the farthest connected load does not exceed 5 percent.

- C. Wiring for 600-volt class power and lighting shall be as manufactured by **Okonite, General Cable, Southwire**, or equal.

2.03 LOW-VOLTAGE CONTROL CONDUCTORS

- A. Low voltage control wire in duct or conduit shall be the same type as power and lighting wire indicated above.
- B. Control wiring shall be No.14 AWG, Class B Type XHHW-2 cross-linked polyethylene conforming to UL-44 - UL Standard for Thermoset-Insulated Wires and Cables
- C. Control wires inside panels and cabinets shall be machine tool grade type MTW, UL approved, rated for 90 degrees C at dry locations, and be as manufactured by **American, General Cable**, or equal.
- D. Multi-Conductor Cable: Where multi-conductor cable is indicated on the drawings, provide type TC, multi-conductor cable assemblies with an overall heat, moisture, and sunlight resistant PVC jacket. Conductor insulation shall be color coded per ICEA-S-58-679, method 1, colored compounds with tracers.

2.04 INSTRUMENT CABLE

- A. Instrumentation cable shall be rated at 600 volts TC rated, minimum.
- B. Individual conductors shall be No. 16 AWG stranded, tinned copper. Insulation shall be color coded polyethylene.

2.05 VARIABLE FREQUENCY DRIVE CABLE

- A. VFD power cable shall be three (3) conductor, stranded copper, PVC jacketed, shielded type, tray cable (TC) rated 1000 volts with three (3) symmetrical ground conductors. The individual conductors shall be UL listed as Type XHHW-2 rated for 90 degrees C at wet and dry locations, with XLPE insulation.
- B. VFD Cables shall be as manufactured by **Belden, Southwire, OLFLEX**, or equal.

2.06 ETHERNET NETWORK 10/100/1000 BASE-T/TX Cable

- A. Ethernet Network 10/100/1000 BASE-T/TX Cable:
1. Provide Ethernet network cables of the cable types indicated on the Drawings and as specified. If no type is indicated, provide Category 6 STP.
 2. Conductors:
 - a. Solid copper conductors.
 - b. Minimum No. 24 AWG.
 3. Insulation:
 - a. Polyolefin polyethylene (non-plenum) or FEP (plenum).
 - b. 600 V rated insulation.
 - c. 100% shielded
 4. Color code:
 - a. Pair 1: White/blue stripe and blue.
 - b. Pair 2: White/orange stripe and orange.
 - c. Pair 3: White/green stripe and green.
 - d. Pair 4: White/brown stripe and brown.
 5. Outer jacket:
 - a. Sunlight resistant, flame retardant polyvinyl chloride outer jacket.

- b. White sheath for Voice.
- c. Blue sheath for Data.
- d. Low Smoke, CMP-50, FEP, clear jacket where required by fire code.

B. STP Cable Hardware

- 1. Cat6 EZ-RJ45 connectors.

2.07 CABLE SPLICES AND TERMINATIONS

- A. Splicing is not permitted for this project. Wire and cable shall be continuous.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. The CONTRACTOR shall provide, terminate and test all power, control, and instrumentation conductors.
- B. The CONTRACTOR shall, as a minimum, provide the number of control wires listed in the conduit schedule or on the Contract Drawings. Excess wires shall be treated as spares for future use.
- C. Conductors shall not be pulled into any raceway until raceway has been cleared of moisture and debris.
- D. Instrumentation wire shall not be run in the same raceway with power and control wiring except where specifically indicated.
- E. Wire in panels, cabinets, and wireways shall be neatly grouped using nylon tie straps, and shall be neatly fanned out to terminals.
- F. Single conductor cable in cable trays shall be No. 1/0 or larger and shall be of a type listed and marked for use in cable trays. Tray cable smaller than 1/0 shall be multi-conductor, with outer jacket.

3.02 FIELD ASSEMBLY

A. General

- 1. Wire taps and splices shall be properly taped and insulated according to their respective classes.
- 2. In general, there shall be no cable splices in underground manholes or pullboxes. If splices are necessary, the cables shall be spliced using submersible cable splices, suitable for continuous submergence. Splices in underground manholes and pullboxes may be made only with the approval of the ENGINEER.
- 3. Stranded conductors shall be terminated directly on equipment box lugs making sure that conductor strands are confined within lug. Use forked-tongue lugs where equipment box lugs have not been provided.
- 4. Excess control and instrumentation wires shall be long enough to terminate at any terminal block in the enclosure, be properly taped, be identified with origin, and be neatly coiled.

B. Control Wire and Cable

- 1. Control conductors shall be spliced or terminated only at the locations indicated and only on terminal strips or terminal lugs of vendor furnished equipment.
- 2. In motor control centers, and control panels, control wire and spare wire shall be terminated to terminal strips.
- 3. The CONTRACTOR shall provide as a minimum the number of control wires listed in the conduit schedule or as indicated in the Contract Documents. Excess wires shall be treated as spares.

C. Instrumentation Wire and Cable

1. Shielded instrumentation cables shall be grounded at one end only, preferably the receiving end on a 4 - 20 mA system.
2. Two and 3 conductor shielded cables installed in conduit runs which exceed available standard cable lengths may be spliced in pullboxes with the prior approval of the ENGINEER. Such cable runs shall have only one splice per conductor.

D. Power Wire and Cable

1. 120/208-volt, 120/240-volt, and 480/277-volt branch circuit conductors may be spliced in suitable fittings at locations determined by the CONTRACTOR. Cables rated above 2,000 volts shall be spliced or terminated only at equipment terminals indicated.
2. Splices to motor leads in motor terminal boxes shall be wrapped with mastic material to form a mold and then shall be taped with a minimum of 2 layers of varnished cambric tape over-taped with a minimum of 2 layers of high temperature tape.
3. Shielded power cable shall be terminated with pre-assembled stress cones in a manner approved by the cable and terminal manufacturer. The CONTRACTOR shall submit the proposed termination procedure as a Shop Drawing.
4. VFD shielded power cables shall have the shield grounded at all locations where it is exposed.

3.03 IDENTIFICATION

A. Cable Identification

1. Wire and cable shall be identified for proper control of circuits and equipment and to reduce maintenance effort. Identification shall be installed at every termination point.
2. Identification Numbers
 - a. The CONTRACTOR shall assign to each control and instrumentation wire and cable a unique identification number. Numbers shall be assigned to conductors having common terminals and shall be shown on "as built" drawings. Identification numbers shall appear within 3-inches of conductor terminals. "Control and Instrumentation Conductors" shall be defined as any conductor used for control, interlock, alarm, annunciator, or signal purposes.
 - b. Multiconductor cable shall be assigned a number which shall be attached to the cable at intermediate pull boxes and at stub-up locations beneath free-standing equipment. It is expected that the cable number shall form a part of the individual wire number. Individual control conductors and instrumentation cable shall be identified at pull points as described above. The instrumentation cable numbers shall incorporate the loop numbers assigned in the Contract Documents.

c. Wire Color Code Requirements:

Description	Phase / Code Letter	Field Wire or Tape Color	Non-Field Wire Color
480V, 3 PH	A	Brown	Brown
	B	Orange	Orange
	C	Yellow	Yellow
240V or 208V, 3 PH	A	Black	-
	B	Red (Orange if high leg)	-
	C	Blue	-
	Neutral	White	White
240/120V, 1 PH	L1	Black	Black
	L2	Red	-
24V Positive	24+	Blue	Pink
24V Negative	24-	Gray	Gray
12V Positive	12+	Blue	Red
12V Negative	12-	Black	Black
AC Control		Red	Red (Yellow for foreign circuits)
DC Control		Blue	Blue
Ground	G	Green	Green
Shielded Pair	+	Red, Clear, or White	Clear or White
	-	Black	Black

- d. Color coding and phasing shall be consistent throughout the Site, but bars at panelboards, switchboards, and motor control centers shall be connected Phase A-B-C, top to bottom, or left to right, facing connecting lugs.
- e. Color coding tape shall be used where colored insulation is not available. Colored identification tape may be used on conductors between the local disconnect and the load, where permitted by the NEC. Any phase changes necessary for proper rotation shall be made at the driven equipment where colored insulation is used. Phase changes may be made on the load side of the local disconnect, where phase colors are identified using tape.
- f. Control wires shall have colored insulation per the above table.
- g. Conductors #10 AWG and smaller shall have factory color coding with solid color insulation.
- h. Conductors #8 AWG and larger shall have factory color coding with solid color insulation or with three wide color stripes co-extruded with the cross-linked polyethylene insulation.
- i. Spare cable shall be terminated on terminal screws and shall be identified with a unique number as well as with destination.
- j. Terminal strips shall be identified by computer printable, cloth, self-sticking marker strips attached under the terminal strip.

3.04 FIELD QUALITY CONTROL

- A. Cable Assembly and Testing: Cable assembly and testing shall comply with applicable requirements of ICEA Publication No. S-95-658/NEMA WC70 - Ethylene-Propylene-Rubber Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.

- B. Factory test results shall be submitted in accordance with Section 01330 – Submittal Procedures, prior to shipment of cable. The following field tests (in addition to the tests specified in Section 16060 – Electrical Tests) shall be the minimum requirements:
1. Insulation resistance testing, using a DC megohmmeter, shall be performed on cables operating at more than 2,000 volts to ground. Time-resistance readings shall be taken and recorded at intervals of 30 seconds and one minute. Time-resistance voltage levels shall be per the cable manufacturer's recommendations.
 2. Power cable rated at 600 volts shall be tested for insulation resistance between phases and from each phase to a ground using a megohmmeter.
 3. Field testing shall be done after cable is installed in the raceways.
 4. Field tests shall be performed by a NETA-certified test organization. Test results shall be submitted to the ENGINEER for review and acceptance.
 5. Cables failing the tests shall be replaced with a new cable at no cost to the OWNER.
- C. Continuity Test: Control and instrumentation cable shall be tested for continuity, polarity, undesirable ground, and origination. Such tests shall be performed after installation and prior to placing cable in service.

END OF SECTION

SECTION 16269
VARIABLE FREQUENCY DRIVE UNITS

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. General

1. The CONTRACTOR shall provide variable frequency drive (VFD) units, complete and operable, as indicated in accordance with the Contract Documents.
2. It is the intent of this Section to require complete, reliable, and fully tested variable frequency drive systems suitable for attended or unattended operation.

B. The requirements of Section 16050 – General Electrical Work, apply to the WORK of this Section.

C. Single Manufacturer

1. Like products shall be the end product of one manufacturer in order to standardize appearance, operation, maintenance, spare parts, and manufacturer's services.
2. This requirement, however, does not relieve the CONTRACTOR of overall responsibility for the WORK.

D. Coordination

1. Equipment provided under this Section shall operate the electric motor driver and the driven equipment as indicated under other equipment specification Sections.
2. The CONTRACTOR'S attention is specifically directed to the need for proper coordination of the WORK under this Section and the WORK under the equipment specifications found in Division 15.

1.02 SUBMITTALS

A. Furnish submittals in accordance with the requirements of Section 01330 – Submittal Procedures, except that Shop Drawing information for the drives shall be submitted as part of the information for the driven equipment.

B. Shop Drawings: Include the following information:

1. Equipment Information

- a. name of drive manufacturer
- b. type and model
- c. assembly drawing and nomenclature
- d. maximum heat dissipation capacity in kW

2. conduit entrance provisions

3. circuit breaker type, frames, and settings

4. information related to relays, timers, pilot devices, control transformer VA, dV/dT devices, line reactors and fuse sizes, including catalog cuts

5. Interconnection Diagrams

- a. Submit the system interconnection diagrams.
- b. The schematic diagram shall include remote devices.
- c. The diagram shall incorporate the control logic on the corresponding elementary schematic as indicated.
- d. Submittals with drawings not meeting this requirement will not be reviewed further and will be returned to the CONTRACTOR stamped "REJECTED."

6. Factory test data certifying compliance of similar equipment from the same manufacturer with requirements of this Section
- C. The Technical Manual shall include the following documentation:
 1. manufacturer's 2-year warranty
 2. field test report
 3. programming procedure and program settings, including program parameter for each VFD.
- D. Spare Parts List
 1. Submit information for parts required by this Section plus any other spare parts recommended by the controller manufacturer.

PART 2 - PRODUCTS

2.01 GENERAL

- A. The CONTRACTOR shall provide a total of 6 variable frequency drives, HEAVY DUTY rated.
- B. Equipment to be operated through variable frequency drives shall include the following:

Quantity	Equipment	HP	Constant or Variable Torque (C/V)	RPM	Bypass (Y/N)	Enclosure Type
6	Flocculator	2HP	Constant	1,200-1,800 (Note 1)	N	NEMA 1

Note 1: Coordinate submittal of variable frequency drives with final flocculator equipment submittal.

2.02 EQUIPMENT

- A. General
 1. The power supply shall be an adjustable frequency inverter designed to convert incoming 3-phase, 480-volt, 60-Hertz power to a DC voltage and then to adjustable frequency AC by use of a 3-phase inverter.
 2. Current-source inverters will not be accepted.
 3. Inverters shall be sized to match the KVA and inrush characteristics of the motors actually provided.
 4. The CONTRACTOR shall be responsible for matching the controller to the load (variable torque or constant torque) as well as the speed and current of the actual motor being controlled.
- B. VFD Programming
 1. The CONTRACTOR thru the System Supplier shall be responsible for programming the VFD with all required INPUTS and OUTPUTS noted per the Wiring Schematics DWG E04.
 2. The VFD shall be controlled via ETHERNET/IP.
 3. The CONTRACTOR shall coordinate with the OWNER for IP address of each VFD.
- C. Inverter
 1. The inverter shall be of a voltage-source design, producing a pulse-width-modulated type output.
 2. Six-step and current-source inverters will not be accepted.
 3. Motors:

- a. Inverters shall be provided with 460-volt, 3-phase, 60-Hertz, squirrel-cage high-efficiency inverter duty induction motors.
 - b. Motors shall be capable of operating over the range of 50-100 percent of base speed without derating or requiring any motor modifications.
 - c. Motors enclosures shall be NEMA B, TEFC (1.00 SF).
4. Inverters shall be capable of delivering the nameplate horsepower exclusive of service factor without the need for mandatory thermostats or feedback tachometers.
5. The VFD shall vary both the AC voltage and frequency simultaneously in order to operate the motor at required speeds.
- D. The minimum VFD inverter efficiency shall be 95 percent at 100 percent speed and load, and 85 percent efficiency at 50 percent speed and load.
- E. Power Outage
 1. The VFD shall shut down in an orderly manner when a power outage occurs on one or more phases.
 2. Upon restoration of power and a START COMMAND is issued from the PLC, the motor shall restart and run at the speed corresponding to the current process input signal.
- F. The VFD shall be provided with the following features:
 1. inrush current adjustment between 50 and 110 percent of motor full load current (factory set at 100 percent)
 2. overload capability at 110 percent for 60 seconds for variable torque loads and 150 percent for constant torque loads.
 3. adjustable acceleration and deceleration
 4. input signal of 4 - 20 mA from process
 5. output speed signal of 4 - 20 mA; Signals other than 4 - 20 mA will not be accepted.
 6. Upon loss of input signal, the VFD shall operate at a preset speed.
 7. A minimum of 2 selectable frequency jump points in order to avoid critical resonance frequency of the driven system.
 8. additional devices and functions as indicated
 9. Ethernet/IP I/O communications to transmit VFD data to/from a plant PLC-based control system
- G. The VFD shall be provided with, as a minimum, the following protection features:
 1. protection against single phasing
 2. instantaneous overcurrent protection
 3. electronic overcurrent protection
 4. ground fault protection
 5. overtemperature protection for electronics
 6. protection against internal faults
 7. ability to start into rotating motor (forward or reverse rotation)
 8. additional protection and control as indicated and as required by the motor and driven equipment
- H. The VFD shall be designed and constructed to satisfactorily operate within the following service conditions.
 1. Elevation

- a. elevation to 3300 feet
 - b. For elevation greater than 3300 feet, the VFD shall be de-rated in accordance with the manufacturer's recommendation
2. Ambient Temperature: 0 to 40 degrees C
3. Humidity: 0 to 95 percent, non-condensing
4. AC Line-Voltage Variation: plus 10 percent to minus 10 percent
5. AC Line-Frequency Variation: plus-and-minus 2 Hertz
6. Individual or simultaneous operation of VFDs shall not add more than 3 percent total harmonic voltage distortion and no more than 5 percent total harmonic current distortion (per IEEE 519, 1992) to the MCC.
- I. Electrical equipment provided in addition to the adjustable frequency inverter for each drive shall include:
 1. 2-1/2-percent (minimum) line reactor integral to the drive enclosure.
 2. Provide a dV/dT filter device at the motor or VFD output per the manufacturer's recommendation. Submit documentation demonstrating where such devices are required, along with mounting and cabling requirements.
 3. fused 480-to-120-volt control transformer to provide system control power for the logic and pilot lamps.
 4. Provide an input circuit breaker.
 5. Heaters
 - a. Provide overload heaters with auxiliary contacts in order to protect the motors in both VFD.
 - b. Refer to the Elementary Schematics indicated on the Drawings.
 - c. The heaters shall be sized for the motor actually being provided.
- J. Inverter Signal Circuits
 1. The inverter signal circuits shall be isolated from the power circuits and shall be designed to accept an isolated 4-20 mA signal in the automatic mode of operation.
 2. The inverter shall follow the setting of a remote or local potentiometer control while in the manual mode.
 3. Refer to the Elementary Schematic indicated on the Drawings for speed control and START/STOP methods.
 4. Access to set-up and protective adjustments shall be protected by key-lockout.
 5. The following operator monitoring and control devices for the inverter shall be provided on the face of the VFD enclosure, either as discrete devices or as part of a multi-function microprocessor-based keypad access device:
 - a. AUTO/HAND selection from a remote logic relay or switch
 - b. While in AUTO, the inverter shall operate from the remote 4-20 mA input, where applicable, and while in HAND control shall operate from a local or remote manually operated speed potentiometer; speed pot ratings shall be coordinated with the supplier of the Local Control Station.
 - c. speed indicator calibrated in percent speed
 - d. inverter fault trip pilot light and output alarm contacts
 - e. trip reset pushbutton
 - f. RUN and OFF indicating lights

- g. Provide other controls and readouts normally furnished as standard equipment, or as otherwise indicated on the Elementary Schematics indicated on the Drawings.
- K. Properly identified screw type terminal boards shall be provided for interconnection to remote controls and instrumentation
- L. Pilot devices, control relays, time delay relays, elapsed time meters, and indicators provided as a part of the VFD equipment package shall meet the applicable requirements of Section 16420 – Industrial Control Panels.

2.03 SPARE PARTS

- A. The CONTRACTOR shall furnish the spare parts listed below, suitably packaged and labeled with the corresponding equipment number.
- B. Modified Parts
 - 1. At any time prior to Substantial Completion, the CONTRACTOR shall notify the ENGINEER in writing about any manufacturer's modification of spare part numbers, interchangeabilities, or model changes.
 - 2. If the ENGINEER determines that the modified parts no longer apply to the equipment provided, the CONTRACTOR shall furnish other applicable parts as part of the WORK.
- C. The following spare parts shall be furnished:
 - 1. Provide one set of spare power fuses of each form, voltage, and current rating.
 - 2. Provide 10 spare control and power fuses of each type and rating.
 - 3. Provide 10 panel lamps of each type (form, voltage, and current rating).
 - 4. Provide one of each type of circuit board, as applicable:
 - a. control board
 - b. power board
 - c. diode bridge
 - d. transistor module
 - 5. Provide one set of any special tools required for maintenance of the VFD units.

2.04 Manufacturer

- A. ALLEN BRADLEY – PowerFlex Series 525, no equal.

PART 3 - EXECUTION

3.01 MANUFACTURER'S SERVICES

- A. General
 - 1. An authorized service representative of the manufacturer shall be present at the Site for 2 Days to furnish the services listed below.
 - 2. For the purpose of this Paragraph, a Day is defined as an 8-hour period excluding travel time.
- B. The authorized service representative shall supervise the following and shall certify that the equipment and controls have been properly installed, aligned, and readied for operation:
 - 1. installation of the equipment
 - 2. inspection, checking, and adjusting the equipment
 - 3. startup and field testing for proper operation
 - 4. performing field adjustments such that the equipment installation and operation comply with requirements

C. Instruction of OWNER's Personnel

1. The authorized representative shall instruct the OWNER's personnel in the operation and maintenance of the equipment, including step-by-step troubleshooting with test equipment.
2. The instruction shall be specific to the VFD models provided.
3. Training shall be scheduled a minimum of 3 weeks in advance.
4. Training shall include individual sessions for 1 shifts of plant personnel.
5. Proposed training materials shall be submitted for review, and comments shall be incorporated.
6. Training materials shall remain with the trainees.
7. The OWNER may videotape the training for later use with the OWNER's personnel.

3.02 INSTALLATION

- A. Conduit stub-ups for interconnected cables and remote cables shall be located and terminated in accordance with the drive manufacturer's recommendations.
- B. Programming
 1. The CONTRACTOR shall perform programming of drive parameters required for proper operation of the VFDs included in this project.
 2. Submit records of programming data in the equipment Technical Manual, including setup and protective settings.

3.03 FIELD TESTING

- A. Testing, checkout, and startup of the VFD equipment in the field shall be performed under the technical direction of the manufacturer's service engineer.
- B. Under no circumstances shall any portion of the drive system be energized without authorization from the manufacturer's representative.
- C. Verify proper operation of control logic in every mode of control.

END OF SECTION

**SECTION 16420
INDUSTRIAL CONTROL PANELS**

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. The CONTRACTOR shall provide complete disconnect switches with axillary contacts for each flocculation mixer as indicated herein or in other Sections of the Specifications.

1.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. Industrial control panels and/or local control stations shall comply with the requirements of NEC (including Article 409), NEMA, and UL.

1.03 CONTRACTOR SUBMITTALS

- A. Furnish Shop Drawings in accordance with Sections 01330 – Submittal Procedures and 16050 – General Electrical Work.
1. Ladder diagrams and written descriptions explaining ladder diagram operation and system operation.
 2. Include catalog cuts of control equipment including enclosures, overcurrent devices, relays, pilot devices, terminations, and wire troughs.

PART 2 - PRODUCTS

2.01 GENERAL

- A. The CONTRACTOR shall provide the equipment, panels and stations to satisfy the functional requirements in the relevant mechanical equipment and Division 16 specifications and the Electrical Elementary Schematics. Each panel and station shall be fabricated with UL labeled components. Equipment not specifically indicated as being WORK of other Sections shall be provided under this Section. All equipment, panels and stations shall be wired under this Section.
- B. Disconnect Switches
1. Heavy duty, fusible, single throw switches shall be rated not less than 65 KAIC at 480 VAC.
 2. Horsepower rated
 3. UL listed
 4. Padlockable in "Off" position and door interlock
 5. Enclosure per area classification in Section 16050 – General Electrical Work.
 6. Auxiliary control contact.
 7. Manufacturer, or approved equal:
 - a. Cutler Hammer
 - b. EATON
 - c. Square D
- C. Identification of panel-mounted devices, conductors, and electrical components shall be in accordance with Section 16050 – General Electrical Work.
- D. Panel-mounted devices shall be mounted a minimum of 3-feet above finished floor elevation, but not higher than 6'-6" above finished floor, unless noted otherwise.

2.02 SPARE PARTS

- A. Provide a minimum of 10 percent spare lamps (minimum 2) and one spare lens for each color pilot lamp in each panel.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Disconnects shall be installed in accordance with in Section 16050 – General Electrical Work, and in accordance with the manufacturer's recommendations.
- B. Conduit, conductors, and terminations shall be installed in accordance with Section 16050 – General Electrical Work.

3.02 FIELD TESTING

- A. Each disconnect shall be tested again for functional operation in the field after the connection of external conductors and prior to equipment startup.

END OF SECTION

SECTION 16431
PROTECTIVE DEVICE STUDIES

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. Section includes:
1. Short-circuit Fault Analysis Study.
 2. Protective Device Coordination Study.
 3. Arc-flash Hazard Study.
- B. The CONTRACTOR shall perform the indicated short circuit, protective device, and arc flash hazard studies for the electrical power system complete including new, modified, and existing distribution equipment in accordance with the Contract Documents for both the Normal and Emergency Power Systems.
1. The previous short circuit, coordination and arc flash study report was performed in 2017 by SIEMENS Industrial Services SAP# 5200520141. The Short Circuit, Protective Device Coordination and Arc Flash Study PDF shall be made available upon request.
 2. Facility modification since 2017 study include:
 - a. Phase 2 (PDF shall be made available upon request):
 - WEST MCC:
 - Replaced existing 40HP Air Scour Blower with new 60HP Blower.
 - SWBD1:
 - Installation of new DP-8200, PNL-8200, and MPZ-8200.
 3. Contactor shall incorporate PHASE 2 and current PHASE 3 contract improvement to provide updated studies per specification.
- C. The WORK of this Section shall include protection studies for motors with solid state overload and overcurrent protection devices.
- D. It is the responsibility of the CONTRACTOR to obtain and collect the information required from the electric utility and appropriate vendors to fully perform the study, including but not limited to engine generator data, motor data, circuit breakers, utility company short circuit, available new and existing device ratings, conductor data, transformer ratings, etc.
1. The CONTRACTOR shall be responsible for scheduling and coordinating the work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the CONTRACTOR'S work.
- E. The short circuit portion of the study shall be submitted prior to or along with the switchgear submittal, and shall include all equipment which has an AIC rating. The short circuit study shall reflect that all equipment with an AIC rating is properly rated for its specific application. The submitted switchgear (including all equipment which has an AIC rating) shall reflect the findings of short circuit study (i.e, the AIC ratings of the equipment shall exceed the available short circuit current and any required derating factors at each point in the system). Series ratings are not acceptable.

1.02 REFERENCES

- A. Institute of Electrical and Electronics Engineers (IEEE):
1. IEEE 141 - Recommended Practice for Electric Power Distribution for Industrial Plants (Red Book).
 2. IEEE 242 - Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems (Buff Book).

3. IEEE 315 - Standards Electrical and Electronics Graphic and Letter Symbols and Reference Designations.
4. IEEE 399 - Recommended Practice for Industrial and Commercial Power Systems Analysis (Brown Book).
5. IEEE 902 - Guide for Maintenance, Operation and Safety on Industrial and Commercial Power Systems (Yellow Book).
6. IEEE 1015 - Recommended Practice for Applying Low-Voltage Circuit Breakers Used in Industrial and Commercial Power Systems - Corrigendum 1 (Blue Book).
7. IEEE 1584 - Guide for Performing Arc Flash Hazard Calculations.

1.03 QUALIFICATIONS

- A. CONTRACTOR shall retain a 3rd party independent consultant to perform the study required in this specification.
- B. Short circuit studies, protective device evaluation studies, arc-flash hazard analysis studies, and protective device coordination studies shall be performed by a manufacturer who has been regularly engaged in short circuit and protective device coordination services for a period of at least 10 years.
- C. The indicated studies shall be stamped/signed by the professional electrical engineer, registered in the State of California, responsible for the studies.
- D. The studies shall utilize computer programs with proven reliability and accuracy for performing 3-phase fault-duty calculations.

1.04 STUDY REQUIREMENTS

- A. Report Preparation:
 1. Prepare study prior to ordering distribution equipment to verify equipment ratings required.
 2. Perform study with aid of computer software program.
 3. Calculate short circuit interrupting and, when applicable, momentary duties for assumed 3-phase bolted fault short circuit current and phase to ground fault short circuit current at each of the following:
 - a. Utility supply bus.
 - b. Medium voltage air interrupter switchgear.
 - c. Automatic transfer switch.
 - d. Manual transfer switch.
 - e. Engine generator.
 - f. Medium voltage motor controllers.
 - g. Low-voltage switchgear.
 - h. Switchboards.
 - i. Motor control centers.
 - j. Distribution panelboards.
 - k. Branch circuit panelboards.
 4. Each other significant equipment location throughout system.
- B. Report Contents (similar to SKM Power Tools) and include the following:
 1. Calculation methods and assumptions.
 2. Base per unit value selected.
 3. One-line diagram, with short circuit values, arc flash values, feeder values and lengths.

4. Source impedance data including power company system available power and characteristics.
5. Typical calculations.
 - a. Fault impedance.
 - b. X to R ratios.
 - c. Asymmetry factors.
 - d. Motor fault contribution.
 - e. Short circuit kVA.
 - f. Symmetrical and asymmetrical phase-to-phase and phase-to-ground fault currents.
 - g. Tabulations of calculation quantities and results.
6. One-line diagram revised by adding actual instantaneous short circuits available.
7. State conclusions and recommendations.
8. Prepare time-current device coordination curves graphically indicating coordination proposed for system, centered on conventional, full-size, log-log forms.
9. Prepare with each time-curve sheet complete title and one-line diagram with legend identifying specific portion of system covered by that particular curve sheet.
10. Prepare detailed description of each protective device identifying its type, function, manufacturer, and time-current characteristics. Tabulate recommended device tap, time dial, pickup, instantaneous, and time delay settings.
11. Plot device characteristic curves at point reflecting maximum symmetrical fault current to which device is exposed. Include on curve sheets the following:
 - a. Power company relay characteristics.
 - b. Power company fuse characteristics.
 - c. Medium voltage equipment protective relay characteristics.
 - d. Medium voltage equipment protective fuse characteristics.
 - e. Low voltage equipment circuit breaker trip device characteristics.
 - f. Low voltage equipment fuse characteristics.
 - g. Cable damage point characteristics.
 - h. Pertinent transformer characteristics including:
 - Transformer full load current.
 - Transformer magnetizing inrush.
 - ANSI transformer withstand parameters.
 - Significant symmetrical fault current.
 - i. Pertinent motor characteristics.
 - j. Generator characteristics including:
 - Phase and ground coordination of generator protective devices.
 - Decrement curve and damage curve.
 - Operating characteristic of protective devices.
 - Actual impedance value.
 - Time constants.
 - Current boost data.
 - Do not use typical values for generator.

- k. Transfer switch characteristics.
- l. Other system load protective device characteristics.

1.05 SUBMITTALS

- A. The indicated studies shall be submitted and approved by the ENGINEER prior to final approval of the distribution equipment Shop Drawings and release of equipment for manufacture.
- B. An initial short circuit study shall be submitted and reviewed before the ENGINEER will approve the Shop Drawings for medium-voltage switchgear, transformers, or 480-volt distribution equipment.
- C. Submit an initial protective device coordination study shall be submitted with 90 days after the approval of the initial short circuit study.
- D. The short circuit, arc-flash hazard analysis, and protective device coordination studies shall be updated prior to Project Substantial Completion; utilize characteristics of as-installed equipment and materials.
- E. The adequacy of the equipment "withstand" and interruption ratings shall be approved by the ENGINEER.
- F. Submit copies of final report signed by Professional Engineer. Make additions or changes required by review comments.
- G. Submit all exported software files from approved final report in 32GB thumb drive required.
 - 1. Including the electrical system model(s), configuration files, custom libraries, and any other files used to perform the studies and produce the reports.
 - 2. Software files shall be free of password protection to allow OWNER to modify program.

1.06 MANUFACTURERS' SERVICES

- A. The low-voltage switchgear manufacturer shall furnish the services of a qualified field engineer and necessary tools and equipment in order to test, calibrate, and adjust the protective relays and circuit breaker trip devices as recommended in the power system coordination study.
- B. The motor control center manufacturer shall furnish the services of a qualified field engineer to calibrate the MCPs as recommended in the power system study.

1.07 SEQUENCING

- A. The short circuit portion of the study shall be submitted prior to or along with the switchgear submittal, and shall include all equipment which has an AIC rating. The short circuit study shall reflect that all equipment with an AIC rating is properly rated for its specific application. The submitted switchgear (including all equipment which has an AIC rating) shall reflect the findings of short circuit study (i.e., the AIC ratings of the equipment shall exceed the available short circuit current and any required derating factors at each point in the system.). No series rated devices will be allowed.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 GENERAL

- A. The studies shall include development of single-line and impedance diagrams of the power system.
- B. The diagrams shall identify components considered in the study and the ratings of power devices, including transformers, circuit breakers, relays, fuses, busses, and cables.
- C. The resistances and reactance's of cables shall be identified in the impedance diagram.
- D. The CONTRACTOR shall obtain the Electric Utility information on the minimum and maximum available fault current, minimum and maximum utility impedances, utility protective device

settings including manufacturer and model number, interrupting ratings, X/R ratios, and model information one level above the point of connection:

1. Utility tolerances and voltage variations.
- E. The studies shall include every protective device and feeder included or modified within the WORK.
- F. The studies shall include all portions of the electrical distribution system for normal and standby power sources down to and including the 480-volt distribution system.

3.02 SHORT CIRCUIT STUDY

- A. The short circuit study shall be performed with the aid of a digital computer program, and shall be in accordance with the following Standards:

ANSI/IEEE 141	Recommended Practice for Electrical Power Distribution for Industrial Plants
ANSI/IEEE 242	Recommended Practice for Protection, and Coordination of Industrial, and Commercial Power Systems
ANSI/IEEE C 37.010	Application Guide for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis
ANSI/IEEE C 37.13	Low-Voltage AC Power Circuit Breakers Used in Enclosures

3.03 PROTECTIVE DEVICE EVALUATION STUDY

- A. A protective device evaluation study shall be performed in order to determine the adequacy of circuit breakers, molded case switches, and fuses.
- B. Any problem areas or inadequacies in the equipment due to prospective short-circuit currents shall be promptly brought to the attention of the ENGINEER.
- C. Do not utilize series-rated circuit breakers to meet short circuit requirements for this project.
- D. Devices shall be fully rated to withstand available fault currents.

3.04 PROTECTIVE DEVICE EVALUATION STUDY

- A. A protective device coordination study shall be performed in order to develop the necessary calculations to select power fuse ratings, protective relay characteristics and settings, ratios and characteristics of associated current transformers, and low-voltage breaker trip characteristics and settings.
- B. Any problem areas or inadequacies in the equipment due to prospective short-circuit currents shall be promptly brought to the ENGINEER's attention.

3.05 TIME/CURRENT COORDINATION CURVES

- A. As a minimum, the time/current coordination curves for the power distribution system shall include the following items plotted on 5-cycle log-log graph paper:
1. time/current curves for each protective relay, circuit breaker, or fuse demonstrating graphically that the settings will provide protection and selectivity within industry standards
 2. Each curve shall be identified, and tap and time dial settings shall be specified.
 3. Provide individual curves for each feeder unless identical to others.
 4. Selectivity
 - a. Time/current curves for each device shall be positioned to provide the maximum selectivity to minimize system disturbances during fault clearing.
 - b. Where selectivity cannot be achieved, the ENGINEER shall be notified as to the cause.

- c. Recommendations shall be included for alternate methods that would improve selectivity.
- 5. time/current curves and points for cable and equipment damage.
- 6. circuit interrupting device operating and interrupting times
- 7. Indicate maximum fault values on the graph.
- 8. sketch of bus and breaker arrangement
- 9. magnetizing inrush points of transformers
- 10. thermal limits of dry-type and liquid-insulated transformers (ANSI damage curve)
- 11. Every restriction of the ANSI and National Electrical Code shall be followed, and proper coordination intervals and separation of characteristics curves shall be maintained.

3.06 ARC FLASH STUDY

- A. An arc flash study shall be performed with the aid of a digital computer program in order to determine the “Arc Flash Protection Boundary” and “Personal Protective Equipment” (PPE) levels for applicable electrical distribution equipment, stand-alone disconnects, starters, and VFDs in the power distribution system.
- B. The arc flash study shall be performed in conjunction with short circuit calculations and protective device coordination.
- C. The arc flash study shall be in accordance with the latest version of the following Standards:
 - 1. NFPA 70E Standard for Electrical Safety Requirements for Employee Workplaces
 - 2. IEEE 1584 IEEE guide for performing Arc Flash Hazard Calculations
 - 3. OSHA (29 CFR PART 1910) Occupational Safety and Health Standards for General Industry
 - 4. ANSI Z535.4 Product Safety Signs and Labels
- D. The recommended values for the “Arc Flash Protection Boundary” and PPE levels, based on the arc flash study results, shall be tabulated in the study.
- E. Labeling
 - 1. The digital computer program shall provide the “Arc Flash Protection Boundary” and PPE values in a format that can be directly printed on to labels.
 - 2. The CONTRACTOR shall provide these labels in accordance with Section 16050 – General Electrical Work.

3.07 FINAL SUMMARY REPORT

- A. Summarize the results of the indicated power system studies in a final report.
- B. The report shall include the following items:
 - 1. single-line diagram
 - 2. impedance diagram
 - 3. tabulation of all protective devices identified on the single line diagram
 - 4. time/current coordination curves
 - 5. specific recommendations, if any
 - 6. test instrumentation, condition, and connections, as applicable, for each study
 - 7. computerized fault current calculations
 - 8. any suggested changes to the protection scheme or equipment selection that will result in improved system reliability and safety
 - 9. recommendations to minimize the arc flash energy

- C. The report shall include information concerning the computer program used for the study, as well as a general discussion of the procedure, items, and data considered in the preparation of the study.
- D. Submit 4 bound copies and PDF including all protective device study data files of the report to the ENGINEER.
- E. Submit all exported software files from approved final report in 32GB thumb drive required.
 - 1. Including the electrical system model(s), configuration files, custom libraries, and any other files used to perform the studies and produce the reports.
 - 2. Software files shall be free of password protection to allow OWNER to modify program.

3.08 PROTECTIVE DEVICE TESTING, CALIBRATION, AND ADJUSTMENT

- A. Test, calibrate, and adjust the protective relays and circuit breaker trip devices in accordance with the recommendations in the power system coordination study.
- B. Calibrate the MCPs as in accordance with the recommendations in the power system study.
- C. Adjustments shall be made prior to energizing any electrical equipment.
- D. Provide the services of a qualified testing agency and the necessary tools and equipment to test, calibrate and adjust the protective relays and circuit breaker trip devices as recommended in the settings table provided by the coordination study. Field adjustments to be completed by the CONTRACTOR.

END OF SECTION

SECTION 16445
LOW-VOLTAGE MOTOR CONTROL CENTERS

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. The CONTRACTOR shall provide motor control centers (MCCs), complete and operable, in accordance with the Contract Documents.
- B. The requirements of Section 16050 – General Electrical Work, apply to the WORK of this Section.
- C. In the event that provided motors are of greater horsepower than the indicated motors, revise the raceways, conductors, starters, overload elements, and branch circuit protectors as necessary in order to control and protect the increased motor horsepower.
- D. Single Manufacturer
 - 1. The MCCs shall be the end product of one manufacturer in order to standardize appearance, operation, maintenance, spare parts, and manufacturer's services.
 - 2. This requirement, however, does not relieve the CONTRACTOR of overall responsibility for the WORK.
- E. Coordination
 - 1. The equipment provided under this Section shall operate the electric motor driver with the driven equipment as indicated under other equipment Sections.
 - 2. The MCC manufacturer shall be provided with the following information, at a minimum:
 - a. Section 16050 – General Electrical Work
 - b. Division 15 Specifications for driven equipment
 - c. Section 16420 – Industrial Control Panels
 - d. Section 16060 – Electrical Tests
 - e. Electrical Contract Drawings

1.02 SUBMITTALS

- A. Furnish submittals in accordance with Section 16050 – General Electrical Work.
- B. Furnish the following equipment information in the Shop Drawings:
 - 1. NEMA rating and color of enclosure
 - 2. horizontal and vertical bus ampacities, voltage rating, interrupting capacity, and materials of construction
 - 3. ground bus size and material of construction
 - 4. conduit entrance provisions
 - 5. main incoming line entry provision (top or bottom)
 - 6. control unit nameplate schedule
 - 7. circuit breaker types, frames, and settings
 - 8. starter NEMA sizes, auxiliary contact provisions, and coil voltage
 - 9. relays, timers, pilot devices, control transformer VA and fuse sizes
 - 10. MCC Ladder Diagrams
 - a. Furnish custom elementary schematic ladder diagrams for each compartment.
 - b. The ladder diagrams shall include remote devices.

- c. Submittals not meeting these requirements will not be reviewed further and will be returned to the CONTRACTOR.
- 11. Short circuit rating of the complete assembly
- 12. Replacement parts lists and operation and maintenance procedures
- 13. Seismic design certification of the anchoring system in accordance with Section 16050 – Electrical Work, General and Section 16070 – Seismic Restraints and Supports.
- 14. Time-current curves for protective devices
- 15. VFD Equipment Information
 - a. name of starter and drive manufacturer
 - b. type and complete model number
 - c. assembly drawing and nomenclature, including enclosure dimensions, mounting and anchoring details, and internal layout
 - d. detailed schematics, including external wiring connections
 - e. maximum heat dissipation capacity in kW
 - f. altitude de-rating information
- 16. System block diagram and interconnection diagrams, including communication protocol, cabling requirements, and any equipment required to connect to the PLC if the PLC has data communication network(s) with any of the MCC component(s).
- 17. factory test data certifying compliance with requirements of similar equipment from the same manufacturer
- C. Furnish an Owner's Manual, including:
 - 1. manufacturer's 2-year warranty
 - 2. field test report
- D. Furnish the Manufacturer's Service Representative's resume, including the following documentation:
 - 1. copy of the proposed representative's Factory Training Certificate
 - 2. number of years experience servicing the manufacturer's MCCs and VFDs
 - 3. a statement that the individual is authorized to inspect, test and perform field service and repairs
- E. Spare Parts List
 - 1. Furnish spare parts information for parts required by this Section as well any other spare parts recommended by the MCC manufacturer.
- F. Startup and Testing Report
 - 1. Within 15 days after completion of startup and testing, the CONTRACTOR shall submit a report for the MCC.
 - 2. The report shall contain the following documentation:
 - a. the device name, serial number, rating, and complete model number of each MCC
 - b. a complete listing of all tests performed and the results of each test
 - c. a complete listing of all circuit breaker and overload settings, fuse ratings, settings, setpoints and configuration information for VFDs and equipment or devices with adjustable settings

- d. documentation for training that was provided to the OWNER's personnel, including topics covered, instructor's name and contact information, and a list of attendees

PART 2 - PRODUCTS

2.01 GENERAL

- A. The manufacturer of the low-voltage motor control center shall also manufacture at least the following:
1. molded case circuit breakers, up to and including 225 ampere frame size
 2. disconnect switches
 3. magnetic motor starters
 4. control and timing relays rated at 600 volts AC
 5. pushbuttons, lights and selector switches, including remote mounted control stations
 6. meters, including ammeter, voltmeter, and solid-state metering devices
- B. Single Manufacturer
1. Devices of the same type shall be products of the same manufacturer.
 2. This requirement applies to control devices, custom-fabricated equipment, and insofar as practical to equipment manufactured on a production basis.
- C. Motor control centers shall conform to the standards for NEMA Class IIS, Type B diagrams and wiring.
- D. MCC Schedule

MCC DESIGNATION	LOCATION
WEST MCC EXTENSION	LOWER LEVEL – ELECTRICAL ROOM

2.02 DESIGN, CONSTRUCTION, AND MATERIAL REQUIREMENTS

- A. The motor control centers shall be 600-volt class and suitable for operation on a 3-phase, 60-Hz system.
- B. The system operating voltage and number of wires shall be as indicated.
- C. Power
1. The motor control center shall receive power from a 3-phase, delta-connected 480-volt WEST MCC.
 2. Power distribution from the MCC shall be 480-volt, 3-phase, 3-wire.
 3. The MCC shall include provision for termination of an incoming neutral conductor in conformance to NEC requirements for service entrance.
- D. Enclosure
1. The enclosure shall be of NEMA Type 1.
 2. The variable frequency drive (VFD) compartments may be of NEMA Type 1, gasketed, provided that ventilation inlet openings are covered by externally replaceable dust filters.
 3. Compartment doors shall be interlocked with compartment circuit breakers, fitted with a maintenance override.

4. Latches for panelboard compartments shall have butterfly heads or another hand operable method that does not require tools to operate.
- E. Enclosure Ventilation: Provide forced air ventilation to limit ambient temperatures within the enclosure. Provide filters over openings. Provide ConAir Rotron ball bearing fans or equivalent.
- F. Size and Arrangement
1. Motor control centers shall be configured as mechanical groupings of control center units, assembled into a lineup of control center sections.
 2. Each control section shall be nominally 90 inches tall by a minimum of 20 inches deep, with a maximum width of 18".
 3. MCCs shall be designed to not exceed the indicated spatial requirements, including spaces, spares, and future compartments.
 4. MCCs shall be subject to rejection if they exceed the indicated lengths, where allotted space is critical.
 5. Equipment within the MCC may be rearranged at the discretion of the manufacturer, providing that the MCC includes the spares, space, and future provisions as indicated.
 6. Switches and circuit breakers used as switches shall be located such that the center of the grip of the operating handle of the switch or circuit breaker, when in its highest position, will not be more than 6 feet, 7 inches above the floor, including the height of the concrete pad.
- G. Components
1. Busses
 - a. Provide a continuous copper ground bus, full width of the motor control center line-up.
 - b. Horizontal Busses
 - The main horizontal bus shall be of tin-plated copper, and located within an isolated compartment.
 - The bus shall be rated for 600 amperes minimum, but in no case less than the main lug or main breaker frame size.
 - c. Vertical Busses
 - The vertical bus in each section shall consist of a single tin-plated copper conductor per phase, with a current capacity of not less than 300 amps.
 - The vertical bus shall be completely isolated and insulated, and shall extend the full height of the section wherever possible.
 - d. Power buses shall be braced to withstand 65,000 amperes, minimum.
 2. Wireways
 - a. Provide a separate vertical wireway adjacent to each vertical unit, covered by a hinged door.
 - b. Each individual unit compartment shall be provided with a side barrier to permit pulling wire in the vertical wireway without disturbing adjacent unit components.
 - c. Full height (72-inch) compartments or sections are not required to have a separate wireway.
- H. Cabinets
1. Structural members shall be fabricated of not less than 12-gauge steel, and side and top panels and doors shall be fabricated of not less than 14-gauge steel.

2. Spaces designated as SPACE or BLANK shall include blank hinged doors and vertical bus bars.
3. Control units inside compartments shall be clearly identified with tags or stencil markings.
4. Identification
 - a. Each control unit, including spares, spaces and blanks, lights, and devices shall be identified by an engraved nameplate.
 - b. Identification shall include the indicated circuit number.
 - c. Each motor control center shall be fitted with the manufacturer's nameplate which shall include the NEMA Standard electric rating and other pertinent data, including manufacturer, sales order number, date of manufacture, and place of manufacture.
5. Where "L" or "U" shaped MCC layouts are indicated, corner compartments shall have similar current and short circuit ratings as functional compartments.
6. Fans, heat exchangers, transformers, capacitors, junction boxes, and other devices shall not be mounted on the outside of the motor control center enclosure.
7. Protective Coating
 - a. The finish for motor control center shall be light grey: ANSI 61 or 49.
 - b. The panels shall be coated with 2 coats of primer inside and out, and 2 coats of enamel finish.
 - c. External colors other than ANSI 61 or 49 will not be accepted.

2.03 MAIN AND FEEDER CIRCUIT BREAKERS (480 V)

- A. Circuit breakers having a frame size of 150 amperes or less shall be molded-case type with thermal magnetic non-interchangeable, trip-free, sealed trip units.
- B. The interrupting capacity of the main and feeder branch circuit breakers shall be a minimum of 65,000 RMS symmetrical amperes.
- C. Circuit breaker disconnect operators shall be capable of accommodating 3 padlocks for locking in the OPEN position.
- D. Circuit breaker auxiliary contacts shall be furnished where indicated.

2.04 MOTOR STARTERS

- A. Control Power Transformer
 1. Each starter unit shall have its own control power transformer, with a 115-volt grounded secondary.
 2. Provide one secondary fuse and 2 primary fuses.
 3. Control power transformers shall be sized to accommodate the indicated control devices.
 4. Local control devices shall be mounted independently of the cover door.
 5. Starters shall have a local GREEN RUN indicator, and a RED OFF indicator to indicate the presence of control power when the motor is not energized.
 6. Starters shall be provided with elapsed time meters, HAND-OFF-AUTO selector switches, and other devices as indicated.
 7. Cubicle control wires shall be terminated at a pull-apart disconnecting terminal block located at the cubicle.
- B. Identification
 1. The motor control center manufacturer shall be responsible for identifying each control wire within each motor starter unit with wrap-around permanent plastic markers.

2. Each control wire shall be identified at both ends.
- C. NEMA Ratings
1. Motor starters shall be designed to NEMA ratings.
 2. Starters designed to IEC ratings or with dual IEC/NEMA ratings will not be accepted, either as part of an MCC, as remote starters, or as part of an equipment package.
- D. Unless otherwise indicated, 2-speed starters shall be of the 2-winding type.
- E. Variable Frequency Drives
1. Variable frequency drives (VFDs) shall be in accordance with the requirements of Section 16269 – Variable Frequency Drives.
 2. An externally mounted line reactor, cooling fan, and bypass contactor will not be accepted.

2.05 FACTORY TESTS

- A. Provide the manufacturer's standard electrical and mechanical production tests and inspections for motor control centers and their components.
- B. The tests shall include electrical continuity check, dielectric tests for each circuit, and inspection for proper functioning of components including controls, protective devices, metering, and alarm devices.

2.06 SPARE PARTS

- A. The CONTRACTOR shall furnish the following for each MCC:
 1. Unit Control Transformer: one of each size furnished in magnetic starters installed
 2. Bezels: 3 of each color installed for pilot indicators
 3. Panel Lamps: one dozen of each type (form, voltage and current rating) installed
 4. Control Fuses: one dozen of each type (form, voltage and current rating) installed
 5. Relays: one of each type and size installed
- B. Spare parts shall be identified by MCC number, type, size, and manufacturer.

2.07 MCC INTEGRATOR/SUPPLIER, or pre-approved equal.

A. TESCO CONTROLS

1. Contractor may elect pre-approved equal by submitting preliminary MCC elevations during bid showing the proposed MCC dimensions satisfy existing electrical building conditions.

PART 3 - EXECUTION

3.01 GENERAL

- A. The CONTRACTOR shall install motor control centers in accordance with the manufacturer's published instructions.
- B. Conduit installation shall be coordinated with the manufacturer's as-fabricated drawings such that conduit stub-ups are within the area allotted for conduit.
- C. Conduit shall be stubbed up in the section that contains the devices to which conductors are terminated.

3.02 STORAGE AND HANDLING

- A. If stored at the Site, motor control centers shall be stored in a clean, dry space.
- B. Factory wrapping shall be maintained or an additional heavy plastic cover shall be provided to protect units from dirt, water, construction debris, and traffic.
- C. The storage space shall be heated or the MCC space heaters shall be energized.

D. Motor control centers shall be handled carefully to avoid damage to motor control center components, enclosure, and finish.

E. Damage shall be repaired before installation.

3.03 MANUFACTURER'S SERVICES

A. General

1. An authorized Service Representative of the manufacturer shall be present at the Site for 3 Work Days in order to provide the services listed below.
2. For the purpose of this paragraph, a Work Day is defined as an 8-hour period, excluding travel time.
3. The service representative's resume shall be approved by the ENGINEER before training is scheduled.

B. Inspection, Startup, Field Adjustment

1. The Service Representative shall supervise the following items, and shall certify that the equipment and controls have been properly installed, aligned, and readied for operation:
 - a. installation of the equipment
 - b. inspection, checking, and adjusting of the equipment
 - c. startup and field testing for proper operation
 - d. performance of repairs to correct any discrepancies or problems revealed during startup and testing
 - e. performance of field adjustments to ensure that the equipment installation and operation comply with the indicated requirements
 - f. preparation and submittal of a report covering startup and testing, including a listing of equipment settings and parameters at the end of startup and testing.

3.04 INSTALLATION

A. After leveling and shimming, the CONTRACTOR shall anchor motor control centers to the concrete pads, and shall grout such that no space exists between the pad and support beams.

B. The CONTRACTOR shall:

1. torque bus bar bolts to manufacturer's recommendations, and tighten sheet metal and structure assembly bolts;
2. adjust overcurrent protection devices to the instantaneous trip setting position recommended for the actual horsepower and full load amps of the motor;
3. verify that overload devices are proper for equipment installed;
4. make necessary changes in overload devices as required for motors having power factor correcting capacitors;
5. touch up scratches after the equipment has been installed;
6. verify that nameplate, and other identification is accurate; and
7. provide high-voltage switchboard matting in front of the MCC, in accordance with the requirements of Section 16050 – General Electrical Work.

3.05 FIELD TESTS

A. Provide a visual and mechanical inspection after installation, as follows:

1. Inspect for physical damage, proper anchorage, and grounding.
2. Verify that the ratings of the thermal overload heaters match the motor full-load current nameplate data.

3. Check tightness of bolted connections.

B. Electrical Tests

1. Insulation Tests

- a. Measure the insulation resistance of each bus section phase-to-phase and phase-to-ground for one minute.
 - b. The test voltage and minimum acceptable resistance shall be in accordance with manufacturer's recommendations.
 - c. Measure the insulation resistance of each starter section phase-to-phase and phase-to-ground with the starter contacts closed and the protective device open.
 - d. The test voltage and minimum acceptable resistance shall be in accordance with the manufacturer's recommendations.
 - e. Measure the insulation resistance of each control circuit with respect to ground.
2. Verify the proper operation of control logic in each mode of control.

END OF SECTION

SECTION 16450
GROUNDING

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. Provide the electrical grounding system, complete and operable, as indicated in accordance with the Contract Documents.
- B. The requirements of Section 16050 – General Electrical Work, apply to this Section.
- C. Single Manufacturer
 - 1. Like products shall be the end product of one manufacturer in order to achieve standardization of appearance, operation, maintenance, spare parts, and manufacturer's services.

1.02 SUBMITTALS

- A. Furnish submittals in accordance with the requirements of Section 01330 – Submittal Procedures and Section 16050 – General Electrical Work.
- B. Shop Drawings
 - 1. Submit manufacturer's product information for connectors, clamps, and all grounding system components, showing compliance with the requirements of this Section.

PART 2 - PRODUCTS

2.01 EQUIPMENT

- A. Components of the grounding electrode system shall be manufactured in accordance with UL 467 - Standard for Safety Grounding and Bonding Equipment, and shall conform to the applicable requirements of National Electrical Code Article 250 and local codes.
- B. Grounding System
 - 1. Grounding loop conductors shall be bare annealed copper conductors.
 - 2. Conductors shall be No. 4/0 unless indicated otherwise.
 - 3. Buried, concrete-encased, or otherwise inaccessible cable-to-cable and cable-to-ground rod connections using exothermic welds.
 - a. Manufacturer, or Equal
 - Cadweld
 - Thermoweld
 - 4. Exposed Connectors
 - a. Exposed grounding connectors shall be of the compression type (connector-to-cable), constructed of high-copper alloy, and manufactured specifically for the particular grounding application.
 - b. Manufacturer, or approved equal.
 - Burndy
 - O.Z. Gedney
 - 5. Use grounding clamps to bond each separately-derived system to the grounding electrode conductors.
 - 6. Equipment Grounding Circuit Conductors
 - a. The conductors shall be the same type and insulation as the load circuit conductors.

- b. The minimum size shall be as indicated. Where not indicated, sizes shall conform to Table 250.122 of the National Electrical Code.
 - c. Metallic conduit systems shall have an equipment grounding wires as well as being equipment grounding conductors themselves.
7. Grounding Materials Manufacturer, or approved equal.
- a. Copperweld
 - b. Thermoweld
 - c. OZ Gedney

PART 3 - EXECUTION

3.01 PREPARATION

- A. Provide a separate grounding conductor, securely grounded in each raceway independent of raceway material.
- B. Provide a separate grounding conductor for each motor and connect at motor box. Provide a supplemental ground connection for motor shaft grounding rings, where applicable.
- C. Do not use bolts for securing the motor box to the frame or the cover for grounding connectors.
- D. Sizes shall be as indicated on the Conduit Schedule and in accordance with NEC Article 250.
- E. Route the conductors inside the raceway.
- F. Provide a grounding-type bushing for secondary feeder conduits that originate from the secondary section of each MCC section or panelboard.
- G. Individually bond the raceway to the ground bus in the secondary section.
- H. Provide a green insulated wire as grounding jumper from the ground screw to a box grounding screw, and, for grounding type devices, to the equipment grounding conductor.
- I. Provide a separate grounding conductor in each individual raceway for parallel feeders. Connect the parallel ground conductors together at each end of the parallel run, as required by the NEC.
- J. Interconnect the MCC or panelboard neutral bus to the ground bus in the secondary switchgear compartment only at the service entrance point. For wye connected, 3 phase, separately derived systems with 3 wire distribution, connect the transformer neutral to the grounding electrode system at the transformer. Connections shall be in accordance with the NEC.
- K. Provide the duct bank ground system as indicated, including trenching, splices, ground rods, and connections to equipment and structures.
- L. Measure ground impedance in accordance with IEEE STD 81 after installation but before connecting the electrode to the remaining grounding system. Provide additional grounding system testing in accordance with Section 16060 – Electrical Tests.
- M. Low Voltage Grounded System (600V or less)
 - 1. A low-voltage grounded system is defined as a system where the local power supply is a transformer, with the transformer secondary grounded.
 - 2. Grounding system connections for a premises-wired system supplied by a grounded AC service shall be provided with a grounding electrode connector connected to the grounded service conductor at each service, in accordance with the NEC.
 - 3. The grounded circuit conductor shall not be used for grounding non-current-carrying parts of equipment, raceways, and other enclosures except where specifically listed and permitted by the NEC.
- N. Embedded Ground Connections

1. Underground and grounding connections embedded in concrete shall be UL-listed ground grid connectors.
2. The connection shall be made in accordance with the manufacturer's instructions.
3. Do not conceal or cover ground connections until the ENGINEER or an authorized representative has established that every grounding connection conforms to the requirements of the Contract Documents and has given the CONTRACTOR written confirmation.

O. Instrumentation Shield Grounding

1. Shielded instrumentation cable shall have its shield grounded at one end only unless the approved Shop Drawings indicate that the shield will be grounded at both ends.
2. The grounding point shall be at the control panel or at the receiving end of the signal carried by the cable.
3. The termination of the shield drain wire shall be on its own terminal screw.
4. Jumper together the terminal screws, using manufactured terminal block jumpers or a No. 14 green insulated conductor.
5. Connect the ground bus via a green No. 12 conductor to the main ground bus for the panel.

END OF SECTION



Bowman WTP Phase 3 Improvements

Contract No. 2022-02

July 2023

Appendix A
Geotechnical Report

GEOTECHNICAL REPORT

PCWA Bowman WTP PAC Facility Building

Auburn, California

March 2019

Prepared for:



WATERWORKS
E N G I N E E R S

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Geotechnical ▪ Geo-Environmental ▪ Construction Services ▪ Forensics

BCI File No. 3508.X
March 25, 2019

Mr. Joe Ziemann, P.E.
Water Works Engineers
2260 Douglas Boulevard, Suite 105
Roseville, CA 95661

Subject: **GEOTECHNICAL REPORT**
PCWA Bowman WTP PAC Facility Building
Auburn, California

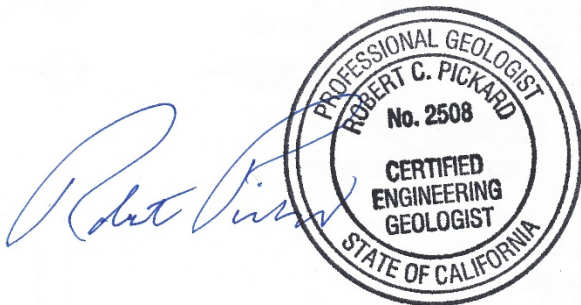
Dear Mr. Ziemann,

Blackburn Consulting (BCI) is pleased to submit this Geotechnical Report for the Placer County Water Agency (PCWA) Bowman Water Treatment Plant (WTP) PAC Facility Building Project. BCI prepared this report in accordance with our January 17, 2019 Task Order from Water Works Engineers.

In this report, we summarize the site geotechnical conditions and present our geotechnical design recommendations. We attach our exploratory boring logs and laboratory test results. Please call if you have questions or require additional information.

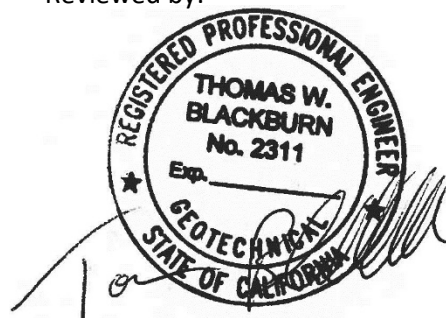
Sincerely,

BLACKBURN CONSULTING



Robert C. Pickard, C.E.G.
Senior Engineering Geologist

Reviewed by:



Thomas W. Blackburn, P.E., G.E.
Senior Principal



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1 INTRODUCTION

1.1 Purpose

In this report BCI generally describes the surface and subsurface conditions, and geotechnical design and construction recommendations for PCWA's new Bowman WTP PAC Building.

Do not use or rely upon this report for different locations or improvements without BCI's written consent.

1.2 Scope of Services

To prepare this report, BCI:

- Reviewed available geologic/geotechnical information for the site.
- Discussed the proposed improvements and reviewed plans with Water Works Engineers.
- Reviewed original boring logs and site plans provided by Water Works Engineers.
- Observed the subsurface conditions in one exploratory boring drilled on January 29, 2019 and two hand auger borings performed on March 4, 2019.
- Performed laboratory tests on soil samples obtained from the exploratory boring.
- Performed engineering analysis and calculations to develop our conclusions and recommendations.

1.3 Site and Project Description

The PAC building will be an approximately 18x25 foot steel frame structure located on the north side of the Bowman WTP located in Auburn, California. Figure 1 shows the approximate site location.

Water Works initially planned to locate the structure on the south side of the access road adjacent to the existing flocculation sedimentation basin. Subsequently, the proposed building location was moved and current plans show the structure on the north side of the access road near the canal intake screen and canal drain. Figure 2 shows the planned location of the PAC building.

Existing grades in the building footprint range from approximately 1811 feet (north side) to 1813 feet (southeast corner). The proposed slab elevation will be 1813 feet. The lightly loaded PAC building will be founded on shallow strip and spread footings with slab-on-grade floors. We expect strip footing loads on the order of 1 to 3 kips per foot.

Low grass covered the ground during our site visit and appears to have been disturbed as part of past grading operations. Photographs 1 and 2 show the proposed location of the PAC building location.



Photograph 1- Approximate location of PAC building looking south towards treatment plant



Photograph 2- Approximate location of PAC building looking north from treatment plant.



2 GEOLOGIC CONDITIONS

Our site work and published geologic mapping¹ show the project site is underlain by Paleozoic metasedimentary rock.

The Fault Activity Map of California² (Jennings and Bryant, 2010) does not identify Historic or Holocene age faults (displacement within the last 11,700 years) within or adjacent to the project site. The nearest mapped fault is the Late Quaternary age Foothill Faults – Dewitt Section located approximately 3.9 miles west of the site.

3 FIELD WORK AND LABORATORY TESTS

3.1 Exploratory Borings

To characterize the site subsurface conditions, BCI drilled, logged and sampled one boring (B1) near the originally proposed building site on January 29, 2019. The boring was advanced to a depth of 15.8 feet below ground surface (bgs). Our subcontractor, Taber Drilling, drilled the boring using 4-inch solid stem augers. BCI obtained soil samples at various intervals using 3.0-inch O.D. Modified California samplers (equipped with 2.4-inch diameter stainless steel liners). Taber drove the samplers with an automatic hammer, weighing 140-pounds and falling approximately 30-inches per blow.

When the PAC building location was changed, we checked the subsurface conditions with two hand augers (HA1 and HA2) to refusal at the new location on March 4, 2019. Figure 2 shows the approximate boring and hand auger locations. We include the boring logs in Appendix A.

3.2 Laboratory Tests

We performed the following laboratory tests on representative soil samples from the exploratory boring at the originally proposed building site:

- Unit weight and moisture content tests for in-situ soil property characterization and liquefaction, settlement, and bearing capacity analysis.
- Direct Shear for bearing and lateral capacity analysis.

Appendix B presents the laboratory test results.

¹ Wagner, D.L., Jennings, C.W., Bedrossian, T.L., and Bortugno, E.J., 1981, Geologic map of the Sacramento quadrangle, California, 1:250,000: California Division of Mines and Geology, Regional Geologic Map 1A, scale 1:250,000.

² Jennings, Charles W., and Bryant, William A., 2010 Fault Activity Map of California: California Geological Survey, Geologic Data Map No. 6.



4 SUBSURFACE FINDINGS

We discuss the subsurface conditions at the current planned PAC building location as logged in the two hand augers.

4.1 Soil and Rock Conditions

We encountered the following general soil/rock profile in our hand augers (HA1 and HA2):

- Loose clayey sand with gravel and sandy lean clay with gravel to depths of approximately 1.7 to 3.0 feet below ground surface (bgs). This could be old fill or disturbed native soil from previous site work.
- Very soft to soft, decomposed, metasedimentary rock below 1.7 to 3.0 feet bgs. Our interpretation of rock is based on hand auger refusal and refusal to 3/8-inch steel probe.

Refer to the Boring Logs (Appendix A) for more specific subsurface conditions at each exploration location.

4.2 Groundwater

We encountered wet soil (perched groundwater) at approximately 2.8 feet in HA1. We did not encounter groundwater in our other hand auger or boring. Perched groundwater levels can fluctuate due to changes in precipitation, canal levels, and other factors.

Based on our experience in the area, groundwater can occur at isolated locations within or perched above the fractured rock. An accumulation of water can also occur near the soil/rock interface during and for several months following the rainy season.

5 CONCLUSIONS AND RECOMMENDATIONS

5.1 Geologic Hazards

- Faulting- The potential for surface rupture or creep due to faulting at the site is very low. The Fault Activity Map of California³ (Jennings and Bryant, 2010) and the Geologic Map of California, San Francisco-San Jose⁴ (Wagner, et. al., 1991) does not identify Historic or Holocene age faults (displacement within the last 11,700 years) within or immediately adjacent to the site. The site does not lie within or adjacent to an Alquist–Priolo Earthquake Fault Zone⁵ (Bryant and Hart, 2007).

³ Jennings, Charles W., and Bryant, William A., 2010 Fault Activity Map of California: California Geological Survey, Geologic Data Map No. 6.

⁴ Wagner, D.L., Bortugno, E.J., and McJunkin, R.D., 1991, Geologic map of the San Francisco-San Jose quadrangle, California, 1:250,000: California Division of Mines and Geology, Regional Geologic Map 5A, scale 1:250,000

⁵ Bryant, W.A., and Hart, E.W., 2007 (Interim Revision), Fault-Rupture Hazard Zones in California: California Department of Conservation, Division of Mines and Geology, Special Publication 42.



- Ground Shaking- The Structural Engineers Association of California (SEAOC) and California's Office of Statewide Health Planning and Development (OSHPD), Seismic Design Maps (<https://seismicmaps.org>) indicate that for the design seismic event, a peak horizontal ground acceleration (PGA) of approximately 0.17g could be expected.
- Liquefaction- Our investigation shows the site is underlain by shallow rock that is not liquefiable. Therefore, the potential for damaging liquefaction at the site is non-existent.
- Landslides and Slope Stability- Due to the relatively low topographic relief we do not expect landsliding or natural slope failure.
- Seismically Induced Settlement- During a seismic event, ground shaking can cause densification of granular soil that can result in settlement of the ground surface. Considering the shallow nature of rock, we consider the potential for significant seismically induced settlement to be non-existent.

5.2 Grading

Where referenced in this report, use ASTM D 1557 test methods to determine relative compaction and optimum moisture. Compacted soil should not be considered suitable (even if it meets relative compaction requirements) if it is unstable and pumps or flexes excessively under construction equipment loads.

5.2.1 Original Ground and Subgrade Preparation

Prior to site grading remove surface vegetation, debris, abandoned utilities, existing asphalt concrete and aggregate base, unwanted structures, soft or unstable areas, or other deleterious materials.

5.2.2 Building Pad Over-excavation

We observed loose clayey sands with gravel (possibly old fill or disturbed native soils) in the building footprint. To mitigate the loose soil conditions in building pad area remove the soils to expose weathered rock (approximately 1.7 to 3 feet bgs) within and extending 5 feet beyond the building footprint. Remove loose rock material prior to placement of backfill. Retain BCI to observe exposed subgrade, prior to pad fill placement, so we can check that the contractor has removed the loose material. Place fill as discussed in section 5.2.3.

Do not use strippings within engineered fill. Strippings can be placed in the upper 2 feet of landscape areas (non-structural locations) if approved by the landscape architect.

We encountered shallow/perched groundwater in HA1. If the contractor encounters groundwater during over-excavation we expect that it can be controlled with sump pumps.

5.2.3 Fill and Compaction

On-site soil, including in the borrow area, may be used as fill provided it is free of debris and visible concentrations of vegetation and has a maximum particle size of 1 inch.



Fill (non-expansive fill) must meet the following requirements:

- No concentrations of organics, debris, and other deleterious materials,
- Maximum particle size of 1-inch, with at least 75% passing the No. 4 Sieve, and between 15-40% passing the No. 200 Sieve.
- Expansion Index of less than or equal to 20, per ASTM D4829
- Approved by BCI prior to transport to the site.

Place and compact on-site, borrow, and imported fill as follows:

1. Place fill in loose lifts no thicker than 8 inches prior to compaction.
2. Uniformly moisture condition native or borrow fill 1% to 2% above the optimum moisture content.
3. Compact fill to at least:
 - a. 90% relative compaction in the building pad areas plus 5 feet laterally beyond exterior foundation edges.
 - b. 95% relative compaction in pavement areas to a minimum depth of 12 inches.

5.2.4 Slopes

Construct cut and fill slopes no steeper than 2H:1V. To achieve adequate compaction on the face of fill slopes, over-build the slopes and then cut back to the design grade. Track-walking is not an adequate method to compact the face of slopes.

5.2.5 Over-optimum Soil Moisture

Over-excavated soils may be excessively over-optimum (wet) which will make proper compaction difficult or impossible. Wet soil is more common during the winter and spring months, or in excavations where groundwater or perched groundwater is encountered.

In general, mitigate the wet soil by spreading and discing during periods of dry weather or replace with drier material.

If wet, unstable soil is encountered, retain BCI to observe the conditions and provide more specific mitigation recommendations.

5.3 Building Foundation Recommendations

Provided the contractor follows our recommendations, use shallow strip footings to support the proposed building:

- Embed strip or isolated footings a minimum of 18 inches into the lowest adjacent soil grade.
- Strip footings must be a minimum of 12 inches wide.
- Size strip footings not to exceed an allowable bearing capacity of 1,500 psf (dead plus live load). The allowable bearing capacity may be increased by one-third if seismic and/or wind loads are included.



- If the design and construction team follow the recommendations in this report, we expect that total settlement at foundation locations will not exceed 1/2-inch. Differential settlement along strip footings (over approximately 25 feet) should be less than 1/4 inch (at anticipated loads).
- To resist lateral movement, use a passive earth pressure of 200 psf per foot of embedment depth. Ignore the upper one-foot of footing depth (below the lowest adjacent soil grade) in determination of the passive pressure.
- Clean footing excavations of debris and loose soil prior to placing concrete.
- BCI must observe all footing excavations prior to reinforcement placement to verify competent bearing materials.
- Slope the ground surface away from foundations at a minimum of 2% for a distance of at least 5 feet.

5.4 2016 California Building Code Seismic Parameters

Based on our boring data, use a Site Class "C". Table 1 includes 2016 California Building Code and ASCE 7-10 seismic design parameters for the site.

Table 1: CBC Seismic Design Parameters (Site Class C)	
S_s – Acceleration Parameter	0.493 g
S_1 – Acceleration Parameter	0.236 g
F_a – Site Coefficient	1.2
F_v – Site Coefficient	1.564
S_{MS} – Adjusted MCE* Spectral Response Acceleration Parameter	0.592 g
S_{M1} – Adjusted MCE* Spectral Response Acceleration Parameter	0.369 g
S_{DS} – Design Spectral Acceleration Parameter	0.395 g
S_{D1} – Design Spectral Acceleration Parameter	0.246 g
Seismic Design Category	C
T_L – Long Period Transition Period**	12
PGA	0.17
PGA_m	0.204

* Maximum Considered Earthquake

** Figure 22-12, ASCE 7-10

5.5 Concrete Slab-on-Grade Floors

5.5.1 Slab Underlayment

Underlay concrete floor slabs with a minimum of 4 inches of washed, crushed, and compacted rock to provide uniform support. Crushed rock used beneath floor slabs should be graded so that 100% passes the ¾ inch sieve and less than 5% passes the No. 4 sieve. Compact crushed rock with at least two passes of a vibratory type compactor.



5.5.2 Design Considerations for Moisture

We observed shallow groundwater and shallow seepage in hand auger HA1. Storm water and seepage from the nearby canal can accumulate near the ground surface and around structures. While we don't expect water accumulations to be significant enough to require underfloor drainage systems, it could be enough to cause higher than normal moisture vapor to pass through concrete floor slabs. Excessive vapor can cause floor covering damage and mold.

The designer must consider the potential for excessive water vapor, its potential impact on proposed improvements, and design the slabs and underlayment accordingly. References providing guidelines for vapor mitigation and slab underlayment include ASTM E 1643, ACI 302.1R-04, PCA, and flooring manufacturer requirements for the intended use.

No matter how extensive the vapor mitigation design, some vapor will pass through the slabs and, the slabs themselves will absorb and release some moisture. Therefore, consult with floor covering and mold specialists, and include a contingency to replace some floor coverings and mitigate potential mold growth.

5.5.3 Slab Design for Light Loads

Design concrete slabs with crushed rock underlayment using a Modulus of Subgrade Reaction, k_s , of 175 pounds per cubic inch (pci). Design concrete floors to resist the anticipated loading conditions. Use a minimum concrete slab thickness of 4 inches.

If forklift or truck loads will operate on the slab, design the slab and underlayment in accordance with ACI standards and considering shrinkage reducing admixture to minimize curl and cracking. We do not know the frequency and loading on the slabs. It is most common for the structural engineer to design slabs when final loads are known.

6 RISK MANAGEMENT

Our experience and that of our profession clearly indicates that the risks of costly design, construction, and maintenance problems can be significantly lowered by retaining the geotechnical engineer of record to provide services during design and construction. For this project, retain BCI to:

- Review and provide comments on the civil plans, foundation plans, and specifications prior to construction.
- Monitor construction to check and document our report assumptions. At a minimum, BCI should monitor grading, check the base of the over-excavated foundation area, check compaction of backfill in the over-excavated area, and footing excavations.
- Update this report if design changes occur, 2 years or more lapses between this report and construction, and/or site conditions have changed.

If we are not retained to perform the above applicable services, we are not responsible for any other party's interpretation of our report, and subsequent addendums, letters, and discussions.



7 LIMITATIONS

BCI performed services in accordance with generally accepted geotechnical engineering principles and practices currently used in this area. Where referenced, we used ASTM or Caltrans standards as a general (not strict) *guideline* only. We do not warranty our services.

BCI based this report on the current site conditions. We assumed the soil and groundwater conditions encountered in our borings and hand augers are representative of the subsurface conditions across the site. Actual conditions between these locations could be different.

Our scope did not include evaluation of on-site hazardous material, flood potential, aerial photograph review, biological pollutants, pavement design, or utility trench backfill. Please contact BCI if you would like an evaluation of one or more of these potential issues.

Appendix A presents our exploratory boring logs. The lines designating the interface between soil/rock types are approximate. The transition between soil/rock types may be abrupt or gradual. Our recommendations are based on the final logs, which represent our interpretation of the field logs, laboratory test results and general knowledge of the site and geological conditions.

Modern design and construction is complex, with many regulatory sources/restrictions, involved parties, construction alternatives, etc. It is common to experience changes and delays. The owner should set aside a reasonable contingency fund based on complexities and cost estimates to cover changes and delays.

We include guidelines for using this report in Appendix E.

GEOTECHNICAL REPORT

PCWA Bowman WTP PAC Facility Building

Auburn, California

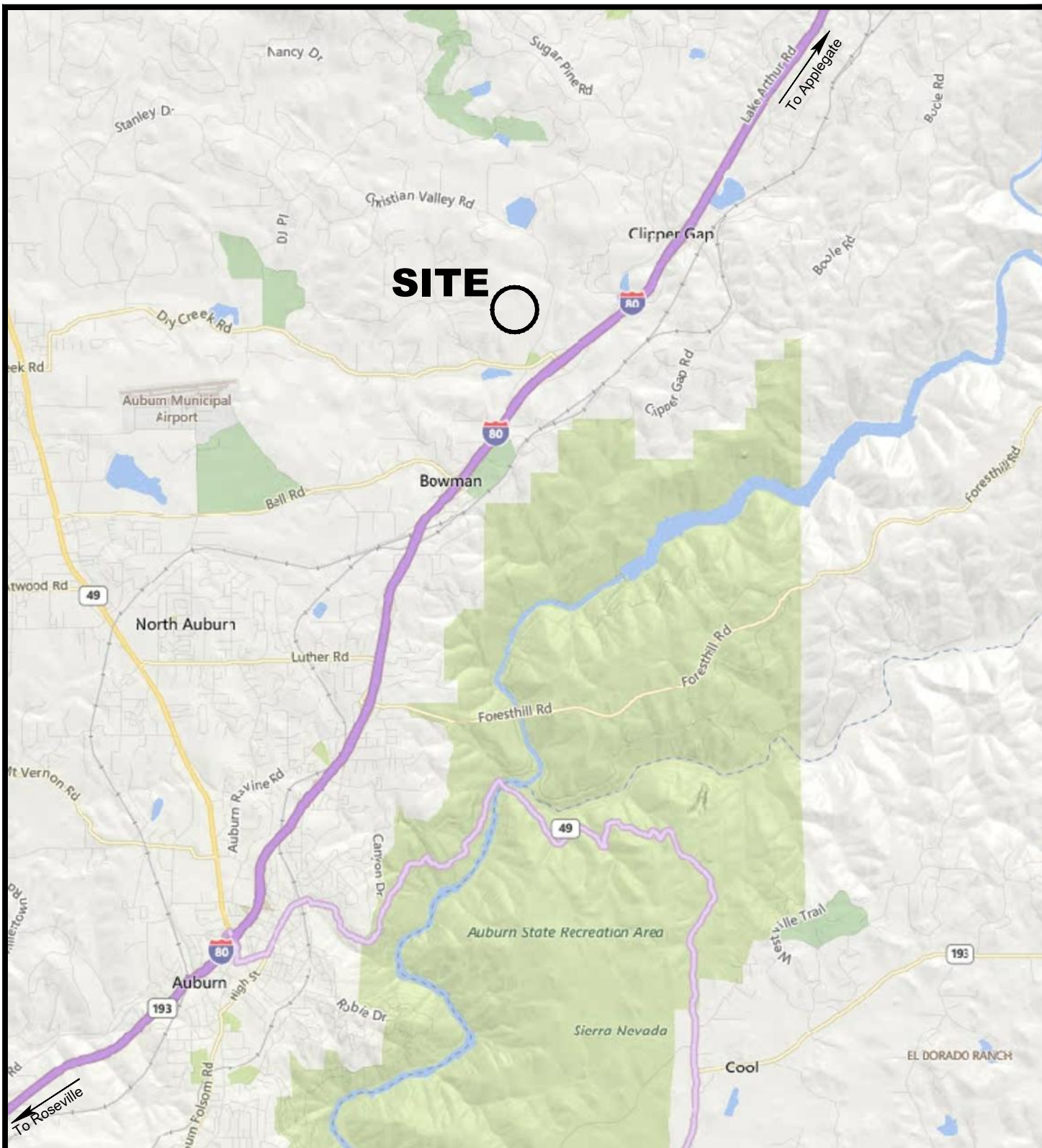
March 2019

FIGURES

Figure 1 — Vicinity Map

Figure 2 — Site Plan





SCALE: 1" = 5,000'



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www.blackburnconsulting.com

VICINITY MAP

PCWA Bowman WTP PAC Facility Building
Auburn, California

File No. 3508.x

March 2019

Figure 1

GEOTECHNICAL REPORT
PCWA Bowman WTP PAC Facility Building
Auburn, California

March 2019

APPENDIX A

Boring Logs
Boring Log Legend



LOGGED BY RCP	BEGIN DATE 1-29-19	COMPLETION DATE 1-29-19	BOREHOLE LOCATION (Lat/Long or North/East and Datum)		HOLE ID B1
DRILLING CONTRACTOR Taber			BOREHOLE LOCATION (Offset, Station, Line)		SURFACE ELEVATION ~1809
DRILLING METHOD Solid-Stem Auger			DRILL RIG Diedrich D120		BOREHOLE DIAMETER 4 in
SAMPLER TYPE(S) AND SIZE(S) (ID) 2.5-in ID Cal Mod			HAMMER TYPE Safety semi-automatic drop (140#/ 30")		HAMMER EFFICIENCY, ERI ~80
BOREHOLE BACKFILL AND COMPLETION Backfilled with native cuttings			GROUNDWATER READINGS	DURING DRILLING None	AFTER DRILLING (DATE) None
					TOTAL DEPTH OF BORING 15.8 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION/REMARKS	Sample Type	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	% <200 Sieve	Plasticity Index	Phi Angle (°)	Shear Strength (psi)	Unconfined Compressive Strength (psi)	Additional Lab Tests	Drilling Method	Casing Depth
0	0		INTERBEDDED CLAYEY SAND with GRAVEL, SANDY lean CLAY with GRAVEL, and GRAVELLY lean CLAY; loose to medium dense, medium stiff; olive brown to brown; moist; FILL																
1	1																		
2	2																		
3	3				1	3	7	50								PP = 0.75-1.0 tsf			
4	4					3				22	100			40.1	DS = 122.2		DS		
5	5					4													
6	6																		
7	7																		
8	8		drilling becomes harder at approximately 8 feet																
9	9		METASEDIMENTARY ROCK; massive; mottled olive brown, blue gray, and brown; decomposed; very soft to soft; intensely fractured																
10	10																		
11	11																		
12	12																		
13	13																		
14	14																		
15	15																		
16	16																		
17	17		Bottom of exploration at 15.8 ft bgs																
18	18		Backfilled with native cuttings																
19	19																		
20	20																		

 blackburn consulting	Blackburn Consulting		PROJECT NAME Bowman WTP PAC Facility Building		FILE NO. 3508.x	HOLE ID B1
	11521 Blocker Drive, Suite 110		COUNTY PLA	ROUTE		POSTMILE
	Auburn, CA 95603		CLIENT Water Works			
	Phone: (530) 887-1494		PREPARED BY RCP		CHECKED BY TWB	SHEET 1 of 1
	Fax: (530) 887-1495					

Blackburn Consulting
 11521 Blocker Drive, Suite 110
 Auburn, CA 95603
 Phone: (530) 887-1494
 Fax: (530) 887-1495

LOGGED BY RCP	BEGIN DATE 3-4-19	COMPLETION DATE 3-4-19	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID HA1
DRILLING CONTRACTOR	BOREHOLE LOCATION (Offset, Station, Line)		SURFACE ELEVATION ~1810.2	
DRILLING METHOD Hand Auger	DRILL RIG		BOREHOLE DIAMETER 4 in	
SAMPLER TYPE(S) AND SIZE(S) (ID)	HAMMER TYPE		HAMMER EFFICIENCY, ERI	
BOREHOLE BACKFILL AND COMPLETION Backfilled with native cuttings	GROUNDWATER READINGS	DURING DRILLING 2.8 ft	AFTER DRILLING (DATE) None	TOTAL DEPTH OF BORING 3.1 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION/REMARKS	Sample Type	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	% <200 Sieve	Plasticity Index	Phi Angle (°)	Shear Strength (psi)	Unconfined Compressive Strength (psi)	Additional Lab Tests	Drilling Method	Casing Depth
	0		INTERBEDDED CLAYEY SAND with GRAVEL and SANDY lean CLAY with GRAVEL; loose, medium stiff; olive brown to brown; moist; possibly FILL or disturbed native soils																
	1																		
	2																		
	3		becomes wet at approximately 2.8 feet Hand auger refusal on METASEDIMENTARY ROCK; massive; mottled olive brown, blue gray, and brown; decomposed; very soft to soft; intensely fractured Bottom of exploration at 3.1 ft bgs Backfilled with native cuttings																
	4																		
	5																		

 blackburn consulting	Blackburn Consulting 11521 Blocker Drive, Suite 110 Auburn, CA 95603 Phone: (530) 887-1494 Fax: (530) 887-1495		PROJECT NAME Bowman WTP PAC Facility Building		FILE NO. 3508.x	HOLE ID HA1
	COUNTY PLA		ROUTE		POSTMILE	
	CLIENT Water Works					
	PREPARED BY RCP		CHECKED BY TWB		SHEET 1 of 1	

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LOGGED BY RCP	BEGIN DATE 3-4-19	COMPLETION DATE 3-4-19	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID HA2
DRILLING CONTRACTOR	BOREHOLE LOCATION (Offset, Station, Line)		SURFACE ELEVATION ~1810.8	
DRILLING METHOD Hand Auger	DRILL RIG		BOREHOLE DIAMETER 4 in	
SAMPLER TYPE(S) AND SIZE(S) (ID)	HAMMER TYPE		HAMMER EFFICIENCY, ERI	
BOREHOLE BACKFILL AND COMPLETION Backfilled with native cuttings	GROUNDWATER READINGS	DURING DRILLING None	AFTER DRILLING (DATE) None	TOTAL DEPTH OF BORING 1.8 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION/REMARKS	Sample Type	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	% <200 Sieve	Plasticity Index	Phi Angle (°)	Shear Strength (psi)	Unconfined Compressive Strength (psi)	Additional Lab Tests	Drilling Method	Casing Depth
	0		INTERBEDDED CLAYEY SAND with GRAVEL and SANDY lean CLAY with GRAVEL; loose, medium stiff; olive brown to brown; moist; possibly FILL or disturbed native soils																
	1																		
	2		Hand auger refusal on METASEDIMENTARY ROCK; massive; mottled olive brown, blue gray, and brown; decomposed; very soft to soft; intensely fractured Bottom of exploration at 1.8 ft bgs Backfilled with native cuttings																
	3																		
	4																		
	5																		

 blackburn consulting	Blackburn Consulting		PROJECT NAME Bowman WTP PAC Facility Building		FILE NO. 3508.x	HOLE ID HA2
	11521 Blocker Drive, Suite 110		COUNTY PLA	ROUTE		POSTMILE
	Auburn, CA 95603		CLIENT Water Works			
	Phone: (530) 887-1494		PREPARED BY RCP		CHECKED BY TWB	SHEET 1 of 1
	Fax: (530) 887-1495					

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GROUP SYMBOLS AND NAMES			
Graphic / Symbol	Group Names	Graphic / Symbol	Group Names
	GW Well-graded GRAVEL Well-graded GRAVEL with SAND		CL Lean CLAY Lean CLAY with SAND Lean CLAY with GRAVEL SANDY lean CLAY SANDY lean CLAY with GRAVEL GRAVELLY lean CLAY GRAVELLY lean CLAY with SAND
	GP Poorly graded GRAVEL Poorly graded GRAVEL with SAND		
	GW-GM Well-graded GRAVEL with SILT Well-graded GRAVEL with SILT and SAND		CL-ML SILTY CLAY SILTY CLAY with SAND SILTY CLAY with GRAVEL SANDY SILTY CLAY SANDY SILTY CLAY with GRAVEL GRAVELLY SILTY CLAY GRAVELLY SILTY CLAY with SAND
	GW-GC Well-graded GRAVEL with CLAY (or SILTY CLAY) Well-graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)		
	GP-GM Poorly graded GRAVEL with SILT Poorly graded GRAVEL with SILT and SAND		ML SILT SILT with SAND SILT with GRAVEL SANDY SILT SANDY SILT with GRAVEL GRAVELLY SILT GRAVELLY SILT with SAND
	GP-GC Poorly graded GRAVEL with CLAY (or SILTY CLAY) Poorly graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)		
	GM SILTY GRAVEL SILTY GRAVEL with SAND		OL ORGANIC lean CLAY ORGANIC lean CLAY with SAND ORGANIC lean CLAY with GRAVEL SANDY ORGANIC lean CLAY SANDY ORGANIC lean CLAY with GRAVEL GRAVELLY ORGANIC lean CLAY GRAVELLY ORGANIC lean CLAY with SAND
	GC CLAYEY GRAVEL CLAYEY GRAVEL with SAND		
	GC-GM SILTY, CLAYEY GRAVEL SILTY, CLAYEY GRAVEL with SAND		OL ORGANIC SILT ORGANIC SILT with SAND ORGANIC SILT with GRAVEL SANDY ORGANIC SILT SANDY ORGANIC SILT with GRAVEL GRAVELLY ORGANIC SILT GRAVELLY ORGANIC SILT with SAND
	SW Well-graded SAND Well-graded SAND with GRAVEL		
	SP Poorly graded SAND Poorly graded SAND with GRAVEL		CH Fat CLAY Fat CLAY with SAND Fat CLAY with GRAVEL SANDY fat CLAY SANDY fat CLAY with GRAVEL GRAVELLY fat CLAY GRAVELLY fat CLAY with SAND
	SW-SM Well-graded SAND with SILT Well-graded SAND with SILT and GRAVEL		
	SW-SC Well-graded SAND with CLAY (or SILTY CLAY) Well-graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)		MH Elastic SILT Elastic SILT with SAND Elastic SILT with GRAVEL SANDY elastic SILT SANDY elastic SILT with GRAVEL GRAVELLY elastic SILT GRAVELLY elastic SILT with SAND
	SP-SM Poorly graded SAND with SILT Poorly graded SAND with SILT and GRAVEL		
	SP-SC Poorly graded SAND with CLAY (or SILTY CLAY) Poorly graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)		OH ORGANIC fat CLAY ORGANIC fat CLAY with SAND ORGANIC fat CLAY with GRAVEL SANDY ORGANIC fat CLAY SANDY ORGANIC fat CLAY with GRAVEL GRAVELLY ORGANIC fat CLAY GRAVELLY ORGANIC fat CLAY with SAND
	SM SILTY SAND SILTY SAND with GRAVEL		
	SC CLAYEY SAND CLAYEY SAND with GRAVEL		OH ORGANIC elastic SILT ORGANIC elastic SILT with SAND ORGANIC elastic SILT with GRAVEL SANDY elastic ELASTIC SILT SANDY ORGANIC elastic SILT with GRAVEL GRAVELLY ORGANIC elastic SILT GRAVELLY ORGANIC elastic SILT with SAND
	SC-SM SILTY, CLAYEY SAND SILTY, CLAYEY SAND with GRAVEL		
	PT PEAT		OL/OH ORGANIC SOIL ORGANIC SOIL with SAND ORGANIC SOIL with GRAVEL SANDY ORGANIC SOIL SANDY ORGANIC SOIL with GRAVEL GRAVELLY ORGANIC SOIL GRAVELLY ORGANIC SOIL with SAND
	 COBBLES COBBLES and BOULDERS BOULDERS		

FIELD AND LABORATORY TESTS

C	Consolidation (ASTM D 2435-04)
CL	Collapse Potential (ASTM D 5333-03)
CP	Compaction Curve (CTM 216 - 06)
CR	Corrosion, Sulfates, Chlorides (CTM 643 - 99; CTM 417 - 06; CTM 422 - 06)
CU	Consolidated Undrained Triaxial (ASTM D 4767-02)
DS	Direct Shear (ASTM D 3080-04)
EI	Expansion Index (ASTM D 4829-03)
M	Moisture Content (ASTM D 2216-05)
OC	Organic Content (ASTM D 2974-07)
P	Permeability (CTM 220 - 05)
PA	Particle Size Analysis (ASTM D 422-63 [2002])
PI	Liquid Limit, Plastic Limit, Plasticity Index (AASHTO T 89-02, AASHTO T 90-00)
PL	Point Load Index (ASTM D 5731-05)
PM	Pressure Meter
PP	Pocket Penetrometer
R	R-Value (CTM 301 - 00)
SE	Sand Equivalent (CTM 217 - 99)
SG	Specific Gravity (AASHTO T 100-06)
SL	Shrinkage Limit (ASTM D 427-04)
SW	Swell Potential (ASTM D 4546-03)
TV	Pocket Torvane
UC	Unconfined Compression - Soil (ASTM D 2166-06) Unconfined Compression - Rock (ASTM D 2938-95)
UU	Unconsolidated Undrained Triaxial (ASTM D 2850-03)
UW	Unit Weight (ASTM D 4767-04)
VS	Vane Shear (AASHTO T 223-96 [2004])

SAMPLER GRAPHIC SYMBOLS

	Standard Penetration Test (SPT)
	2.5" ID Sampler
	2" ID Sampler
	Shelby Tube
	Piston Sampler
	NX Rock Core
	HQ Rock Core
	Bulk Sample
	Other (see remarks)

DRILLING METHOD SYMBOLS

	Auger Drilling		Rotary Drilling		Dynamic Cone or Hand Driven		Diamond Core

WATER LEVEL SYMBOLS

	First Water Level Reading (during drilling)
	Static Water Level Reading (short-term)
	Static Water Level Reading (long-term)



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BORING RECORD LEGEND

CONSISTENCY OF COHESIVE SOILS				
Descriptor	Unconfined Compressive Strength (tsf)	Pocket Penetrometer (tsf)	Torvane (tsf)	Field Approximation
Very Soft	< 0.25	< 0.25	< 0.12	Easily penetrated several inches by fist
Soft	0.25 - 0.50	0.25 - 0.50	0.12 - 0.25	Easily penetrated several inches by thumb
Medium Stiff	0.50 - 1.0	0.50 - 1.0	0.25 - 0.50	Can be penetrated several inches by thumb with moderate effort
Stiff	1.0 - 2.0	1.0 - 2.0	0.50 - 1.0	Readily indented by thumb but penetrated only with great effort
Very Stiff	2.0 - 4.0	2.0 - 4.0	1.0 - 2.0	Readily indented by thumbnail
Hard	> 4.0	> 4.0	> 2.0	Indented by thumbnail with difficulty

APPARENT DENSITY OF COHESIONLESS SOILS	
Descriptor	SPT N ₆₀ - Value (blows / foot)
Very Loose	0 - 4
Loose	5 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	> 50

MOISTURE	
Descriptor	Criteria
Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table

PERCENT OR PROPORTION OF SOILS	
Descriptor	Criteria
Trace	Particles are present but estimated to be less than 5%
Few	5 to 10%
Little	15 to 25%
Some	30 to 45%
Mostly	50 to 100%

SOIL PARTICLE SIZE		
Descriptor		Size
Boulder		> 12 inches
Cobble		3 to 12 inches
Gravel	Coarse	3/4 inch to 3 inches
	Fine	No. 4 Sieve to 3/4 inch
Sand	Coarse	No. 10 Sieve to No. 4 Sieve
	Medium	No. 40 Sieve to No. 10 Sieve
	Fine	No. 200 Sieve to No. 40 Sieve
Silt and Clay		Passing No. 200 Sieve

PLASTICITY OF FINE-GRAINED SOILS	
Descriptor	Criteria
Nonplastic	A 1/8-inch thread cannot be rolled at any water content.
Low	The thread can barely be rolled, and the lump cannot be formed when drier than the plastic limit.
Medium	The thread is easy to roll, and not much time is required to reach the plastic limit; it cannot be rerolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit.
High	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be rerolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit.

CEMENTATION	
Descriptor	Criteria
Weak	Crumbles or breaks with handling or little finger pressure.
Moderate	Crumbles or breaks with considerable finger pressure.
Strong	Will not crumble or break with finger pressure.

NOTE: This legend sheet provides descriptors and associated criteria for required soil description components only. Refer to Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010), Section 2, for tables of additional soil description components and discussion of soil description and identification.



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BORING RECORD LEGEND

ROCK GRAPHIC SYMBOLS



IGNEOUS ROCK



SEDIMENTARY ROCK



METAMORPHIC ROCK

BEDDING SPACING

Descriptor	Thickness or Spacing
Massive	> 10 ft
Very thickly bedded	3 to 10 ft
Thickly bedded	1 to 3 ft
Moderately bedded	3-5/8 inches to 1 ft
Thinly bedded	1-1/4 to 3-5/8 inches
Very thinly bedded	3/8 inch to 1-1/4 inches
Laminated	< 3/8 inch

WEATHERING DESCRIPTORS FOR INTACT ROCK

	Diagnostic Features					
Descriptor	Chemical Weathering-Discoloration-Oxidation		Mechanical Weathering and Grain Boundary Conditions	Texture and Solutioning		General Characteristics
	Body of Rock	Fracture Surfaces		Texture	Solutioning	
Fresh	No discoloration, not oxidized	No discoloration or oxidation	No separation, intact (tight)	No change	No solutioning	Hammer rings when crystalline rocks are struck.
Slightly Weathered	Discoloration or oxidation is limited to surface of, or short distance from, fractures; some feldspar crystals are dull	Minor to complete discoloration or oxidation of most surfaces	No visible separation, intact (tight)	Preserved	Minor leaching of some soluble minerals may be noted	Hammer rings when crystalline rocks are struck. Body of rock not weakened.
Moderately Weathered	Discoloration or oxidation extends from fractures usually throughout; Fe-Mg minerals are "rusty"; feldspar crystals are "cloudy"	All fracture surfaces are discolored or oxidized	Partial separation of boundaries visible	Generally preserved	Soluble minerals may be mostly leached	Hammer does not ring when rock is struck. Body of rock is slightly weakened.
Intensely Weathered	Discoloration or oxidation throughout; all feldspars and Fe-Mg minerals are altered to clay to some extent; or chemical alteration produces in situ disaggregation (refer to grain boundary conditions)	All fracture surfaces are discolored or oxidized; surfaces are friable	Partial separation, rock is friable; in semi-arid conditions, granitics are disaggregated	Altered by chemical disintegration such as via hydration or argillation	Leaching of soluble minerals may be complete	Dull sound when struck with hammer; usually can be broken with moderate to heavy manual pressure or by light hammer blow without reference to planes of weakness such as incipient or hairline fractures or veinlets. Rock is significantly weakened.
Decomposed	Discolored or oxidized throughout, but resistant minerals such as quartz may be unaltered; all feldspars and Fe-Mg minerals are completely altered to clay		Complete separation of grain boundaries (disaggregated)	Resembles a soil; partial or complete remnant rock structure may be preserved; leaching of soluble minerals usually complete		Can be granulated by hand. Resistant minerals such as quartz may be present as "stringers" or "dikes".

Note: Combination descriptors (such as "slightly weathered to fresh") are used where equal distribution of both weathering characteristics is present over significant intervals or where characteristics present are "in between" the diagnostic feature. However, combination descriptors should not be used where significant identifiable zones can be delineated. Only two adjacent descriptors shall be combined. "Very intensely weathered" is the combination descriptor for "decomposed to intensely weathered".

RELATIVE STRENGTH OF INTACT ROCK

Descriptor	Uniaxial Compressive Strength (psi)
Extremely Strong	> 30,000
Very Strong	14,500 - 30,000
Strong	7,000 - 14,500
Medium Strong	3,500 - 7,000
Weak	700 - 3,500
Very Weak	150 - 700
Extremely Weak	< 150

CORE RECOVERY CALCULATION (%)

$$\frac{\sum \text{Length of the recovered core pieces (in.)}}{\text{Total length of core run (in.)}} \times 100$$

RQD CALCULATION (%)

$$\frac{\sum \text{Length of intact core pieces} > 4 \text{ in.}}{\text{Total length of core run (in.)}} \times 100$$

ROCK HARDNESS

Descriptor	Criteria
Extremely Hard	Specimen cannot be scratched with pocket knife or sharp pick; can only be chipped with repeated heavy hammer blows
Very hard	Specimen cannot be scratched with pocket knife or sharp pick; breaks with repeated heavy hammer blows
Hard	Specimen can be scratched with pocket knife or sharp pick with heavy pressure; heavy hammer blows required to break specimen
Moderately Hard	Specimen can be scratched with pocket knife or sharp pick with light or moderate pressure; breaks with moderate hammer blows
Moderately Soft	Specimen can be grooved 1/6 in. with pocket knife or sharp pick with moderate or heavy pressure; breaks with light hammer blow or heavy hand pressure
Soft	Specimen can be grooved or gouged with pocket knife or sharp pick with light pressure, breaks with light to moderate hand pressure
Very Soft	Specimen can be readily indented, grooved, or gouged with fingernail, or carved with pocket knife; breaks with light hand pressure

FRACTURE DENSITY

Descriptor	Criteria
Unfractured	No fractures
Very Slightly Fractured	Lengths greater 3 ft
Slightly Fractured	Lengths from 1 to 3 ft, few lengths outside that range
Moderately Fractured	Lengths mostly in range of 4 in. to 1 ft, with most lengths about 8 in.
Intensely Fractured	Lengths average from 1 in. to 4 in. with scattered fragmented intervals with lengths less than 4 in.
Very Intensely Fractured	Mostly chips and fragments with few scattered short core lengths



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BORING RECORD LEGEND

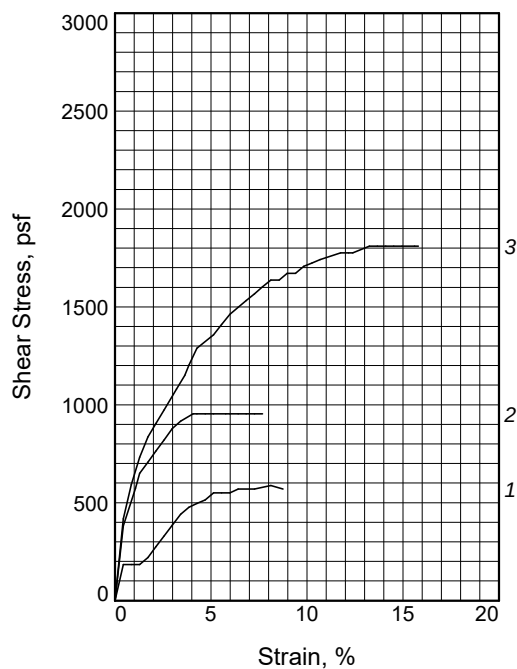
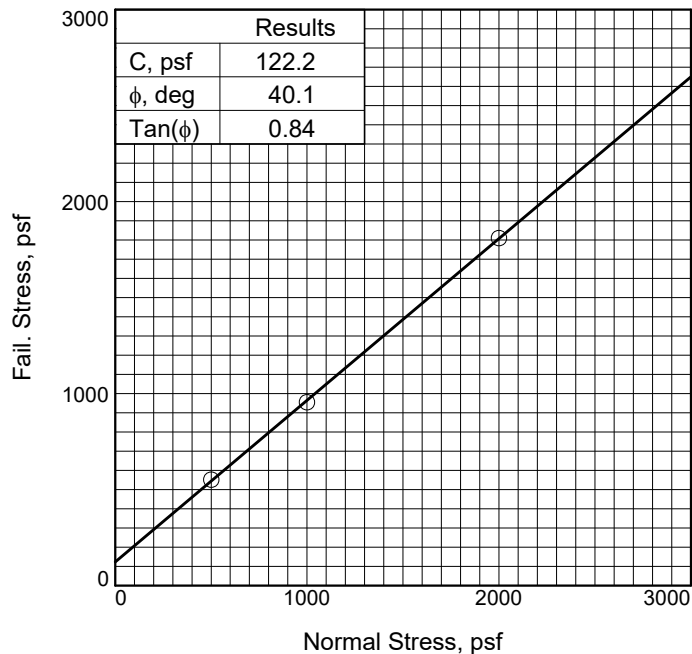
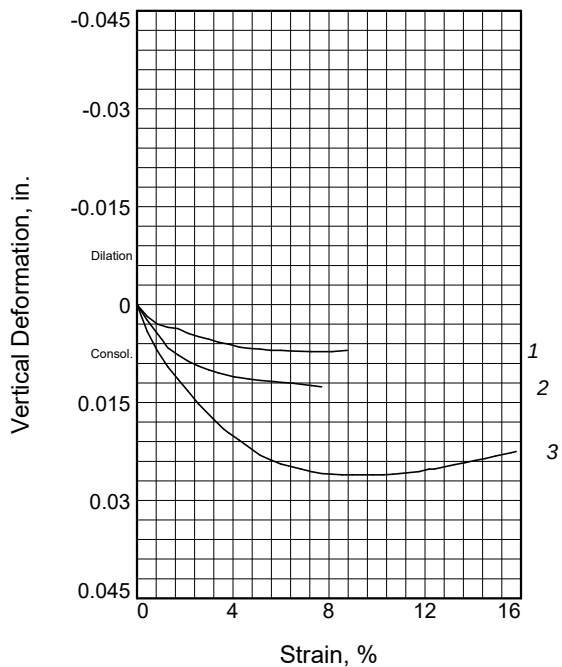
GEOTECHNICAL REPORT
PCWA Bowman WTP PAC Facility Building
Auburn, California

March 2019

APPENDIX B

Laboratory Test Results





Sample No.		1	2	3
Initial	Water Content, %	23.1	21.7	21.8
	Dry Density, pcf	99.0	100.5	99.9
	Saturation, %	88.7	86.4	85.6
	Void Ratio	0.7020	0.6768	0.6874
	Diameter, in.	2.340	2.340	2.340
	Height, in.	0.945	0.945	0.945
At Test	Water Content, %	25.3	23.4	22.7
	Dry Density, pcf	100.1	103.4	104.4
	Saturation, %	100.0	100.0	100.0
	Void Ratio	0.6840	0.6307	0.6139
	Diameter, in.	2.340	2.340	2.340
	Height, in.	0.935	0.919	0.904
Normal Stress, psf		500.0	1000.0	2000.0
Fail. Stress, psf		550.5	954.3	1810.8
Strain, %		5.1	4.1	13.2
Ult. Stress, psf				
Strain, %				
Strain rate, in./min.		0.003	0.003	0.003

Sample Type: 2.4" Mod Cal

Description: GRAVELLY lean CLAY, strong brown

Assumed Specific Gravity= 2.70

Remarks:

Figure _____

Client: Water Works Engineers LLC

Project: Bowman WTP Washwater Recovery Pond Access Road

Source of Sample: B1 **Depth:** 3.0-3.5'

Sample Number: 1C

Proj. No.: 3508.X

Date Sampled:

DIRECT SHEAR TEST REPORT
Blackburn Consulting
W. Sacramento, CA

GEOTECHNICAL REPORT
PCWA Bowman WTP PAC Facility Building
Auburn, California

March 2019

APPENDIX C

IMPORTANT INFORMATION ABOUT
THIS GEOTECHNICAL ENGINEERING REPORT,
GEO-PROFESSIONAL BUSINESS ASSOCIATION, 2016



Important Information about This Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, clients can benefit from a lowered exposure to the subsurface problems that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed below, contact your GBA-member geotechnical engineer. Active involvement in the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Geotechnical-Engineering Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. *Those who rely on a geotechnical-engineering report prepared for a different client can be seriously misled.* No one except authorized client representatives should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one – not even you – should apply this report for any purpose or project except the one originally contemplated.*

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read it *in its entirety*. Do not rely on an executive summary. Do not read selected elements only. *Read this report in full.*

You Need to Inform Your Geotechnical Engineer about Change

Your geotechnical engineer considered unique, project-specific factors when designing the study behind this report and developing the confirmation-dependent recommendations the report conveys. A few typical factors include:

- the client's goals, objectives, budget, schedule, and risk-management preferences;
- the general nature of the structure involved, its size, configuration, and performance criteria;
- the structure's location and orientation on the site; and
- other planned or existing site improvements, such as retaining walls, access roads, parking lots, and underground utilities.

Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

This Report May Not Be Reliable

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, that it could be unwise to rely on a geotechnical-engineering report whose reliability may have been affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If your geotechnical engineer has not indicated an "apply-by" date on the report, ask what it should be, and, in general, if you are the least bit uncertain about the continued reliability of this report, contact your geotechnical engineer before applying it.* A minor amount of additional testing or analysis – if any is required at all – could prevent major problems.

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface through various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing were performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgment to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team from project start to project finish, so the individual can provide informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, *they are not final*, because the geotechnical engineer who developed them relied heavily on judgment and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* revealed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a full-time member of the design team, to:

- confer with other design-team members,
- help develop specifications,
- review pertinent elements of other design professionals' plans and specifications, and
- be on hand quickly whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction observation.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for informational purposes only*. To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report, but they may rely on the factual data relative to the specific times, locations, and depths/elevations referenced. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may

perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely*. Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures*. If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. As a general rule, *do not rely on an environmental report prepared for a different client, site, or project, or that is more than six months old*.

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, none of the engineer's services were designed, conducted, or intended to prevent uncontrolled migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, *proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration*. Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. *Geotechnical engineers are not building-envelope or mold specialists*.



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Bowman WTP Phase 3 Improvements

Contract No. 2022-02

July 2023

Appendix B
PCWA Hot Work Program



Hot Work Program

Placer County Water Agency

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Appendix A – Hot Work Permit

Program Evaluation Log

FIRE PREVENTION

Date of Evaluation	Revision Completion Date*	Completed by:
January 2023	June 2023	Kayla Loken

1. PURPOSE

The Placer County Water Agency (PCWA) uses a hot work permitting system to ensure that affected employees are aware of hot work being performed and appropriate safety precautions are taken prior to beginning the hot work. A Hot Work Program is used to ensure the safe performance of hot work activity.

Welding and hot work such as brazing, cutting, or grinding, presents a heightened opportunity for injury and fire hazard. Employees and contractors must take all precautions outlined in this program prior to commencing any welding or hot work.

This program complies with the requirements of California Occupational Safety and Health Administration (Cal/OSHA) Title 8, § 4848, Fire Prevention and Suppression Procedure (life safety, minimize property loss, prevent wild fires), as well as the requirements of Cal/OSHA Title 8, § 6777, Hot Work Procedures and Permits.

2. SCOPE

PCWA's Hot Work Program applies to all hot work conducted at PCWA facilities or properties that have the potential to start a fire:

- Structural – hot work done within PCWA facilities.
- Wildland Fire – work done outdoors that has the potential to start a wildland fire.

Hot work includes electric or gas welding, cutting, brazing, soldering or similar flame or spark-producing operations (such as grinding).

Open flame hot work includes:

- work involving open flames (welding, flame cutting).
- electrical welding.
- electrical induction pre-heating, stress relieving or use of high temperature thermal calibrators (above 200°C).
- use of portable air and electrically powered grinders.
- use of flare guns.
- use of heat shrink blowers.
- use of equipment or work on pipe work or vessels contaminated with pyrophoric scale.

Spark potential hot work includes:

- dry grit/shot blasting in hazardous areas.
- needle gunning in hazardous areas.
- use of non-intrinsically safe hand-held electrical equipment (battery powered equipment, portable electrical power tools, etc.).

- opening live (energized) electrical junction boxes where energized components are exposed in a classified area.
- use of air or hydraulically powered tools capable of generating a spark in a classified area.
- work involving perforating guns.
- use of cartridge operated fixing tools in a classified area.
- operation of portable diesel engines not tied into fire and gas systems in a classified area.

The objectives of this program are to:

- ensure the work area is inspected and combustibles and flammables are isolated from the hot work.
- establish a fire watch.
- provide communication with all Departments and Stakeholders.
- control how open flame or spark-producing equipment is used.
- formally document all hazardous conditions and special requirements of the work area.

The plan is to be kept readily accessible to all personnel.

3. RESPONSIBILITIES

The responsibilities of PCWA personnel are provided in the following sections.

PCWA managers, supervisors and employees will follow this hot work program when conducting any work where an open flame is present or has the potential to be present or for any work where sparks or slag are present or may be generated.

3.1. Department Heads

Department head responsibilities include:

- ensure department compliance with Cal/OSHA and PCWA's Hot Work Program requirements.
- provide the necessary resources to ensure the health and safety of employees.
- ensure departmental employees and supervisors are trained in their health and safety responsibilities.
- ensure employees have access to PCWA's Hot Work Program.

3.2. Supervisors, Leads, and Managers

Supervisors, leads, or managers responsible for hot work will:

- ensure that only qualified and trained authorized employees perform hot work

activities.

- not act as the operator.
- determine if work can be moved to a designated hot work area.
- perform safety assessments / job hazard analysis of the hot work task and the area the hot work will be performed.
- communicate to affected employees regarding hot work activities that may be occurring in their area to ensure their safety.
- complete and sign the hot work permit. List all precautions as necessary.
- Ensure compliance with the safe work requirements required by the program while the hot work permit is in effect, inspecting the hot work permit area at least once per day.
- show the employees doing the work the locations of the nearest communications equipment and applicable safety devices.
- check placement and condition of proper fire extinguishers and other safety equipment.
- inform fire watch of potential fire hazards.
- stop the work if a change occurs which creates an unsafe condition. Work shall not resume until a safe condition is restored.
- retain hot work permits for six months from the date of issue.

3.3. Welder/Worker

The person performing the hot work will:

- be qualified by their supervisor to operate the hot work equipment.
- be trained and follow the requirements of this program.
- read, understand, and follow the conditions listed on the Hot Work Permit.
- ensure that the hard copy of the permit has been posted at the work location.
- wear all required PPE and ensure all persons within the hot work area are wearing appropriate PPE prior to performing hot work.
- if needed, contact Facilities Maintenance personnel to turn off the fire alarms in the area where the hot work is to be performed.
- inspect hot work equipment before use and verify it is safe to use.
- ensure a fire watch is present, when required.
- survey the work area to confirm safe working conditions. Know the location of the nearest telephone, fire alarm, emergency communication system, fire extinguisher, safety shower, first aid kit, etc., before starting work, and know how to use them.
- ensure all combustible materials in the vicinity are removed from the work area and

adjacent areas for a distance of at least 35' around the hot work site, including the other side of any wall or barrier, to which sparks, or heat might spread.

- confine all sparks and slag as close to the work area as possible.
- be constantly aware of conditions in the immediate work area and stop work if conditions change.
- clean up and secure the work area after completion of work each shift. At the end of the shift or upon completion of the work, whichever comes first, return the permit to the supervisor, lead or manager.
- stop all work when an alarm or emergency announcement is made, disconnect all electrical equipment, and secure all gas cylinders. Notify the permit-issuer of the alarm situation. Do not resume any work until notified by the supervisor, lead, or manager.

3.4. Fire Watch

The Fire Watch will:

- observe an area of at least 35 feet around the hot work site, including the other side of any wall or barrier, and maintain the area free of combustibles and tripping hazards.
- have no other duties assigned while on Fire Watch Duty.
- understand and follow the conditions listed on the Hot Work Permit.
- be trained in the use of fire extinguishing equipment provided.
- understand the alarms and where and how to activate them.
- notify the person doing the work if any sparks are not contained at the work area.
- sound the alarm for assistance and extinguish any small fires started by sparks or slag.
- call 9-1-1 if a fire starts.
- remain on the scene from the start of hot work and until the time designated by the issuer of the hot work permit (at least 30 minutes) after the completion of all hot work.

3.5. Safety

The Safety Manager is the Program Administrator. The Program Administrator will:

- monitor and maintain the Hot Work Program, ensuring it meets all applicable regulatory requirements and meets Agency needs.
- ensure the Hot Work Program is readily accessible to employees through the Agency's Splash webpage.
- assist departments with serious accident investigations and safety recommendations.
- monitor, evaluate, and update the written Hot Work Program as needed.

3.6. Contractor Coordination

It is the policy of the PCWA to inform contractors of site conditions that might raise health and safety concerns that are unusual or unique to PCWA operations. PCWA will ensure the contractor is provided with information regarding hazards presented by PCWA facilities and operations.

It is the responsibility of the contractor to protect its employees, subcontractors, and suppliers, and to provide a safe place of employment. PCWA is not establishing or enforcing safety practices for the benefit of a contractor, subcontractor, supplier or their employees. Contractors working on new construction or PCWA facilities must have or obtain their own hot work permit.

PCWA inspectors, upon discovering health and safety concerns that are not compliant with generally accepted safe work practices or Cal/OSHA guidelines, are authorized to take the appropriate action to ensure that the contractor is informed of such concerns, and to ensure that PCWA personnel are not in an unsafe working place.

PCWA employees are authorized to address unsafe contractor work activities where it is obvious that death or serious injury is imminent (i.e., remove PCWA employees from potential exposure, and request that the contractor stop construction activities in order to correct the unsafe condition, as necessary), and shall immediately notify the Supervisor or Lead of such actions.

4. HOT WORK CONTROLS

Hot work hazards may be reduced by implementing engineering and work practice controls. Attempts should be made to eliminate or reduce the hazards associated with hot work to the extent that is feasible.

4.1 Engineering Controls

Engineering controls include those that:

- eliminate the need to conduct hot work.
- move hot work to a Designated Safe Hot Work Area.
- isolate lines through purging, bleeding, and blocking.

4.2 Work Practice (Administrative) Controls

Work practice recommendations include the following:

- Utilize a hot work permit system to evaluate all hot work activity.
- schedule hot work during facility downtime/shutdown.
- Erect barriers and barricades to protect surrounding areas from flames, sparks, and slag.
- Perform atmospheric monitoring before and while hot work is performed.

- Post a fire watch for all hot work.
- Treat all pipelines, vessels, pumps, process, and/or equipment as unsafe until rendered safe and verified by a qualified person and/or hot work supervisor.

4.3 Ventilation

Ventilation must be adequate during general welding and cutting hot work operations.

Mechanical ventilation must be provided when welding or cutting operations take place:

- In a space less than 10,000 cubic feet per welder.
- In a room having a ceiling height of less than 16 feet.
- In a confined or enclosed space.
- In a space containing partitions, balconies or other structural barriers, which may significantly obstruct ventilation.

Ventilation should be provided at a rate of 2,000 cubic feet per minute (CFM) per welder unless local exhaust hoods, booths, or supplied breathing air is provided in the work area.

4.4 Personal Protective Equipment

Employees performing hot work, and any personnel assisting or in the area must be provided with the appropriate personal protective equipment (PPE).

PPE including head, hand and foot protection shall be provided based on the hazard evaluation of the work area and work to be completed. PPE will be selected to minimize the potential for ignition, burning, trapping hot sparks, and electric shock.

Protective Clothing: Employees performing Hot Work operations should wear appropriate clothing to shield their bodies from Hot Work by-products.

- Boots with rubber bottoms are preferred for footwear, as they provide adequate protection from heated slag.
- Clothing made from polyester should be avoided. Some examples of appropriate attire include: welding jackets and fire resistant long sleeve shirts.

Hand Protection: Hand protection needs to be suitable for the type and temperature of the welding being done. Thick leather welding gloves are recommended.

Hearing Protection: Hot Work Operations involving cutting metals can produce noises that may be harmful. Hearing protection should be worn.

Head and Eye Protection: Suitable eye protection must be provided and worn by employees during all hot work operations. PPE used for eye protection such as goggles, helmets and hand shields must meet minimum ANSI standards.

- Shielded metal Arc Welding (SMAW) / Electrical Welding Helmets must meet ANSI Z87.1 standard. The selected SMAW helmet must have the appropriate shade number as listed in this program.
- Gas Welding Goggle and Gas Welding Glasses do not protect the user from UV rays and should only be used when conducting gas welding activities.

Below is the suggested guide for selection of shade numbers of filter lenses or plates used in welding. Shades denser than those listed may be used to suit the individual's needs.

FILTER LENS SHADE NUMBERS FOR PROTECTION AGAINST RADIANT ENERGY

<i>Welding operation</i>	<i>Shade number</i>
Shielded metal-arc welding 1 1/16-, 3/32-, 1/8, 5/32-inch diameter electrodes.....	10
Gas-shielded arc welding (nonferrous) 1/16-, 3/32-, 1/8-, 5/32-inch diameter electrodes.....	11
Gas-shielded arc welding (ferrous) 1/16-, 3/32-, 1/8-, 5/32-inch diameter electrodes.....	12
Shielded metal-arc welding 3/16-, 7/32-, 1/4-inch diameter electrodes.....	12
5/16-, 3/8-inch diameter electrodes.....	14
Atomic hydrogen welding.....	10-14
Carbon-arc welding.....	14
Soldering.....	2
Torch brazing.....	3 or 4
Light cutting, up to 1 inch.....	3 or 4
Medium cutting, 1 inch to 6 inches.....	4 or 5
Heavy cutting, over 6 inches.....	5 or 6
Gas welding (light), up to 1/8-inch.....	4 or 5
Gas welding (medium), 1/8-inch to 1/2-inch.....	5 or 6
Gas welding (heavy), over 1/2-inch.....	6 or 8

Respiratory Protection: When ventilation of the hot work area is not adequate to maintain healthy breathable air, respiratory protective equipment must be used. Personnel wearing respiratory protection must be enrolled in PCWA's Respiratory Protection Program.

5. HOT WORK AREAS

5.1 Designated Safe Hot Work Areas

A Designated Safe Hot Work Area is an area that has been designated as safe for Hot Work activities without a hot work permit. These areas include:

- Fabrication Shop
- Welding shops
- Auto Shop
- Foothills Maintenance shop

- Power Maintenance Shop
- Wood Shop
- Vehicle Shop

These areas are known to be free of combustible or flammable vapor, gas, liquid, or material during normal operations. Each facility location with a Designated Safe Hot Work Area shall comply with the following:

- It shall be of noncombustible fire-resistive construction, essentially free of combustible and flammable contents.
- It shall be suitably segregated from adjacent areas.
- It shall be equipped with an appropriate fire extinguisher.
- Combustible materials must be removed or must be provided with appropriate shielding to prevent ignition from sparks, slag, or heat.
- Ventilation must be working properly.
- Equipment must be in working order.
- Inspections of these areas will be conducted on a monthly basis.

5.2 Prohibited Areas

Hot work operations shall not be permitted in the following situations:

- In unauthorized areas, such as occupied office space.
- In a sprinklered building while such protection is impaired.
- In the presence of explosive atmospheres or potential for explosive atmospheres.
- In areas near the storage of large quantities of exposed readily ignitable materials.
- In areas not approved by the hot work permitting process.

5.3 Wildland Hot Work

Many of PCWA's facilities are located in remote areas. Extreme caution will be taken to ensure that flames and/or sparks do not escape the work area and cause a fire in the surrounding area. Employees conducting hot work in remote locations will evaluate if the hot work can be moved to a less hazardous location. If the hot work cannot be eliminated or moved to a safer location, additional fire protection barriers and equipment will be used.

Hot work should not be performed on windy days to prevent embers, sparks, or slag from escaping the hot work area and igniting nearby vegetation. Wind speed should be less than 10 miles per hour for hot work to commence.

6. HOT WORK PROCEDURES

6.1 Pre-Hot Work Activities

All hot work activities are required to have a hot work permit and follow the hot work permit procedures, unless the welding, cutting, or brazing operations are being conducted in an area/shop designed to facilitate safe hot work operations.

If possible, move hot work activities to a designated safe area free from all combustible materials and fire hazards. Designated safe hot work areas are listed in section 5.1 of this program.

The following precautions must be taken prior to all hot work commencing:

- If performing hot work in a facility, notify the facility that hot work is scheduled. Provide the day, time and expected duration of the work.
- The hot work permit will be posted at the entrance to the work site to inform personnel of the hot work operations taking place.
- If required, smoke detectors and fire systems will be addressed by the Field Services Facilities Maintenance Staff. Precautions must be taken to avoid accidental activation of automatic smoke detection or fire suppression systems.
- Ensure first aid supplies are readily available.
- Ensure the fire extinguisher is charged, currently inspected, and available. If using an alternative method, such as a water buffalo, ensure the equipment is inspected and ready for use.
- Ensure PPE (welding hood, gloves, rubber boots/soled shoes, and aprons) are fitted correctly and have no defects.
- Employees will perform a safety check and inspection on all equipment.
- Verify equipment, hoses, cords, cables are in proper working condition. All defective equipment must be repaired or replaced before use.
- Ensure tank gas valves, hose connections and other fittings are tight.
- Ensure proper contact of any work leads and connections.
- Ensure the welding unit is properly grounded (for electric welding).
- Relocate or protect explosive material, compressed gas cylinders or stored fuel.
- Establish a fire watch and assign a properly trained individual.
- Place welding screen(s) or a suitable barricade around work area to provide a fire safety zone and prevent injuries to passersby (do not block emergency exits or restrict ventilation).
- Ensure adequate ventilation and lighting.

6.2 Fire Watch

A fire watch is the person or persons responsible for continuously observing hot work activity for the detection of and response to fires during hot work operations. A fire watch has the authority to stop work if necessary and conduct essential steps for restoring safe conditions within the hot work area. A fire watch is required for all hot work operations outside of PCWA's designated safe hot work areas.

Fire watch includes at least one person who maintains awareness for the presence of fire or hazardous conditions within the hot work area before and at least 30 minutes after the hot work has been completed. The person performing the hot work cannot be the fire watch. The fire watch must be maintained uninterrupted throughout lunch, breaks and ensuing shifts. The manager or supervisor may determine if more than 30 minutes of fire watch is required after the work is completed depending on the type of hot work conducted and the fire potential. The fire watch will ensure that other workers are aware of hot surfaces and be monitoring for fire hazards to ensure that a fire does not start.

Where hot work could spread or fall over more than one level, a fire watch will be posted simultaneously in each blind area.

6.3 Special Considerations

6.3.1 Containers

No welding, cutting or other hot work shall be performed on used drums, barrels, tanks, or other containers until they have been cleaned to ensure no flammable materials or vapors are present.

Pipes connected to containers must be disconnected prior to hot work.

All hollow spaces, cavities, or containers must be vented during the hot work to permit the escape of air and gases. Purging with inert gas is recommended.

6.3.2 Pipes

Cutting or welding pipes or other metal in contact with combustible walls, partitions, ceilings, or roofs shall not be undertaken if the work is close enough to cause ignition by conduction.

6.3.3 Confined Spaces

If hot work activities are to take place in a confined space the operator must be trained under and follow all components of PCWA's Confined Space Entry Program.

Prior to hot work in a confined space the following precautions must be addressed:

- Ensure a confined space entry permit is completed.

- Ensure all openings/covers are open and secured from closing.
- Test atmosphere within the confined space for oxygen, explosives, and toxins.
- Isolate lines and maintain vents open and valves leak-free.
- Lockout/tagout all systems not required during hot work.
- Provide a means for readily turning off power, gas, and other supplies from outside the confined space.
- Protect or remove any hazardous materials which may become hazardous when exposed to hot work; and
- Gas cylinders and welding machines must be left outside the confined space and secured to prevent movement during hot work operations.
- When breaks in hot work occur (for example: lunch) all valves must be turned off and hoses and connections must be disconnected at the power source.

7. HOT WORK PERMIT

A written hot work permit is required before hot work operations may begin in a location outside of PCWA's designated safe hot work areas. Permits may be issued by supervisors, leads or managers who are not the authorized hot work operator.

7.1 Permit Conditions for Work in Buildings and Structures

A permit may be issued once the following conditions have been met and/or verified:

- A fire watch is established.
- Hot work equipment to be used is inspected by the operator and determined to be in good repair.
- Precautions are taken to protect the area within 35 feet of the hot work area:
 - No combustible materials or flammable liquids may be present.
 - Floors will be swept clean of dust and combustibles.
 - Combustible floors must be wetted or covered with damp sand, metal or other suitable shields.
 - Where floors have been wetted down, personnel operating arc welding equipment or cutting equipment will be protected from possible electrical hazards.
 - Combustible surfaces are to be protected with covers, guards, curtains, or metal shields. Edges of covers at the floor shall be tight to prevent sparks from going under them, including where several covers overlap when protecting a large pile.
 - Combustible materials in adjacent rooms are to be moved away from the walls.
 - All wall and floor openings or cracks must be covered, blocked or shielded.

Openings must be tightly covered with fire retardant or non-combustible material to prevent sparks from passing to adjacent areas.

- Grated floors (i.e. catwalks) are protected to ensure collection of sparks during work.
- Walls, partitions, ceilings, and rooftops made of combustible construction must be blocked by fire-retardant shields or guards to prevent ignition.
- Conveyor systems that might carry sparks to distant combustibles will be shielded or turned off.
- Fully charged and operable fire extinguishers that are appropriate for the type of possible fire will be available immediately in the work area. If existing hose lines are located within the hot work area, they will be connected and ready for service, but will not be required to be unrolled or charged.
- No hot work will be allowed if the gas concentration is above 10% LEL. Conduct necessary tests for flammable and/or hazardous conditions.
- Ensure nearby personnel have been protected against heat, spark, slag and other biproducts of hot work activities.

7.2 Permit Conditions for Wildland Hot Work

Supervisors and leads may issue a permit once the following conditions have been met and/or verified.

- A Fire Watch is established.
- If grinding or welding near dry (cured) vegetation, always wet down the vegetation at least 35 feet around and 75 feet downwind of the work site. Do not mow, weed-eat or grind or weld near dry vegetation within 24 hours of a red flag day (temperatures exceed 80°F, sustained wind speeds exceed 10 mph and humidity is less than 30%). Check the National Weather Service on-line, evaluate weather with a “Kestrel” or contact your supervisor prior to hot work.
- Hot work equipment to be used has been inspected by the operator and determined to be in good repair.
- Fully charged and operable fire extinguishers that are appropriate for the type of possible fire will be available immediately in the work area. Alternative fire suppression systems, such as the use of a water buffalo may replace a fire extinguisher as deemed appropriate by the supervisor.
 - If using a water buffalo, employees must start and test the water to ensure it is in good working order.
 - The water buffalo must be as close to the worksite as practical.
 - The hose on the water buffalo must be extended, ready for use, and capable of reaching the work location.

- Ensure nearby personnel have been protected against heat, spark, slag and other byproducts of hot work activities.
- The local fire department must be notified if work has to be conducted during poor weather conditions (e.g., when wind speed is > 10 mph or it is a non-burn day).
- Have the following equipment readily available and ensure it is in working order.
 - Fire extinguisher, Indian water can, or water buffalo
 - Shovel
 - McLeod tool (optional)
 - Bucket of dirt
- Monitor the work area during hot work for conditions that could lead to fire.
- Advise other workers of any special precautions or conditions pertaining to the job.
- Survey the work area to confirm safe working conditions. Know the location of the nearest telephone, fire alarm, emergency communication system, fire extinguisher, safety shower, first aid kit, etc. before starting work, and know how to use them.
- Observe an area of at least 35 feet around the hot work site, including the other side of any wall or barrier, and maintain the area free of combustibles and tripping hazards.

7.3 Permit Content Requirements

A printable hot work permit is included in Appendix A. If preferred, departments may also purchase hot work permit tags instead of the printable hot work permit included in this program. All hot work permits or tags must include the information required below.

The hot work permit will be written, numbered, and contain the following information:

- The effective time and date.
- The place of use.
- The hours the source of ignition may be used (must not exceed 24 hours).
- The specific location or piece of equipment where the source of ignition will be used.
- The nature of the use of the source of ignition.
- Any special precautions or limitations to be observed before, during or after the use of the source of ignition, including the need for fire watch.

Permits must have the information included above and be posted at the entrance to the work site to inform personnel of the hot work operations taking place.

7.4 Duration of Permits, Permit Close Out, Permit Retention

Permits will be cancelled under the following conditions:

- The operation has been completed.

- An unsafe condition develops during the operation.
- If an inactive period of more than two hours has elapsed.
- At the end of the work shift.
- If conditions change after the issuance of the permit.

Upon completion of hot work, permits must be returned to the issuing supervisor or manager.

Completed hot work permits will be retained by the permit issuer for six months from the date of issue.

8. TRAINING

Departments will ensure initial training is provided prior to an employee conducting hot work operations. The employee's supervisor must ensure that all employees meet the requirements before assignment to a task that meets the criteria of hot work operations. An employee can be utilized as a helper, prior to receiving the initial training, as long as they work directly under a trained employee.

The initial training includes the following topics:

- Written program
- Hot work procedures, including how to obtain a permit
- Proper equipment operation
- Handling and storage of welding materials
- Welding safety, if applicable to welder and/or worker
- Compressed gas cylinder safety
- Fire watch
- Physical and chemical hazards
- Hazard control
- PPE selection and use

Employees will receive refresher training in hot work annually after the initial training. The refresher training will include the topics set forth by the initial training. It will also provide updates or new requirements, if applicable.

Employees will also be required to complete fire prevention training prior to any hot work operations.

9. RECORDKEEPING

Completed hot work permits will be retained by the worker's Supervisor, Lead, or Manager for six months from the date of issue.

Each Department remains responsible for maintaining their own training records. A copy of the following should be retained in the employee's Department:

- Sign in sheet.
- Topics covered in the training.
- Copy of training materials (PowerPoint and/or handouts utilized in training).

10. DEFINITIONS

Brazing and Soldering – Soldering and brazing use molten metal to join two pieces of metal. The metal added during both processes has a melting point lower than that of the workpiece, so only the added metal is melted, not the workpiece. Brazing produces a stronger joint than does soldering, and often is used to join metals other than steel, such as brass. Brazing can also be used to apply coatings to parts to reduce wear and protect against corrosion.

Combustible – generally refers to materials with a flash point above 100 degrees Fahrenheit.

Contractor - The individual, partnership, corporation, joint venture, or other legal entity having a Contract with PCWA to perform work.

Designated Safe Hot Work Area – A specific area designated or approved for such work, such as maintenance shop or a detached outside location that is of noncombustible or fire-resistive construction, essentially free of combustible and flammable contents, and suitably segregated from adjacent area. A hot work permit is not required in these designated areas.

Fire Watch/Guard – The individual who is designated to watch the operation to ensure that errant sparks do not cause a fire or explosion.

Flammable – Materials with a flash point below 100 degrees Fahrenheit.

Hot Work – Any work involving burning, welding, grinding, or similar operations.

Hot Work Operator – The individual(s) performing the hot work.

Hot Work Permit - A document issued for the purpose of verifying the safety of an area where hot work is to be conducted, as per the requirements of this hot work program. See Appendix A.

Permit-Required Area – An area that is made fire safe by removing or protecting combustibles from ignition sources. Any area employees will be completing hot work activities outside of PCWA's designated safe hot work areas.

Welding - Joining together (metal pieces or parts) by heating the surfaces to the point of melting using a blowtorch, electric arc, or other means, and uniting them by pressing, hammering, etc.

11. REFERENCES

- CCR 8 4848, Fire Prevention and Suppression Procedure
<https://www.dir.ca.gov/title8/4848.html>

- CCR 8 6777, Hot Work Procedures and Permits <https://www.dir.ca.gov/title8/6777.html>
- NFPA 51b, Standard for Fire Prevention During Welding, Cutting, and Other Hot Work <https://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards/detail?code=51B>

Appendix A

Hot Work Permit



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Rev. 0 – 05/23	Hot Work Permit	Permit # or WF #:
Instructions Required Precautions Checklist		
Authorizing Supervisor: 1. Complete precaution checklist at right 2. Sign Supervisor Approval 3. Issue permit to person performing hot work		
Permit Information		
Hot work done by: ☐ Employee ☐ Contractor		
Location:		
Reason for job:		
☐ PPE Required: ☐ Welder's hood with appropriate lenses ☐ Welder's gloves ☐ Leather jacket/clothing ☐ Head Protection ☐ Hearing Protection ☐ Respirator Type/cartridge: _____ ☐ Other: _____		
Name of Person(s) doing Hot Work		
Name:		
Signature:		
<i>I verify the above information has been examined, the precautions checked on the Required Precautions Checklist have been taken to prevent fire, and permission is authorized for this work.</i>		
Hot Work Supervisor Authorization		
Name:		
Signature:		
Date:		
Permit Dates		
Permit Activated	Date:	Time:
Permit Expires	Date:	Time:
Date and time work completed	Date:	Time:
Final Fire Watch Check-up	Date:	Time:
Assigned Fire Watch Inspector		
Name:		
Signature:		
☐ Sprinkler protection in service (if present) and extinguishers available. ☐ Hot work equipment is in good working order. ☐ Other permits completed as required: Lock-out/tag-out, working at heights, live electrical work, confined space, etc. Requirements within 35 ft. of hot work ☐ Floors, work level and below are cleaned and protected. Sweep floors. ☐ All combustibles removed or shielded from sparks. - Remove flammable liquids, dust, lint, combustible waste, oil, deposits, etc., where possible. - If removal/cleaning is impractical, protect with fire-retardant covers, or shield with fire-retardant guards, curtains, blankets, or metal shields. ☐ Explosive atmosphere in area eliminated or potential not present. ☐ Nearby activities evaluated for conditions that could be affected by hot work. ☐ Transmission or conveying of sparks to adjacent areas eliminated or protected. - Path of likely sparks evaluated. - Tightly cover wall/floor openings with fire-retardant material. - Where openings cannot be sealed, suspend fire-retardant tarpaulins to help protect areas beneath. - Isolate or shut down fans to prevent the capturing and conveying of sparks to other areas. - Combustible floors wet down, covered with damp sand or fire-resistive sheets. ☐ An appropriate fire extinguisher or alternative is in the hot work area.		
Hot work on walls, ceilings, or roofs ☐ Construction is noncombustible and without combustible covering or insulation. ☐ Combustible material on other side of walls, ceilings or roofs is moved away.		
Hot work on enclosed equipment (i.e., welding on the outside of tanks) ☐ Enclosed equipment cleaned of all combustible material. ☐ Containers purged of flammable liquid/vapor. ☐ Pressurized vessels, piping and equipment removed from service, isolated, and vented.		
Hot work inside of enclosed spaces (i.e., inside of tanks) ☐ Adequate ventilation provided. ☐ Area purged of any flammable or toxic vapors. ☐ Atmosphere checked with gas detector per confined space permit.		
Hot work/Fire Safety Notifications ☐ Location of nearest fire alarm known ☐ If no alarm is present, what method will be used to raise the alarm? (List in other precautions area below) ☐ Escape routes maintained and known by personnel.		
Fire Watch/Hot work area monitoring ☐ Fire watch will be provided for a minimum of _____ minutes after work has ceased. ☐ Fire watch is provided with suitable fire extinguishing equipment. ☐ Fire watch trained in use of equipment and in sounding alarm.		
Other Precautions/Special Instructions: ☐ _____ ☐ _____		

WARNING!

HOT WORK IN PROGRESS

WATCH FOR FIRE!

In case of emergency:

Call:
At:
Other Instructions:

FIRE WATCH

Maintain fire watch throughout work. Watch must be maintained uninterrupted throughout lunch, breaks and ensuing shifts. The manager or supervisor will determine the appropriate length of time a fire watch is to be maintained depending on the type of hot work conducted and the fire potential.

Please return this hot work permit to the hot work supervisor/manager upon completion of fire watch.