PINE FLAT UNIT 4 PROJECT
ENGINEERING, PROCUREMENT, & CONSTRUCTION (EPC) PACKAGE

CONTRACT #203.02.97_R1

PINE FLAT UNIT-4 PROJECT
ENGINEERING, PROCUREMENT AND CONSTRUCTION (EPC) PACKAGE

INVITATION FOR BIDS

Notice is hereby given that electronically submitted bids will be received until the hour of **2:00 PM Pacific Standard Time (PST), June 28, 2024** on www.bidnetdirect.com platform **Solicitation number: 203.02.97_R1**, the web-based bid posting platform used by Kings River Conservation District (KRCD), herein after referred to as Owner, for the procurement of Engineering, Procurement and Construction (EPC) services for the Pine Flat Unit-4 addition at the existing Pine Flat Hydroelectric Power Project, as more fully described in the Procurement Documents.

Stantec Consulting Services, Inc. has been hired by the Owner as the Owner's Engineer for this project, herein after referred to as Owner's Engineer (OE).

Bidders may send questions regarding the bid in the form of Request for Information (RFI). Last date for RFIs submission is June 12, 2024 by 4:00 PM PST.

Bids will be evaluated by Owner's panel and will thereafter be accepted or rejected by the Owner within 90 days. The owner may opt to implement a two-stage selection process and may only select three (3) to four (4) qualified bidders to move forward with detailed bid evaluation process.

Bids are requested for EPC, Goods and Services, more specifically for the design and construction of a new powerhouse building for Pine Flat Unit-4 and include installation services of following equipment, supplied by others: Horizontal small turbine (approximately 5 MW), one horizontal synchronous generator, one turbine shutoff valve, unit control panels and equipment, and auxiliary equipment and components, as more fully described in the Specification Documents. EPC scope also includes design, manufacture, testing and delivery of equipment. Successful EPC will be responsible for completing all work covered in these Specifications and summarized in Section 01010 Summary of Work.

Bid documents shall be downloaded from the web-based platform www.bidnetdirect.com. Bid documents consist of Bidding Requirements, Procurement Specification and Drawings, and Bid Forms. Bidders are informed that these documents will be required in the preparation of bids. Each bid must be submitted on the prescribed Bid Forms and must be for all Contract items.

Bidder must deposit with his Bid, security in the amount, form and subject to the conditions stated in the Instructions to Bidders.

Bidder will be required to submit with his Bid evidence of their qualifications to perform the Work satisfactorily. The Successful Bidder must furnish a Performance Bond in the amount of the total Bid.

Owner reserves the right in its sole discretion after opening bids to waive any and all irregularities in any bid, to reject any or all bids, or to award the Contract to the responsible

bidder. The award of the Contract, if it is awarded, will be made within one hundred-twenty days after the final bid submission date.

It shall be noted that KRCD awarded limited contract for Water-to-Water Equipment manufacturing and supply scope to Gugler Water Turbines, GmbH, Austria. The successful bidder shall timely coordinate with Water- to-Wire Equipment supplier for all design, testing and schedule work during the contract period.

A copy of the bid specification is also available on KRCD's website at https://krcd.org/request-for-proposal. However, only the bids submitted on bidnetdirect.com will be accepted.

Dated at Fresno, California this 29th day of April, 2024.

Kings River Conservation District

David M. Merritt, General Manager

1. Specifications

Mechanical

Division 16 Electrical

2. Drawing List

PF4-PLT-LYT-1001 -001	Site Layout - Plan View
PF4-PLT-LYT-1001 -002	Site Layout - Elevation
PF4-PLT-LYT-1001 - 003	Site Layout - Transverse Section
PF4-PLT-3DL-1002 -001	3D Isometric of Powerhouse & Bypass Piping - Sht. 1
PF4-PLT-3DL-1002 -002	3D Isometric of Powerhouse & Bypass Piping - Sht. 2
PF4-PLT-3DL-1002 -003	3D Isometric of Powerhouse & Bypass Piping - Sht. 3
PF4-PLT-STR-1003-001	Powerhouse Structural – Overall Plan
PF4-PLT-STR-1003-002	Powerhouse Structural - Section
PF4-PLT-STR-1003-003	Powerhouse Structural -Transverse Section
PF4-PLT-STR-1003-004	Powerhouse Substructure – Micropile Layout
PF4-PLT-STR-1003-005	Powerhouse Substructure- Micropile Sections
PF4-PLT-STR-1003-006	Powerhouse Substructure- Micropile Sections
PF4-PLT-STR-1003-007	Powerhouse Substructure -Micropiles Details
PF4-PLT-STR-1003 -008	Draft Tube Spray Wall Penetration - Plan & Section
PF4-PLT-CPL-1004-001	Demolition - Existing Bypass Piping-Plan
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PF4-PLT-LYT-1006-004	Powerhouse Major Equipment Plan
PF4-PLT-LYT-1006-005	Powerhouse Major Equipment Section
PF4-PLT-LYT-1006-006	Powerhouse Major Equipment Transverse Section
PF4-PLT-LYT-1006-007	Powerhouse Major Equipment List
PF4-PLT-LYT-1007-001	230 kV Switchyard Layout – Plan View
PF4-PLT-LYT-1007 -002	230 kV Switchyard & Main Powerhouse Layout – Plan View
PF4-PLT-DIA-1008	Pine Flat Unit 4 One-Line Diagram
PF4-PLT-DIA-1009	Station Service One Line Diagram
PF4-PLT-DIA-1010	48VDC One Line Diagram

3. Appendix

Manufacturers' Drawings, if required, will be provided after signing the NDA.

MUTUAL NON-DISCLOSURE AGREEMENT (NDA)

(To be submitted to KRCD to obtain additional reference drawings and documents)

This Mutual Non-Disclosure Agreement ("Agreement") is entered into as of this _(Day)__ day of (Month), (Year) (the "Effective Date"), by and between __[Insert name of Counterparty] ("_____") with its principal office located at __(contractor's corporate office address)_____ and Kings River Conservation District ("KRCD"), with its principal office located at 4886 E. Jensen Ave., Fresno CA 93725. __(Contractor name)_____ and KRCD shall be referred to herein collectively as the "Parties," and individually as a "Party". When a Party receives Confidential Information (defined below) from the other Party, for purposes of this Agreement it is the "Recipient." When a Party provides Confidential Information to the other Party, for purposes of this Agreement it is the "Disclosing Party."

IN CONSIDERATION OF any Party's disclosure of Confidential Information to the other and the other understandings set forth below, the Parties agree as follows:

1. ***Scope***. This Agreement sets forth the terms and conditions under which Confidential Information may be used by the Parties in connection with **Pine Flat Unit-4 Engineering, Procurement & Construction (EPC) bid solicitation (solicitation # 203.02.97_R1)** at the Jeff L. Taylor Pine Flat Power Plant being defined hereafter as the "Project".

2. ***Confidential Information Defined***. "Confidential Information" shall mean any data, information, trade secrets or "know-how" that is proprietary to the Disclosing Party, and not known to the Recipient or the general public as of the date hereof, which is disclosed in the course of dealings between the Parties in connection with the Project. Confidential Information may be in intangible or tangible form, including any form of media. This Agreement does not require either Party to disclose any particular Confidential Information, or to disclose it in any particular form or format. The term Confidential Information shall include, without limitation, information, data or materials regarding the past, present or future operations, sales, marketing, engineering, technical matters, products or goods, legal and/or financial aspects of the Project and/or the Disclosing Party's business interests or investments, including the Project, whether in preliminary or final form and whether or not designated as confidential. Confidential Information shall also include any copies, analyses, summaries, extracts, memoranda, reports and other materials prepared by the Recipient or its Representatives (as defined below) that are derived from or based on other Confidential Information disclosed by the Disclosing Party, regardless of the form of media in which it is prepared, recorded or retained. The term "Representatives" shall mean, as to each Party, its directors, officers, employees, agents and advisors (including, without limitation, financial advisors, consultants, attorneys and accountants).

3. ***Exceptions To Confidentiality***. The obligations set forth in this Agreement related to Confidential Information shall not apply to information that the Recipient establishes is:
   (1) Information which is in the public domain as of the date of this Agreement, or which later enters the public domain from a source other than the Recipient; or
   (2) Information which the Recipient knew prior to the execution of this Agreement; or
   (3) Information which the Recipient receives from a bona fide third party source that to the Recipient's knowledge is not under any obligation of confidentiality to the Disclosing Party; or
   (4) Information approved for release by the Disclosing Party in writing; or
   (5) Information required to be disclosed in a regulatory or judicial proceeding, or as otherwise required to be disclosed by law; provided that Recipient provides the Disclosing Party with advance notice as provided in Section 6 below.

4. ***Use of Information***. Recipient hereby agrees that Recipient and the Recipient's Representatives may use the Confidential Information solely for the purpose of evaluating a Project, that the Confidential Information will be kept confidential by the Recipient and the Recipient's Representatives and that the Recipient and the Recipient's Representatives will not disclose any of the Confidential Information in any manner whatsoever; provided, however, that any of such information may be disclosed to the Recipient's Representatives in accordance with Section 5 below. The Recipient shall use its best efforts to ensure compliance with the provisions hereof by all persons to whom Confidential Information is disclosed.

In addition, the Recipient agrees that, without the prior written consent of the Disclosing Party, the Recipient and the Recipient's Representatives will not, directly or indirectly, consult or share Confidential Information with, or enter into any agreement, arrangement or understanding, or any discussions which might lead to such agreement, arrangement or understanding, with any co-investor, source of equity financing or other person (other than the Disclosing Party) regarding any possible Project involving the Disclosing Party. The term "person" as used in this Confidentiality Agreement shall be broadly interpreted to include the media and any corporation, partnership, group, individual or other entity.

5. ***Protection***. The Recipient shall take all reasonable measures to prevent unauthorized disclosure or use of Confidential Information. Specifically, the Recipient shall restrict access to Confidential Information and to materials prepared in connection therewith to employees, affiliates, and Representatives of the Recipient. The Recipient agrees to reveal, transmit, or otherwise make the Confidential Information available only to those of its Representatives: (a) who need to know the Confidential Information for the purpose of evaluating the Project; (b) who are informed of the confidential nature of the Confidential Information; and (c) who are provided with a copy of this Agreement and who agree in writing to be bound by the terms of this Agreement. The Recipient shall be primarily liable for the actions of any disclosure or use by its employees, affiliates or Representatives contrary to this Agreement. In no event shall the Recipient take any actions related to Confidential Information that are inconsistent in any way with the standards it uses for protection of its own similar proprietary materials.

6. ***Disclosure Exception***. If the Recipient becomes or believes it has become legally compelled to disclose any of the Confidential Information, the Recipient will provide the Disclosing Party with prompt notice thereof unless prohibited from doing so by law so that Disclosing Party may seek a protective order or other appropriate remedy. If such protective order or other remedy is not obtained, the Recipient will furnish only that portion of the Confidential Information which is legally required, and the Recipient will use reasonable efforts to obtain reliable assurance that confidential treatment will be accorded the same.

7. ***California Public Records Act***. __(Contractor name)_____ acknowledges that, as a public agency of the State of California, KRCD is subject to the California Public Records Act (the "Act"). KRCD is therefore required to disclose any information deemed to be a public record upon request as provided in the Act. Therefore, notwithstanding any other provision of this Agreement, KRCD shall not be in breach of this Agreement because it discloses any Confidential Information in response to a request made under the Act.

8. ***Return/Destruction of Confidential Information***. Upon written request from the Disclosing Party, the Recipient shall promptly return to the Disclosing Party: (i) all materials received from the Disclosing Party in tangible form, (ii) all copies, summaries, outlines and all other representations made of the Confidential Information in any medium; and (iii) any analyses or other materials prepared in connection with the use thereof, or derived therefrom. In lieu of return, however, the Disclosing Party may request in writing that the Recipient certify that it has destroyed all or specified portions of the items listed in (i), (ii) or (iii). Notwithstanding the foregoing, the Recipient may keep one archival copy of the Confidential Information so long as it continues to be bound by the obligations contained herein, which obligations shall survive the termination of this Agreement with respect to such archival copy. Furthermore, destruction of Confidential Information shall not extend to electronic files archived, backed up or otherwise preserved that are inaccessible to the Recipient in the normal course of business. Notwithstanding the return or destruction of the Confidential Information, the Recipient and the Recipient's Representatives will continue to be bound by their obligations of confidentiality and other obligations hereunder.

9. ***No Representations or Warranties***. The Parties make no representation or warranties, express or implied, of any kind to the other with respect to the Confidential Information, including without limitation with respect to the accuracy, completeness or fitness for any purpose thereof. Any representations or warranties shall be made thereby, if at all, only in definitive written agreements that may be entered into hereafter.

10. ***Remedies/Limitation On Damages***. Each Party acknowledges that disclosure or misappropriation of any Confidential Information could cause irreparable harm to the Disclosing Party, the amount of

which may be difficult to assess. Accordingly, each Party hereby confirms that the Disclosing Party shall be entitled to apply to a court of competent jurisdiction for an injunction, specific performance or such other relief as may be appropriate in the event of improper disclosure or misuse of its Confidential Information. Such right shall, however, be construed to be in addition to any other remedies available to the Disclosing Party, in law or equity. In no event, however, shall either Party be subject to the payment of indirect, special, punitive or consequential damages, whether based on concepts of tort or contract law, even if a Party has been advised of the possibility of such damages.

11. ***No Right Conveyed.*** The Recipient's permitted use of the Confidential Information consistent with this Agreement shall not be deemed as providing a license, title or other legal right or interest in or to any Confidential Information.

12. ***No Further Obligation.*** Neither this Agreement, nor the disclosure of Confidential Information under this Agreement, nor the ongoing discussions and correspondence by the Parties regarding the Project, shall constitute or imply any commitment by either Party with respect to the Project or any other present or future arrangement. If, in the future, the Parties elect to enter into binding commitments relating to any of the matters stated herein, they must be stated in a separate executed written contract.

13. ***Term***. Except as expressly set forth herein, the obligations set forth in this Agreement shall terminate two (2) years after the date of this Agreement.

14. ***Communications/No Contact***. ___(Contractor name)_____ agrees that all (i) communication regarding the Project; (ii) requests for additional information, facility tours or management meetings with respect to the Project, and (iii) discussions or questions regarding procedures with respect to the Project, will be submitted or directed to KRCD. In addition, ___(Contractor name)_____ agrees not to contact any employee, supplier or customer of KRCD in connection with its evaluation of the Project without the prior written approval of KRCD.

15. ***Integration/Amendment/Waiver***. This Agreement sets forth the entire understanding of the Parties with respect to the subject matter hereof, and supersedes all prior discussions, negotiations, understandings, correspondence and representations, whether oral or written. This Agreement shall not be amended, modified or waived except by an instrument in writing, signed by both Parties, and, specifically, shall not be modified or waived by course of performance, course of dealing or usage of trade. Any waiver of a right under this Agreement shall be in writing, but no such writing shall be deemed a subsequent waiver of that right, or any other right or remedy.

16. ***No Agreement***. Recipient understands and agrees that no contract or agreement providing for any Project shall be deemed to exist unless and until a final definitive agreement has been executed and delivered by both Parties, and each Party hereby waives, in advance, any and all claims (including, without limitation, breach of contract) in connection with the Project unless and until the Parties have entered into a final definitive agreement. The Parties agree neither of them will be under any legal obligation of any kind whatsoever with respect to pursuing the Project by virtue of this Agreement, except for the matters specifically agreed to herein. Each Party further acknowledges and agrees that other Party reserves the right, in its sole discretion, to reject any and all proposals made with regard to the Project and to terminate discussions and negotiations with respect to the Project at any time. Each Party further understands that (i) the other Party and its Representatives shall be free to conduct any process for the Project if and as they, in their sole discretion, shall determine (including, without limitation, negotiating with any other interested parties and entering into a definitive agreement without prior notice), (ii) any procedures relating to such process or the Project may be changed at any time without notice to any other person and (iii) neither Party shall have any claims whatsoever against the other Party, its Representatives or any of their respective directors, officers, employees, stockholders, owners, partners, affiliates or agents arising out of or relating to the Project (other than those as against the parties to a definitive agreement in accordance with the terms thereof) nor, unless a definitive agreement is entered into, against any third party with whom a Project is entered into.

17. ***Attorneys' Fees***. If either Party employs attorneys to enforce any rights arising out of or related to this Agreement, the prevailing Party (as determined by the court) in such matter shall be entitled to receive its reasonable attorneys' fees, costs and disbursements.

18. ***Successors and Assigns***. This Agreement shall be binding on and inure to the benefit of the successors and permitted assigns of the Parties hereto. This Agreement shall not be assigned, however, without the prior written consent of the non-assigning Party, which consent may be withheld in a Party's sole and absolute discretion due to the confidential nature of the information, data and materials covered.

19. ***Applicable Law/Venue***. This Agreement shall be construed and interpreted in accordance with the laws of the State of California, excluding any choice of law rules which may direct the application of the laws of another jurisdiction. Any controversy, dispute, issue, or claim arising out of or in any way relating to this Agreement which cannot be amicably settled without court action shall be litigated in a California State Court in Fresno County, California, and the parties consent to venue therein; or if jurisdiction over the action cannot be obtained in a California State Court, in a Federal Court of competent jurisdiction situated in Fresno County, California.

20. ***Counterparts***. This Agreement may be executed in counterparts, each of which shall be an original and all of which taken together shall constitute one and the same agreement. The Parties agree that if a copy of this Agreement is executed by a Party and transmitted to the other Party by facsimile or email, the copy received shall be deemed for all legal purposes to be an original executed by the transmitting Party.

21. ***Severability***. The provisions of this Agreement are severable, and if one or more of such provisions is determined to be unenforceable by a court of competent jurisdiction, the remaining provisions shall nevertheless be binding and enforceable.

IN WITNESS WHEREOF, the authorized representatives of the Parties have executed this Agreement as of the Effective Date.

KINGS RIVER CONSERVATION DISTRICT

By: _____

Name: David M. Merritt

Title: General Manager

[Insert name of Counterparty]

By: _____

Name:

Title:

SECTION 00050

PROJECT INTRODUCTION
AND
STATEMENT OF QUALIFICATIONS

1. Introduction

Kings River Conservation District (Owner) is proposing to develop, construct, and commission the Pine Flat Unit 4 hydroelectric Project (Project). KRCD is seeking to award a contract for the Engineering, Procurement, and Construction (EPC) scope of the Project, as explained in detail in the specification enclosed herewith. Bidders interested in providing EPC services will be expected to cooperate fully with KRCD's Owner's Engineer (OE), team, and other consultants. Bidders are expected to provide qualifications for the full scope of the Project. This Request for Bid (RFB) does not accept partial scope or only one area, discipline, or phase of the project. The exception is that a separate Water-to-Wire scope is already awarded to the Primary Equipment Provider (Gugler Water Turbines, GmbH as specified in Section 3 below).
The selected EPC will be expected to design and construct the full powerhouse building and appurtenant structures for the new unit and install and assist in commissioning the turbine generator equipment and other equipment supplied through the separate contract as well as through the EPC contract.

2. Project Description

The Pine Flat Unit 4 Project is being developed by the Kings River Conservation District (KRCD). The Project license would be for a 6.3 MW hydroelectric facility designed to generate energy from flows normally released to maintain a minimum flow in the Kings River through the bypass system of the existing Pine Flat Hydroelectric Facility (Units 1-3). Project is located in Fresno County, California, approximately 30 miles outside the City of Fresno (Figure 1), on the north bank of the Kings River, adjacent to the United States Department of Defense, Army Corps of Engineers (USACE) Pine Flat Dam (Figure 2 and 3).

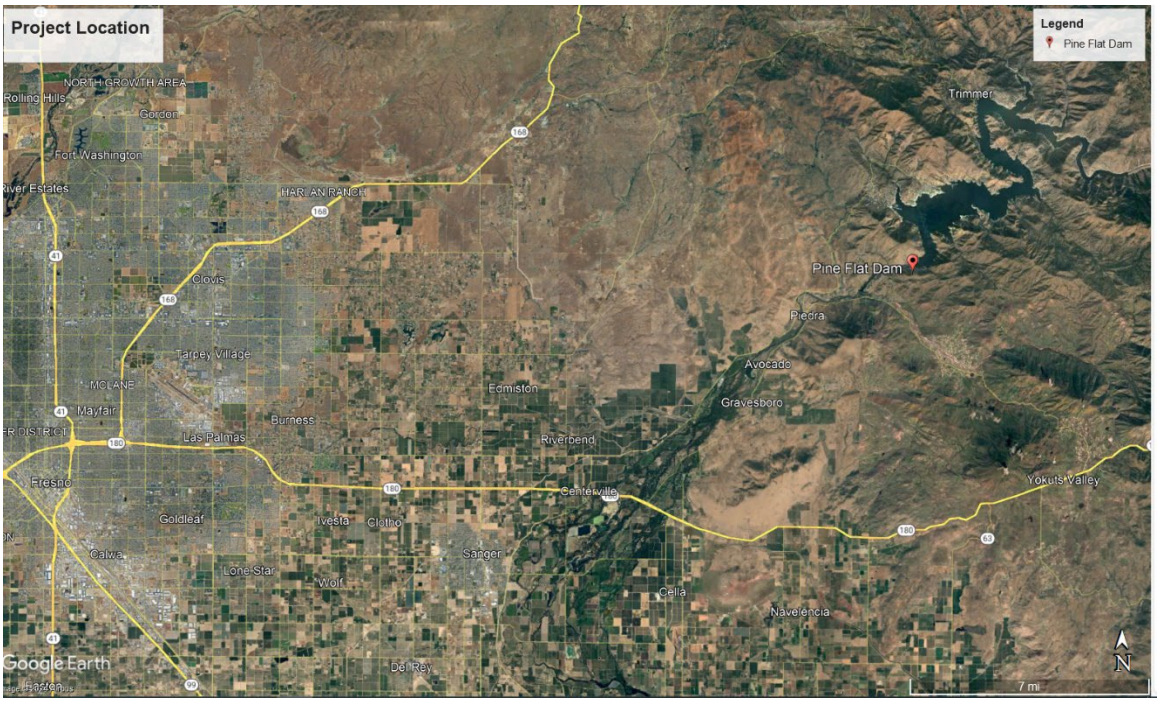

Figure 1. Pine Flat Dam Hydroelectric Project Location

Figure 2. Pine Flat Hydroelectric Project Area

Figure 3. Pine Flats Switchyard and Existing Powerhouse. View from Pine Flats Dam looking West (Downstream)

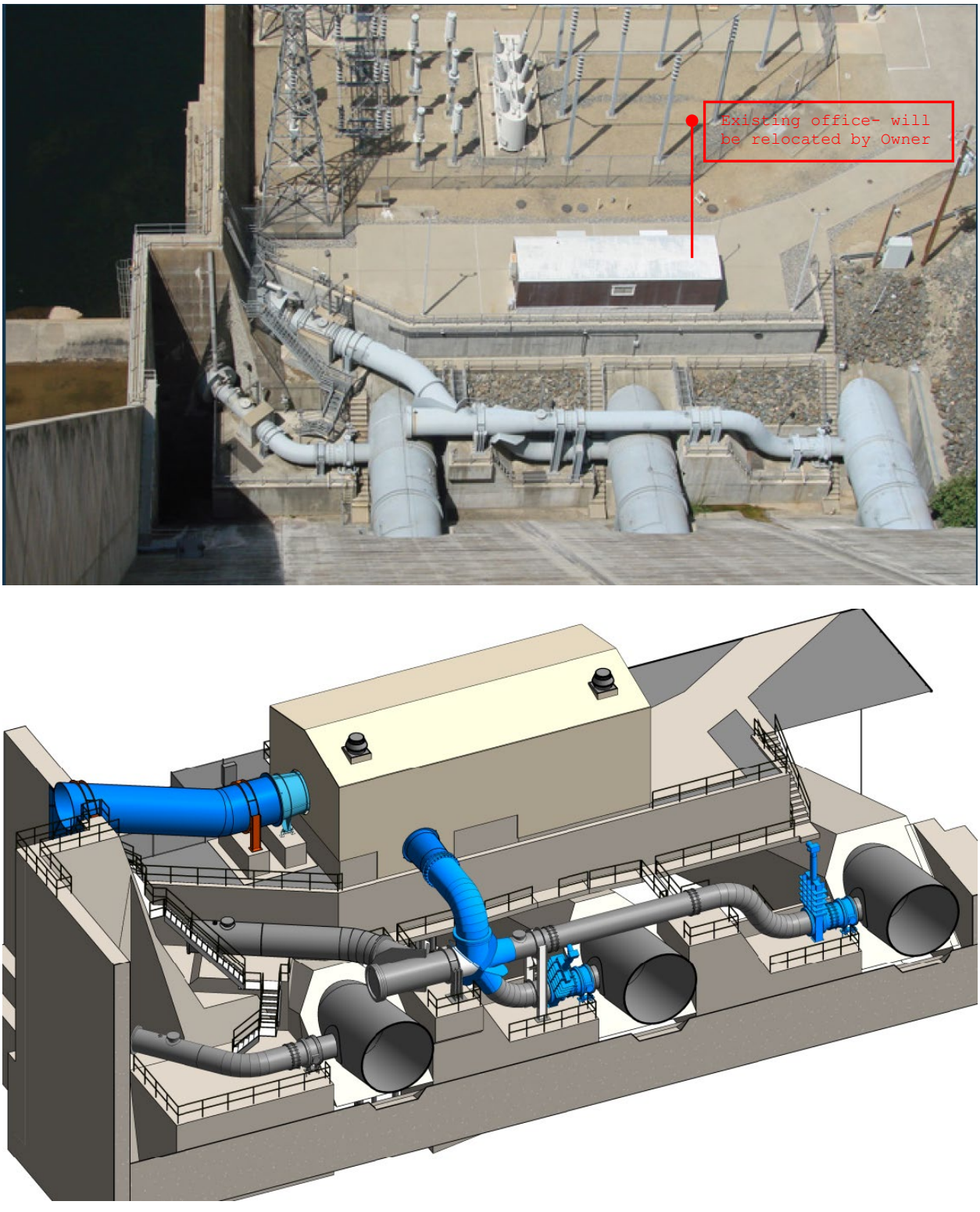

Figure 4 – Pine Flat Unit 4 Site Photograph and General Arrangement

KRCD is currently in the process of amending the existing Federal Energy Regulatory Commission (FERC) existing license project number P-2741 to include the 6.3MW small hydro unit to the existing facility. FERC approved the license amendment on May 3, 2023, with requirements that the construction of the new unit and associated structures shall start within two years and that the unit should go into commercial operation within four years from the date of license amendment approval.

The Project will interconnect into the existing Pine Flat switchyard and the DWR-owned Pine Flat Transmission Line (Figures 3 and 4)., FERC Project No. 2876, that taps with the PG&E's 230-kV Balch #2-McCall Transmission Line.

The primary features of the Pine Flat Unit 4 project are shown in Figure 4 and drawings PF4-PLT-LYT-1001-001 & PF4-PLT-LYT-1007-001 and include:

a) A new 6.3 MW hydroelectric turbine generator (FERC license is for 6.3MW).

b) A 27.9-ft 59.0 ft powerhouse to enclose the single turbine generator and associated auxiliary equipment.

   i. Two-section prefabricated metal building (A and B over Turbine and Generator))

   ii. Reinforced concrete mat foundation for section A of Powerhouse

   iii. Drilled micropile and reinforced concrete mat foundation for section B powerhouse, which serves as turbine and generator encasement and foundation.

c) A penstock manifold taping into the existing bypass system to supply water to Unit 4

d) Turbine inlet pipe connecting to owner-supplied turbine shutdown inlet pipe and valve (TSV)

e) Two new knife gate valves were installed in the existing bypass branch to isolate the new turbine from existing penstock units 1 and 2.

f) A new pipe (draft tube extension) that discharges water into the Kings River through the existing spray wall.

g) Relocation of the existing emergency backup diesel generator and fuel tank

h) Relocation of the existing 6.9/230kV GSU Transformer.

i) A generator Step Up transformer, circuit switch (proposed), associated wiring, and equipment in the existing Pine Flat substation approximately 100 yards from the proposed Pine Flat Unit 4 powerhouse.

Access to Pine Flat Unit 4 will be through existing access roads and powerhouse areas (Figures 2 and 3); potential construction areas are shown on reference drawing PF_G_03.

The footprint and layout of the new Pine Flat Unit 4, as shown in PF4-PLT-LYT-1001-001 to - 003 and PF4-PLT-LYT-1007-001 and 002), are spatially constrained by the location of existing and water supply location, and site conditions.

The Unit 4 powerhouse will be located on an existing rockfill embankment directly upstream of the Unit 1-3 switchyard (See PF4-PLT-LYT-1001-003 and PF4-PLT-STR-1003--003 to -006. The concrete-encased Unit 1 -3 penstocks are buried below the new powerhouse footprint in the embankment. A concrete "L" wall retains the upstream (east) face of the embankment. The retaining wall is founded on MSE. The existing embankment, MSE, and retaining wall, built in 2001-2003) were not designed to withstand

surcharge from the new unit 4 generating equipment and its mass concrete encasement. Therefore, using a direct foundation such as a mat or strip foundation is not possible for this application. To address this issue, the proposed powerhouse consists of two sections:

- a 27.9 ft x33ft footprint supporting the generating equipment with a deep foundation of drilled micropiles (PF4-PLT-STR-1003--004 to- 007) required to transfer vertical loads onto sound rock some 45 feet below the switchyard finished grade,
- a 27.9 ft x 26 ft supporting other electrical and mechanical equipment on direct reinforced concrete slab foundations.

The Powerhouse footprint will be enclosed with a metal pre-engineered building. The building will comprise two sections with independent structural systems. The continuity of the envelope will be provided by detailing an expansion joint at the full height of the building (PF4-PLT-STR-1003-001 to-003).

The minimum required access to the powerhouse will be provided through the roll-up loading dock door and side staircase, which leads directly to the generator level.

The powerhouse's overall footprint (59 feet by 27.9 feet) and location accommodate all the required equipment (PF4-PLT-LYT-1006 003 to -006), allowing for convenient short water intake and space access to existing facilities such as the existing bypass discharge valves or spray wall while minimizing the need for relocation of existing utility/electrical cables and control.

Generation water will be supplied from branches 1-2 of the existing bypass system. The existing pipeline (PF4-PLT-CPL-1004-001 and -002) requires modification and relocation of existing butterfly valves and couplings to install new knife gates (F4-PLT-LYT-1006-001 - 002) and a new steel manifold and inlet pile that will connect to the Turbine Shutdown Valve inlet (PF4-PLT-LYT-1006-003 and -004). The water will be discharged through the draft tube extension through the existing spray wall to the Kings River (PF4-PLT-STR-1003-008). The existing spray wall and walkway will require concrete demolition and relocations of ladders and handrails to accommodate the new outlet (PF4-PLT-CPL-1004 (SHT-003).

The Unit 4 powerhouse will include the 6.3 MW horizontal Francis generating unit, turbine shut-of valve, inlet, and draft tube (PF4-PLT-LYT-1006-004 and -006). In addition, balance of plant electrical and mechanical equipment, such as HVAC, lighting, grounding, etc., will be included to provide a fully functional facility for operation and maintenance activities.

The electrical power from the hydro-generator will be routed out to the existing Pine Flat substation to step up the generation voltage from 6.9 kV to 230 kV to tie into the existing transmission system for delivery of the electrical power generated from the new facility (PF4-PLT-LYT-1007-001 and -002).

Reference Documentation:

Existing Facilities: Kings River Hydroelectric Project-Unit I Pine Flat Power Plant (1982-84)		
1.	LG-11-101R1	Dam and Powerplant – Section and Elevation
2.	LG-11-112R5	Powerhouse – General Arrangements – Transverse Section
Existing Facilities: Pine Flat Dam – Turbine Bypass Project (2001-2003)		
1.	PF-G-03	Contractor Mobilization Areas
2.	PF C-03	Excavation Sections
3.	PF-S-01	New Pipelines and Concrete Pads – Plan Layout

4.	PF-S-10	New Pipelines – Plan and Elevation
5.	PF-E-01	Electrical Plan – Switchyard, Penstocks & Bypasses
6	PF-E-04	Grounding Plan– Switchyard, Penstocks & Bypasses
Proposed Facilities: New Pine Flat Unit 4 Project		
1	PF4-PLT-LYT-1001 -001	Site Layout - Plan View
2	PF4-PLT-LYT-1001 -002	Site Layout - Elevation
3	PF4-PLT-LYT-1001 - 003	Site Layout - Transverse Section
4	PF4-PLT-3DL-1002 -001	3D Isometric of Powerhouse & Bypass Piping - Sht. 1
5	PF4-PLT-3DL-1002 -002	3D Isometric of Powerhouse & Bypass Piping - Sht. 2
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13	PF4-PLT-STR-1003-007	Powerhouse Substructure -Micropiles Details
14	PF4-PLT-STR-1003 -008	Draft Tube Spray Wall Penetration - Plan & Section
15	PF4-PLT-CPL-1004-001	Demolition - Existing Bypass Piping-Plan
16	PF4-PLT-CPL-1004 -002	Demolition - Existing Bypass Piping-Elevation
17	PF4-PLT-CPL-1004 -003	Demolition – Spray Wall - Elevation
18	PF4-PLT-LYT-1006-001	Site Layout - Bypass Piping Configuration
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22	PF4-PLT-LYT-1006-007	Powerhouse Major Equipment List
23	PF4-PLT-LYT-1007-001	230 kV Switchyard Layout – Plan View
24	PF4-PLT-LYT-1007 -002	230 kV Switchyard & Main Powerhouse Layout – Plan View
25	PF4-PLT-DIA-1008	Pine Flat Unit 4 One-Line Diagram
26	PF4-PLT-DIA-1009	Station Service One Line Diagram
27	PF4-PLT-DIA-1010	48VDC One Line Diagram

3. Scope of work

SoW is summarized in section **01010, Summary of Work,** and as specified in the other specification sections provided herein. SoW involves the following areas:

3.1 Unit 4 Water Inlet Pine Flat Unit 4 will be interconnected into the existing Unit 1 and 2 bypass system piping The Owner and Owner's Engineer (OE) developed a preliminary design bypass modification, including the extension of reinforced concrete bypass pedestals, relocation of existing butterfly valves, installation of two knife gates and new manifold directing the flow to the new Unit 4. The contractor will provide services to deliver the detailed design, procurement furnish, construction and installation, commissioning, and testing as specified in applicable sections of specifications.

3.2 Subsurface Investigation: The information on the powerhouse subsurface is well established. In April 2023, the owner and Owner's Engineer conducted a geotechnical investigation at the location of the new powerhouse foundation. The Geotechnical Investigation Report will be provided to all bidders. Further investigations are not required.

3.3 Powerhouse and Appurtenances: The contractor will be responsible for detailed engineering design (geotechnical, civil, and structural), procurement/furnishing, and construction for the Unit-4 powerhouse and appurtenances, including the discharge piping support system.

The Owner and Owner's Engineer (OE) developed a preliminary design of the powerhouse and piping supports, accounting for space limitation, constructability, capacity, and existing conditions, as well as the preliminary design and layout of water-to-wire equipment. The level of maturity of the civil works design is at approximately 20-30% (Table 1 69R-12 Cost estimate Classification Systems-As applied in Engineering, Procurement and Construction for the Hydropower Industry, ACEE). This corresponds to:

i. **Structural systems are confirmed** to adequately support the water-to-wire works and transfer loads onto the foundation in a manner that the foundation can accommodate without disrupting the structural and functional integrity of the existing works in the vicinity. Major deviations from the structural system choices are not expected in the detailed design phase by EPC contractor:

   - Two independent sections of metal pre-engineered Building envelope protecting the equipment for elements.
   - Powerhouse foundation: two independent sections separated by expansion joint: 1) conventional mat foundation and 2) deep foundation (drilled micro piles and mass concrete matt) supporting the major water-to-wire equipment).
   - Steel pipe supports anchored to concrete pedestals to support the new discharge piping (Draft Tube extension).

ii. **The general arrangements** (footprint, layout, and concrete dimensions) **are preliminarily established** to accommodate the equipment with required vertical and horizontal clearances, provide the embedment for anchors and studs and attachment of other structural elements and equipment, and remain stable in all operating conditions. Only nonsubstantive changes are expected in the detailed design by EPC contractor.

iii. **Micropile Foundations layout and design are determined preliminary** for critical load conditions, including lateral loads. The layout was established, including clearance for a potential 1 % deviation from a plumb in any direction during drilling and clearance from existing structural elements (Penstocks, retaining wall, septic tank, etc.). The casing and

reinforcement (pile capacity) were preliminarily established. Group pile effects were accounted for in the preliminary design. Marginal changes in layout and sizing are expected during the detailed design phase by PC contractor.

The preliminary engineering work by the Owner and OE **did not include** reinforcement, anchorage, steel structural elements, and connection sizing. The Steel structural elements shown on the preliminary design drawings are scaled of similar elements implemented in the existing bypass.

3.4 Water to Wire KRCD awarded a separate contract for the Water to Wire Equipment package engineering and procurement that covers all the unit-specifics. This package consists of the turbine generator equipment and accessories, turbine shut-off valve, generator breaker, hydraulic power unit, governor, excitation system, electrical and mechanical balance of plant equipment, associated monitoring equipment, and all cabling. The EPC contractor will be responsible for installation of the Water to Wire equipment package.

The turbine generator will be housed in an enclosure that meets California Building Code requirements for an occupied space. The Powerhouse will not be equipped with an overhead crane but rather separate lifting equipment will be required for during construction and installation. Under-rated lifting equipment or lifting equipment that is not capable of lifting at multiple precise pick points will not be allowed. EPC contractor shall furnish the lifting equipment and other equipment as necessary.

The Project will be operated from the existing main control room for the Jeff L. Taylor powerhouse. All operating interface equipment shall be in the existing control room and necessary wiring accommodation shall be made to interface all required equipment within Unit-4 powerhouse for remote operation from main control room.

3.5 High Voltage Electrical Interconnection. This scope includes procurement and installation of a suitable generator Step up transformer from the generator output voltage to the existing transmission line voltage of 230kV, 230kV circuit switch or, as an alternate proposal, line breaker, required California Independent System Operator (CAISO) metering and SCADA, required protection scheme approved by CAISO, Pacific Gas & Electric Company (PG&E) and California Department of Water Resources (DWR). To accommodate new line equipment for Unit-4, relocation of the existing spare GSU and emergency diesel generator and fuel tank will be needed (and is within this scope), and all supporting wiring and equipment for a fully functioning system from the generator output breaker to the interconnection with the existing Pine Flat high voltage substation shall be established. Relocation of the existing equipment for this purpose is EPC contractor's responsibility.

3.6 Unit-4 Discharge. Water from Pine Flat Unit 4 shall be discharged into the Kings River, through the existing spray wall. To achieve this, the EPC contractor is to cut through the spray wall concrete and make necessary arrangements to install the discharge pipeline onto the pipline supports and through this spray wall. Construction access from the Kings River is not permitted.

3.7 Water to Wire Equipment Schedule. Following is a preliminary high level schedule based on some of the received bids for Water to Wire Equipment procurement package. This schedule shall be used as an estimate for the EPC contractor to plan their site work. A Baseline schedule for Water to Wire Equipment contract shall be provided to the EPC contractor once this contract is awarded.

12/15/2023	Award
8/30/2024	Preliminary Equipment drawings
1/31/2025	Final Equipment drawings
11/30/2023	Submission of final electrical drawings

3/15/2025 to 5/15/2026	Manufacturing of Equipment + Testing + Quality checkoffs
7/1/2026 to 7/20/2026	Arrival of Equipment/ Components at site
10/20/2026 to 11/30/2026	Turbine, Generator and Mechanical installation
11/1/2026 to 12/15/2026	Electrical Installation
1/9/2027 to 2/5/2027	Testing and Commissioning

It shall be noted that the above schedule is preliminary and does not constitute consecutive working days for the activities listed. The Owner prefers major work requiring outage to be performed during the winter months (November through February), so that the generation loss from the existing plant is minimum.

4. Proposal Expenses

Bidders are solely responsible for all costs and expenses of any nature associated with responding to this RFB, including attending briefing(s), any site visits and providing supplemental information.

5. Non-disclosure Requirement

The Bidder will be given access to records, which are confidential and solely for the purpose of participating in the RFB process with a properly executed NDA. The Bidder shall be required to sign a non-disclosure statement prior to its receipt of such documents obligating each employee, agent, or subcontractor of the Bidder not to make inappropriate use of or improperly disclose any of the contents of such documents.

6. Content of the Bidder's Proposal/ Statement of Qualification (SOQ)

This section describes specific information that must be included in the proposal. Bidders shall provide brief, concise information that addresses the requirements of the Project consistent with the evaluation criteria described in this RFB. Failure of a Bidder to submit a complete response may result in the bid submittal being determined nonresponsive. Details pertaining to the organization and format are outlined in Appendix A.

5.1. Transmittal Letter

The Bidder shall submit a transmittal letter signed by a duly authorized representative of the Bidder's organization. For Bidders that are joint ventures, partnerships, or other associations, authorized representatives of all equity members of the Bidder shall sign the Transmittal Letter. In addition, for Bidders that are joint ventures, partnerships, or other associations, authorized representatives of all equity members of the Bidder shall sign the letter.

5.2. Legal Structure

In order to demonstrate that Bidder's organization, legal structure, team members, and history possess the ability to remain stable and viable for the duration of the Project, Bidders shall address all the following and submit it under Section 1 of Appendix-A:

a) Legal structure of the Bidder and its organization. If the Bidder's organization has already been formed, provide complete copies of the organizational documents of the Major Participants to conduct business in the State of California. If the Bidder's organization has not yet been formed, provide a brief description of the proposed legal structure or draft copies of the underlying agreements.

b) Name and describe all Major Participants as defined in this RFB. Provide a resume of the major participants.

c) In cases where Major Participants on different Bidder organizations belong to the same parent company, each Bidder must describe how conflicts of interest would be avoided by the participants through the qualification and proposal phases of the Project. KRCD may disqualify a Bidder if any of its Major Participants belong to more than one Bidder organization.

5.3. Financial Capacity

To demonstrate that Bidder's team members have the financial capacity to enter into a future EPC Construction Contract and secure the resources to successfully complete the Project, Bidder shall address the following and submit it under Section 2 of Appendix-A:

a) Provide a letter or other written documentation from a surety or insurance company stating that the Bidder is capable of obtaining a Performance Bond and Payment Bond covering project with a value equal to the total bid amount. Letters indicating "unlimited" bonding capability are not acceptable.

b) Bidders shall provide examples of insurance certifications, either a certificate of insurance evidencing current policies of, or written evidence from an insurance company or broker indicating that the Bidder is capable of obtaining the following types of insurance: Commercial General Liability, Auto Liability, Workers' Compensation/ Employers Liability, and Pollution Liability for a similar sized project.

5.4. Safety Program

Bidder may submit their general Safety Program/ Plan for this section, that shall be based on current and up to date Industry standards and practices.

5.5. Experience and Past Performance

To demonstrate experience, expertise, competence, capability, and capacity in, and a record of producing quality work on projects similar to the Project, the following shall be submitted under Appendix-A.

a) Provide a brief narrative summary of the capability and capacity of each Major Participant. Summaries shall be a maximum of two pages for each firm, the format is at the discretion of the Bidder.

b) Firm Experience: In the Appendix show the firm's experience by providing at least three but no more than five project descriptions for each Major Participant (not to exceed 10 total project descriptions for Bidder's team). In particular, demonstrate experience in each of the following areas and provide contact information for EPC Contractor's representatives on each project for verification of the following:

   i. Design and construction of projects of similar size, scope, and complexity. This could be a hydroelectric project of small to medium size.

   ii. Design/construction using innovative designs, methods, and materials.

   iii. Engineers experience with FERC and Board of Consultants for regulatory review and approval on engineering and design including construction techniques.

   iv. Accelerated construction of major elements common to this Project.

   v. Experience with 230 kV high voltage substation design and construction.

   vi. Compliance with environmental regulations and restrictive requirements.

   vii. Experience working together with other contractors and equipment suppliers as an integrated team.

   viii. Constructing controversial or highly sensitive projects, including experience in coordination with local and regional agencies on similar sized projects. Each project description must include the following information as appropriate:

      - Name of the project, contract number, the owner's contact information (Contractor or Engineer name, phone number, e-mail address), and project number. If the owner's contact is no longer with the owner, provide an alternative contact at the agency that is familiar with the project. The alternative contact must have played a leadership role for the owner during the project.
      - Dates of construction, and/or warranty periods.
      - A narrative describing the project.
      - Description of the work or services provided, and percentage of the overall project actually performed by (each of) the Major Participant(s).
      - Description of scheduled completion deadlines and actual completion dates.

- Initial construction bid price and final construction contract price for the project, including the quantity and dollar value of contract modifications and claims, and an explanation of the causes for construction contract change(s), whether upward or downward.
- Record of cost and schedule growth or reduction, cost reduction incentive proposals implemented to minimize cost and schedule growth, and experience with techniques to achieve goals of avoiding delays and minimizing claims.
- Claims history, numbers, and dollars submitted and final results.
- Dispute Review Board history including subjects and outcomes.

5.6. Key Personnel

Bidder shall identify the qualified personnel for key positions with demonstrated experience and expertise and a record of producing quality work on projects of a similar nature to this Project.. The following information shall be submitted under Section 5 (resumes shall be submitted under Appendix A) of the SOQ:

a) Key Personnel: In Appendix A list appropriate information on each Key Personnel position.

b) Required Resumes: Resumes of Key Personnel, limited to four pages for each personnel. Resumes for Key Personnel shall include the following items on each resume:

   i. Relevant licensing and registration.

   ii. Years of experience performing similar work.

   iii. Actual work examples (include the capacity on the project in which the person worked (e.g., lead design engineer, utility coordinator). Including duties performed and percent of time on the job. For each project listed provide:

      - Name of the project, the owner's contract information (project manager name, phone number, e-mail address), and project number. If the owner project manager is no longer with the owner, provide an alternative contact at the agency that is familiar with the project. The alternative contact must have played a leadership role for the owner during the project.
      - Dates of work performed on the project.
      - Detailed description of the work or services provided and role on the project. If more than one role was played, identify the dates and duration of each role.

c) Required Licenses: Evidence that the Bidder and all Major Participants have, or at the time of Preconstruction Services Contract award will have:

   i. All licenses, registrations, and credentials required to construct the Project including:

      1 date(s) obtained or anticipated to be obtained

      2 type

      3 number

      4 classification

5 issuing agency

6 expiration date

ii. Such information shall include any information on the revocation or suspension of any license, credential, or registration, and to provide specific details including date(s) and reason(s) for revocation or suspension, whether same was reinstated, and any conditions thereto.

At the time the EPC Services Contract is awarded, the Contractor shall be properly licensed in accordance with the laws of California. Any contractor not so licensed shall be subject to all legal penalties imposed by law, including, but not limited to, any appropriate disciplinary action by the California Department of Consumer Affairs Contractors State License Board. Failure of the Bidder to obtain proper and adequate licensing for an award of a contract shall constitute a failure to execute the Preconstruction or EPC Services Contract.

5.7. Project Understanding and Approach

Bidders shall demonstrate the following:

a) An understanding of and approach to the management, technical aspects, and maintenance of traffic issues and risks associated with the Project.

b) An understanding of and approach to how the EPC process and the Bidder's organization will contribute to the success of the Project and meet the Project goals.

c) An understanding of the risk sharing and the teaming relationship between the Construction Manager, OEM equipment supplier, KRCD and the OE.

d) A narrative describing the Bidder's understanding of the Project scope.

e) A narrative description of the Construction Manager's approach to EPC project contracting. The narrative should describe the methodology for integrating the EPC entity and the different areas of expertise within the team into an efficient and effective organization. The management approach must reflect an understanding of the use of the EPC project delivery methodology for dams, large diameter pipelines, small and medium sized hydropower stations and transmission line projects. Narrative shall include an organizational chart.

f) A brief description of how the Bidder will use its organization and the EPC process to ensure a successful Project, considering the Project goals.

g) Identification of the top construction, design, right of way, environmental and stakeholder risks of the Project in terms of Project constraints, the Bidder's understanding of the risks, and potential solutions to address the risk.

h) A narrative description of the Bidder's approach to managing risks including methods for identifying and pricing risks.

i) Discussion of how the Engineer of Record will complete the design, work with the Owner, Owner's Engineer, Water to Wire Equipment supplier, and other equipment suppliers and contractors.

j) Discussion of any innovative ideas that may assist the Project team in meeting Project goals. Discuss the impacts of the innovations on time, cost, and/or quality.

k) A narrative description of the safety considerations specific to the Project and the Bidder's overall approach to safety.

7. Evaluation Criteria

Successful Bidder will have demonstrated a clear understanding of the following:

a) Identification of Project elements, Project's local and regional significance, and the relationships of the Project elements and constraints and their effect on the Project schedule.

b) A proposed methodology for integrating the EPC entity and associated Key Personnel into an efficient and effective organization in cooperation with KRCD and OE Project team. The management approach reflects an understanding of the use of the EPC project delivery methodology for dams, large diameter pipelines, hydropower stations and transmission line projects.

c) Bidder's team and approach align with and will support the EPC project to ensure a successful Project, considering the Project goals listed herein and a feasible approach to achieving the planned schedule.

d) How the Engineer of Record will compete the design and obtain Board of Consultant final review and FERC approval.

e) That the Bidder has carefully considered anticipated top priority construction, design, right-of-way, environmental, and stakeholder risks of the Project in terms of Project constraints and lays out feasible proposed solutions to identified risks.

f) An approach to managing risk that includes proactive elements and/or tools intended to be utilized on this Project.

g) Proposed approach to innovation that demonstrates Bidder's understanding of the Project constraints and the Project goals.

h) An approach to safety that will enhance the safety of the work force and/or traveling public both during and after the construction of the Project.

i) An approach to managing interface points with other EPC contractors on site and accepting and working with OEM provided equipment and how OEM equipment interfaces will be successfully managed.

8. Evaluation Process

This section outlines the evaluation factors for the bidders' bids.

Bid Evaluation

KRCD will evaluate the bids based on the rating and scoring information outlined in this section. As a result, each Bidder submitting a responsive bid will be ranked. As stated earlier, KRCD expects to shortlist only three (3) to four (4) top candidates to further move along in the evaluation process.

Evaluation Objective

The objective of this step of the procurement is to identify Bidders with the legal, technical, financial, and management capability, capacity, and experience necessary to successfully undertake and complete the Work. KRCD has set high responsibility standards for the EPC Contractor, which is reflected in the evaluation factors of this bid.

Bid Evaluation Factors

The information submitted will be evaluated by the Evaluation Team in accordance with the initial responsiveness review.

7.1. Initial Responsiveness Review

Each qualification will initially be reviewed on a pass/fail basis for:

a) minor informalities, irregularities, and apparent clerical mistakes which are unrelated to the substantive content of the bid,

b) the bid's conformance to the instructions regarding organization and format, and

c) the responsiveness of the Bidder to the requirements set forth in the bid.

7.2. Evaluation Categories

Each non-scored category of a responsive bid will be evaluated on a non-scored pass/fail basis. For a bid to achieve a passing rating, each of the following categories shall meet the minimum requirements as set forth below:

a) Legal: The qualification complies with and meets or exceeds the minimum requirements listed in Section 5.2.

b) Financial: The qualification complies with and meets or exceeds the minimum requirements listed in Section 5.3.

c) Safety: The qualification complies with and meets or exceeds the minimum requirements listed in Section 5.4.

7.3. Scored Categories

Each scored category of a responsive bid will be evaluated and scored by the Evaluation Team according to the following, using the scoring form provided in Appendix F:

a) Bidder's Experience and Past Performance: The bid will be evaluated against the criteria established under Section 5.5 (15% weightage)

b) Bidder's Key Personnel: The SOQ will be evaluated against the criteria established under Section 5.6. (10% weightage)

c) Project Understanding and Approach: The SOQ will be evaluated based on the criteria established under Section 5.7. (15% weightage)

d) Pricing (40% weightage)

e) Safety and Quality Control methods (10% weightage)

f) Proposal description and detailed plan for this project (10% weightage)

7.4. Scored Interview

The short listed candidates may be interviewed in-person. If this option is exercised, interviews will be held on a pre-agreed date, time and location and will consist of a presentation by the Bidder followed by a question and answer discussion session. The presentation shall not be used to fill in missing or incomplete information that was required in the SOQ. No new Information shall be presented by any Bidder at the interview. An interview invitation letter will provide items for discussion during the interview presentation. Date, time, location, required personnel, allotted time for the interviews, as well as equipment available to Bidder for the presentation, shall also be provided in the interview letter. Only Key Personnel listed by the Bidder in its SOQ shall participate in the interview; only selected personnel form the list may attend, depending on the plan. The Bidders will be evaluated based on their presentation and responses to questions and a single score will be established. The bidder will bear the cost of travel and all associated logistics for the interview. For planning purposes, the bidder shall assume the interview to take place at Owner's district office in Fresno, California at the physical address- 4886 E Jensen Ave, Fresno, CA 93725. Location is subject to change.

7.5. Evaluation and Scoring Process

The Evaluation Team will evaluate the non-scored categories as defined along with the scored categories as defined. If interviews are conducted, the Evaluation Team will evaluate and score the interview. The overall score for each scored element will be a consensus score from the Evaluation Team based on individual assessment of the bids/ responses/ proposals by the Evaluation Team members.

8. Reserved Rights

KRCD reserves all rights available to it under applicable law, including without limitation, the following, with or without cause and with or without notice to:

a) Withdraw or cancel this RFB in whole or in part at any time without incurring any cost obligations or liabilities.

b) Issue a new RFB.

c) Accept or reject any and all submittals.

d) Modify dates set or projected in this RFB.

e) Terminate evaluations of submittals received.

f) Waive any informalities, irregularities or omissions in an SOQ.

g) Issue addenda to this RFB.

Bids/ Responses received become the property of KRCD and will not be returned to the Bidder.
KRCD assumes no obligations, responsibilities, and liabilities, fiscal or otherwise, to reimburse all or part of the costs incurred or alleged to have been incurred by parties responding to this RFB. All such costs shall be borne solely by the Bidder. In no event shall KRCD be bound by, or liable for, any obligations with respect to the project until such time (if at all) as an EPC Contract(s), in form and substance satisfactory to KRCD, has been authorized and executed and then, only to the extent set forth therein. KRCD makes no representations that any short-listed EPC Contractor will be awarded any future contract based on the results of this RFB.

APPENDIX A: FORMAT AND ORGANIZATION OF STATEMENT OF QUALIFICATIONS

A1 Organization

The bid response shall be organized as follows and as depicted in Table A-1 below:

Transmittal Letter
Section 1 – Legal Structure
Section 2 – Financial Capacity
Section 3 – Safety Program
Section 4 – Experience and Past Performance
Section 5 – Key Personnel
Section 6 – Project Understanding and Approach.

Appendices:
Appendix A: Resumes
Appendix B: Legal Forms

A2 Clarity and Conciseness

Bidders should make every effort to present information clearly and concisely.

A3 SOQ Submittal Instructions

All SOQ sections and appendices shall be provided.

Table A-1: Organization and Content of SOQ

SOQ Section	Section Title and Required Information
Cover	Transmittal Letter • Transmittal Letter (to be signed by duly authorized representatives of all equity members of the Bidder's team).
Section 1	Legal Structure (no overall page limitation for this section): • Legal structure or description of proposed legal structure. • Identification of Major Participants. •
Section 2	Financial Capacity (no overall page limitation for this section): • Verification of Bidder's ability to secure Performance Bond and Payment Bond. • Verification of Bidder's ability to secure insurance.
Section 3	Safety Program (no overall page limitation for this section): • Safety Record for the most recent three (3) year period. • Worker's Compensation experience history for the past three (3) years. • OSHA citations and assessed penalties, any serious, willful or repeat violations of its safety or health regulations in the past five (5) years.

SOQ Section	Section Title and Required Information
Section 4	Experience and Past Performance (no overall page limitation for this section): • A brief narrative summary of each Major Participant's capability and capacity, a maximum of two pages for each firm is permitted. • Project Description. • Summary of claims for projects described.
Section 5	Key Personnel • Evidence of Bidder's ability to meet license requirements.
Section 6	Project Understanding and Approach • Proposed management approach and project understanding. • Keys to ensuring a successful Project.
Section 7	Resumes (no overall page limitation for this section): Key Personnel resumes, a limit of four (4) pages for the Project Manager, four (4) pages for the Project Construction Manager, and three (3) pages for all other Key Personnel will be permitted.
Section 8	Legal Documents (no overall page limitation for this section): • Power(s) of attorney. • Organization documents, letters of agreement, and other documents identified in RFB Section 3.2 or addressed in Section 1 of the Bidder's SOQ.

SECTION 00100

INSTRUCTIONS TO BIDDERS

TABLE OF ARTICLES

ARTICLE 1 - DEFINED TERMS

1.01 Terms used in these Instructions to Bidders will have the meanings indicated in the General Conditions and Supplementary Conditions. Additional terms used in these Instructions to Bidders have the meanings indicated below which are applicable to both the singular and plural thereof:

ARTICLE 2 - BIDS RECEIVED

2.01 Refer to Invitation to Bid for information on receipt of Bids.

ARTICLE 3 - COPIES OF BIDDING DOCUMENTS

3.01 A complete set of the Bidding Documents may be obtained from the. KRCD's website www.krcd.org/request-for-proposal or www.bidnetdirect.com (Bid Solicitation number: 203.02.97_R1)

3.02 Complete sets of the Bidding Documents shall be used in preparing Bids; neither Buyer nor Owner's Engineer assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.

3.03 Buyer and Owner's Engineer in making copies of Bidding Documents available on the above terms do so only for the purpose of obtaining Bids for furnishing Goods and Special Services and do not confer a license or grant for any other use.

ARTICLE 4 - QUALIFICATIONS OF BIDDERS

Refer to Section 00001.

ARTICLE 5 - EXAMINATION OF BIDDING DOCUMENTS AND POINT OF DESTINATION

5.01 Upon request Buyer will provide *Bidder* access to the Point of Destination to conduct investigations, examinations, tests, and studies as Bidder deems necessary for submission of a Bid.

5.02 It is the responsibility of each Bidder before submitting a Bid to:

A. examine and carefully study the Bidding Documents, including any Addenda and the related data identified in the Bidding Documents;

B. if specified, or if, in Bidder's judgment, any local condition may affect cost, progress or the furnishing of EPC services, Goods and Special Services, visit the Point of Destination to become familiar with the local conditions;

C. become familiar with and satisfy all federal, state, and local Laws and Regulations that may affect cost, progress, or the furnishing of EPC services, Goods and Special Services;

D. carefully study and correlate the information known to Bidder, and information and observations obtained from Bidder's visits, if any, to the Point of Destination, with the Bidding Documents;

E. promptly give Owner's Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder discovers in the Bidding Documents and confirm that the written resolution thereof by Owner's Engineer is acceptable to Bidder; and

F. determine that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for furnishing EPC services, Goods and Special Services.

5.03 The submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article 5, that without exception the Bid is premised upon furnishing EPC services, Goods and Special Services required by the Bidding Documents, that Bidder has given Owner's Engineer written notice of all conflicts, errors, ambiguities and discrepancies that Bidder has discovered in the Bidding Documents and the written resolutions thereof by Owner's Engineer are acceptable to Bidder, and that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for furnishing EPC services, Goods and Special Services.

ARTICLE 6 – SITE VISIT

Site Visit is highly recommended but is not mandatory. If bidders plan to visit the site location, bidders shall schedule their site visit by requesting via email to Owner's Project Manager and a copy to Owner's Engineer Project Manager. The following dates are available for site visit-

Tuesday, May 21st , 2024 from 9:00am to 2:30pm
Wednesday, May 22nd , 2024 from 9:00am to 2:30pm
Thursday, May 23rd , 2024 from 9:00am to 2:30pm
Friday, May 24th, 2024 from 9:00am to 2:30pm

ARTICLE 7 - INTERPRETATIONS

7.01 All questions about the meaning or intent of the Bidding Documents are to be submitted to Owner's Engineer in writing. Interpretations or clarifications considered necessary by Owner's Engineer in response to such questions will be issued by Addenda mailed or delivered to all parties recorded by Owner's Engineer as having received the Bidding Documents. Questions received less than ten days prior to the date for opening of Bids will not be answered. Only answers in the Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.

7.02 Addenda may be issued to clarify, correct, or change the Bidding Documents as deemed advisable by Buyer or Owner's Engineer.

ARTICLE 8 - BID SECURITY

8.01 A Bid must be accompanied by Bid security made payable to Buyer, in an amount of 10 percent of Bidder's maximum Bid price and in the form of a certified or bank check or a Bid Bond [on form attached] issued by a surety meeting the requirements of the General Conditions.

8.02 The Bid security of the apparent Successful Bidder will be retained until such Bidder has executed the Agreement, furnished the required contract security and met the other conditions of the Notice of Award, whereupon the Bid security will be returned. If the apparent Successful Bidder fails to execute and deliver the Agreement and furnish the required contract security within 15 days after the Notice of Award, Buyer may annul the Notice of Award and the Bid Security of that Bidder will be forfeited. The Bid security of other Bidders whom Buyer believes to have a reasonable chance of receiving the award may be retained by Buyer until the earlier of seven days after the Effective date of the Agreement or 61 days after the Bid opening, whereupon Bid security furnished by such Bidders will be returned.

8.03 Bid security of other Bidders whom Buyer believes do not have a reasonable chance of receiving the award will be returned within seven days after the Bid opening.

ARTICLE 9 - CONTRACT TIMES

9.01 See applicable provisions in the Agreement.

ARTICLE 10 - LIQUIDATED DAMAGES

10.01 Provisions for liquidated damages, if any, are set forth in the Section 00800 Supplemental Conditions.

ARTICLE 11 - "OR-EQUAL" ITEMS

11.01 The Contract, if awarded, will be on the basis of services, material and equipment specified or described in the Bidding Documents without consideration of possible "or-equal" items. Whenever it is specified or described in the Bidding Documents that an "or-equal" item of material or equipment may be furnished or used by Seller if acceptable to Owner's Engineer, application for such acceptance will not be considered by Owner's Engineer until after the Effective Date of the Agreement. The procedure for submittal of any such application by Seller and consideration by Owner's Engineer is set forth in the General Conditions and may be supplemented in the General Requirements.

ARTICLE 12 - PREPARATION OF BID

12.01 The Bid Schedule (section 00310) is included within the Bidding Documents.

12.02 Further instructions and requirements are listed in section 00050

12.03 A Bid by a corporation shall be executed in the corporate name by the president or a vice-president or other corporate officer accompanied by evidence of authority to sign. The corporate seal shall be affixed and attested by the secretary or an assistant secretary. The corporate address and state of incorporation shall be shown below the signature.

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

12.05 A Bid by a limited liability company shall be executed in the name of the firm by a member and accompanied by evidence of authority to sign. The state in which the firm was formed, and the official address of the firm shall be shown below the signature.

12.06 A Bid by an individual shall show the Bidder's name and official address.

12.07 All names must be typed or printed in ink below the signature.

12.09 The Bid shall contain an acknowledgment of receipt of all Addenda.

12.10 The address and telephone number for communications regarding the Bid shall be shown.

12.11 The Bid shall contain evidence of Bidder's authority and qualification to do business in the state of the Point of Destination or covenant to obtain such qualification prior to award of the Contract.

ARTICLE 13 - BASIS OF BID; COMPARISON OF BIDS

13.01 *Series of Lump Sums*

A. Bidder shall submit a Bid for each lump sum item and per unit pricing as set forth on the Bid Schedule and shall compute and enter the total of all lump sum (lump sum items only) items in the space provided on the Bid Form. During bid evaluation, the items with per unit pricing will be assigned with a fixed base quantity to develop a base pricing.

B. For determination of the apparent low Bid, Bids will be compared on the basis of the total of all lump sum items and base pricing for the items with per unit pricing.

C. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the arithmetically correct sum. Discrepancies between words and figures will be resolved in favor of the words.

ARTICLE 14 - SUBMITTAL OF BID

14.01 Each prospective Bidder is furnished one copy of the Bidding Documents with all necessary specifications, instructions and blank forms enclosed as a single packet.

14.02 A Bid shall be submitted no later than the date and time prescribed and at the place indicated in the Invitation to Bid and shall be uploaded to the bidnetdirect.com response portal with an email confirmation to Owner's Project Manager and a copy to the Owner's Engineer's Project Manager, after uploading all required bid documents; the date and time of submittal of the bid shall be indicated in the email.

1. Owner, Kings River Conservation District, 4886 E. Jensen Ave, Fresno, CA 95835
   Owner's Project Manager: Pawan Niroula
   Email: pniroula@krcd.org

2. Owner's Engineer, Stantec Consulting Services, 1340 Treat Boulevard, Suite 300, Walnut Creek, CA 94597
   OE Project Manager: Uddhav Lakkundi, PE, PMP
   Email: uddhav.lakkundi@stantec.com

As a cautionary measure, bidders are also advised to prepare a secondary submission method in case there are any technical difficulties in the platform to upload all required bid documents. Owner suggests submitting the bid earlier than the bid due time on the bid due date to avoid any potential traffic congestion on the online platform.

All the Request for Information (RFI) during the bid process until the contract is awarded shall be emailed to the Owner's Engineer's Project Manager with a copy to the Owner's Project Manager. The subject line shall mention the keywords- "RFI-PINE FLAT UNIT-4 PROJECT_EPC (TOPIC)". Multiple questions can be included within the same RFI. The last date of RFI (and any other questions) submission shall be no later than the date and time prescribed in the Invitation to Bid. The RFI responses will be posted on bidnetdirect.com and will be available to all the bidders.

ARTICLE 15 - MODIFICATION OR WITHDRAWAL OF BID

15.01 A Bid may be modified or withdrawn by a document executed in the manner that a Bid must be executed, and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids.

15.02 If, within 24 hours after Bids are opened, any Bidder files a signed written notice with Buyer and promptly thereafter demonstrates to the reasonable satisfaction of Buyer that there was a material and substantial mistake in the preparation of its Bid, it may withdraw its Bid, and its Bid security will be returned. Thereafter, if the EPC services, Goods and Special Services are rebid, that Bidder will be disqualified from further bidding on the Goods and Special Services to be furnished under the Contract Documents.

ARTICLE 16 - OPENING OF BIDS

16.01 All bids will be received electronically in a PDF format via web-based platform bidnetdirect.com. Owner and Owner's Engineer will start evaluating the bids after the final bid submission date. An abstract of the amounts of the Bids and Alternate Bids, if any, will not be made available to Bidders after or during the evaluation of the Bids.

ARTICLE 17 - BIDS TO REMAIN SUBJECT TO ACCEPTANCE

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

ARTICLE 18 - AWARD OF CONTRACT

18.01 Buyer reserves the right to reject any and all Bids, including, without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. Buyer further reserves the right to reject the Bid of any Bidder whom it finds, after reasonable inquiry and evaluation, to be non-responsible. Buyer may also reject the Bid of any Bidder if Buyer believes that it would not be in the best interest of the Buyer to make an award to that Bidder. Buyer also reserves the right to waive all informalities not involving price, time or changes in the EPC services, Goods and Special Services, and to negotiate contract terms with the Successful Bidder.

18.02 More than one Bid for the same EPC services, Goods and Special Services from an individual or entity under the same or different names will not be considered. Reasonable grounds for believing that any Bidder has an interest in more than one Bid for the EPC services, Goods and Special Services shall be cause for disqualification of that Bidder and the rejection of all Bids in which that Bidder has an interest.

18.03 In evaluating Bids, Buyer will consider whether or not the Bids comply with the prescribed requirements, and such alternatives, unit prices and other data, as may be requested in the Bid Form or may be requested from Bidders prior to a Notice of Award.

18.04 In evaluating Bids, Buyer will consider the qualifications of the Bidders.

18.05 Buyer may implement a two-stage selection process- only the top three (3) to four (4) most qualified bidders will be considered for the further bid evaluation.

18.05 Buyer may conduct such investigations as Buyer deems necessary to establish the responsibility, qualifications, and financial ability of Bidder's proposed subcontractors, suppliers, individuals, or entities to furnish parts of the EPC services, Goods and Special Services in accordance with the Contract Documents.

18.06 If the Contract is to be awarded, Buyer will award the Contract to the Bidder whose Bid is in the best interest of Buyer.

18.07 Bidder may submit an alternative proposal(s) that could potentially offer better pricing and technology than described by the specifications. Alternative proposal will be equally considered during the bid evaluation process.

ARTICLE 19 - CONTRACT SECURITY AND INSURANCE

19.01 Article 4 of the General Conditions sets forth Buyer's requirements as to performance and other bonds and insurance. When the Successful Bidder delivers the executed Agreement to Buyer, it must be accompanied by the required performance and other bonds.

ARTICLE 20 - SIGNING OF AGREEMENT

20.01 When Buyer gives a Notice of Award to Successful Bidder, it shall be accompanied by the required number of unsigned counterparts of the Agreement with the other Contract Documents which are to be identified in the Agreement and attached thereto. Within 15 days thereafter, Successful Bidder shall sign and deliver the required number of counterparts of the Agreement and attached documents to Buyer. Within ten days thereafter, Buyer shall deliver one fully signed counterpart to Successful Bidder with a complete set of Drawings with appropriate identification.

ARTICLE 21 - SALES AND USE TAXES

21.01 Buyer is not exempt from California state or Fresno County sales and use taxes on materials and equipment to be incorporated in the Project. Said taxes shall be included in the Bid.

ARTICLE 22 - RETAINAGE

22.01 Provisions concerning Seller's rights to deposit securities in lieu of retainage are set forth in the Agreement.

ARTICLE 23 - CONTRACT TO BE ASSIGNED

23.01 The EPC services Contract will not be assigned.

SECTION 00250

ACCESS, INDEMNITY AND RELEASE AGREEMENT

POTENTIAL BIDDER: _____

OWNER: Kings River Conservation District

SITE: Pine Flat Dam, California

PROJECT: Pine Flat Unit-4 Project EPC Package

CONTRACT/SPECIFICATION NO. 203.02.97_R1

In consideration of the Kings River Conservation District (Owner), 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 Owner, 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 the Owner 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, prior to disturbing the existing site and/or adjacent property, provide written notice of its intent and action plan, obtain the consent of the Owner, and fully execute this Access, Indemnity and Release Agreement. 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 the Owner before Bidder's visit to the Site) is a certificate for comprehensive general liability and auto liability insurance and workers compensation insurance.

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****

DOCUMENT 00310

BID SCHEDULE

CONTRACT TITLE: Pine Flat Unit-4 Project EPC Package

CONTRACT NO.: 203.02.97_R1

BIDDER'S NAME: _____

(Name style as recorded on CA Contractor's License)

Item No.	Section*	Item	Estimated Quantity	Unit	Unit Price (In Figures)	Total (In Figures)
1.	01019	Mobilization and Demobilization	1	JOB	LUMP SUM	
2.	01640	Install Owner Furnished Equipment	1	JOB	LUMP SUM	
3.	01640	Contractor QC/Testing/Commissioning	1	JOB	LUMP SUM	
4.	02220	Demolition, relocation, and site preparation	1	JOB	LUMP SUM	
5.	02450, 03300 03700 05500; 13120	Detail Design of Unit 4 Powerhouse Structure, Foundations and Appurtenances (Civil, Structural, Foundations Design) in accordance with USACE Engineering Manuals	1	JOB	LUMP SUM	
6.	02450	Design, install, and test micropiles in accordance with NHI-05-039 for compression up to or tension loading	1	JOB	LUMP SUM	
7.	02450	Design, install, and test micropiles in accordance with NHI-05-039 for lateral loading for up to 40 kips	1	JOB	LUMP SUM	
8.	02450	Installed Micropiles	1	JOB	LUMP SUM	
9.	03300	Cast In Place Concrete		CY		
10.	03700	Mass Concrete		CY		
11.	05500	Pre-engineered metal powerhouse building steel stairs	1	JOB	LUMP SUM	

Item No.	Section*	Item	Estimated Quantity	Unit	Unit Price (In Figures)	Total (In Figures)
12.	05500	Pre-engineered metal powerhouse building steel Heavy duty grating	1	JOB	LUMP SUM	
13.	05500	Pre-engineered metal powerhouse building steel handrails	1	JOB	LUMP SUM	
14.	13120	Pre-engineered metal powerhouse building	1	JOB	LUMP SUM	
15.	05500	Discharge Pipe (draft tube extension) steel supports	1	JOB	LUMP SUM	
16.	05500	Design Spray Wall Deflector plate	1	JOB	LUMP SUM	
17.	05500	Furnish and install Spray Wall Deflector plate	LBS			
18.	Various	Handling of all items specified herein	1	JOB	LUMP SUM	
19.	15000	Large Diameter Steel Pipe		LBS		
20.	15000	Large Diameter Steel Pipe Fittings	1	JOB	LUMP SUM	
21.	15060	Furnish and install piping stainless steel pipe		LBS		
22.	15060	Furnish and install piping carbon steel pipe		LBS		
23.	15060	Furnish and Install Valves and pipe accessories	1	JOB	LUMP SUM	
24.	15060	Design of Piping System (Inlet Manifold, Inlet Pipes, Draft Tube Extension)	1	JOB	LUMP SUM	
25.	15101	Furnish, install, and commission penstock #1 48 Inch knife gate valve	1	JOB	LUMP SUM	
26.	15101	Furnish, install, and commissioning penstock #2 48 Inch knife gate valve	1	JOB	LUMP SUM	
27.	15500	Design and Installation of Pre-Action Sprinkler System	1	JOB	LUMP SUM	
28.	15500	Furnish Sprinkler System Components	1	JOB	LUMP SUM	

Item No.	Section*	Item	Estimated Quantity	Unit	Unit Price (In Figures)	Total (In Figures)
29.	15800	Furnish and Install HVAC System	1	JOB	LUMP SUM	
30.	16050	Junction boxes, pull boxes, cable tray, conduit and fittings, plugs, transformers, and panelboards.	1	JOB	LUMP SUM	
31.	16050	Multi-conductor 600 Volt power cable.		LF		
32.	16050	Multi-conductor 600 Volt control cable.		LF		
33.	16050	Medium Voltage 8kV power cable		LF		
34.	16050	Instrumentation cable		LF		
35.	16050	Unit 4 powerhouse bare grounding/bonding conductors and accessories.		LBS		
36.	16050	Design of electrical systems	1	JOB	LUMP SUM	
37.	16240	Cable bus duct segment from Unit 4 to generator switchgear (procurement and installation only)	1	JOB	LUMP SUM	
38.	16240	Cable bus duct segment from generator switchgear to GSU transformer.	1	JOB	LUMP SUM	
39.	16300	Furnish, install and commission one (1) HV Circuit Switcher.	1	JOB	LUMP SUM	
40.	16300	OPTIONAL- Furnish, install and commission one (1) SF6 Circuit Breaker dead tank type with bushing current transformers (CTs) including support structure.	1	JOB	LUMP SUM	
41.	16300	Furnish, install and commission one (1) group operated, three phase disconnect switch with interlocked grounding switch including steel support structure.	1	JOB	LUMP SUM	
42.	16300	Furnish, install and commission one (1) set of three 230 kV Coupling Capacitor Voltage Transformers (CCVTs) including steel support structure.	1	JOB	LUMP SUM	

Item No.	Section*	Item	Estimated Quantity	Unit	Unit Price (In Figures)	Total (In Figures)
43.	16300	Furnish, install and commission one (1) set of three 230 kV Voltage Transformers (VTs) including steel support structure.	1	JOB	LUMP SUM	
44.	16300	Furnish and install switchyard air insulated conductor and power connections.	1	JOB	LUMP SUM	
45.	16300	Furnish, install and commission one (1) set of three 230 kV combination Current and Voltage Transformers (CTs/VTs) including steel support structure.	1	JOB	LUMP SUM	
46.	16300	Update/design switchyard grounding grid due to switchyard modifications.	1	JOB	LUMP SUM	
47.	16300	Furnish and install switchyard grounding grid and accessories due to switchyard modifications.		LBS		
48.	16400	Furnish, install, and commission one (1) 10MVA, 3-phase, 230kV-6.9kV, ONAN-cooled GSU transformer.	1	JOB	LUMP SUM	
49.	16475	Local Control Panels	1	JOB	LUMP SUM	
50.	16490	Enclosed Power Disconnect Switches	1	JOB	LUMP SUM	
51.	16500	Outlet boxes, pull boxes, conduit and fittings, switches, receptacles, outlets, plugs, lighting fixtures, lighting transformers, and lighting panelboards.	1	JOB	LUMP SUM	
52.	16600	Furnish, install, and commission lead acid storage battery and charging system.	1	JOB	LUMP SUM	
53.	16670	Field Instrumentation	1	JOB	LUMP SUM	
54.	16720	Fire Detection and Alarm System	1	JOB	LUMP SUM	
					TOTAL	

*Section where contract item is defined.

END OF DOCUMENT

SECTION 00410

BID GUARANTY BOND

(To Be Submitted with Bid)

PROJECT NAME: Pine Flat Unit-4 Project EPC Package

CONTRACT/SPECIFICATION NO: 203.02.97_R1

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**

(SEAL)

_____ (SEAL) _____

(Bidder's Name and Corporate Seal)	(Surety's Name and Corporate 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 Kings River Conservation District (KRCD), Fresno, 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 Fresno 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****

SECTION 00420

CERTIFICATION OF BIDDER'S EXPERIENCE AND QUALIFICATIONS

PROJECT: ***Pine Flat Unit-4 Project EPC Package***

CONTRACT/SPECIFICATION NO.: 203.02.97_R1.

The undersigned Bidder represents that it is competent, knowledgeable and has the special skills on the nature, extent and inherent conditions of the work to be performed on this project. 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. 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 perform the construction work adequately and safely with respect to such hazards.

A. ESSENTIAL REQUIREMENTS FOR QUALIFICATION

If the answer to any of questions 1 through 4 is "no", or if the answer to any of questions 5 through 8 is "yes", the Bidder will be disqualified from being awarded the Contract.

1. Bidder possesses a valid and current California Contractor's license for the project for which it intends to submit a bid.
   □ Yes □ No

2. Bidder will comply with and provide all insurance as defined in Section 00800 Article 11, Liability and Insurance.
   □ Yes □ No

3. Bidder has current Workers' Compensation insurance policy as required by the Labor Code or is legally self-insured pursuant to Labor Code section 3700 et. seq.
   □ Yes □ No

4. Bidder's three-year average Workers' Compensation Experience Modification Rate (EMR) is less than or equal to 1.20 (100%). See Item D below for EMR calculation.
   □ Yes □ No

5. Has your contractor's license been revoked at any time in the last five (5) years?
   □ Yes □ No

6. Has a surety firm completed a contract on your behalf, or paid for completion because your firm was default terminated by the project owner within the last five (5) years?
   □ Yes □ No

7. At the time of submitting this qualification form, is your firm ineligible to bid on or be awarded a public works contract, or perform as a subcontractor on a public works contract, pursuant to either Labor Code section 1777.1 or Labor Code section 1777.7?
   □ Yes □ No

8. At any time during the last five (5) years, has your firm, or any of its owners or officers been convicted of a crime involving the awarding of a contract of a government construction project, or the bidding or performance of a government contract?
   □ Yes □ No

B. COMPANY EXPERIENCE- To be submitted with Bid.

The Bidder has been engaged in the contracting business, under the present business name for _____ years.

The Bidder, as a Contractor, has never failed to satisfactorily complete a contract awarded to him, except as follows:

_____

_____

For the Owner to consider the Bidder properly experienced in work of similar nature to this project, the Bidder must provide a separate attached list of successful water or wastewater treatment plant projects which clearly demonstrates to the Owner that the Bidder has been actively and continuously engaged since January 2018 until present as a Prime Contractor in the construction of the following types of projects:

1. Small to medium size Hydro-electric plant design, procurement, and construction.

Any projects listed below which are not as defined above will not be considered by the Owner in meeting this pre-requisite experience requirement.
The list of projects may include projects currently under construction.

Bidder also certifies that Bidder self-performed at least forty percent (40%) of the Work on each of the projects listed below. The Owner considers this level of past self-performance demonstrates a benefit to a Project in terms of better control of cost, schedule and safety.

If the Bidder is a Joint Venture of two or more companies, each participant in the Joint Venture shall meet this prior project experience requirement and provide project information for each Joint Venture participant in the format found below.

The Bidder's list of relevant projects should contain, at a minimum, the following nine (9) informational items for each project listed:

Project Name: _____

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 (beginning with projects as of January 2018 and ending with projects currently under construction): _____

Important Note: Any projects found on Bidder's Completed Projects list which are not as defined above will not be considered by the Owner in meeting this pre-requisite experience requirement. For example, pump stations are not considered a treatment plant.

C. PROJECT MANAGER EXPERIENCE- To be 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 one project with a final contract amount greater than **$3 million** where this person held the role of Project Manager. The demonstrated experience of the Project Manager must have been within the last four years**.** This 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 three related projects as defined above where the individual named above held the position of Project Manager. One of the projects must have a contract value of at least **$3 Million**.

Project # 1 Name: _____

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: _____

Project # 2 Name: _____

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: _____

Project # 3 Name: _____

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 Owner 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 will be grounds for the Owner to determine the Bidder as non-responsible and ineligible for contract award.

D. SAFETY QUALIFICATION INFORMATION

The following information will be used to determine if Bidder meets the minimum safety requirements for this project. **To qualify to bid and be awarded the project, the Contractor's three-year average Workers' Compensation Experience Modification Rate (EMR) must not be greater than 1.20 (100%).** The Bidder shall list its Experience Modification Rate for the last three complete years (available from your insurance carrier).

Year	EMR
_____	_____
_____	_____
_____	_____

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.

To verify the above information, the Owner will contact the Bidder's subcontractor's Workers' Compensation Insurance carrier. The Bidder shall authorize its carrier to release this information. Failure to release this information will result in the bid being non-responsive and result in automatic disqualification of the bid.

Workers' Compensation Insurance Company:
Contact Person for Insurance Company:_____
Telephone Number:_____

If the Bidder is a Joint Venture of two or more companies, each participant in the Joint Venture shall meet this minimum safety requirement and provide project information for each Joint Venture participant in the format found above.

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 _____, 20____

_____
Bidder's Name

_____ _____
Authorized Signature Date

_____
Title of Signatory

****END OF SECTION****

Name of Bidder: _____

SECTION 00430

DESIGNATION OF SUBCONTRACTORS

(To Be Submitted with Bid)

PROJECT: ***Pine Flat Unit-4 Project EPC Package***

CONTRACT/SPECIFICATION NO.: 203.02.97_R1.

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 Section 00100, WORK PERCENTAGES which stipulates the percent of the Work to be performed with the Bidder's own forces.**

Work to be Performed	Contractor License Number and Classification	Percent of Total Bid Price	Subcontractor's Name and Address
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

Name of Bidder: _____

Work to be Performed	Contractor License Number and Classification	Percent of Total Bid Price	Subcontractor's Name and Address
11.			
12.			
13.			
14.			

Add additional sheets, if necessary.

BIDDER:

_____
(Signature)

_____
(Date)

****END OF SECTION****

SECTION 00440

MAJOR EQUIPMENT AND MATERIAL SUPPLIERS

(To Be Submitted with Bid)

1. The undersigned Bidder represents that, if awarded the Contract, the items of major equipment and materials specified below will be supplied by the manufacturers or suppliers specified below. By so indicating, Bidder warrants that the equipment and materials manufactured and/or supplied by the named manufacturer or supplier will be provided on the Project unless review of submittal information or performance tests reveal that the equipment or material does not meet Contract requirements or the manufacturer or supplier is unable to meet the delivery requirements necessary to maintain progress of the Project based upon the accepted baseline construction schedule. Failure to indicate a manufacturer or supplier listed in the following schedule may render the Bid non-responsive and may be the basis for rejection of the Bid.

2. All major Equipment shall be bid according to the following:

   (a) Major equipment items as listed in each technical spec sections 15000 - 16720. All costs for providing these equipment items shall be included in each appropriate Bid item in the Bid Schedule 00310. The Bidder shall indicate which Manufacturer/Supplier of equipment be proposes to provide. If the Bidder desires to propose an "or equal" equipment item, by writing in a proposed "or equal." If the Bidder writes in a proposed "or equal," he shall also indicate the named, listed items. It is the Bidder's responsibility that all equipment to be provided, either as specified or proposed "or equal" write-in, meet the requirements of the Specifications.

   (b) In the event that the Owner's Engineer allows the Bidder's proposed "or equal" material or equipment item for use as an "or equal", the proposed "or equal" material or equipment item shall be provided for the amount included in the bid schedule with NO change in Contract price. Should the write-in proposed "or equal" item be determined "not equal" by the Owner's Engineer, then the Bidder hereby agrees to provide the specified Manufacturer/Supplier item for the amount included in his Bid. Should a Bidder fail to indicate which named manufacturer or supplier his Bid is based on, or indicates more than one named Manufacturer/Supplier per listed equipment item, the Bidder hereby agrees to provide the Manufacturer/Supplier item noted as first for the amount included in his Bid with NO change in Contract Price.

   (c) Allowances of proposed "or equal" equipment does not constitute a waiver of the Specifications. Proposed "or equal" equipment is defined as equipment proposed and named by the Bidder under the Manufacturer/Supplier column in the Major Equipment Schedule Table as equal and equivalent to the specified equipment.

   (d) Proposed "or equal" equipment will only be considered after award and execution of contract. For each "or equal" (write-in) equipment item, Contractor shall submit a PROPOSED "OR EQUAL" SUBSTITUTION SUBMITTAL TRANSMITTAL FORM within ten (10) calendar days after the date of the Notice to Proceed. Proposed "Or Equal" Substitution Form must be completely filled out, certified and include all required supporting documentation to allow Engineer to assess the "or equal" acceptability of the product or system. Failure to submit all the required information within the established time limit shall be grounds for determination that the proposed "or equal" major equipment item is "not equal" to the named, listed Manufacturer/Supplier equipment item.

   (e) Within 10 calendar days after receiving the proposed "or equal" major equipment submittals, the Owner's Engineer will notify Contractor, in writing, as to whether or not the submitted proposed "or equal" equipment, if any, are accepted as meeting the general specification requirements. The consideration of this equipment shall not be construed to indicate final acceptance by Owner, nor relieve the Contractor and/or Manufacturer/Supplier of the equipment from providing the post-Contract award submittal information.

   (f) To be deemed equal, the proposed "or equal" equipment shall be the same or better than the specified named product with respect to features, materials of construction, function, performance, reliability, quality, general dimensional configuration, operations and maintenance access and costs, and static and dynamic loads. Determination of equality in reference to the

project design requirements will be made by the Owner's Engineer.

(g) No proposed "or equal" major equipment will be considered unless, in the opinion of the Owner's Engineer, it conforms to the Contract Specifications in all respects, except for make and manufacturer and minor details.

Bidder: _____

Name: _____

Signature: _____

****END OF SECTION****

SECTION 00510

AGREEMENT FOR THE CONSTRUCTION OF *PINE FLAT UNIT-4 PROJECT, CONTRACT NO.*_____

(Document will be retyped after Contract Award)

THIS AGREEMENT, made and concluded, in duplicate, this ___ day of _____, 20___, by and between the Kings River Conservation District (KRCD), doing business in Fresno County, CA (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 *June 28, 2024 until 2:00 PM Pacific Standard Time* for the Pine Flat Unit-4 Project Engineering, Procurement and Construction (EPC), Contract No._____ 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 ***(date)*** awarded to Contractor Pine Flat Unit-4 Project EPC, Contract No._____; 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: Pine Flat Unit-4 Project Engineering, Procurement and Construction (EPC), Contract No._____ ("Work") as specified or indicated in the Contract Documents.

1.2 Location of Work. The Work will be performed at the following location:
Jeff L. Taylor Pine Flat Power Plant, Piedra, Fresno County, California.

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

2.1 Owner's Representative. The Owner has designated Pawan Niroula 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 Stantec Consulting Services, Inc. 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 or his designee 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 00700-6.2, **Contract Time**. The amount of damages to be incurred by the Owner due to delay in completion is difficult, if not impossible, to precisely ascertain at the time of contracting. Therefore, in accordance with California law, Owner and Contractor agree that as liquidated damages for delay, Contractor will pay to the Owner liquidated damages in the amount set forth in 00800-4, **Liquidated Damages**, per day for each and every calendar day that expires after the time for completion specified in Section 00700-6 **Progress of the work,** 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:

Item No.	Section*	Item	Estimated Quantity	Unit	Unit Price (In Figures)	Total (In Figures)
1.	01019	Mobilization and Demobilization	1	JOB	LUMP SUM	
2.	01640	Install Owner Furnished Equipment	1	JOB	LUMP SUM	
3.	01640	Contractor QC/Testing/Commissioning	1	JOB	LUMP SUM	
4.	02220	Demolition, relocation, and site preparation	1	JOB	LUMP SUM	
5.	02450, 03300 03700 05500; 13120	Detail Design of Unit 4 Powerhouse Structure, Foundations and Appurtenances (Civil, Structural, Foundations Design) in accordance with USACE Engineering Manuals	1	JOB	LUMP SUM	
6.	02450	Design, install, and test micropiles in accordance with NHI-05-039 for compression up to or tension loading	1	JOB	LUMP SUM	
7.	02450	Design, install, and test micropiles in accordance with NHI-05-039 for lateral loading for up to 40 kips	1	JOB	LUMP SUM	
8.	02450	Installed Micropiles	1	JOB	LUMP SUM	
9.	03300	Cast In Place Concrete		CY		
10.	03700	Mass Concrete		CY		
11.	05500	Pre-engineered metal powerhouse building steel stairs	1	JOB	LUMP SUM	
12.	05500	Pre-engineered metal powerhouse building steel Heavy duty grating	1	JOB	LUMP SUM	
13.	05500	Pre-engineered metal powerhouse building steel handrails	1	JOB	LUMP SUM	

Item No.	Section*	Item	Estimated Quantity	Unit	Unit Price (In Figures)	Total (In Figures)
14.	13120	Pre-engineered metal powerhouse building	1	JOB	LUMP SUM	
15.	05500	Discharge Pipe (draft tube extension) steel supports	1	JOB	LUMP SUM	
16.	05500	Design Spray Wall Deflector plate	1	JOB	LUMP SUM	
17.	05500	Furnish and install Spray Wall Deflector plate	LBS			
18.	Various	Handling of all items specified herein	1	JOB	LUMP SUM	
19.	15000	Large Diameter Steel Pipe		LBS		
20.	15000	Large Diameter Steel Pipe Fittings	1	JOB	LUMP SUM	
21.	15060	Furnish and install piping stainless steel pipe		LBS		
22.	15060	Furnish and install piping carbon steel pipe		LBS		
23.	15060	Furnish and Install Valves and pipe accessories	1	JOB	LUMP SUM	
24.	15060	Design of Piping System (Inlet Manifold, Inlet Pipes, Draft Tube Extension)	1	JOB	LUMP SUM	
25.	15101	Furnish, install, and commission penstock #1 48 Inch knife gate valve	1	JOB	LUMP SUM	
26.	15101	Furnish, install, and commissioning penstock #2 48 Inch knife gate valve	1	JOB	LUMP SUM	
27.	15500	Design and Installation of Pre-Action Sprinkler System	1	JOB	LUMP SUM	
28.	15500	Furnish Sprinkler System Components	1	JOB	LUMP SUM	
29.	15800	Furnish and Install HVAC System	1	JOB	LUMP SUM	

Item No.	Section*	Item	Estimated Quantity	Unit	Unit Price (In Figures)	Total (In Figures)
30.	16050	Junction boxes, pull boxes, cable tray, conduit and fittings, plugs, transformers, and panelboards.	1	JOB	LUMP SUM	
31.	16050	Multi-conductor 600 Volt power cable.		LF		
32.	16050	Multi-conductor 600 Volt control cable.		LF		
33.	16050	Medium Voltage 8kV power cable		LF		
34.	16050	Instrumentation cable		LF		
35.	16050	Unit 4 powerhouse bare grounding/bonding conductors and accessories.		LBS		
36.	16050	Design of electrical systems	1	JOB	LUMP SUM	
37.	16240	Cable bus duct segment from Unit 4 to generator switchgear (procurement and installation only)	1	JOB	LUMP SUM	
38.	16240	Cable bus duct segment from generator switchgear to GSU transformer.	1	JOB	LUMP SUM	
39.	16300	Furnish, install and commission one (1) HV Circuit Switcher.	1	JOB	LUMP SUM	
40.	16300	OPTIONAL- Furnish, install and commission one (1) SF6 Circuit Breaker dead tank type with bushing current transformers (CTs) including support structure.	1	JOB	LUMP SUM	

Item No.	Section*	Item	Estimated Quantity	Unit	Unit Price (In Figures)	Total (In Figures)
41.	16300	Furnish, install and commission one (1) group operated, three phase disconnect switch with interlocked grounding switch including steel support structure.	1	JOB	LUMP SUM	
42.	16300	Furnish, install and commission one (1) set of three 230 kV Coupling Capacitor Voltage Transformers (CCVTs) including steel support structure.	1	JOB	LUMP SUM	
43.	16300	Furnish, install and commission one (1) set of three 230 kV Voltage Transformers (VTs) including steel support structure.	1	JOB	LUMP SUM	
44.	16300	Furnish and install switchyard air insulated conductor and power connections.	1	JOB	LUMP SUM	
45.	16300	Furnish, install and commission one (1) set of three 230 kV combination Current and Voltage Transformers (CTs/VTs) including steel support structure.	1	JOB	LUMP SUM	
46.	16300	Update/design switchyard grounding grid due to switchyard modifications.	1	JOB	LUMP SUM	
47.	16300	Furnish and install switchyard grounding grid and accessories due to switchyard modifications.		LBS		
48.	16400	Furnish, install, and commission one (1) 10MVA, 3-phase, 230kV-6.9kV, ONAN-cooled GSU transformer.	1	JOB	LUMP SUM	

Item No.	Section*	Item	Estimated Quantity	Unit	Unit Price (In Figures)	Total (In Figures)
49.	16475	Local Control Panels	1	JOB	LUMP SUM	
50.	16490	Enclosed Power Disconnect Switches	1	JOB	LUMP SUM	
51.	16500	Outlet boxes, pull boxes, conduit and fittings, switches, receptacles, outlets, plugs, lighting fixtures, lighting transformers, and lighting panelboards.	1	JOB	LUMP SUM	
52.	16600	Furnish, install, and commission lead acid storage battery and charging system.	1	JOB	LUMP SUM	
53.	16670	Field Instrumentation	1	JOB	LUMP SUM	
54.	16720	Fire Detection and Alarm System	1	JOB	LUMP SUM	
					TOTAL	

The above Total Contract Amount includes all allowances, if any, provided for in the Contract Documents.

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 of work furnished or completed.

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 Existing Facilities, which are identified in reference

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 the Owner 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 District is acceptable to Contractor.

E. Contractor is duly licensed, 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:

Invitation to Bid (Section 00020);
Instructions to Bidders (Section 00100);
Bid Form and Bid Schedule
Designation of Subcontractors
Agreement (Section 00510);
Performance Bond (Section 00530);
Payment Bond (Section 00535);
General Conditions (Section 00700);
Supplementary General Conditions (Section 00800);
Technical Specifications and General Requirements (Sections 01010 through 16720);

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;
- Transfer and Novation Agreement (Section 00560) as Exhibit C; (if applicable)
- Insurance Certificates and Endorsements as Exhibit D;

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 00600);
- 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.** 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. These rate determinations are found on the State of California Department of Industrial Relations' website at:
http://www.dir.ca.gov/dlsr/DPreWageDetermination.htm.

7.6 Equal Employment Opportunity. Pursuant to the Owner's (KRCD's) Equal Employment Opportunity and Affirmative Action Policy, during the performance of this contract, the Contractor agrees as follows:

A. The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, national origin, veteran status, age, marital status, sexual orientation or any other legally protected status. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, national origin, veteran status, age, marital status, sexual orientation or any other legally protected status. Such action shall include, but not be limited to the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the contracting officer setting forth the provisions of this nondiscrimination clause.

B. The Contractor will, in all solicitations or advancements for employees placed by or on behalf of the contractor; state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, national origin, veteran status, age, marital status, sexual orientation or any other legally protected status.

C. The Contractor will include the provisions of paragraphs A and B above in every subcontract or purchase order, so that such provisions will be binding upon each subcontractor or supplier.

7.7 Waiver of Jury Trial. The parties acknowledge they have read and understand Section 00700-7.3.7.2 the foregoing and accept they are waiving their right to a jury trial.

7.8 Governing Law. This Agreement and the Contract Documents shall be deemed to have been entered into in the County of Fresno, 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 Fresno, 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.

Kings River Conservation District

By:_____

_____
Name

_____
Title

ATTEST:

By:_____

_____
Name

_____
Title

NOTE: Owner shall attach evidence of authority to sign and resolution or other documents authorizing execution of Agreement.

_____
CONTRACTOR'S NAME

By_____
(Authorized Signature)

_____
Name

_____
Title

ATTEST:

By_____

_____
Name

_____
Title

(If Corporation, must be attested by Corp Secretary)

_____
STATE OF CALIFORNIA
CONTRACTOR'S LICENSE No.
and CLASSIFICATION

_____
LICENSE EXPIRATION DATE

_____
FEDERAL TAX I.D. No.

_____
TYPE OF ORGANIZATION

_____
STATE OF INCORPORATION

(SEAL)

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

OWNER:

Kings River Conservation District

4886 E. Jensen Ave, Fresno, California 93725

CONTRACTOR:

_____
CONTRACTOR'S NAME

_____
STREET ADDRESS

_____
CITY, STATE & ZIP

****END OF SECTION****

SECTION 00530

FAITHFUL PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS: that, WHEREAS, the Kings River Conservation District ("Obligee"), Fresno 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 ***Pine Flat Unit-4 Project EPC Package***, **Contract/Specification No**. 203.02.97, 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 Kings River Conservation District (KRCD), Fresno County, _____, 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 KRCD, 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.

If the Obligee shall provide notice that it considers the conduct of the Principal to be worthy of consideration as being in potential default, Surety, upon receipt of such written notice shall, within thirty (30) days, promptly (and in anticipation that a default may be determined by the Obligee and demand made against the Surety) conduct any and all investigations that it deems necessary and appropriate to perform. Surety agrees to do so in order to be in a position to respond timely and efficiently, with the best interests of the overall completion of the Project as the primary goal, and without detriment to the Project or the Obligee, should the Obligee elect to exercise its right to terminate the Principal's right to proceed due to default.

If the Obligee issues a written notice of termination for default, Surety shall, within fifteen (15) calendar days, tender a written program to Obligee which comprehensively details Surety's proposed completing contractor, its personnel and the manner in which the Surety will immediately honor its performance bond obligations, and the time for completion of the Project shall not be extended as a result of the notice to the Surety, the election by Obligee to terminate Principal's right to proceed for default, and/or the time it takes Surety to act as required hereunder.

Surety agrees that in responding to any such notice of default of its Principal, Surety shall not be entitled to tender as its completion contractor the Principal or any entity owned, controlled or affiliated with Principal. Use of the key project personnel of Principal as part of the staff of the Completing Contractor shall be included, if sought, in the response by Surety to Obligee, and the consent by Obligee of the right to use some, any or all of those proposed individuals shall be at the sole and absolute discretion of the Obligee. No claim shall be made arising from the good faith exercise by Obligee of the discretion denying any such request.

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 KRCD 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.

The terms and conditions of the contract between the Principal and Obligee are expressly incorporated into this Performance bond as though set forth in full.

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

In the event the KRCD, 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 KRCD, or its successors or assigns, a reasonable sum on account of attorney's fees and costs, including consultants and experts costs in such action, which sum shall be fixed by the court.

FURTHER BOND TERMS AND CONDITIONS

1. The Principal and the Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Obligee for the complete and proper performance of the Contract, which is incorporated herein by reference.

2. If the Principal completely and properly performs all of its obligations under the Contract, the Surety and the Principal shall have no further obligation under this Performance Bond, except to participate in conferences as provided in Paragraph 3.1 below.

3. The Surety's obligation under this Performance Bond shall arise after:

3.1 The Obligee has notified the Principal and the Surety at their respective addresses described in Paragraph 10 below, that the Obligee is considering declaring a Principal Default and has requested and attempted to arrange a conference with the Principal and the Surety to be held not later than fifteen (15) days after receipt of such notice to discuss methods of performing the Contract. If the Obligee, the Principal and the Surety agree, the PRINCIPAL shall be allowed a reasonable time to perform the Contract, but such a mutual agreement shall not waive the Obligee's right, if any, subsequently to declare a Principal Default. At the time of such notice, Surety shall commence its investigation, as detailed above, which shall take no longer than thirty (30) days;

3.2 The Obligee has declared a Principal Default and formally terminated the Principal's right to complete the Contract. Such Principal Default shall not be declared earlier than thirty (30) days after the Principal and the Surety have received notice as provided for above;

3.3 The Obligee agrees to pay the Balance of the Total Contract Price to the Surety in accordance with the terms of this Performance Bond and the Contract. Surety and Obligee may alter this term and condition by a written agreement signed by both parties.

4. Within forty-five (45) days of the written notice from Obligee pursuant to Paragraph 3 above, the Surety shall, and at the Surety's expense, elect to take one of the following actions:

4.1 Undertake to perform and complete the Contract itself, through its agents or through independent contractors; or

4.2 Obtain proposals from qualified contractors acceptable to the Obligee for a contract for performance and completion of the Contract, and, upon determination by the Obligee of the best value for the Obligee, arrange for a contract to be prepared for execution by the Obligee and the contractor selected, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Contract; and, if the Surety's obligations defined in Paragraph 6 below exceed the Balance of the Total Contract Price, then the Surety shall pay to the Obligee the amount of such excess. (As used herein, the term “best value” concerns a multitude of considerations including cost to complete, timing of proposed performance and completion of the Project, experience in performing work of a similar nature, experience in successfully performing work previously for Obligee, the experience and abilities of the Project management team proposed to be dedicated to the Project, whether the proposed contractor has ever been terminated for default, the claims and litigation history of the proposed contractor, and other reasonable commercial considerations at the time the consideration is to be made); or

4.3 Waive its right to perform and complete the Contract, arrange for completion, or obtain a new contractor and with reasonable promptness under the circumstances, and, after investigation and consultation with the Obligee, determine in good faith the amount for which it may then be liable to the Obligee under Paragraph 6, below, for the performance and completion of the Contract and, as soon as practicable after the amount is determined, tender payment therefor to the Obligee with full explanation of the payment's calculation. If the Obligee accepts the Surety's tender under this Paragraph 4.3, the Obligee may still hold Surety liable for future damages then unknown or unliquidated resulting from the Seller Default. If the Obligee disputes the amount of Surety's tender under this Paragraph 4.3, the Obligee may exercise all remedies available to it at law to enforce the Surety's liability under Paragraph 6, below.

5. If the Surety does not proceed as provided in Paragraph 4, above, then the Surety shall be deemed to be in default on this Performance Bond ten (10) calendar days after receipt of an additional written notice from Obligee to the Surety demanding that the Surety perform its obligations under this Performance Bond. At all times the Obligee shall be entitled to enforce any remedy available to the Obligee at law or under the Contract including, without limitation, and by way of example only, rights to perform work, protect work, mitigate damages, or coordinate work with other consultants or contractors.

6. The Surety's monetary obligation under this Performance Bond is limited by the amount of this Performance Bond. Subject to these limits, the Surety's obligations under this Bond are commensurate with the obligations of the Seller under the Contract. The Surety's obligations shall include, but are not limited to:

6.1 The responsibilities of the Principal under the Contract for completion of the Contract and correction of defective work;

6.2 The responsibilities of the Principal under the Contract to pay liquidated damages, and damages for which no liquidated damages are specified in the Contract, including but not limited to, all valid and proper back charges, offsets, payments, indemnities, defense costs or other damages; and

6.3 Additional legal, inspection, construction management, design professional and delay costs resulting from the Principal Default or resulting from the actions or failure to act of the Surety under Paragraph 4, above.

7. The Surety shall not be liable to the Obligee or others for the obligations of the Principal that are unrelated to the Contract, and the Balance of the Total Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Performance Bond to any person or entity other than the Obligee or its heirs, executors, administrators, or successors.

8. The Surety hereby waives notice of any change, alteration or addition to the Contract or to related subcontracts, purchase orders and other obligations, including but not limited to changes of time. The Surety consents to all terms of the Contract, including provisions on changes to the Contract Documents. No extension of time, Change Order, alteration, Modification, deletion, or addition to the Contract Documents, or of the work required thereunder, shall release or exonerate Surety on this Performance Bond or in any way affect the obligations of Surety on this Performance Bond.

9. Any proceeding, legal or equitable, under this Performance Bond shall be instituted in any court of competent jurisdiction in Fresno County, California within two (2) years after the Project is completed. If the provisions of this Paragraph 9 are void or prohibited by law, the minimum period of limitation available to sureties as a defense in Fresno County shall be applicable.

10. Notice to the Surety, the Obligee or the Principal shall be mailed or delivered to the address shown on the signature page.

11. Any provision in this Performance Bond conflicting with any statutory or regulatory requirement shall be deemed deleted herefrom and provisions conforming to such statutory requirement shall be deemed incorporated herein. The intent is that this Performance Bond shall be construed as a statutory bond and not as a common law bond.

12. Definitions.

12.1 Balance of the Total Contract Price: The total amount payable by the Obligee to the Principal pursuant to the terms of the Contract after all proper adjustments have been made under the Contract, including, for example, deductions for progress payments made, deductions for liquidated damages owed, and increases/decreases for approved modifications to the Contract.

12.2 Contract: The documents between the Obligee and the Principal identified as the Contract Documents in that certain Construction Contract for the Waste Water Lift Stations and Storm Water Pump Station Improvements Project, including all changes, Addenda and modifications thereto.

12.3 Principal Default: Material failure of the Principal, which has neither been remedied nor waived, to perform or otherwise to comply with the terms of the Contract.

12.4 Obligee Default: Material failure of the Obligee, which has neither been remendied nor waived, to pay the Principal progress payments due under the Contract or to perform other material terms of the Contract, provided such failure is the cause of the asserted Principal Default and is sufficient to justify Principal termination of the Contract.

IN WITNESS WHEREOF, the undersigned obligated parties have executed this instrument.

	Principal: _____
	Signature: _____
	Name & Title:
	Address:
(Corp. Seal)	

(Corp. Seal)	Surety: _____ Signature: _____ Name & Title: Address:

Attorney in Fact: _____

Surety shall submit the following documents along with this Performance Bond:

1. Verification that Surety is admitted to transact surety business in the State of California; and

2. Copy of Surety's Certificate of Authority, issued by the Insurance Commissioner of the State of California, along with a statement that said Certificate has not been surrendered, revoked, cancelled, annulled or suspended.

Approved: _____, Attorney for KRCD

****END OF SECTION****

SECTION 00535

PAYMENT BOND

KNOW ALL MEN 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 _____, 20___, with the Kings River Conservation District (KRCD) ("Owner") to do the following work, to wit: Construct the ***Pine Flat Unit-4 Project EPC Package***, Contract/Specification No._203.02.97_R1

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 Section 3247 to 3252, 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.

FURTHER BOND TERMS AND CONDITIONS

1. The Principal and the Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner and to Claimants, to pay for labor, materials, equipment furnished and services provided in the performance of the Contract, which is incorporated herein by reference.

2. With respect to the Owner, this obligation shall become null and void if and when the Principal:

2.1 Promptly and fully makes payment, directly or indirectly, for all sums due Claimants, and

2.2 Fully defends, indemnifies and holds harmless the Owner from all claims, demands, liens or suits by any person or entity who furnished labor, materials or equipment for use in the performance of the Contact, provided the Owner has promptly notified the Principal and the Surety (at the address described in Paragraph 10 below) of any claims, demands, liens or suits and has

tendered defense of such claims, demands, liens or suits to the Principal and the Surety, and provided there is no Owner Default.

Otherwise, this Payment Bond shall be, and remain, in full force and effect.

3. With respect to Claimants, this obligation shall become null and void if and when the Principal promptly and fully makes payment, directly or indirectly through its Subcontractors, for all sums due Claimants; otherwise, this Payment Bond shall be, and remain, in full force and effect.

4. The Surety shall have no obligation to Claimants under this Payment Bond until:

4.1 Claimants who are employed by or have a direct contract with the Principal have given notice to the Surety (at the address described in Paragraph 12) and sent a copy, or notice thereof, to the Owner, stating that a claim is being made under this Payment Bond and, with substantial accuracy, the amount of the claim.

4.2 Claimants who do not have a direct contract with the Principal:

4.2.1 Have furnished written notice to the Principal and sent a copy, or notice thereof, to the Owner, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the claim stating, with substantial accuracy, the amount of the claim and the name of the party to whom the materials were furnished or supplied or for whom the labor was done or performed; and

4.2.2 Have either received a rejection in whole or in part from the Principal, or have not received within thirty (30) days of furnishing the above notice any communication from the Principal by which the Principal has indicated the claim will be paid directly or indirectly; and

4.3.3 Not having been paid within the above thirty (30) days, have sent a written notice to the Surety (at the address described in Paragraph 12) and sent a copy, or notice thereof, to the Owner, stating that a claim is being made under this Payment Bond and enclosing a copy of the previous written notice furnished to the Principal.

5. If a notice required by Paragraph 4 above is given by the Owner to the Principal or to the Surety, that is sufficient compliance.

6. When the Claimant has satisfied the conditions of Paragraph 4, and, if requested by Surety has submitted reasonable supporting documentation that it possesses demonstrating entitlement to money and the amount of money due (including submitting a reasonable proof of claim form if requested by Surety), Surety shall, within sixty (60) days, notify the Claimant in writing of the following: (a) the amounts of the claim that are undisputed; and (b) as to those amounts that are disputed, the factual and legal basis asserted by the Surety for challenging any amounts that are claimed but disputed (including whether the denial is based on any asserted lack of substantiating documentation as to entitlement and/or amount claimed). Within ten (10) days of the Surety's written response, but in no event later than seventy (70) days from Claimant's compliance with Paragraph 4, Surety shall pay the undisputed amount.

As to any amount which is disputed by Surety hereunder, Claimant may submit any further documentation for consideration by Surety and Surety shall, within thirty (30) days, respond as required hereinabove, including payment of any further undisputed amount within a period of time no greater than forty (40) days from the date of Claimant's further compliance with this Paragraph 6.

Once Claimant receives Surety's written response as required hereunder, or, in the absence of the timely receipt of Surety's response (which includes the failure of the Surety's response to contain the required content), and further without regard to whether Claimant submits further documentation to Surety for its consideration as provided for hereunder, Claimant shall have the immediate right, without further notice, to bring suit against the Surety to enforce any remedy available to it under this Bond.

7. The Surety's total obligation shall not exceed the amount of this Payment Bond, and the amount of this Payment Bond shall be credited for any payments made in good faith by the Surety under this Payment Bond.

8. Amounts due the Principal under the Contract shall be applied to satisfy claims, if any, under this Payment Bond.

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

10. The Surety hereby waives notice of any change, alteration or addition to the Contract or to related subcontracts, purchase orders and other obligations, including but not limited to changes of time. The Surety consents to all terms of the Contract, including provisions on changes to the Contract Documents. No extension of time, Change Order, alteration, modification, deletion, or addition to the Contract Documents, or of the work required thereunder, shall release or exonerate Surety on this Payment Bond or in any way affect the obligations of Surety on this Payment Bond.

11. Any proceeding, legal or equitable, under this Payment Bond shall be instituted in any court of competent jurisdiction in Fresno County, California within one (1) year from the date on which (i) the Claimant gave the notice required by Paragraph 4.1 or Paragraph 4.3.3, or (ii) the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Contract, whichever of (i) or (ii) first occurs. If the provisions of this Paragraph 11 are void or prohibited by law, the minimum period of limitation available to sureties as a defense in Fresno County shall be applicable.

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

13. Any provision in this Payment Bond conflicting with any statutory or regulatory requirement shall be deemed deleted here from and provisions conforming to such statutory requirement shall be deemed incorporated herein. The intent is that this Payment Bond shall be construed as a statutory bond and not as a common law bond.

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

15. DEFINITIONS

15.1 CLAIMANT: An individual or entity having a direct contract with the Principal or with a subcontractor of the Principal to furnish labor, materials or equipment for use in the performance of the Contract. The intent of this Payment Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental equipment used in the Contract, architectural and engineering services used or reasonably required for performance of the work of the Principal and the Principal’s subcontractors, and all other items for which a mechanic’s lien or stop notice might be asserted.

15.2 If Applicable: DESIGN ASSIST CONTRACT: The documents between the Owner and the Principal identified as the Contract Documents, including all changes, Addenda and modifications thereto.

15.3 OWNER DEFAULT: Material failure of the Owner, which has neither been remedied nor waived, to pay the Principal as required by the Contract, provided such failure is the cause of the

failure of Principal to pay the Claimants and is sufficient to justify Principal termination of the Contract.

IN WITNESS WHEREOF, the undersigned obligated parties have executed this security instrument.

(Corp. Seal)	Principal: _____ Signature: _____ Name & Title: Address:
(Corp. Seal)	Surety: _____ Signature: _____ Name & Title: Address:

Attorney in Fact: _____

Surety shall submit the following documents along with this Labor and Material Bond:

1. Verification that Surety is admitted to transact surety business in the State of California; and

2. Copy of Surety's Certificate of Authority, issued by the Insurance Commissioner of the State of California, along with a statement that said Certificate has not been surrendered, revoked, cancelled, annulled or suspended.

Approved: _____, Attorney for KRCD

****END OF SECTION****

SECTION 00545

ESCROW AGREEMENT FOR SECURITY DEPOSITS IN LIEU OF RETENTION

Project Name: ***Pine Flat Unit-4 Project EPC Package***

Contract/Specification No.: 203.02.97_R1

This Escrow Agreement is made and entered into by and between; the Kings River Conservation District (KRCD)**,** whose mailing address is 4886 E Jensen Avenue, Fresno, CA 93725 ; 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 _____ (hereinafter 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:
General Manager Title	Title
David Merritt Name	Name
_____ Signature	_____ Signature

****END OF SECTION****

SECTION 00555

WORKERS' COMPENSATION INSURANCE CERTIFICATE

Project Name: ***Pine Flat Unit-4 Project EPC Package***

Contract/Specification No.: 203.02.97_R1

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*****

SECTION 00700

GENERAL CONDITIONS

1.0 GENERAL

1.1 Contract Agreement

A Bidder to whom award is made shall execute a written Contract Agreement and required supplementary documents and submit them to the Owner within ten (10) calendar days after the Notice of Award has been provided to the Bidder. The Agreement shall be made in the form adopted by the Owner**.**

If the best value 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 best value responsive, responsible Bidder, and such Bidder shall fulfill all terms, conditions, obligations, and covenants of the Contract Documents 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**.

In the event the Contractor is a joint venture of two or more contractors, the grants, covenants, obligations 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 Owner's Project 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 Owner's Project Manager under this Contract shall be deemed to have been given by and shall bind all persons or entities 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, and further that the terms and conditions of the Contract Documents, including those provisions relating to the resolution of disputes and claims, are expressly incorporated therein. 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 and purchase orders for materials and equipment 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, conveyance and or other disposition without such written consent of the Owner will be void.

1.2 Written Notice and Service Thereof

Any notice to any party relative to any part of this Contract shall be in writing and considered delivered and the service thereof completed, when said notice is posted, by certified or registered mail, to said party at its last given address, or delivered in person to the said party or its authorized representative of the work. This includes notice of change of address. The parties may agree to permit alternative service methods, including via email, but any emails sent after 3:00 p.m. on any business day shall be deemed served the next business day. Any and all emails sent on a non-business day shall be deemed served on the next business day.

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 Contract Documents

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 without limitation to California Public Contract Code sections 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 the price bid. Incidental work includes, but is not limited to, tasks required to be performed by the Specifications.

The Contractor shall keep on the Project site a complete copy of the Conformed Specifications and approved Contractor Design Drawings and shall at all times give the Owner’s Project Manager and Owner’s staff access thereto Anything mentioned in these Specifications and not shown on approved Contractor Drawings, or shown on approved Contractor Drawings and not mentioned in these Specifications, shall be of like effect as though shown or mentioned in both. The Owner’s Project Manager will furnish from time to time such as-built drawings, plans, profiles, and information of the existing facility and Owner Furnished Equipment 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 comply with any term, condition, covenant or specification of the Contract Documents will be sufficient cause for the rejection of the Work at any time before its acceptance.

Wherever reference specifications 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.

The Contractor or any of its subcontractors or suppliers shall not reuse any of the drawings, specifications or other documents prepared and stamped by the Owner’s Engineer or Engineer’s consultants on any other project without written approval by both the Owner and the Owner’s Engineer. This prohibition of reuse will survive final payment or termination of the Contract.

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 Owner Furnished Equipment 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 Owner's Project Manager and/or Owner's Engineer.

1.6 Contract Interpretation by the Owner's Project Manager

Notwithstanding any omission from these Specification or the Drawings it shall be the duty of the Contractor to call the Owner's Project Manager's attention to apparent errors or omissions and request instructions in writing before proceeding with the work. The Contractor, as part of the Contract, shall agree not take advantage of any errors or omissions in the Contract Documents. It is also the duty of the Contractor to promptly notify the Owner's Project Manager in writing of any design, materials, or specified method that the Contractor believes may prove defective or insufficient or for which there are procurement challenges affecting the ability of the Contractor to complete the Work within the times required. If the Contractor believes that a defect or insufficiency exists in design, materials or specified method and fails to promptly notify the Owner's Project Manager in writing of this belief, the Contractor thereby waives any right to assert entitlement to and/or recover any damages and/or time extensions arising from any such 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 Owner's Project 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 Owner's Project Manager. Questions regarding the meaning and intent of the Contract Documents shall be referred in writing by the Contractor to the Owner's Project Manager with a Request for Information (RFI). The Owner's Project 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 Owner's Project Manager shall notify the Contractor in writing as to when a decision will be provided. RFI procedures are further described in Section 01260, **REQUESTS FOR INFORMATION AND CLARIFICATIONS**

Work done by the Contractor after its discovery of such errors, omissions, discrepancies, inconsistencies or ambiguities without such notice and prior to response from the Owner's Project 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
(4) Contractor's accepted Bid Proposal
(5) General Requirements (Sections 01000 through 01999)
(6) General Conditions (Section 00700)
(7) Owner Furnished Equipment Drawings
(8) Technical Specifications (Section 02000 and all other Sections following)
(9) Reference/Standard Plans
(10) Reference/Standard Specifications

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) Addenda/Change Order drawings govern over any other drawings
(4) Contract Drawings govern over standard drawings/plans

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 successful Bidder shall, at the time of signing the Contract, furnish surety bonds executed by a surety admitted to conduct business in California using the bond forms included in the bid package.

The payment bond shall be in amount equal to one hundred percent (100%) of the Contract Amount and shall be for payment of just claims for materials, equipment, labor and subcontractors employed by the Contractor thereon.

The faithful performance bond shall be in an amount equal to one hundred percent (100%) of the Contract Amount and shall be for the faithful performance of the Contract, and for the fulfillment of such other requirements as may be provided by Law. The performance bond shall remain in effect to guarantee the repair and replacement of defective equipment, materials, and workmanship, and payment of damages sustained by the Owner on account of such defects, discovered within two (2) year after final acceptance by the Owner, for the work performed under the Contract, which shall remain in effect for a period of two (2) year, to guarantee the repair and replacement, and payments for damages.

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 00535.

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 are cumulative, and 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 Owner's Engineer, or the Owner's Project 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 Owner's Project Manager, and the Owner's Engineer will provide administration of the Contract as hereinafter described. 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 Owner's Engineer or the Owner's Project Manager, the Owner shall appoint an Engineer or a Owner's Project Manager whose status under the Contract Documents shall be that of the former Engineer or Owner's Project Manager, respectively.

2.2 Owner's Representative

2.2.1 General -The Owner's Representative has the authority to act on behalf of the Owner on change orders, field orders, progress payments, Contract decisions, acceptability of the Contractor's work, and early possession. Only the Owner's Representative on behalf of Owner may amend, alter, or change the terms of this Contract and the Contract Documents, and all such conduct, to be enforceable, must be in writing. This provision cannot and shall not be able to be waived by any individual.

2.2.2 Change Orders/Field Orders - The Owner's Representative has the authority to accept or reject change orders, field orders and cost proposals submitted by the Contractor or as recommended by the Owner's Project Manager.

2.2.3 Progress Payments - The Owner's Representative has the authority to accept or reject requests for progress payments which have been submitted by the Contractor and recommended by the Owner's Project Manager.

2.2.4 Contract Decisions - Should the Contractor disagree with the Owner's Project 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 Owner's Engineer's recommendations regarding retention of defective work as provided.

2.3 Owner's Project Manager

2.3.1 General: The Owner's Project 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 Owner's Project Manager may include more than one individual to perform contract administration and construction observation. Hereinafter, the term Owner's Project Manager includes any and all representatives working under the direction of the Owner's Project Manager.

All instructions to the Contractor and all communications from the Contractor to the Owner or the Owner's Engineer shall be forwarded through the Owner's Project Manager. The Owner's Project 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 Owner's Project 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 Owner's Project 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 Owner's Project Manager in matters relating to the Contract.

The Owner's Project 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 the Contract Documents.

2.3.2 On-Site Representative - The Owner's Project Manager will 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 Owner's Project Manager shall not be responsible for construction means, methods, appliances 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 Owner's Project 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 Owner's Project Manager shall 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 by the Owner's Project Manager is not an authorization to revoke, alter, or waive any requirements of the Specifications. Observation and inspection is, however, 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 Owner's Project Manager 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 Owner's Project Manager for decision. If the decision of the Owner's Project 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 Owner's Project Manager has the authority to make a recommendation as to the acceptability of the Work.

2.3.5 Change Orders - The Owner's Project Manager has the authority to initiate change orders; to reject change orders proposed by the Contractor or Owner's 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 Owner's Project 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 Owner's Project Manager has the authority to recommend acceptance or rejection of requests for progress payments which have been submitted by the Contractor.

2.3.8 Final Payment - The Owner's Project Manager, with the assistance of the Owner's 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 **Owner's Engineer**

2.4.1 General - The Owner's 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 Owner's 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 Owner's Project Manager for interpretations necessary for the proper execution or progress of the Work. The Owner's Project Manager shall refer such written requests to the Owner's Engineer, who will render such interpretations. Where the Contractor has requested an interpretation from the Owner's Project

Manager, or been notified by the Owner's Project 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 Owner's Project Manager without additional expense to Owner.

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

2.4.4 Submittal - The Owner's Engineer shall receive, through the Owner's Project Manager, design drawings, analysis/calculations, shop drawings, product data and samples for review in accordance with Section 01300, **SUBMITTAL PROCEDURES**.

The Owner's Engineer has the authority to review and take other appropriate action upon the Contractor's submittal such as design drawings, calculations/analysis, 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 Owner's Project 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 Documents.

3.2 Attention to Work

The Owner's Project Manager's designated representative will normally be available at the project site of the Work. An alternate representative will be designated when the designated Owner's Project Manager's representative is not available at the project site of the Work. The Owner's Engineer may assign a representative to be available at the project site of the Work.

3.3 Observation and Inspection

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

3.4 Owner's Right to Use

The Owner reserves the right, prior to Substantial Completion, to use any completed part or parts of the Work, providing these areas have been approved for use 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 anyway 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 use, the Owner and Contractor shall agree in writing regarding the responsibilities assigned to each of them for payments, security, maintenance, 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 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.

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, or 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 Owner's Engineer, the Owner's Project Manager, 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 **Non-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 for in the Contract Documents.

4.0 CONTRACTOR

4.1 **Status of Contractor, Subcontractors and Suppliers**

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, methods, and appliances subject to compliance with the requirements of the Contract Documents.

4.1.2 If the Contractor subcontracts any part of the Contract, the Contractor shall be fully responsible to the Owner for the acts, errors and omissions of the subcontractor(s) and supplier(s) and of the person(s) employed directly or indirectly employed by the subcontractor(s) and supplier(s) as the Contractor is for the acts, errors and omissions of persons directly employed by the Contractor. 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 Contract Documents to actions required of subcontractors, manufacturers, suppliers, or any person other than the Contractor, the Owner or the

Owner's Project Manager shall be interpreted as requiring that the Contractor shall require such subcontractor, manufacturer, supplier or person to perform the specified action.

4.1.3 By appropriate agreement, the Contractor shall require each subcontractor and supplier to be bound to the Contractor by the terms of the Contract Documents. Each subcontractor and supplier shall assume toward the Contractor all obligations, requirements and responsibilities, including for safety of the subcontractor's work, which the Contractor, by the Contract Documents, assumes towards the Owner. Each subcontractor or supplier shall include in their contracts with lower-tier subcontractors or suppliers these same requirements.

4.1.4 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 Owner's Project Manager that the subcontractor is properly licensed for the work it will perform.

4.1.5 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.

4.1.6 The Contractor shall have sole responsibility for promptly settling any disputes between its subcontractors and/or suppliers at all tier levels.

4.2 Contractor's Representative

Only the Project Manager named in **Section 00420 (C) of the CERTIFICATION OF BIDDER'S EXPERIENCE AND QUALIFICATIONS ,** or an equally qualified alternate approved by the Owner**,** will 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, unless the Owner agrees in writing to less Project Manager jobsite presence on small projects. During periods when the Work is suspended, arrangements acceptable to the Owner's Project 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 for reasons found in Section 5.3, **Character of Workers**.

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

4.3.1 With the approval of the Owner's Project 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 Owner's 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 of 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 Owner's Project 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 Owner's Project 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 Owner's Project 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 the inclement weather, extreme temperatures, and environmental elements. The 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. The forty-eight (48) hour non-emergency repair response time may be extended only if agreed to in writing by the Owner and/or private property owner. 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 therefore. 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 Contractor shall be responsible for all fees and permits required for construction activities performed in execution of this project.

However, these regulatory fees and permits- FERC license, CAISO interconnect application fees, WREGIS renewable energy permit fees, will be borne by the Owner.

4.5 **Compliance with Laws**

The Owner is a public agency of 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 Contractor.

The Contractor, shall at its own cost and expense, observe and keep itself and its subcontractors fully informed of all existing and future enacted state and federal laws and regulations and local 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 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 the Contract Documents, in relation to any such law, ordinance, regulation, order or decree, the Contractor shall immediately report the same to the Owner's Project 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 Owner's Project Manager, the Owner's 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 1720 and 1770 through 1785, 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 at http://www.dir.ca.gov/dlsr/DPreWageDetermination.htm. 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 Labor Code section 1775 and shall, as a penalty to the Owner, forfeit up to fifty dollars ($50) 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 furnish to the Owner no less frequently than monthly all certified 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 **(last four numbers only)**, 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 Labor Code section 1776 may be deducted from project payments as provided in said Labor Code section 1776.

The form for reporting of payroll records requested pursuant to Labor Code Section 1776 shall be the DIR's "Public Works Payroll Reporting Form" (Form A-1-131). This form may be downloaded from the DIR's website at http://www.dir.ca.gov/dlse/DLSE-PublicWorks.htm or copies of the form may be procured at any office of the Division of Labor Standards Enforcement (DLSE).

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 Labor Code section 1773.1,

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 particularly sections 1810 through 1815, eight (8) hours labor shall constitute a days' work and no laborer, worker, or mechanic in the employ of the 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 Title 8 of the California Code of Regulations, 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.

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 require Contractor to 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.

4.5.6 Receipt of Workers' Wages, Fee for Registering or Placing Persons In Public Works - Attention is directed to the provisions of Labor Code sections 1778 and 1779 of the California Labor Code, which read 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. Attention is directed to Labor Code section 1735 of the Labor Code, which reads as follows:

"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 (including race, religious creed, color, national origin, ancestry, physical disability, mental disability, medical condition, marital status, or gender), 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."

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 Lateral and Subjacent Supports - Attention is directed to California Civil Code 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.

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

4.5.11 Asbestos Related Work- All work involving asbestos containing material must be performed in accordance with Labor Code, sections 6501.5 through 6510, and Title 8 of the California Code of Regulations, section 5208 and all other pertinent laws, rules, regulations, codes, ordinances, decrees and orders.

4.5.12 Public Records Act -

A. Ownership and Disclosure

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 sections 6250 through 6276.48 (the “Act”). The Owner's use and disclosure of its records are governed by the Act. The Owner will use its best efforts to inform the Contractor of any request under the Act for any Owner records marked "Trade Secret", "Confidential" or "Proprietary" that were provided by the Contractor to the Owner. The Owner will not advise as to the nature or content of documents entitled to protection from disclosure under the California Public Records Act and any opposition by the Contractor to the Owner’s proposed disclosure of Contractor-generated documents will be at the Contractor’s sole cost and risk.

B. Litigation Related to Disclosure

In the event of litigation concerning the disclosure of any Records, Owner's sole involvement will be as a stakeholder, retaining the Records until otherwise ordered by a court. The Contractor, at its sole expense and risk, shall be fully responsible for any and all attorney fees, litigation costs and expenses, and any expert witness fees and expenses for prosecuting or defending any action concerning the Records and shall indemnify and hold Owner harmless from all costs and expenses including such fees, costs and expenses in connection with any such action

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..

4.7 **Safety**

4.7.1 Contractor's Safety Responsibility - The Contractor shall be solely and completely liable for all 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 and regulations, including without limitation 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 Owner’s Project Manager, the Owner’s Engineer or any other party than the Contractor responsible for safety. The Contractor agrees that for purposes of Labor Code section 6400 and related provisions of law the Contractor, the Contractor's directors, officers, employees, agents and subcontractors and any other entities acting pursuant to the Contract Documents 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 Owner’s Project Manager, Owner’s Engineer or their respective directors, 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 Owner’s Project Manager, Owner’s 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 the 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 the Contract Documents and the Contractor's own inspection of the location(s) where the 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 the 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 Owner's Project Manager, Owner's Engineer or their respective directors, officers, officials, employees, agents or volunteers or other authorized representatives will be "employers" as defined in Labor Code section 6400 and related provisions of law with respect to the Contractor, the Contractor's directors, officers, employees, agents and subcontractors and any other entities acting on behalf or for the benefit of the Contractor.

The Contractor shall indemnify, defend and hold Owner and Owner's Project Manager, Owner's 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, 2.1.7**, Indemnification**.

If death or serious injuries or serious damages are caused, the accident shall be reported immediately by telephone or messenger to both the Owner's Project Manager and the Owner. In addition, the Contractor shall furnish the Owner's Project 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 the Contract Documents. The Contractor shall also furnish the Owner's Project Manager with a copy of the Employer's Report of Injury involving any subcontractors on the Work. 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 the Contract Documents.

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 Owner's Project 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 Owner's Project 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 Owner's Project Manager's acceptance for filing of the Contractor's Safety Program shall not relieve or decrease the liability of the Contractor for safety. The Owner's Project 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 Owner's Project Manager in writing prior to the commencement of the 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 Owner's Project Manager. The Safety Supervisor shall be responsible for supervising compliance with the Safety Program and

all other applicable safety requirements on the project site and for developing and implementing safety training classes for all job personnel.

The Contractor will, through and by its Safety Supervisor, ensure that all of Contractor's employees and its subcontractors of any tier, fully comply with the Safety Program. 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 the Work safely, nor shall it impose any obligation upon the Owner to ensure the Contractor conducts the 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 of the Owner, Owner's Engineer, Owner's Project Manager, Contractor, subcontractors, suppliers 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 project 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 or entity 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.

At all times, the Contractor shall provide and maintain safe and unimpeded access for the Owner to existing operating facilities. This may include, but not limited to, temporary driveways, walkways, handrailing and overhead protection during construction. The cost of such access is to be included in Contractor's bid.

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 Labor Code 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 paragraph 4.7.6 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 paragraph shall be construed to impose a tort liability on the Owner, the Owner's Engineer, the Owner's Project 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 Owner's Project 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 Owner's Project Manager, is obligated to act to prevent threatened damage, injury or loss. The Contractor shall give the Owner's Project 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 Owner's Project 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, **Owner 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 safety authorities and applicable federal, state and local laws and regulations. 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 where workers may trip, slip and/or fall several feet.

H. Exposure to an oxygen enriched environment.

4.7.11 Public Safety and Convenience - The Contractor shall conduct the 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 Owner's Project 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.

The Contractor shall protect the public during construction or demolition in accordance with Section 3303 of the California Building Code.

4.7.12 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 Owner's Project Manager for review. Upon review, the Owner's Project 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 Owner's Project 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, **Work Hours**. Such work may be required due to project and/or operational constraints as defined in Section 01010, **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 paragraph 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 Owner's Project Manager.

5.0 CONTROL OF WORK AND MATERIAL

5.1 **Means, Methods and Appliances**

The means, methods and appliances 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 Owner's Project Manager shall not supervise, direct, or have control over, or be responsible for, Contractor's means, methods and appliances 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 the Work. However, if at any time the means, methods and appliances appear inadequate or of inferior quality, the Owner's Project Manager may order the Contractor to improve their character or efficiency, and the Contractor shall conform to such order; failure of the Owner's Project 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.

5.2 **Contractor's Responsibility for Work**

Until the formal acceptance of the Work by the Owner, 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 its own expense, provide suitable drainage of the project site 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 Owner with the name and phone number of the Contractor's employee or agent responsible for such service. Emergency service shall be within thirty (30) minutes from the time of notification. If the Contractor fails to provide this service, the Owner 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 Owner's Project Manager, unfaithful, disorderly or profane, dangerous, abusive, insubordinate, incompetent, or otherwise reasonably 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 Owner's Engineer, the Owner's Project 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 the Owner.

If Contractor does not comply with any Owner notice of insufficient workers within five (5) days of date of service thereof, the Owner shall have the right (but not a duty) to provide qualified workers to finish the Work or any affected portion of Work, as the Owner may elect. The 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. The 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 the Owner from claims of others.

Exercise by the Owner of its rights conferred upon Owner in this Section 00700, **GENERAL CONDITIONS** is entirely discretionary on the part of Owner. The Owner shall have no duty or obligation to exercise the rights referred to in Section 00700, 5.3, **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, 5.3, **Supply of Sufficient Workers** are cumulative to Owner's other rights under any provision of the Contract Documents.

5.5 Materials, Equipment and Workmanship

Unless otherwise indicated in the Contract Documents, or favorably reviewed and approved by the Owner's Engineer, materials and equipment for the 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 Work by the Contractor, whether in place or not, and shall be replaced or renewed in such manner as the Owner's Project Manager may direct. All materials and workmanship of whatever description shall be subjected to the inspection of, and rejection by, the Owner's Project Manager if not in conformance with the Contract Documents.

Unless otherwise stipulated in the Contract Documents, any defective material, equipment or workmanship, or any unsatisfactory or imperfect work which may be discovered before the final acceptance of the Work or within two (2) 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. The Owner's failure to inspect work shall not relieve the Contractor from any obligation to perform sound and reliable work as herein described. Any material, equipment and/or workmanship determined to be defective after the expiration of the one year express warranty provision (or beyond any furnished warranty extending beyond one year) shall be subject to the ten year statute relating to latent defects. The express warranties of the contract documents are in addition to, not in lieu of, the ten year statutory obligations.

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 Work. The Contractor, with the approval of the Owner's 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 Owner's 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 Owner's 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 Work.

To the extent required by law, 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 to the extent required by law.

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 these General Conditions.

Pursuant to Government Code section 4216.2 the Contractor shall contact the appropriate underground service alert regional notification center at least two (2) working 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.

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 Owner's Project 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, 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.

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 immediately upon discovery notify the Owner's Project Manager in writing. The Owner's Project Manager will supply a method for correcting said interferences in accordance with the responsibilities of this sub-section 5 and Government Code section 4215.

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 submitted**.**

The public utility, where they are the owner of the affected utility facility, shall have the sole discretion to perform repairs or relocation work or to 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 affected 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 Documents indicate 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 all arrangements with the affected utilities and bear all costs for such work.

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 Owner's Engineer. Replacement of plants and shrubs shall be required where an easement crosses a developed parcel. In such cases the Owner, Developer and Contractor shall agree before proceeding as to which plants and shrubs shall be saved or replaced.

The restoration of trench surfaces shall include measures to prevent surface erosion of the trench. 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**

Except where specified in the Contract Documents, the Contractor shall make arrangements for disposing of materials. Excess excavated material not required for backfill 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 Owner from any and all responsibility in connection with the disposal of material on said property. Before any material is disposed of on such property, the Contractor shall obtain permission from the Owner's Engineer to dispose of the material at the location designated in the permit.

Unless otherwise provided in the Contract Documents, 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 ten (10) 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 issuance of the Notice to Proceed. The Contractor shall provide the required Contract bonds and evidences of insurance prior to issuance of the Notice to Proceed and commencing the Work.

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

The Contractor shall give the Owner's Project 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. 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 Owner's Project Manager in writing of the probability of the occurrence and the estimated extent of the delay, and its cause. The notice required shall comprehensively detail in writing all known facts as to the who, what, where, when, and why of each and every delay event and the activity(ies) affected. The Contractor shall take immediate steps to prevent and/or minimize, 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 Owner's Project 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 any 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 as detailed in the Contract Documents.

A. Unanticipated/Unusual/Abnormal Delays - Delays caused by fire, unusual storms, floods, tidal waves, earthquakes, strikes, labor disputes, freight embargoes, and unknown and not reasonably anticipated shortages of materials shall be considered as excusable delays 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 - Should inclement weather conditions or the conditions resulting from weather 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, it shall be a weather delay day.

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 Owner's Project 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. Material escalation costs shall not be considered a shortage or eligible for consideration as an excusable delay. 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 Contractor's or its agent's 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 the 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 Owner's Project 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 Owner's Project Manager stating at a minimum the probable cause of the delay and the number of days being requested.

B. If requested by the Owner's Project Manager, the Contractor shall promptly provide sufficient information to the Owner's Project 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.

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 (critical path activities on accepted CPM Construction Schedule) 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 **Indirect Overhead**

The Contractor shall be reimbursed for indirect 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 indirect overhead shall be made for compensable delays which occur during a concurrent delay as defined in Section 00700, 6.3.5, **Concurrent Delays**. As a condition precedent to any reimbursement, the Contractor must fulfill all conditions as provided in Section 00700, 6.4.2 **Excusable or Compensable Delays**. No additional markup for overhead or profit shall be provided for such indirect overhead expenses.

Payment to the Contractor for indirect 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 depletion of the original Contract period and any time extensions granted other than compensable time extensions.

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

A. Actual invoice costs for on-site field offices and temporary utilities as described in Section 01500, **CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS**.

B. Actual labor costs for field office staff.

C. Fair rental values acceptable to the Owner's Project Manager for construction equipment idled due to the delay.

6.4.3.1 Indirect Home Office Overhead – For those allowable delay periods as defined in Section 00700, 6.4.3, Indirect Overhead, the Contractor shall be reimbursed for its unabsorbed home office overhead based on the following formula:

$$\frac{\text{Total Contract Bid Price (\$)}}{\text{Contract Period (Calendar Days)}} \times 0.035 = \text{Daily Home Office Overhead (\$/Calendar Day of Delay)}$$

As it is impractical to determine the actual home office overhead, such reimbursement shall encompass full payment for any and all home office overhead expenses for such periods of time for the Contractor and all subcontractors. Distribution of the markup amount among the Contractor and all subcontractors and suppliers is the responsibility of the Contractor.

6.5 **Liquidated Damages**

6.5.1 The 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, **Times 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, **Times Allowed for Completion** herein.

6.5.2 It is, therefore, agreed in accordance with California Government Code section 53069.85 that the Contractor will 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 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, **Times 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. Owner may elect to assess, but not withhold, liquidated damages, from any, some or all progress payments. Such election shall not operate as a waiver of Owner's right to later assert and/or withhold liquidated damages from subsequent progress payments, retention, and/or as a claim against Contractor and/or its surety. Liquidated damages may not be waived or reduced by the Owner's Project Manager unless expressly waived or reduced in writing by the Owner.

6.6 Owner Suspension of Work

6.6.1 If the Contractor fails to correct defective work as required by Section 00700, 5.4, **Materials and Workmanship**, Section 00700, 4.7.7, **Safety Violations**, 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, 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 the 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 sole expense, shall perform all work necessary to provide a safe, smooth, and unobstructed passageway through construction for use by Owner, Owner's Project Manager, 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 materially violate any of the provisions of the Contract

Documents, or if the Contractor should persistently or repeatedly refuse or fail, except in cases for which an authorized extension of time is provided, to provide the required project management, supervision, quality control, and/or 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 Documents. Said notice shall contain the reasons for such intention to terminate the Contractor's performance under the Contract Documents, 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 Documents and the Contractor shall not be entitled to receive any further payment until the Work is finished. Preliminary notice of any or all of the foregoing may be provided to the surety by or on behalf of Owner so as to enable it to investigate the contentions and project status so as to be poised to promptly respond, as required in the performance bond, to a declaration from the Owner declaring the right of the Contractor to proceed to be terminated due to default. Upon receipt of such notice the surety on the performance bond shall investigate the contentions raised and keep a record of its investigation in its files for a period of no less than five (5) years following the notice.

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 Work. 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 Work, and if it serves such notice of its intent to take over and perform the Work 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.

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 Documents.

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 conduct of the Work.

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 endeavor to 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 any portion of the Work that 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 the 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 the Work 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 Work and/or property related to the Work.

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 Owner’s Project 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 such 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 Owner's Project 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 Owner's Project Manager a request for final payment in accordance with the requirements of the Contract. Such request shall be submitted promptly, but no later than sixty (60) days from the effective date of the termination for convenience.

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 amounts paid or payable on account of goods delivered or work furnished by a 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 ten (10) 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 and 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

3) Because of the Owner's failure to pay the Contractor in accordance with the Contract Documents; or

B. If the Work is suspended by the Owner, without cause attributable to the wrongful acts of Contractor, for one hundred and eighty (180) consecutive 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 Contractor from making a Claim as provided for in the Contract Documents for an adjustment in Contract Price or Contract Times or otherwise

for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this 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 Owner's Project 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 Owner's Project 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 of 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. No reservations of rights for additional time, money or anything else shall be permitted on a change order unless approved by the Owner. It is the intent of the Owner to have all change orders issued comprehensively address all issues known and unknown relating to time and/or costs. See Section 01320, **PROGRESS REPORTS** for the detailed procedures and requirements of timely information in support of notice and the request for compensation (of time and money) and the negotiating process.

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 Section 00700, 1.4. Such work shall be governed by all applicable provisions of the Contract Documents. In giving instructions, the Owner's Project Manager shall have authority to make minor changes in the Work in writing by way of a Field Directive, 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 Owner's Project Manager, and no claim for an addition to the Contract Amount and/or Contract Time shall be valid unless so ordered.

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 Owner's Project 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 issue 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 section 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's Project Manager 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 Owner's Project Manager.

7.3.1 Notice – Either party shall provide written notice of disputed or potentially disputed work to the other party 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 Owner's Project Manager in accordance with Section 00700, 1.6, **Contract Interpretation by the Owner's Project Manager** . If the Contractor disagrees with the Owner's Project Manager's decision in Section 00700, 1.6, **Contract Interpretation by the Owner's Project 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 Owner's Project Manager has not recognized as extra work, the Contractor shall notify the Owner's Project Manager, in writing, of its intention to file a claim within 2 days of the written notice of disputed or potentially disputed work. Notice pertaining to decisions provided in Section 00700, 1.6, **Contract Interpretation by the Owner's Project Manager**, or such other determinations by the Owner's Project Manager shall be filed in writing by the Contractor with the Owner's Project Manager within ten (10) days of receipt of such decision and prior to the commencement of such work including all requests for additional compensation or a time extension shall be delivered in writing to the Owner's Project Manager prior to the commencement of such work. Written notice shall use the words "Notice of Potential Claim". Such Notice of Potential Claim shall describe, in detail, the circumstances and the reasons for the claim, but need not state the amount.

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

Unless timely notice 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 supported a claim for additional compensation. The Contractor should understand that timely notice of potential claim is of great importance to the Owner's Project Manager and Owner, and is not merely a

formality. Such notice permits 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 Owner's Project Manager has kept account of the work in question, shall not in any way be construed as proving the validity of any claim.

7.3.2 Response by Owner's Project Manager - The Owner's Project Manager shall review the "Notice of Potential Claim" and within ten (10) days of receipt of the notice shall respond to the Contractor in writing with its determination, or if it is necessary to extend this period, the Owner's Project Manager shall notify the Contractor in writing as to when a decision will be rendered.

7.3.3 Appeals to the Owner's Representative - In the event the Contractor disagrees with any determination of the Owner's Project Manager rendered in accordance with Section 00700, 7.3.2, Response by Owner's Project Manager, the Contractor may, within ten (10) days of receipt of such determination, appeal the determination to the Owner's Representative for review. The Owner's Representative shall review the appeal and transmit the decision in writing to the Contractor within thirty (30) days from the date of receipt of the appeal. Failure of the Contractor to appeal the determination of the Owner's Project Manager within said ten (10) days after receipt of such determination shall constitute a waiver of the Contractor's right to thereafter assert a claim resulting from such determination or decision.

In the event the Contractor disagrees with the determination of the Owner's Representative, the Contractor shall notify the Owner's Project Manager, in writing within ten (10) days of receipt of such determination, of its intention to make a claim in accordance with Section 00700, 7.3.7, Resolution of Claims.

7.3.4 Records of Disputed Work - In proceeding with a disputed portion of the Work, the Contractor shall keep accurate daily 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 that are used. Such information shall be submitted to the Owner's Project Manager on a daily basis, receipt of which shall not be construed as an authorization for or acceptance of the disputed work. Failure to comply with this paragraph shall constitute a waiver of the Contractor's claim for additional compensation or a time extension as to that day.

7.3.5 Submission of Claim Costs - Within thirty (30) days after incurring 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 Owner's Project Manager, as best the Contractor is able, its costs incurred for the claimed matter. Claims shall be made in itemized detail, and should the Owner's Project 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 Owner's Project Manager. If the additional costs are not fully ascertainable, they shall be estimated with as much accuracy as possible in the circumstances. The Owner's Project Manager shall have the right 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.

7.3.6 Claim Meetings - From time to time the Contractor may request or the Owner's Project 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, and make available the personnel, subcontractors and suppliers necessary for resolution, of the claim. In addition, the Contractor shall timely provide all documents relevant to the claim which may reasonably be requested by the Owner's Project Manager.

7.3.7 Resolution of Claims - Claims pertaining to this Agreement for three hundred and seventy-five thousand dollars ($375,000) or less which cannot be resolved between the parties shall be resolved pursuant to the provisions of Public Contract Code section 20104 through 20104.6 as provided for in this section.

7.3.7.1 Claims Not Exceeding $375,000 - Said Code Sections provide in part that:

Under Public Contract Code section 20104.2, construction claims of $375,000.00 or less on local public agency construction contracts must be in writing and include the documents necessary to substantiate the claim. Claims must be filed on or before the date of final payment.

The Owner must respond in writing to any written claim of $375,000 or less within 60 days or within 45 days in the case of claims of less than $50,000 of receipt of the claim. Within 30 days of receipt of the claim, the Owner may request in writing any additional documentation supporting the claim or relating to defenses to the claim the Owner may have against the Contractor. If additional information about the claim is thereafter required, it shall be requested and provided upon mutual agreement of the Owner and the Contractor. The Owner's written response to the claim, as further documented, shall be submitted to the Contractor within 30 days (or, for claims of less than $50,000, within 15 days) after receipt of the further documentation, or within a period of time no greater than that taken by the Contractor in producing the additional information or requested documentation, whichever time is greater.

If the Contractor disputes the Owner's written response (or if the Owner fails to respond within the time periods prescribed above) the Contractor may notify the Owner, in writing, within 15 days of receipt of the Owner's response or within 15 days of the Owner's failure to respond within the times prescribed, respectively, and demand an informal settlement conference. The Owner must then schedule the requested settlement conference within 30 days.

If, following the settlement conference, the claim or any portion remains in dispute, the Contractor may file a claim as required by the claims statute commencing at California Government Code Section 910. The time within which a Government Code claim must be filed is tolled from the time the Contractor submits the Public Contract Code claim until the time when the claim is denied.

If the claim is denied, the Contractor may bring a civil action against the District in the manner and within the time prescribed in Public Contract Code section 20104.4.

7.3.7.2 Claims Exceeding $375,000 - For claims that exceed $375,000 that are not required to be resolved under Public Contract Code sections 20104 through 20104.6, the Contractor shall file a claim and the claim will be resolved according to the following procedures:

The Owner will respond in writing to any written claim filed by the Contractor that is an amount greater than $375,000 within 60 days of receipt of the claim. If the Owner deems the claim incomplete, it may request in writing, within 30 days of receipt of the claim, any additional documentation supporting the claim or relating to defenses to the claim the Owner may have against the Contractor. If the Owner determines that it will need more than 60 days to review and respond to the claim, it may advise the Contractor in writing within 30 days of receipt of the claim of when the review and response to the claim will be furnished.

If a civil action is filed to resolve the claim, then between 30 and 60 days after the filing of responsive pleadings, the court shall submit the matter to nonbinding mediation unless waived by the Owner and the Contractor in a stipulation submitted to the court. If mediation is elected, the Owner and Contractor will select a mutually agreeable neutral mediator within 15 days of such election. The mediation must commence within 30 days of the mediators' selection and conclude within 15 days of commencement unless the time is extended by stipulation of the parties or for good cause by the court.

If the matter remains in dispute, the case shall be submitted to judicial reference pursuant to California Code of Civil Procedure sections 638, former subdivision 1, and 641 through 645.1. or any successor statutes thereto. The Parties shall cooperate in good faith to ensure that all necessary and appropriate parties are included in the judicial reference proceeding. The Owner shall not be required to participate in the judicial reference proceeding unless it is satisfied that all necessary and appropriate parties will participate. The Owner and the Contractor shall share equally in the fees and costs of the referee, unless the referee orders otherwise.

The referee shall have the authority to hear all issues, whether of fact or law, and to report a statement of decision to the court. In the event that they do not otherwise agree, the Owner and the Contractor shall

use the procedures adopted by Judicial Arbitration and Mediation Services/Dispute ("JAMS") for judicial reference (or any other entity offering judicial reference dispute resolution procedures as may be mutually acceptable to the parties), provided that the following rules and procedures shall apply in all cases unless the parties agree otherwise:

(a) The proceedings shall be heard in the County of Fresno;

(b) The referee must be a retired judge or a licensed attorney with at least ten years substantive experience in construction matters;

(c) Any dispute regarding the selection of the referee shall be resolved by JAMS or the entity providing the reference services, or, if no entity is involved, by the court with appropriate jurisdiction;

(d) The referee may require one or more pre-hearing conferences;

(e) The parties shall be entitled to discovery, and the referee shall oversee discovery and may enforce all discovery orders in the same manner as any trial court judge;

(f) A stenographic record of the proceedings shall be made, provided that the record shall remain confidential except as may be necessary for post-hearing motions and any appeals;

(g) The referee's proposed statement of decision shall contain findings of fact and conclusions of law to the extent applicable; and

(h) The referee shall have the authority to rule on all post-hearing motions in the same manner as a trial judge.

The referee's final statement of decision shall be binding upon the Owner and the Contractor provided that the parties first have an opportunity to comment on and seek changes to the proposed statement of decision. Upon filing of the final statement of decision with the clerk of the court, or with the judge where there is no clerk, the court may enter judgment hereon. The decision of the referee shall be appealable as if rendered by the court. This provision shall in no way be construed to limit any valid cause of action which may be brought by Owner of the Contractor.

If any party hereto commences a civil action to interpret or enforce any of the following provisions of this Contract, the prevailing party shall be entitled to an award of reasonable attorney's fees and costs in addition to any other amounts awarded as part of the judgment in the reference.

A party that appeals a judgment and does not obtain a more favorable judgment shall pay the reasonable attorney's fees and costs on appeal of the other party. The Owner must pay interest at the legal rate on any judgment, commencing on the date when the judgment was entered. Except as otherwise provided in the Contract, the Owner must pay the undisputed portions of any claims.

BY INITIALING BELOW, THE PARTIES ACKNOWLEDGE THAT THEY HAVE READ AND UNDERSTAND THE FOREGOING AND ACCEPT THAT THEY ARE WAIVING THEIR RIGHT TO A JURY TRIAL.

OWNER'S INITIALS _____ **CONTRACTOR'S INITIALS _____**

8.0 PAYMENT

8.1 Basis of Payment

8.1.1 General - The Contractor shall accept the compensation, as herein provided in the Contract Documents, 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 therefore.

8.1.2 Payment for Patents and Patent Infringement – Contractor represents and warrants that is has the legal right to utilize all equipment, materials, and other goods supplied for or used in the Work. 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 Owner's Project Manager, and Owner's Engineers, together with all their respective directors, officers, volunteers, agents, and employees harmless from and any and all suits and claims including claims for attorney's 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 for the Work, the Contractor shall furnish an affidavit to the Owner regarding patent rights for the Work. The affidavit shall state that all fees and payments due as a result of the Work 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 the Work.

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, without limitation, 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 for payment of taxes, 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 01150, **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 Owner's Project 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 Owner's Project 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 ten (10) 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 ten (10) day return requirement set forth in subdivision (B) above.

If requested, the Contractor shall provide such additional data as may be reasonably required to support the partial payment request. The Owner's Project 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 with the Owner's Project Manager's evaluation, the Contractor shall submit to the Owner's Project Manager a properly completed and signed progress payment request. The Owner's Project 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 judgment of the Owner's Project Manager, the Work is not proceeding in accordance with the provisions of the Contract, or when in the Owner's Project Manager's judgment 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 §3262 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 §3262 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 Owner's Project 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 Owner's Project 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 Owner's Engineer 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. No more than seventy-five percent (75%) of the total cost of an equipment item which requires Operation and Maintenance Manuals for equipment will be paid for stored materials until such manuals are submitted in accordance with Section 11050, **OPERATION AND MAINTENANCE MANUALS**, 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 Owner's Project Manager, at the job site.

D. The Contractor's actual net cost for the materials must be supported by paid invoices of suppliers, or other documentation requested by the Owner's Project 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.

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.**

8.2.3 Effect of Payment – Payment will be made by Owner based on the Owner's Project 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 submitted by 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 for the Contractor or its agents 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 – As part security, the Owner will withhold from each of the partial payments and retain as part security, ten (10) percent of the amount earned until final completion and acceptance of all of the Work; provided, that if, at any time after fifty percent (50%) of the Work has been completed, the Owner and Owner's Project Manager find that satisfactory progress is being made, the Owner may at its sole discretion, authorize any of the remaining partial payments in full. However, the amount retained by Owner before such authorization by the Owner and Owner's Project Manager will be kept by Owner and will be included in the final payment.

8.3.2 Other Withholds - In addition to the amount which the Owner may otherwise retain under the Contract Documents, 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 Work 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 01720, **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 01320, **PROGRESS 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.

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 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, 8.2, **Partial Payments**, or 00700, 8.7, **Final Inspection and Payment**, the Contractor may substitute securities as provided in Public Contract Code section 22300 of the Public Contract Code, as amended, which state 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 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 00545, **ESCROW AGREEMENT FOR SECURITY DEPOSITS IN LIEU OF RETENTION**.

8.5 **Warranty of Title**

The material, supplies, or equipment used in the Work or required to be provided by the Contractor under the Contract Documents shall not 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 Work or the project site 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 is substantially complete, the Contractor shall notify the Owner's Project Manager in writing. Upon receipt of the notification, the Owner's Project Manager, the Owner, the Owner's 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 Owner's Project 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 Owner's Project Manager in writing. The Owner's Project Manager, the Owner and/or the Owner's 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 Owner's Project Manager shall prepare a Certificate of Substantial Completion and the Punch List. 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 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 Contractor has satisfied the preceding conditions and the Owner has approved such satisfaction, the Owner and the Contractor shall both 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 Owner's Project Manager in writing. Upon receipt of the notification, the Owner's Project Manager, the Owner's Representative(s) and the Owner's Engineer will make a final inspection, to determine the actual status of the Work as being 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 Owner's Project 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 Owner's Project Manager. The Owner's Project 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**.

After receipt of the last partial payment, but prior to acceptance of the Work by the Owner, the Contractor shall send a letter to the Owner's Project Manager. The letter, pursuant to California Public Contract Code Section 7100, shall state that acceptance of the final payment described below shall operate as and shall be, a full release of the Owner, the Owner's Project Manager, the Owner's Engineer, and their duly authorized agents, from all claims and liabilities arising under the Contract related to undisputed contract amounts. Disputed Contract claims in stated amounts previously filed as provided in Section 00700, 7.3, **Resolution of Disputes,** may be specifically excluded by the Contractor from the operation of the release.

Following receipt of all required submittals and the Owner's Project 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 Public Contract Code Section 7107 withhold from the final payment an amount of 150 percent of the disputed amount.

8.8 Warranties and Bonds

The Contractor hereby agrees to make, at its sole expense, all repairs or replacements necessitated by defects in materials or workmanship, supplied under terms of the Contract Documents, and pay for any damage to other works resulting from such defects, which becomes evident within two (2) year after the date of acceptance of the project as evidenced by the notice of completion recorded by Owner (or, in the absence of a proper notice of completion, within two (2) year of acceptance by Owner). Unless otherwise provided in Contract Documents, the two (2) year warranty period is the shortest duration and such duration may be a 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 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 the Owner 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/or 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.

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,"** 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 the Contract Documents proves to be unsatisfactory to the Owner's Project 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 the 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 the Contract Documents 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 the Contract Documents 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, that it may have against the Contractor, subcontractors, suppliers of the equipment and work performed under the Contract Documents.

****END OF SECTION****

SECTION 00800 – SUPPLEMENTARY CONDITIONS

For General Conditions (GC) Art. 4.5, *Compliance with Laws*, add the following:

This contract will be interpreted and enforced according to the laws of the State of California. Should litigation arise related to the enforcement or interpretation of the agreement in any way, Equipment Supplier and Owner agree that such litigation shall be brought and venue will lie in Fresno County, California.

In addition to the requirements of the GC for timely Shop Drawing submittals, additional provisions regarding changes or revisions made by the EPC Contractor which will require redesign of the powerhouse or any ancillary facilities, will be as set forth in the following paragraphs:

1. For changes or revisions made by EPC Contractor after initial 30-day Preliminary Design Drawings submittal of confirmed equipment dimensions and locations, and for each subsequent scheduled submittal that changes dimensions and locations before Award of the Construction Contract, Owner's Engineer will record time and costs required by Owner and Owner's Engineer and their consultants in evaluating the changes, and in making changes in the Construction Documents occasioned thereby.

For changes or revisions made by EPC Contractor during the course of the project construction, Owner's Engineer will record time and costs required by Owner and Owner's Engineer and their consultants in evaluating the changes,

For GC Art. 4, *Contractor*, add the following:

2. in making changes in the Construction Documents, as required, and in computing changes in construction costs occasioned thereby.
3. EPC Contractor shall reimburse Owner for all costs for services of Owner, Owner's Engineer and their consultants for making changes in the Construction Documents, as related in 1 and 2, above, for evaluating the changes in construction costs, and for all added construction costs occasioned by redesign during construction phase.
4. Revised shipping information: all revisions to shipping information provided within the bids shall be submitted within the specified 120-day submittal period. This revised information will be given to the construction contract bidders for basing their handling and storage costs. All additional costs resulting from subsequent changes to shipping information different from that submitted by EPC Contractor after the 120-day submittal period will be deducted from payments due the EPC Contractor.

For GC Art. 6.5 *Liquidated Damages*, add the following:

The EPC contractor shall pay the Owner $1,000.00 (US dollars One Thousand and zero cents) for each day of the delays arising from EPC contractor's fault. The liquidated

damages specified herein are cumulative and are limited to 15 percent of the Contract Price and shall be withheld from moneys due the Equipment Supplier. The agreed upon Project Master Schedule at the contract signing will be the basis of determining the delays.

For GC Art. 8.0 *Payment*, add the following:

Unit Price Contract Items: For Contract Items bid on a unit price basis, the estimated quantities in the Bid Form are approximate and are given only as a basis for comparison of bids. Owner does not expressly, or by implication, warrant that the actual amount of work will correspond to the estimated quantities. Owner reserves the right to increase or decrease the amount of work performed under unit price contract items, or to omit such work altogether. No adjustments to the Contract unit prices will be made, nor will any claim for loss of anticipated profit be allowed, on account of any such increase, decrease or omission. Payment for unit price contract items will be made at the Contract unit prices stated in the EPC Contractor's Proposal, for the quantities of work directed by the Owner's Engineer to be performed and actually performed.

For GC Art. 8.0 *Payment*, add the following:

In addition to the Goods specified for delivery, all specified supplementary data and documents shall have been delivered to and accepted by the Owner's Engineer.

Add new Article 9, Full Operation Date

9.1 Definition of Full Operation Date: The first date, after all essential operational elements of the power Plant have been completed, and after the startup tests have been completed, on which all features and equipment are capable of operating simultaneously in such condition and adjustment that the plant is capable of continuous delivery into the transmission lines at full capacity for the available head and flow conditions. The EPC contractor, based on Equipment manufacturer's field representative's recommendation may have to adjust installation.

9.2 The fact that the Power Plant has met the standards of Art. 9.1 above must be confirmed by satisfactory completion of performance tests, which will be conducted as soon as possible and will commence not later than 30 days after the completion of testing described herein. For the purpose of this paragraph, one of the performance tests, which shall follow the startup tests, shall include the satisfactory operation of the plant for a period of 30 consecutive days.

9.3 The 30-day performance test requirement of paragraph 9.2 above shall be continuous, except for any scheduled shutdown for maintenance, adjustment and correction; or for limited uncontrolled shutdowns, which will be determined by the Owner's Engineer on a case-by-case basis. For issues that are deemed to have arisen due to EPC contractor's

installation defects or EPC furnished equipment shall be borne by the EPC contractor at no expense to the Owner.

9.3.1 Uncontrolled shutdowns may or may not result in the start of a new 30-day period. For all shutdowns, a timely explanation to Engineer is required to confirm the understanding relative to the effect of the shutdown on the 30-day performance test.

9.3.2 Periods of unsatisfactory performance shall not count toward the 30-day performance test requirement.

9.3.3 Unsatisfactory performance, not included shutdowns identified above, shall be considered as any uncorrected condition which affects the ability of the hydro generator to operate as specified herein, or which significantly increases the operation or maintenance cost.

9.4 The Scheduled Full Operation Date shall be determined at the Project Kick-off meeting.

9.5 The Actual Full Operation Date will be the date confirmed by performance testing as specified in paragraph 9.2, above. Final payment under this contract will not be made before the Actual Full Operation Date and completion of performance testing. The supplier shall have submitted all the required project documentation and that the Engineer shall have final approved all of them prior to the final payment.

9.6 The responsibility of the EPC contractor with respect to the Scheduled Full Operation Date is limited to the responsibility to deliver acceptable Goods (under EPC contractor's scope) meeting the requirements of the Procurement Documents within the specified times and to install all the equipment supplied by the EPC contractor themselves and other contractor(s), assist during the testing/ commissioning phase and work on correcting installation issues.

Add new Article10, *Detailed and Erection Drawings*

10.1 Before proceeding with fabrication or manufacture of EPC contractor designed and furnished materials and equipment (including the powerhouse building and all appurtenances), EPC contractor shall submit to the Owner's Engineer the designs, design computations when requested, detailed specifications, general assembly drawings of the equipment, and sufficient subassembly drawings, details, and control and wiring diagrams to demonstrate fully that all parts will conform to the provisions and intent of the Procurement Documents and to the requirements of their installation, operation, and maintenance. These submissions shall substantially conform to the Drawings and shall show all necessary dimensions; any and all field joints required; and subassemblies in which the EPC contractor proposes to ship the equipment; locations and sizes of auxiliary

connections for oil, grease, water, and air; and the terminal boxes and wire sizes for electrical circuits. EPC contractor shall submit to the Owner's Engineer, before proceeding with fabrication or purchase, Shop Drawings, Product Data, and Samples as appropriate to items designed but not detailed on the Drawings.

Add new Article 11 - INSURANCE REQUIREMENTS
The seller shall carry following insurance throughout the active contract duration

A. General Liability insurance with a limit of $10M, including additional insured coverage for KRCD for ongoing and completed operations.

B. Professional liability insurance with a limit of $10M, coverage to be in place for the duration of the project and for 3 years after the completion of the project.

C. Commercial Auto Liability insurance with a $1M limit insurance 'any auto'. If supplier does not own any vehicles then coverage for "Hired and non-owned" auto in the amount of $1M.

D. Workers Compensation insurance for statutory limits required by law including employer's liability coverage in the amount of $1M combined single limit.

For GC Art. 8.8 *Warranty and Bonds*, add the following:

A. Warranty for EPC contractor furnished equipment and components

A.(1). For all equipment, including sub-assemblies and individual components under the EPC contractor scope of supply shall have Twelve (12) month warranty or 8,000 operating hours (whichever is longer) for any defects and/or malfunctioning. The warranty date shall begin on the Scheduled Full Operation Date. Any cost associated with the repair, replacement or other action taken by the equipment supplier within the 12 month warranty period (or 8,000 operating hours, whichever is longer) shall be borne by the equipment supplier.

A.(2). All warranties which are available in the normal course of business from manufacturers of equipment or components, such warranties shall be obtained by the EPC contractor's Equipment Supplier and furnished to the Owner as follows:

1. Assemble warranties from manufacturers and subcontractors.
2. Provide two signed original copies.
3. Provide a Table of Contents, neatly typed, in orderly sequence. Provide the following information for each item:
    a. Product or work item.
    b. Manufacturer, with name of principal, address and telephone number.

c. Scope.
d. Date of beginning of warranty.
e. Duration of warranty.
f. Proper procedure in case of failure.
g. Instances which might affect the validity of warranty.
h. Include as part of the operation and maintenance data.

B. Powerhouse Warranty

For the powerhouse building and all the appurtenances including roofing, foundation and building components, including sub-assemblies and individual components under the EPC contractor shall have five (5) year warranty for any building and building systems (including but not limited to HVAC, Fire suppression system, air conditioning system) defects and/or malfunctioning. The warranty date shall begin on EPC handover date to the owner of such facility and sub-systems. Any cost associated with the repair, replacement or other action taken by the EPC contractor within the warranty period shall be borne by the EPC contractor.

SECTION 01010
SUMMARY OF WORK

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Summary of Work.

B. Access to the Site.

C. Intent.

D. Work by Others.

E. Contract Documents

1.02 SUMMARY OF WORK

A. Construction of Unit 4 powerhouse, steel penstock (Inlet Manifold and Pipe; Draft Tube extension), and modifications to existing Bypass Structure.

B. Work includes the relocation of:

1. Diesel generator and fuel tank.

2. Spare transformer.

C. Work includes design, procurement, and construction of:

1. Unit 4 Powerhouse reinforced concrete substructure, including independent mat foundation, and drilled micropile foundation.

2. Extension of the existing reinforced concrete bypass support pads n.1 and 2

3. Reinforced concrete foundation for Draft Tube Extension Support

D. Work includes installation and testing of the following Owner-furnished equipment:

1. Turbine, horizontal Francis type.

2. Generator, horizontal synchronous type, including static excitation.

3. Turbine Shutoff Valve.

4. Metal-clad Switchgear.

5. Governor and Hydraulic Power Unit

6. Turbine Generator Control Switchboard

7. Generator Termination Cabinet

8. ISO Metering Cabinet

E. Work includes design, furnishing, installing, and testing the following:

1. Demolition work and Diesel Generator and tank Relocation.

2. Pre-engineered Metal Powerhouse Building.

3. Powerhouse auxiliary systems and interconnections.

4. Manifold and Turbine Inlet Pipe.

5. Draft Tube Extension and Steel Supports and Spray Wall Deflector Plate.

6. 48” Diameter Knife Gate Valves 6.9/230kV Generator Step-Up (GSU) Transformer.

7. 230 KV Circuit Switcher.

8. Ultrasonic Flowmeter or other flow monitoring system to be designed by the Contractor and approved by the Owner.

9. External piping, except as otherwise specified.

10. External electrical connections are throughout, and all alarms, signals, and electrical devices except those specified to be owner-furnished.

11. 230kV substation modifications as shown on the Drawings.

12. Balance of Plant – Electrical systems.

13. Balance of Plant – Mechanical systems.

14. Other work includes:

    a. Receiving, unloading, and storing Goods at point of delivery.

    b. Furnishing and installing anchor bolts and other similar items.

c. Field installation of equipment.

d. Field painting.

e. Furnishing external power and control wiring and conduit, except as otherwise specified.

f. Field assembly, fitting, welding, shoring, rigging, and erection platforms.

g. Field testing, except as otherwise specified.

h. Field office at the site to be used for all the Work of this Contract including space for Equipment Supplier Field Service Representative during installation supervision and testing.

i. Delivery to Owner's Engineer a major component list for all Goods included in the Work of the Contract.

j. Delivery of Submittals including Drawings, Calculations, Manufacturer's Instructions for erection and installation, Operation and Maintenance Manuals and Record Drawings in accordance with the delivery schedule.

k. Contractor shall prepare design drawings showing detailed arrangements of powerhouse building, mechanical systems piping and equipment with supports, electrical systems cable tray and conduit with supports within the powerhouse structure to be reviewed and approved by the Owner's Engineer.

l. Contractor shall prepare design drawings showing detailed design of the bypass bifurcation piping arranged with knife gate valves and turbine inlet pipe. Contractor shall fully design the system complete with couplings, pipe supports at elbows and pipe bend locations and any locations where external supports are needed according to contractor's design calculations.

1.03 ACCESS TO THE SITE

A. Pine Flat Dam is located on the Kings River in the Central Valley of Fresno County, approximately 31 miles ENE from the City of Fresno, California, off State Highway 180.

1.04 INTENT

A. These Specifications utilize the Construction Specifications Institute (CSI) 16 division format. Sections of Division 1, General Requirements, govern the execution of all Sections of the Specifications.

B. All Services, Equipment, and Work specified herein shall be provided under a single Construction Contract. The Contractor may, subject to the review and approval of the Owner's Engineer, subcontract specific Services, Equipment, and/or Work as required. Any such subcontracted Services, Equipment, and Work must fully conform to and comply with the terms and conditions, responsibilities and obligations, and technical requirements of these Contract Documents. Contractor shall be responsible for all Services, Equipment, and Work described herein, whether self-performed or performed by Subcontractors.

C. Furnish, Install, and Provide.

1. Furnish means to design, detail, fabricate, procure, assemble, test, supply and deliver to project site, ready for installation or use.

2. Install means to provide all services and provide all equipment or work necessary or desirable to place in position for service, complete and ready for intended use, including removal and disposal of features to be demolished and not reused.

3. Provide means to furnish, install, checkout, commission, and test, complete and ready for intended use.

1.05 WORK BY THE OTHERS

A. Work to be provided by others prior to, concurrent with, or after the work of this Contract, and which is excluded from this Contract:

B. Special Services include providing one or more Equipment Supplier's Field Service Representatives to supervise installation, startup, operating and acceptance tests and initial operation of equipment furnished as Goods under the Procurement Contract.

1.06 CONSTRUCTION CONTRACT DOCUMENTS

A. The specification will be available electronically in PDF format.

B. Preliminary conceptual drawings will be made available for information only; the contractor is responsible for the complete design according to this specification to be submitted for approval to the Owner's Engineer.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

PART 4 - MEASUREMENT AND PAYMENT (NOT USED)

END OF SECTION

SECTION 01019
MOBILIZATION & DEMOBILIZATION

PART 1 - General

1.01 MOBILIZATION

This Section covers the mobilization of personnel, equipment, materials, and supplies and their transport to the job site. Also included is setting up the Contractor's complete construction plant, field office, and other construction facilities, as required for the Contractor's operation, all in adequate time for satisfactory performance of all Work under the Contract.

1.02 DEMOBILIZATION

Demobilization shall include the removal of all construction plant, equipment and accessories, materials, supplies, appurtenances, construction debris and the like from the job site upon completion of the Work.

1.03 PERMITS

The Contractor shall obtain, and pay for, all required permits, and comply with applicable laws and regulations regarding mobilization, transport of equipment, personnel and supplies, and the construction and maintenance of temporary facilities including but not limited to structures, storage sites, laydown areas, and construction utilities.

PART 2 - PRODUCTS

Not applicable.

PART 3 - Execution

Not applicable.

PART 4 - Measurement and Payment

4.01 MEASUREMENT

No measurement for Work of this Section will be made.

4.02 PAYMENT

A. Payment for Mobilization and Demobilization Work of this Section will be made at the lump sum price for Mobilization and Demobilization in the Bid Schedule, which shall not exceed 10 percent of the Bid Subtotal. Payment will be made in three equal installments, equal to 30% of the amount bid, one with each of the first three progress payments. Payment for Demobilization will be equal to 10% of the amount bid. Payment for Demobilization will be made proportional to the amount of Contractor Use areas that have been cleaned and restored and returned to the District.

END OF SECTION

SECTION 01060
CODES, STANDARDS AND SPECIFICATIONS

PART 1 - GENERAL

1.01 GENERAL

A. The standards under which the Work is to be performed or tested are specified throughout the Contract Documents. Where such standards are specified, it shall be understood that the latest revision or edition at the time of submission of bids shall apply. Other standards may be substituted for those specified, provided prior approval is obtained from the Owner's Engineer. If the Contractor desires to deviate from the specified or approved standards, a statement of the exact nature of the proposed deviation shall be submitted for approval.

B. In referring to standards, the following abbreviations have been used:

Name	Abbreviation
American Association of State Highway & Transportation Officials 444 North Capitol Washington, DC 20001	AASHTO
American Concrete Institute Box 19150, Redford Station Detroit, MI 48219	ACI
American Institute of Steel Construction 1221 Avenue of the Americas New York, NY 10020	AISC
American Institute of Timber Construction 333 W Hampden Avenue Englewood, CO 80110	AITC
American Iron and Steel Institute 1000 - 16th Street NW Washington, D.C. 20036	AISI
American National Standards Institute 1430 Broadway New York, NY 10018	ANSI
American Petroleum Institute 2100 "L" Street NW Washington, D.C. 20037	API
American Plywood Association P.O. Box 11700 Tacoma, WA 98411	APA

American Public Works Association	APWA
American Society for Testing and Materials 1916 Race Street Philadelphia, PA 19103	ASTM
American Society of Civil Engineers 345 East 47th Street New York, NY 10017	ASCE
American Society of Heating, Refrigerating, and Air Conditioning Engineers	ASHRAE
American Society of Mechanical Engineers 345 East 47th Street New York, NY 10017	ASME
American Water Works Association 6666 West Quincy Avenue Denver, CO 80235	AWWA
Architectural Woodwork Institute	AWI
American Welding Society 2501 NW 7th Street Miami, FL 33125	AWS
American Wood Preservers Bureau	AWPB
Associated General Contractors of America 1957 East Street NW Washington, D.C. 20006	AGC
Concrete Plant Manufacturers Bureau 900 Spring Street Silver Springs, MD	CPMB
Concrete Reinforcing Steel Institute 933 Plum Grove Road Schaumburg, IL 60195	CRSI
Federal Highway Administration 1200 New Jersey Avenue, SE Washington, DC,20590	FHWA
Federal Specification Board c/o Superintendent of Documents U.S. Government Printing Office Washington, D.C. 20402	U.S. Fed. Spec. Mil. Spec.
Institute of Electrical and Electronics Engineers, Inc. 445 Hoes Lane,	IEEE

P.O. Box 1331
Piscataway, NJ 08855-1331

Insulated Power Cable Engineers' Association 192 Washington Street Bellmount, MA 02178	ICEA
International Electro Technical Commission 1, Rue De Varemb, Geneve, Switzerland	IEC
Joint Industrial Council	JIC
Manufacturer's Standards Society	MSS
National Bureau of Standards c/o Superintendent of Documents U.S. Government Printing Office Washington, D.C. 20402	NBS
National Association of Corrosion Engineers P.O. Box 1499 Houston, TX 77001	NACE
National Electrical Code	NEC
National Electrical Manufacturers Association 2101 L Street NW Washington, D.C. 20037	NEMA
National Fire Code	NFC
National Fire Protection Association Batterymarch Park Quincy, MA 02269	NFPA
National Forest Products Association 1619 Massachusetts Avenue NW Washington, D.C. 20036	NFPA
Occupational Safety and Health Administration US Department of Labor Governmental Printing Office Washington, D.C. 20402	OSHA
Society of Automotive Engineers 485 Lexington Avenue New York, NY 10017	SAE

Steel Structures Painting Council 4400 Fifth Avenue Pittsburgh, PA 15213	SSPC
Underwriters Laboratories 333 Pfingsten Road Northbrook, IL 60062	UL
Uniform Building Code	UBC
Uniform Mechanical Code	UMC
Uniform Plumbing Code	UPC
Western Wood Products Association 1500 Yeon Bldg. Portland, OR 97204	WWPA

C. Additional abbreviations will be defined as they appear in the specifications.

PART 2 - PRODUCTS

Not applicable.

PART 3 - EXECUTION

Not applicable.

END OF SECTION

SECTION 01150
MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.01 1.01 MEASUREMENT OF QUANTITIES

A. Estimated Quantities: The quantities for which unit prices are set forth in the Bid Schedule are understood to be approximations, the amount of Work to be paid for shall be based upon the actual quantities performed.

B. Increased or Decreased Quantities: Payment to the Contractor will be made only for the actual quantities of work performed and accepted in conformance with the Contract. When the accepted quantities of work vary from the original bid estimated quantities, payment will be made at the unit prices set forth in the Bid Schedule unless the total quantity of any contract item, using the original bid estimated quantity, increases, or decreases by more than 25 percent. In that case that part of the increase or decrease exceeding 25 percent will be adjusted as follows:

1. Increased Quantities: Either the Owner or the Contractor will be entitled to an equitable adjustment for that portion of the actual quantity in excess of 125 percent of the original bid quantity except as limited in subparagraph 3 in this paragraph below.

2. Decreased Quantities: Either the Owner or the Contractor will be entitled an equitable adjustment if the actual quantity of work performed is less than 75 percent of the original bid quantity except as limited in subparagraph 3 in this paragraph below.

3. Adjustment Limits: The equitable adjustment for increased or decreased quantities will be determined in accordance with Paragraph 7, Changes in the Work, of the General Conditions, except as limited by the following provisions:

   a. No payment for loss of anticipated profits will be allowed because of any decrease from the estimated quantities show in the Proposal form, these specifications.

   b. The total payment for the item will be limited to not more than 75 percent of the amount originally bid.

   c. No payment will be made for extended or unabsorbed home office overhead and field overhead expenses to the extent that there is an unbalanced allocation of such expenses among the contract bid items.

   d. No payment for consequential damages will be allowed because of any variance in quantities from those originally shown in the Proposal, these specifications.

   e. No adjustment in the unit prices set forth in the Bid Schedule will be made for any item unless the increase or decrease in quantity results in a change of $10,000 or more as measured by the original bid estimated quantities and unit prices for the item.

4. When ordered by the Owner's Engineer, the Contractor shall proceed with the work pending determination of the cost or time adjustments for the change.

C. Determination of Quantities: Quantities will be determined by the Contractor's Engineer in accordance with the applicable measurement provisions of the contract.

D. Basis of Compensation: Wherever the measurement and payment provisions of the Contract provide that payment for the item(s) listed therein will be made at the Contract unit price or Contract lump sum price therefor, whichever is set forth in the Bid Schedule, such payment shall be full compensation to the Contractor for all Work referred to in such provision, including but not limited to the following: all labor, supervision, tools, materials and equipment; the performance of all operations; all other direct expenses and items of overhead; general and administrative expense; and profit, for the applicable Contract item.

PART 2 - PRODUCTS

Not applicable.

PART 3 - EXECUTION

Not applicable.

END OF SECTION

SECTION 01200
PROJECT MEETINGS

PART 1 - General

1.01 PROJECT KICKOFF MEETING

A. Within 21 days after EPC Contractor (contractor) receives Notice to Proceed, a kickoff meeting will be held at the location, date and time to be designated by the Owner. Equipment Supplier representatives will also attend.

1.02 PROJECT DESIGN REVIEW MEETINGS

A. During the execution and through the completion of the construction by the Contractor, there will be monthly design review meetings. At a minimum, these meetings will be attended by the Contractor, the equipment supplier, the Owner, and the Owner's Engineer.

1.03 PRECONSTRUCTION CONFERENCE

A. Within 28 days before the Contractor's scheduled date for start of construction, a preconstruction conference will be held at the location, date and time to be designated by the Owner. Contractor and his major subcontractors shall attend. The Equipment Supplier will be required to attend the Preconstruction Conference.

B. Agenda: The matters to be discussed at the preconstruction conference include:

1. Owner-furnished equipment supplied under the Water to Wire Equipment Procurement Contract
2. Construction schedule and progress reports to be submitted by Contractor.
3. Communication and general correspondence procedures between the parties.
4. The names and titles of all persons authorized by the Contractor to represent and execute documents for him with samples of all authorized signatures.
5. The names, addresses and telephone numbers of all those authorized by the Contractor to act for him in emergencies.
6. Access and rights-of-way furnished by the Owner.
7. Procedures for Contractor's submittals.
8. Construction equipment and methods proposed by the Contractor. The Contractor shall submit a list of equipment to be used in the Work.
9. Other administrative and general matters as needed.
10. Traffic movements on existing roads and parking areas for public and Contractor.
11. Survey layout.
12. Emergency telephone numbers for doctors, hospital, ambulance service, etc.
13. Site and construction plant layout. Location of field office.
14. Temporary power and phone system.
15. Subcontractors.
16. Safety regulations as required
17. Progress payments, estimates and submittals for payment.

PART 2 - PART 2 - PRODUCTS

Not applicable.

PART 3 - EXECUTION

Not applicable.

END OF SECTION

SECTION 01310

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 Owner's Project 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.

It shall be noted that this section discussed the RFI procedures during the active contract duration. The RFI process during the bidding stage is explained in section 00100 INSTRUCTION TO BIDDERS.

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. Submittal requests

The Contractor shall submit all requests for clarification and/or additional information in writing through the Owner's Project Manager to the Owner's Engineer using the request for information (RFI) form. 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 each RFI electronically. Each RFI shall be dated and bear a signed certification that Contractor has performed the review defined above. No consideration for review by Owner's Project 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 Owner's 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 Owner's Project Manager will assign blocks of numbers for the Contractor, Owner's 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 Owner's Project Manager clarifying original RFI. Additionally, Owner's Project 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 Owner's Project 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 Owner's Project Manager shall notify the Contractor in writing as to when a decision will be provided.

Owner's Engineer's review will be only to provide clarification and interpretation of the Contract Documents. Owner's Engineer's review shall not relieve Contractor for the responsibility for compliance with the Contract Documents.

Owner's 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 Owner's 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**.** 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 Owner's Project 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 Owner's Project Manager considers it justified, the instructions of the Owner's 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 Owner's Project 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 Owner's Project 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 Owner's Project Manager or Owner's 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 Owner's Project Manager's and Owner's 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 Owner's 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 Owner's Engineer has given written approval of each such variation by specific written notation thereof incorporated in the RFI review; nor will any review by Owner's Engineer relieve Contractor from responsibility for compliance with the requirements for careful review above.

****END OF SECTION****

SECTION 01300
SUBMITTALS

PART 1 - GENERAL

1.01 SCOPE

A. This section describes the requirements for and procedures to be followed in submitting samples, drawings, documents and other information and materials in connection with the performance of the Contract.

B. Related Work in Other Sections:

1. Section 01310 - Project Schedule and Coordination of Contract.
2. Section 01720 - Project Record Documents.

1.02 SUBMITTAL SCHEDULE

A. The Contractor shall, within 14 days after receiving the Notice to Proceed, prepare and submit for review the project schedule, required by Section 01310 – Project Schedule and Coordination of Contract, and a detailed list of all the submittals which Contractor proposes to make to meet the requirements stated herein and those cited in other sections of the Specifications, including the dates on which Contractor intends to make such submittals. The submittal list shall include design criteria, design and shop drawings, design calculations, and all other submittals, as required by Section 01310 – Project Schedule and Coordination of Contract, and a detailed list of all the submittals that he proposes to make to meet the requirements stated herein and those cited in other sections of the Specifications, together with the dates on which he proposes to make such submittals. The list shall include Design drawings and calculations, Design Criteria reports, Shop Drawings, Manuals, Project Record Documents, and all other items for which a submittal is required. The list shall include identifying references for each item to relate it to the specific section of the Specifications.

B. The Design Criteria shall be submitted to the Owner and Owner's Engineer for review and approval prior to detailed design.

C. It is imperative that the drawings be furnished within the time required herein, in order that the engineering, procurement and construction of related facilities may be progressed on schedule.

D. After the submittal schedule is reviewed by the Owner's Engineer, it shall become the basis for the submittal of all items by the Contractor.

1.03 SUBMITTAL REQUIREMENTS

A. General: The Contractor shall furnish for review its submittals as outlined herein. The sequence of submission shall be such that information is available for review of each submittal when it is received. Drawings and schematics shall not be of typical equipment but shall accurately represent the proposed equipment. All submittals furnished formally shall bear an approval stamp or a certification. The stamp or certification shall be signed by an authorized representative of the Contractor. The

Contractor's stamp or certification on any submittals shall constitute a representation to the Owner and the Owner's Engineer that the Contractor has either determined and verified all quantities, dimensions, field construction criteria, materials, catalog numbers, and similar data, or that he/she assumes full responsibility for doing so, and that he/she has reviewed or coordinated each submittal with the requirements of the Contract Documents. Before submitting any drawings for review, the Contractor shall obtain approval of the list of drawings and calculations he proposes to submit, showing sequence of submittal and submittal dates. All drawings and calculations shall be submitted in accordance with the approved schedule specified in Paragraph 1.02, Submittal Schedule.

B. The drawings shall fully demonstrate that the equipment to be furnished will comply with the provisions of these Contract Documents and shall furnish a true and complete record of the facilities and equipment as manufactured, constructed, and delivered. Additional drawings, instructions, or information which may be requested by the Owner's Engineer for erection, operation, and maintenance of the equipment or to determine compliance with the Agreement shall likewise be submitted for review. Review of the Contractor's drawings by the Owner's Engineer or their designated representative shall not relieve the Contractor of the responsibility to meet all of the requirements of these Contract Documents and correct detail and fit of parts when installed, or of the responsibility for the correctness of the drawings furnished by the Equipment Supplier. The Contractor shall have no claim for additional costs or extension of time on account of delays due to revisions of the drawings which may be found necessary to comply with the Contract Documents. In case of later discovery of errors, omissions, or inconsistencies in the Contractor's drawings, the Contractor shall promptly make any necessary corrections and submit revised transparencies and copies to the Owner's Engineer for re-review.

C. All submittals shall be in PDF format and compatible with Adobe Acrobat formatting. Drawing and Document numbering shall be as per Owner's standard. The numbering and filename convention will be provided to the Equipment Supplier after the project kick-off meeting. An AutoCAD title block template will also be provided by the Owner that must be used for creating all the project drawings. Drawings shall be in AutoCAD version (2020 or later).

D. All drawings submitted shall, insofar as practicable, be of one standard size, measuring approximately 22 x 34 inches. The Contractor's drawings shall have a blank area of 4 x 4 inches adjacent to the drawing title block for the review stamp of the Owner's Engineer. The Contractor shall verify by inspection of sample reproductions that good legible reproductions can be obtained from the reproducible before submittal. Optionally, the Owner's Engineer will allow electronic submittals to be made in pdf-file format. Electronic review and edits to the submittals would then be made and the submittal returned to the Contractor. Record copies of all approved, final submittals will be hard copies, plus electronic files in both PDF and original file format.

E. All submittals shall be addressed to the Owner's Engineer (two copies plus one reproducible).

F. Each submittal shall be accompanied by a transmittal letter, which describes the items submitted. The transmittal letter shall be clearly labeled Pine Flat Unit-4 Project, EPC Project and shall have a serial number. The first submittal shall have serial number 001, and subsequent submittals shall be consecutively numbered. Resubmittals of previously submitted information shall bear the same serial number as the initial

submittal with a sequential alpha character as a suffix. For example, the second resubmittal of the submittal 001 shall be 001-A and the second resubmittal shall be 001-B, and so on.

1.04 REVIEW OF DRAWINGS AND DOCUMENTS

A. The review prints shall be complete with title, drawing number, and date.

B. The Owner's Engineer's review procedures shall apply to each revision of each submittal transmitted to the Owner's Engineer. Within 30 calendar days after receipt of submittals for review, or as required to complete the review, one print of each will be returned to the Contractor designated "no exception noted", "Corrections needed", "rejected", or "not required".

C. If a Submittal is designated "no exceptions noted", the Contractor may proceed with the work in accordance with the submittal. If the Owner's Engineer does not respond within 30 calendar days, the Contractor may consider the submittals designated as "no exception noted".

D. If a Submittal is designated "corrections needed", the Contractor may proceed with the work covered by the submittal and the corrections needed. However, the Contractor shall resubmit the revised submittal in accordance with the corrections needed to the Owner's Engineer within 14 calendar days after Contractor's receipt of that submittal.

E. If a Submittal is designated "rejected", the Contractor shall revise the submittal to comply with the requirements of the Contract Documents and shall resubmit a full-size revised transparency and 4 prints for review within 10 calendar days after the Contractor receives the submittals which have been rejected from the Owner's Engineer. The Contractor shall not proceed with the work until a submittal is designated either "no exceptions noted" or "corrections needed."

F. Every revision shall be shown by number, date and subject in a revision block, and in addition, each revised submittal shall have its latest revision clearly indicated by clouding around the revised areas on the submittal. Submittals submitted without these indications will be considered nonconforming.

G. If a submittal is designated "not required", it is not required under the Agreement.

H. Revised submittals shall be submitted in the same size as the original submittal.

I. If the submittals contain information which does not pertain to the Agreement, the Contractor shall either delete the information which is not applicable or plainly identify the pertinent information.

J. No revision in any way shall be made after a submittal has been marked "no exceptions noted" without resubmitting the submittal for review.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

3.01 REVIEW DRAWINGS

A. General: The Review prints shall be completed with title and drawing number, and shall be dated.

3.02 FINAL DRAWINGS

A. Signature of the Contractor

1. The Contractor shall complete and sign the transparencies of the drawings after the review, with no corrections needed, or after the revised drawings, with corrections made or resolved after review.
2. The final drawings shall be marked in the revision block with the words "Final".(Note: if Contractor does any site work, then Contractor will have to maintain running as-built markups on-site, and provide final as-built revisions of drawings.)

3.03 SIGNATURE OF REGISTERED ENGINEERS

A. All original construction and installation, equipment mounting and support, and seismic drawings shall be signed and sealed by an applicable professional Civil, Electrical, Mechanical, or Structural Engineer registered in the state of California.

3.04 SIGNED DRAWINGS

A. After drawings are signed and dated, the Contractor shall provide the Owner pdf and original format copies by uploading them to SharePoint drive. The original design drawings shall be in AutoCAD format (2020 version or later) while all other documents shall be in MS Word, MS Excel, MS Project and other Microsoft applications, as applicable. Original calculations done in ETAP, EasyPower, MathCAD, etc shall also be submitted in their original format along with their associated database files.

B. DRAWING REVISIONS

C. The Contractor shall make revisions needed to correct the drawings for all errors or omissions which may be found by the Owner's Engineer. A brief description of all such revisions shall be made by the Contractor in the revision block area of the drawings. The review and signatures of revisions shall be handled the same as for the original drawing, except that signatures shall be by initials only. Revisions shall be raised numerically with each successive revision.

END OF SECTION

SECTION 01310
PROJECT SCHEDULE AND COORDINATION OF CONTRACTS

PART 1 - GENERAL

1.01 DESCRIPTION

Scope: This section covers restrictions to Project construction, submittals of Project Schedule, coordination of work of others and required completion dates.

1.02 PROJECT SCHEDULE RESTRICTIONS

In December, 2021, the owner, Kings River Conservation District (KRCD) applied for an amendment to existing FERC license for Pine Flat Hydroelectric Powerplant to accommodate the addition of a 6.3MW small hydro unit (Unit-4). As of the release of this specification, KRCD has cleared all the hurdles in the process and completed all the required studies, investigation and public hearing process. FERC approved the license amendment on May 3, 2023, with requirements that the construction of the new unit and associated structures shall start within two years and that the unit should go into commercial operation within four years from the date of license amendment approval.

A. Commencement of Powerhouse Construction shall not begin prior to obtaining all applicable permits, and regulatory authorization.

1.03 PROJECT SCHEDULE

Within 20 days after issuance of the Notice to Proceed, the Contractor shall submit for review by the Owner's Engineer a combined design, fabrication and delivery schedule, including design, shop drawing development, material procurement, fabrication and machining, shop assembly, testing, shipping and delivery. Every month thereafter the Contractor shall revise the schedule and shall resubmit it to the Owner's Engineer for review. The latest revised schedule shall be submitted for discussion at the periodic meetings.

The schedule shall be a time-scaled network diagram prepared using the critical path method and shall clearly show each unit of Work to be performed under the Contract, and all items involved in the overall sequencing of the Work.

The schedule shall be prepared and maintained using MS-Project scheduling software.

The project schedule shall be arranged with notations to show how the sequence of Work is affected by the submittal review of seasonal weather variations, purchase of materials, fabrication time, seasonal weather variations, and any other items deemed appropriate.

1.04 COORDINATION OF CONTRACTS

A. The work shall be coordinated with the following contracts, and any additional contracts which may be let:

1. A separate contract for supply of major equipment, including turbine, generator, switchgear and controls will be entered in to. Construction of the powerhouse will

commence before equipment manufacture is complete and will require delivery of embedded parts before remaining equipment.

B. Contractor shall cooperate with other contractors and shall not hinder, delay or prevent other contractors from performing work. Portions of the use areas shown on the Drawings may be required for use by other Contractors or the Owner.

1.05 REQUIRED COMPLETION DATES

A. The work is divided into specific milestones. The minimum requirements for completion of each milestone are defined below.

1. Issue Desing Criteria and Requirements
2. Issue for Construction Desing documentation
3. Demolition and Site prep complete.
4. Bypass modifications.
5. Relocation of existing equipment.
6. Powerhouse construction/installation of Owner-furnished equipment.
7. Complete the drafttube and discharge pipe.
8. Startup testing/commissioning/ release for operations.
9. Prepare As-Built/Record Drawings and O&M Manuals.

B. Liquidated Damages:

In case of failure on the part of the Contractor to meet the required Milestone 2, Milestone 3, and Milestone 4, dates to be specified, or any extensions thereof, the Contractor shall pay to the Owner fixed and agreed to liquidated damages as specified in the Agreement.

PART 2 - PART 2 - PRODUCTS

Not applicable.

PART 3 - PART 3 - EXECUTION

Not applicable.

END OF SECTION

SECTION 01320
PROGRESS REPORTS

PART 1 - GENERAL

1.01 DESCRIPTION

A monthly progress report shall be submitted to the Owner's Engineer in a form approved by the Owner's Engineer. The progress report shall be submitted by the Contractor together with his Application for Payment, in accordance with Section 00700, 8 - Payment. The monthly progress report shall include:

A. Progress of Work: Provide a brief narrative description of design, procurement, and fabrication activities and related events during the report period. Report major items of work which reflect overall progress, rather than detailed statistical information.

B. Status of Construction: Furnish construction schedules and progress charts monthly. Describe the status of progress weekly and monthly, as related to the original schedule. Provide an appraisal as to whether work is proceeding at such a rate as to enable completion within the specified contract time. If not, include plans to regain lost time.

C. Contract Status: Identify principal subcontractors engaged on the work. Describe any special expertise or equipment possessed by subcontractors. Show changes monthly.

D. Critical Events and Dates: Report important items and events such as delivery of major equipment, in-progress inspection activities, start and completion of construction, and testing activities

END OF SECTION

SECTION 01400
QUALITY ASSURANCE

PART 1 - GENERAL

1.01 DESCRIPTION

In addition to the provisions in the Conditions of Contract, the following shall apply. In general, the Contractor shall provide material certifications for material and equipment furnished under this contract only.

Relationship of On-Site and Off-Site Testing: Contractor shall conduct tests and provide test results or reports on testing as described in the Specifications. These tests may be conducted both on-site or off-site, as is applicable to the particular situation.

1.02 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

A. Submittals: Section 01300. Where testing is performed for the Contractor by an independent laboratory, each laboratory test or inspection report shall be signed and certified by the supervising engineer of the testing laboratory. Unless otherwise specified, three copies of each report shall be submitted to the Owner's Engineer.

PART 2 - PRODUCTS

Any materials, supplies or articles required in the Work which are not covered by detailed specifications herein shall be standard products of reputable manufacturers and suitable for the intended use. Unless so directed, tests of these items will not be required but such items will be subject to the acceptance of the Owner's Engineer. Tests, if directed, shall be in conformity with approved modern methods for the particular item and class of work.

All parts shall be made to standard gauge where possible, and like parts shall be interchangeable.

2.01 GENERAL

Whenever in these Specifications references are made to published standards or requirements, it shall be understood that the latest standards or requirements of the respective issuing agencies which have been published as of the date proposals are invited for the Work shall apply, unless otherwise specified herein, except to the extent that said standards or requirements may be in conflict with applicable laws, ordinances or governing codes. No requirement set forth in these Specifications or shown on the Drawings shall be waived because of any provision of, or omission from said standards or requirements.

2.02 ALTERNATIVE STANDARDS

The Contractor may request that, for articles manufactured outside the United States, alternative technical standards in force in the country of origin shall apply. Such request will be considered by the Owner's Engineer upon receipt of written application by the Contractor, including the following information:

A. The part or parts of the Work affected.

B. The reason for the requested change.

C. Complete details of the alternative standard proposed, expressed in the English language and U.S. customary units of measurement.

D. Information demonstrating the material or equipment conforming to the proposed alternative standard will be equal or superior in quality, durability and suitability for the intended use to that conforming with the reference standard cited in the Specifications.

2.03 MANUFACTURER REQUIREMENTS

All manufacturers who furnish materials or equipment for the Work shall comply with the following requirements. The Contractor shall, before placing orders for or undertaking manufacture of items of the Work, submit information to the Owner's Engineer demonstrating that the requirements are met:

A. Each manufacturer shall be experienced in the manufacture of the class, size and rating of the various components specified herein. Previous manufacturing experience and present manufacturing facilities will be considered, together with information as to the type, size, location and service experience recorded of similar equipment previously furnished, in determining whether the manufacturer is qualified to perform the Work.

B. Each manufacturer shall have the necessary capital and experience, and own, control by firm option, or be able to procure the necessary plant to commence the Work promptly upon award, and thereafter prosecute and complete the Work within the time specified and not be already obligated for the performance of other Work which would delay the commencement, prosecution and completion of the Work contemplated herein.

C. Each manufacturer shall have available and maintain within the contiguous United States an adequate supply of spare parts and an organization capable of promptly making necessary replacements or repairs to or alterations of the equipment he proposes to furnish.

PART 3 - EXECUTION

3.01 QUALITY CONTROL SYSTEM

A. The Contractor shall provide a quality control organization and system to perform inspections, tests and retesting in the event of failure of all items of Work, including that of his subcontractors, to assure compliance with the Contract provisions.

B. Prior to the start of manufacture, the Contractor shall submit to the Owner's Engineer a plan detailing the organization, procedures and reports to be used to assure compliance of the Work with the requirements of the Contract.

C. All submittals, working drawings, catalog cuts, samples, etc., unless otherwise specifically noted, shall be approved and certified by the Contractor as conforming to the Contract Documents. Test results provided shall cite the Contract requirements, the test or analysis procedures used, and the actual test results, and include a statement that the item tested or analyzed conforms or fails to conform to the Specification requirements.

D. Throughout the period of the Contract, the Contractor shall make available all reports, test results and other documentation of the quality control organization relating to the Work, for inspection by the Owner's Engineer.

3.02 INSPECTION AND TESTS

Unless waived in writing, all tests and trials conducted relating to the turbine, generator, turbine shutoff valve, governor and hydraulic power unit (HPU), switchgear and controls, piping and all other equipment to be furnished under this contract shall be made in the presence of an inspector and a copy of all test reports showing the results thereof shall be furnished to the Owner's Engineer. All other test results shall be made available for inspection by the Owner's Engineer at the Contractor's facility.

END OF SECTION

SECTION 01500
CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 - GENERAL

1.01 DESCRIPTION

This Section covers the following:

A. Construction facilities.

B. Construction aids and safety precautions.

C. Special controls.

D. Sanitary facilities and domestic water supply.

E. Traffic control at site.

F. Telephone services and communications systems.

G. Field office and parking areas.

H. Temporary buildings.

I. Temporary power supplies.

J. Use of project site.

PART 2 - PRODUCTS

2.01 FIELD OFFICE

A. The Contractor shall provide at the site, in the designated or approved area, a field office and parking area for the joint use of the Contractor and Owner to conduct in-person business related to project construction.

B. The Contractor shall also maintain restroom facilities for construction personnel for the entire duration of the project.

C. Electrical hookup is covered in paragraph 3.09 A.

PART 3 - EXECUTION

3.01 CONSTRUCTION FACILITIES

A. Temporary Facilities Supplied by Contractor: Contractor shall supply temporary services and facilities required in the execution of the Work, such as electrical power and distribution, compressed air, fuel, telephones, temporary lighting, change house, potable water, sanitary facilities, field office, warehouses, and other facilities required by him. See paragraph 3.06 and 3.09 for facilities provided by the Owner.

B. Location: Contractor's field office, temporary facilities and laydown areas shall be located in the areas shown on the Drawings.

3.02 CONSTRUCTION AIDS AND SAFETY PRECAUTIONS

A. The Contractor shall comply with applicable laws, ordinances, rules, regulations and orders pertaining to personnel, construction machinery and equipment, hoists, cranes, scaffolding, staging, materials handling facilities, tools, appliances and other construction aids. The Contractor shall provide first aid facilities where required.

B. The Contractor shall provide barriers and shall post "No Trespassing" and other construction safety signs as necessary to protect the public.

3.03 SPECIAL CONTROLS

A. Water Control: The Contractor shall perform grading and other operations to maintain site drainage. Surface water shall not be allowed to accumulate in excavations. The Contractor shall dispose of surface and subsurface water in accordance with the Plan for Control of Erosion and Sediment, Waste, Spoil, and Hazardous Materials, according to local, state and federal laws and regulations.

B. Archaeological and Historic Preservation Control: If during the course of construction, the Contractor discovers any archaeological or historic properties, he shall stop all land-disturbing activities in the vicinity of the properties and shall notify the Owner’s Engineer immediately. The Owner’s Engineer will consult with the State Historic Preservation Officer and will obtain permission to proceed. The Contractor will be entitled to time extensions equal to the time the Work is suspended, but will not be entitled to additional compensation.

3.04 SANITARY FACILITIES AND DOMESTIC WATER SUPPLY

A. Toilet and Washing Facilities and Drinking Water: The Contractor shall provide sanitary and drinking water facilities to accommodate his employees and those of the Resident Inspector, Owner and project visitors as may be necessary to comply with the applicable requirements and regulations of the governing authorities and as approved by the Owner’s Engineer.

B. The Contractor shall provide weekly janitor service for the Owner’s Engineer's field office. Service shall include garbage disposal, cleaning of floors, windows, and lavatory facilities, all required general maintenance, and providing of normal consumable supplies such as light bulbs, paper towels, soap, and toilet paper.

3.05 TRAFFIC CONTROL AT SITE

A. The Contractor shall conduct operations to minimize obstruction to dam operations and public traffic. The two-lane road adjacent to the project site is used significantly by recreationalists, particularly during the summer months. The Contractor shall coordinate with KRCD and the County for use and closure of existing roads.

B. Flaggers, warning signs, barricades, standard construction signs and traffic control conforming to the standards established in the latest adopted edition of the "Manual of Uniform Traffic Control Devices" published by U.S. Department of Transportation shall be utilized as necessary to warn and protect the public from injury or property damage as a result of the construction.

C. When it is necessary to have one-way traffic control, two flaggers shall control the traffic at the ends of the public road segment affected by the construction work area and the adjacent public road shall be left in a condition that it can be traveled without danger to users.

3.06 TELEPHONE SERVICES AND COMMUNICATION SYSTEMS

A. The Owner will make available phone service to the Contractor and service for use by the Owner at the existing Powerhouse. Service will consist of eight phone lines, (four for use by the Contractor, four for use by the Owner).

B. This phone facility is the property of the Owner and no guarantee as to the acceptability of its use for all Contractor's purposes is implied. The cost of all long distance charges incurred by the Contractor will be reimbursed to the Owner.

3.07 PARKING AND OFFICE AREAS

A. The Contractor shall confine parking and office buildings to areas designated approved by the Owner’s Engineer.

3.08 TEMPORARY BUILDINGS

A. General: The Contractor may construct or provide necessary temporary buildings or trailers at approved locations within the project area.

B. Camp: Camp for employees at the project will not be allowed.

3.09 TEMPORARY POWER

A. Electric power at the dam is provided by Electric Company. To the extent Electric Company can provide energy at the Site, the Owner will pay for installation of construction drops of the type and at the locations desired by the Contractor. The locations and design will be as agreed upon by the parties at the Pre-construction conference. See Section 01200. Modifications to the plan subsequent to this meeting will be at the Contractor's expense. Contractor is to provide all hookup to both the Contractors and the Owner's facilities beyond the standard construction power drops. The Contractor will pay all costs of power and demand charges, as applicable, to Electric Company, including cost of power for the Owner's office facility.

B. Relocation of Electric Company facilities:

1. Permanent and temporary relocation of Electric Company facilities required for the construction of project will be paid for by the Owner. The Owner will pay PG&E for the cost of temporary relocation of Electric Company facilities as required for the permanent construction, limited to one relocation of a power line. The Contractor is to carefully coordinate the relocation work with the Owner and Electric Company.

3.10 USE OF PROJECT SITE

A. Contractor will not have exclusive or unrestricted use of the project site for storage and his operations.

B. Contractor shall recognize and take into account in his planning and execution of his work that the work of other contractors, the dam operator, and the Owner will require that they have reasonable access to and use of certain areas or spaces during certain periods.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

A. No separate measurement for the work of this Section will be made.

4.02 PAYMENT

A. Payment for work required under this Section will be a part of the lump sum price in the Bid for the Bid Item covered under Section 01019 Mobilization and Demobilization.

END OF SECTION

SECTION 01640
OWNER FURNISHED EQUIPMENT

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section covers the following:

1. Receiving and off-loading of all Owner-furnished equipment.
2. Installation of all Owner Furnished Equipment.
3. Interfacing Owner Furnished Equipment (OFE) with the equipment supplied under this contract.
4. Testing and commissioning of Turbine-Generator and auxiliaries furnished by W2W (Water to Wire) supplier.

B. The following owner-furnished equipment is provided by another contract and includes, but is not limited to, the following major items, their incidental parts and metal fabrications:

1. One horizontal Francis turbine.
2. One horizontal synchronous generator. Including static excitation
3. Turbine shutoff valve.
4. Metalclad switchgear
5. Turbine Generator control switchboard.
6. Governor and Hydraulic Power Unit and auxiliaries.
7. Piping and appurtenances.
8. Generator terminal cabinet.
9. Generator neutral cabinet.
10. ISO Metering Cabinet

C. A detailed list of Owner furnished equipment through sperate contract(s) is provided on drawing PF4-PLT-LYT-1006 Sheet-6, The following materials and equipment shall be furnished by the Contractor for installation:

1. Turbine pipe and appurtenances.
2. Ultrasonic flowmeter (or a different type that is suitable for the application).

1.02 MANUFACTURERS' RECOMMENDATIONS

Except as otherwise approved in writing by the Owner’s Engineer, handle, store, install and test all equipment in accordance with the manufacturers' recommendations and with the consent of the manufacturers' on-site installation/start-up Owner’s Engineers hired by the Owner. The Owner’s Engineer will provide this information to the Contractor when available. Contractor shall be responsible to determine any additional handling and storage requirements.

1.03 PACKAGING

A. Maintain packaged materials with seals unbroken and labels intact and legible.

B. Promptly notify the Owner's Engineer of any apparent shipping damage or damage incurred during handling.

C. In case of visible damage at the time of delivery, such condition to be noted on the delivery ticket and the delivering driver is to sign this notation.

1.04 SUBMITTALS

The Contractor shall submit plans for material and equipment storage. It is anticipated that an on-site warehouse facility will be required. The Contractor is to determine the size, construction, and other aspects of the storage facility to adequately protect the equipment, both Owner and Contractor furnished.

PART 2 - PRODUCTS

Not applicable.

PART 3 - EXECUTION

3.01 INTERFACING WITH OFE EQUIPMENT

A. The Contractor shall provide W2W supplier information related to equipment supplied under this contract, for W2W supplier to develop complete and integrated interface drawings for Contractor installation.

B. The Contractor shall interface (wire) owner furnished equipment with equipment supplied under this contract for signals related to protection, control, metering, monitoring, and metering.

3.02 TESTING AND COMMISSIONING

A. The Contractor shall provide all required labor during equipment testing and commissioning as directed by the W2W supplier.

3.03 DELIVERY AND OFF-LOADING

A. Owner-furnished equipment will be delivered to the site by the Suppliers. The Contractor shall coordinate with shipper the time and place of delivery and equipment needed for off-loading.

B. Before unloading, the Contractor shall accompany the Owner's Engineer on the inspection of the deliveries to verify completeness and condition of parts. If the Contractor discovers any defect in material or equipment, he shall notify the Owner's Engineer at that time. Such material and equipment after receipt at the point of delivery

shall form part of the Work for all purposes of the contract as if it had been supplied by the Contractor himself.

C. Off-load all Owner-furnished equipment with appropriate handling equipment in approved storage areas. All lifting equipment shall be operated by qualified personnel.

3.04 INVENTORY

Maintain a record of all equipment received, including date received, condition on delivery, carrier who made delivery and location stored.

3.05 STORAGE

A. The Contractor shall make arrangements for the storage of equipment which requires heated space or electric supply for internal space heaters. Exposed machined surfaces shall be covered adequately to protect them from rust and other damage. Storage conditions shall be maintained as recommended by the manufacturer.

B. The schedule of contract work shall be arranged to receive and install the owner furnished equipment when they are delivered by the manufacturer.

C. If necessary, due to conflicts with the construction schedule the Owner will furnish off-site storage for OFE that requires protection. The Contractor shall provide services for shipment and handling between the project site and the storage facility in the Fresno area as required.

PART 4 - PAYMENT

4.01 MEASUREMENT

A. No separate measurement for the work of this Section will be made.

4.02 PAYMENT

A. Payment for work required under this Section will be the lump sum price in the in the Bid for the following item:

B. Such payment will be considered full compensation for all costs incurred for the performance of the work necessary to complete the requirements of this Section.

Item No.	Item	Description	Unit
01640-1	Install Owner Furnished Equipment	Provide all labor required for installation of owner furnished equipment	LS

Item No.	Item	Description	Unit
01640-2	Contractor QC/Testing/Commissioning	Under the supervision and direction of the manufacturer's engineer provide all labor required for testing and commissioning of Owner Furnished Equipment.	LS

4.03 MOVEMENT AND INITIAL PLACEMENT OF PARTS

The Contractor shall obtain clearance from the Owner's Engineer prior to moving any part which is in storage, either within the storage area or to the assembly area.

END OF SECTION

SECTION 01720
PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.01 DESCRIPTION

A. At the beginning of the Work, the Contractor shall set aside one complete set of prints of the Reference Drawings, Contract Drawings, Supplier's design drawings, and any later supplementary drawings, upon which shall be recorded all deviations in construction and all deviations due to Change Orders. Notations and changes shall be done with a red pen in a neat and legible manner as prescribed by the Owner's Engineer. At any time during normal working hours, the Contractor shall make the Record Drawings available to the Owner's Engineer to examine and verify that they are being kept up to date. Upon completion of the project, the Contractor shall deliver a complete set of Contract Drawings, Supplier's design drawings and supplementary drawings showing and annotating the as-built conditions, and the set of marked-up Reference Drawings showing as-built conditions to the Owner's Engineer and Owner before final payment will be made.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

NOT APPLICABLE

END OF SECTION

SECTION 01730
OPERATING AND MAINTENANCE DATA

PART 1 - GENERAL

1.01 SCOPE OF WORK

The Contractor shall compile and submit operating and maintenance data for all mechanical and electrical equipment provided under the Contract, including parts lists of all components, as well as a recommended spare parts list.

1.02 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

A. Submittals - Section 01300

B. Warranties and Guarantees - Section 01750

1.03 QUALITY ASSURANCE

A. Preparation of data shall be done by personnel who are:

1. Trained and experienced in maintenance and operation of the described products.

2. Completely familiar with requirements of this Section.

3. Skilled as technical writers to the extent required to communicate essential data.

1.04 SUBMITTAL REQUIREMENTS

A. Three copies of sample data format and outline of contents in draft form shall be submitted prior to delivery of the equipment to be installed in the powerhouse.

B. A complete draft of the data with catalogs and drawings shall be submitted electronically in PDF to the Owner's Engineer for review. The draft will be returned with appropriate comments. The Contractor shall resubmit the one draft copy with such corrected and/or additional data sheets and drawings as may be required.

C. Upon final approval of the draft, the Contractor shall prepare five additional copies for a total of six copies and furnish them to the Owner's Engineer. The additional five copies shall be furnished within 30 days.

PART 2 - PRODUCTS

2.01 FORMAT OF MANUALS

A. Two sets of manuals are required. Manuals shall be project specific; generic manual will not be acceptable.

Manuals shall be in English.

B. Data shall be provided in book form, completely assembled and delivered to the Owner's Engineer at one time. All data shall be in one volume, if possible.

C. Provide expandable binders (Vulcan-Burkhard B-453, or approved equal) with project name and volume number engraved on front and spine of binder. Thermofax copies and ring binders are not acceptable.

D. A separate master index shall be provided if more than one volume is required. Reduced size drawings shall be provided folded and bound for easy unfolding without removal from the binding. Each sheet in the binder shall be numbered and an index provided for ready reference to the data.

E. All standard catalog cuts, manufacturer's printed data or descriptive literature, parts sheets, illustrations, etc., shall either be original sheets provided by the manufacturer, or reproduced copies of equal clarity and durability.

F. Folded page size shall be 8-1/2 inches by 11 inches. Paper shall be 20-pound minimum stock.

G. A fly-leaf shall be provided between pages relating to different products or components, with a printed or typed description of the product or component to which the succeeding pages refer.

H. Index tabs shall be provided.

I. A complete copy of all O&M Manuals shall be submitted through the SharePoint site.

2.02 CONTENT OF MANUALS

A. OPERATING AND MAINTENANCE MANUAL: Each set of manuals shall include the following:

1. General titles

2. Project identification.

3. Identification of system or equipment.

4. Table of contents and index.

5. Name, address and telephone numbers of Contractor and of all equipment manufacturers.

6. Name, address and telephone numbers of manufacturers' nearest service representatives.

7. Description of systems and components.

8. Pre-operation checks and inspection lists.

9. Procedures for starting, operating and stopping equipment.

10. Post-operation check or shut-down lists.

11. Special and emergency operating instructions.

12. Accepted test data.

13. Routine maintenance procedures and schedules.

14. Complete disassembly and reassembly instructions, with illustrations.

15. Manufacturers' printed operating and maintenance instructions, and manufacturers' parts lists, parts numbers, illustrations (illustrated breakdowns) and diagrams.

16. One copy of each schematic diagram.

17. One copy of each wiring diagram.

18. One copy of each final assembly drawing.

19. Matchmarking information, and identification of locations where metric bolting warning nameplates are affixed.

20. List of spare parts, and manufacturers recommended quantities.

21. Names, addresses and phone numbers of nearest parts vendors.

22. Copies of warranties issued to, and executed in the name of the Owner, in accordance with Section 01750.

B. PARTS LISTS

1. Parts lists and catalogs shall include the part identification, nomenclature, part numbers, required number of parts and actual spare parts supplied.

2. All data shall match the actual equipment furnished, and standard catalog sheets, cuts and diagrams shall have all irrelevant parts marked out.

3. Parts shall be so identified that they can be readily ordered.

4. Assembled material shall be completely indexed and include identification of spare parts furnished in compliance with requirements of these Specifications.

5. A cross-reference between items described in catalogs and instructions and drawings shall be provided to facilitate location of parts described.

C. OPERATIONS AND MAINTENANCE DATA OF OTHERS

1. The Contractor shall include operations and maintenance information from all sub-suppliers. The turbine, generator and appurtenant equipment manufacturers are responsible for their own operations and maintenance data.

2. Contractor shall integrate O&M data from all equipment suppliers and sub-suppliers into a single comprehensive O&M Manual.

PART 3 - EXECUTION

3.01 INSTRUCTION OF OWNER'S PERSONNEL

A. Prior to final inspection or acceptance, the Contractor’s Representative shall fully instruct the Owner's designated operating and maintenance personnel in the operation, adjustment and maintenance of all products, equipment and systems.

B. The operating and maintenance manuals shall constitute the basis of instruction. The Contractor’s Representative shall review the contents of the manual with the Owner's personnel in full detail to explain all aspects of operation and maintenance.

C. The instruction shall be on-site.

END OF SECTION

SECTION 01750
WARRANTIES AND GUARANTIES

PART 1 - GENERAL

1.01 SCOPE OF WORK

This section covers warranties and guaranties required of the Contractor.

1.02 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

A. General Conditions.

B. Supplementary Conditions.

C. Operating and Maintenance Data - Section 01730.

1.03 MANUFACTURER'S WARRANTIES

All warranties which are available in the normal course of business from manufacturers of equipment or components, such warranties shall be obtained by the Contractor and furnished to the Owner as follows:

1. Assemble warranties from manufacturers and subcontractors.

2. Provide two signed original copies.

3. Provide a Table of Contents, neatly typed, in orderly sequence. Provide the following information for each item:

    a. Product or work item.

    b. Manufacturer, with name of principal, address, and telephone number.

    c. Scope.

    d. Duration of warranty.

    e. Date of beginning of warranty.

    f. Proper procedure in case of failure.

    g. Instances which might affect the validity of warranty.

    h. Include as part of the operation and maintenance data, per Section 01730.

1.04 RIGHT TO OPERATE UNSATISFACTORY EQUIPMENT

A. The Owner shall have the right to operate any and all equipment as soon as, and as long as, it is in operating condition, whether or not such equipment has been accepted as complete and satisfactory, except that this shall not be construed to permit operation of any equipment which may be materially damaged by such operation before any required alterations or repairs have been made.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION

SECTION 02010
TRAFFIC REGULATION AND SITE ACCESS

PART I-GENERAL

1.01 DESCRIPTION

A. This section specifies traffic regulation and site access required for the construction of the Pine Flat Unit-4 Project EPC Package.

B. Related work specified elsewhere:

1. Section 01500: Construction Facilities and Temporary Controls
2. Section 01640: Owner Furnished Equipment

1.02 SYSTEM DESCRIPTION

A. Design Criteria:

1. All traffic control work shall be performed in accordance with Fresno and State Specifications.
2. Traffic control plans shall implement devices conforming to the latest edition of the Federal Highway Administration "California Manual on Uniform Traffic Control Devices for Streets and Highways" FHWA 's MUTCD as amended for use in California.
3. Traffic control plans shall be designed and implemented so as to minimize construction related impacts.

1.03 SUBMITTALS

A. General: Make submittals in accordance with Section 01300.

B. Working Drawings and Methods Statements;

1. Submit a traffic control plan in accordance with the requirements specified in Section 01500: Construction Facilities and Temporary Controls. The Traffic Control Plan shall be submitted to the Owner’s Engineer and the County for approval in advance of the preconstruction meeting.

C. Quality Control:

1. Qualifications:
   a. Prior to the preconstruction meeting, submit the name of the Contractor's designated traffic safety supervisor.
      (1) The safety supervisor shall be available for contact 24-hours per day. A backup shall be designated if the safety supervisor is not available.
      (2) This person's primary responsibility shall be to ensure that traffic control operations and devices comply with the contract specifications and the Contractor's approved traffic control plans.
   b. Submit the names and telephone numbers of the persons responsible for the 24-hour emergency maintenance services.
   c. Submit qualifications of person preparing the traffic control plans.

D. Notifications:

1. Expected starting and completion date of construction operations.

1.04 QUALITY ASSURANCE

A. Reference Standards:

1. Manual on Uniform Traffic Control Devices (MUTCD)

B. Qualifications:

1. Traffic control plans shall be prepared by a person with at least five years experience in developing traffic control plans in the state of California.

PART 2-PRODUCTS

2.01 MATERIALS

A. Construction signing, striping, barricades, and other traffic control devices used for handling traffic and public convenience shall conform to the latest edition of the Federal Highway Administration "California Manual on Uniform Traffic Control Devices for Streets and Highways" FHW A's MUTCD as amended for use in California.

B. Signs shall be reflectorized when they are used during hours of darkness.

C. Provide cones, pylons, barricades, or posts used in the diversion of traffic with flashers or other illumination if in place during hours of darkness.

PART 3 - EXECUTION

3.01 GENERAL

A. Furnish, install, construct, maintain, and remove detours, road closures, signs, barricades, K-rail, fences, gates, flag men radios, flares, miscellaneous traffic devices, drainage facilities, paving, and such other items and services as are necessary to adequately safeguard the public from hazard and inconvenience.

B. During the duration of a detour, cover all signs not in accordance with the traffic control plan. Relocate existing signs to provide visibility from all relocated traffic lanes.

C. All such work shall comply with the ordinances, directives, and regulations of authorities with jurisdiction over the public roads in which the construction takes place and over which detoured traffic is routed by the Contractor.

3.02 CONTROL OF ACCESS

A. The construction access road will be closed to the public throughout the duration of the project.

B. Post signs and barricades at all road closure locations to prevent any public vehicular access during all working and non-working hours for the duration of the work.

C. Control/detour traffic at all locations in conformance with the working drawings approved by the Owner's Engineer.

D. Provide access for the Owner and the Owner's Engineer to all areas of the construction site.

3.03 MAINTENANCE AND REPAIR/RESTORATION

A. After devices have been installed, maintain and keep them in good repair and working order until no longer required.

1. Replace such devices that are lost or damaged, to such an extent as to require replacement, regardless of the cause of such loss or damage.
2. When and where flagmen or radio controllers are an essential part of the traffic control plan (such as during working hours) they shall remain in effect until the plan indicates they are no longer necessary (such as after the construction site has been closed down for the night).

B. Maintain a 24-hour emergency service to remove, install, relocate, and maintain warning devices.

1. Furnish to the authority having jurisdiction names and telephone numbers of three persons responsible for this emergency service.
2. In the event these persons do not promptly respond or the authority having jurisdiction deems it necessary to call out other forces to accomplish emergency service, the Contractor will be held responsible for the cost of such emergency service.

3.04 FIELD QUALITY CONTROL

A. Visually ensure that all traffic control devices are installed in accordance with the approved working drawings.

B. Periodically during construction, verify that all traffic control devices are visible and functional.

END OF SECTION

SECTION 02220
DEMOLITION AND RELOCATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This section covers the requirements for Pine Flat Hydroelectric Unit #4 turbine project demolition work.

B. The Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required for demolitions of existing civil, landscaping, structural, architectural, mechanical, HVAC, electrical, and instrumentation facilities, in accordance with the Contract Documents.

1.02 COORDINATION

A. The Contractor shall carefully coordinate the Work in areas where existing facilities are interconnected with new facilities and where existing facilities remain operational. The Contractor shall be responsible for performing the reconstruction indicated plus that which can be reasonably inferred from the Contract Documents as necessary to complete the Project.

B. The Contractor shall conduct a comprehensive survey at the Site to verify the scope of Work, and the extent of auxiliary utilities.

C. Demolition and relocation activities shall be performed in an efficient manner so as to minimize time and inconvenience to activities being conducted in the vicinity of the demolition.

D. All demolition and relocation activities shall be performed in accordance with the federal, state, and local environmental protection laws and regulations, applicable permits, and this Contract.

E. While demolition and reconstruction are being performed, the Contractor shall provide adequate access for the continued operation and maintenance of powerhouse equipment. The Contractor shall erect and maintain fences, warning signs, barricades, and other devices around the reconstruction as required for the protection of the Contractor's employees and the Owner's personnel at the powerhouse. The Contractor shall remove such protection when reconstruction activities are complete, or as Work progresses, or when requested by the Owner’s Engineer.

F. The Contractor shall be responsible for acquiring appropriate necessary permits for the work. Copies of the permits shall be submitted to the Owner prior to commencement of demolition.

G. The Contractor shall not begin demolition at the project site until authorization is provided by the Owner.

1.03 CONTRACTOR SUBMITTALS

A. A demolition plan shall be submitted to the Owner's Engineer for review. The demolition plan shall detail demolition and reconstruction activities and procedures, including operational sequences, in accordance with Section 01330 - Submittal Procedures. The procedures shall provide for safe conduct of the Work, careful removal and disposition of materials and equipment, protection of existing facilities which are to remain undisturbed, coordination with existing facilities to remain in service, and timely disconnection and reconnection of utility services. The procedures shall include a detailed description and time schedule of the methods and equipment to be used for each operation and the sequence of operation.

B. The demolition plan shall include identification of items to be salvaged or relocated. A storage plan for salvaged items shall be included.

C. The Owner Engineer's review shall be limited to a review of the scope and intent of demolition as required by the contract documents. The Contractor shall be responsible for the means and methods to ensure the work is conducted in a safe and proper manner. The Owner Engineer's review of the demolition plan shall in no way alleviate the Contractor from this responsibility.

D. Protection:

1. Perform all demolition and removal Work to prevent damage or injury to structures, occupants thereof and adjacent features which might result from falling debris or other causes, and so as not to interfere with the use, and free and safe passage to and from adjacent structures.
2. Closing or obstructing of roadways, sidewalks, and passageways adjacent to the Work by the placement or storage of materials will not be permitted, and all operations shall be conducted with a minimum interference to traffic on these ways.
3. Erect and maintain barriers, lights, sidewalk sheds, and other necessary protective devices.
4. Repair damage to facilities to remain, or to any property belonging to the Owner or occupants of the facilities.

E. Scheduling:

1. Carry out operations to avoid interference with Owner's operations and Work in the existing facilities.

F. Notification:

1. At least forty-eight (48) hours prior to the commencement of a demolition or removal activity, notify the Owner's Engineer in writing of the proposed schedule. The Owner will inspect the existing equipment and mark for identification those items which are to remain the property of the Owner. Do not start removals without the permission of the Owner's Engineer.

G. Explosives:

1. Do not bring explosives onto site.
2. The use of explosives will not be permitted.

1.04 DEMOLITION

A. Existing pavement, structures, equipment, piping, valves, ductwork, electrical gear, instrumentation, utilities, and related appurtenances such as anchors, supports, and hardware indicated or required to be demolished as part of the Work shall be removed and disposed of unless otherwise indicated. Removal of buried structures, utilities, and appurtenances includes the related excavation and backfill as required. Removed items shall be disposed of offsite by the Contractor.

1.05 SALVAGE

A. Items of existing equipment, piping, valves, electrical gear, instrumentation, utilities, and appurtenances indicated to be salvaged shall be removed without any degradation in condition from that prior to removal. Salvaged items shall be stockpiled and protected on the Site at a location chosen by the Owner's Engineer. The Contractor shall be responsible for properly safeguarding the salvaged items against damage and loss during removal and handling.

1.06 RELOCATION

A. Items of existing equipment, piping, valves, electrical gear, instrumentation, utilities, and appurtenances to be relocated shall be removed without any degradation in condition from that prior to removal. The Contractor shall be responsible to properly safeguard the relocated items against damage and loss during removal, handling, storage, and installation in the new location.

1.07 ABANDONMENT

A. Items of existing equipment, anchors, piping, valves, electrical gear, instrumentation, utilities, and appurtenances to be abandoned shall be prepared by the Contractor as indicated.

1.08 REHABILITATION

A. Existing civil, landscaping, structural, architectural, mechanical, HVAC, electrical, and instrumentation Work disturbed or damaged by reconstruction activities shall be repaired and rehabilitated as indicated.

B. Damaged items shall be repaired or replaced with new items to restore items or surfaces to a condition equal to and matching that existing prior to damage.

1.09 DISPOSAL

A. The Contractor shall be responsible for the offsite disposal of debris resulting from reconstruction in compliance with local, state, and federal codes and requirements.

1.10 OTHER REQUIREMENTS

A. Dust and Debris Control

1. Prevent the spread of dust and debris and avoid the creation of a nuisance or hazard in the surrounding area. Do not use water if it results in hazardous or objectionable conditions such as, but not limited to, ice, flooding, or pollution. Vacuum and dust the work area daily.

B. Traffic Control Signs, Barricades and Lights

1. Where pedestrian and driver safety is endangered in the area of removal work, use traffic barricades with flashing lights. Notify the Owner prior to beginning such work.

PART 2 - PRODUCTS – [NOT USED]

PART 3 - EXECUTION

3.01 GENERAL

A. The Contractor shall coordinate demolition, relocation, and reconstruction Work with the Owner and Owner's Engineer. Unless otherwise indicated, the Contractor shall be responsible for the sequence of activities. Work shall be performed in accordance with applicable safety rules and regulations.

B. The Contractor shall verify that any utilities connected to structures, equipment, and facilities to be removed, relocated, salvaged, replaced, or abandoned are rendered inoperable, replaced with new utilities, or adequately bypassed with temporary utilities before proceeding with demolition and reconstruction.

C. The Contractor shall take precautions to avoid damage to adjacent facilities and to limit the Work activities to the extent indicated. If reconstruction beyond the scope indicated is required, the Contractor shall obtain approval from the Owner's Engineer prior to commencing.

3.02 PROTECTION OF EXISTING FACILITIES

A. Before beginning any reconstruction, the Contractor shall carefully survey the existing facilities and examine the Contract Documents and site to determine the extent of reconstruction and coordination with the Work. Existing facilities not subject to reconstruction shall be protected. Damaged existing facilities shall be repaired to the previous condition or replaced.

B. Persons shall be afforded safe passages around areas of demolition.

C. Structural elements shall not be overloaded. The Contractor shall be responsible for shoring, bracing, or adding new supports as may be required for adequate structural support as a result of Work performed under this Section. The Contractor shall remove temporary protection when the Work is complete or when so authorized by the Owner's Engineer.

D. The Contractor shall carefully consider bearing loads and capacities before placement of equipment and material on Site. In the event of any questions as to whether an area to be loaded has adequate bearing capacity, the Contractor shall consult with the Owner's Engineer prior to the placement of such equipment or material.

E. The Contractor shall promptly repair damages caused to adjacent facilities by demolition operations at no cost to the Owner.

3.03 DEMOLITION, SALVAGE, AND RELOCATION

A. The Contractor shall verify the scope of the Work to remove the equipment indicated; coordinate its shutdown, removal, replacement, or relocation; and submit an outage plan. The removal of existing facilities for demolition, salvage, and relocation shall include the following requirements:

1. Equipment supports, including concrete pads, baseplates, mounting bolts, and support hangers, shall be removed. Damage to the existing structure shall be repaired as indicated.
2. Exposed piping including vents, drains, and valves shall be removed. Where exposed piping penetrates existing floors and walls, the piping, including wall thimbles, shall be removed to a minimum depth of 2-inches. Resultant openings in the structure shall be repaired as indicated.
3. Electrical control panels, junction boxes, motor control centers, and local switches and pushbuttons shall be removed.
4. Exposed electrical conduits and associated wiring shall be removed. Resultant openings in structures shall be repaired as indicated.
5. Connections to embedded electrical conduits shall be removed a minimum of 2-inches inside the finished surface of the existing structure. Wiring shall be removed, and the resulting openings shall be repaired as indicated.
6. Associated instrumentation devices shall be removed.
7. Auxiliary utility support systems shall be removed.
8. The area shall be thoroughly cleaned such that little or no evidence of the previous equipment installation will remain.
9. Asphalt and concrete pavement, curbs, and gutters shall be removed as necessary to perform reconstruction. The limits of removal shall be sawcut. When the required improvements have been constructed, new asphalt and concrete pavement, curbs, and gutters shall be placed to match the original unless otherwise indicated.
10. Footings, foundation walls, below-grade construction and concrete slabs on grade shall be demolished and removed to a depth which will not interfere with new construction, but not less than 36-inches below existing ground surface or future ground surface, whichever is lower.
11. Below-grade areas and voids resulting from demolition of structures shall be completely filled. After fill and compaction, surfaces shall be graded to meet adjacent contours and to provide flow to surface drainage structures, or as indicated.
12. When existing pipe is removed, the Contractor shall plug the resulting open ends whether or not so indicated. Where removed piping is exposed, the remaining piping shall be blind-flanged or fitted with a removable cap or plug.

13. When existing piping is removed from existing structures, the Contractor shall fill resulting openings in the structures and repair any damage such that the finished rehabilitated structure shall appear as a new homogeneous unit with little or no indication of where the new and old materials join. The openings in water-bearing structures shall be filled with non-shrink grout to be watertight and reinforced as required or indicated. In locations where the surface of the grout will be exposed to view, the grout shall be recessed approximately 1/2-inch and the recessed area filled with cement mortar grout.
14. Electrical reconstruction shall be conducted by the Contractor in a safe and proper manner to avoid injury from electrical shock to the Owner's and Contractor's personnel. Electrical equipment to be shut off for an extended period of time shall be tagged, locked out, and sealed with a crimped wire and lead seal and made inoperable. At no time shall electrical wiring or connections which are energized or could become energized be accessible to Contractor, Owner, or other personnel without suitable protection or warning signs.

B. The Contractor shall perform a functional test of existing equipment that is relocated and reinstalled to ensure the equipment functions in the manner documented during the initial inspection. The Contractor shall inform the Owner's Engineer in writing a minimum of 5 Days prior to the functional testing in order for the Owner and Owner's Engineer to witness the test. If, in the opinion of the Owner's Engineer, the relocated equipment does not function in a satisfactory manner, the Contractor shall make repairs and modifications necessary to restore the equipment to its original operating condition at no additional cost to the Owner.

3.04 ABANDONMENT

A. Existing facilities to be abandoned shall be prepared as indicated. Where existing buried piping is to be abandoned, the Contractor shall remove the abandoned pipe for a distance of 5-feet from any connecting structures. Openings at the existing structures shall be repaired. The remaining pipe shall be capped at both ends prior to backfill. Buried piping, 12-inches diameter or greater shall be completely filled with sand or flowable fill prior to closure of the piping ends.

3.05 REHABILITATION

A. Certain areas of existing structures, piping, conduits, and the like will be affected by Work necessary to complete modifications under this Contract. The Contractor shall be responsible to rehabilitate those areas affected by its construction activities.

B. Where new rectangular openings are to be installed in concrete or concrete masonry walls or floors, the Contractor shall score the edges of each opening (both sides of wall or floor slab) by saw-cutting clean straight lines to a minimum depth of 1-inch and then chipping out the concrete. Alternately, the sides of the opening (not the corners) may be formed by saw cutting completely through the slab or wall. Saw cuts deeper than 1-inch (or the depth of cover over existing reinforcing steel, whichever is less) shall not be allowed to extend beyond the limits of the opening. Corners shall be made square and true by a combination of core drilling and chipping or grinding. Necessary precautions shall be taken during removal of concrete to prevent debris from falling into or entering adjacent equipment in service or from damaging adjacent equipment or piping. Saw cuts allowed to extend beyond the opening shall be repaired by filling with non-shrink grout. The

concrete around any exposed reinforcement steel shall be chipped back and exposed reinforcement steel cut a minimum of 2-inches from the finished face of the new opening and be painted with epoxy paint containing a corrosion inhibitor. The inside face of the new opening shall be grouted with a non-shrink grout to fill any voids and cover the exposed aggregate and shall be trowel-finished to provide a plumb and square opening.

C. Where new piping is installed in existing structures, the Contractor shall accurately position core-drilled openings in the concrete as indicated or otherwise required. Openings shall be of sufficient size to permit a final alignment of pipelines and fittings without deflection of any part and to allow adequate space for satisfactory packing where pipe passes through the wall to provide watertightness around openings so formed. The boxes or cores shall be provided with continuous keyways to hold the filling material in place, and they shall have a slight flare to facilitate grouting and the escape of entrained air during grouting. Before placing the non-shrink grout, concrete surfaces shall be sandblasted, thoroughly cleaned of sand and any other foreign matter, and coated with epoxy bonding compound.

D. Pipes, castings, or conduits shall be grouted in place by pouring in grout under a head of at least 4-inches. The grout shall be poured or rammed or vibrated into place to fill completely the space between the pipes, castings, or conduits, and the sides of the openings to obtain the same watertightness as through the wall itself. The grouted casings shall then be water cured.

E. In locations where the surface of the grout will be exposed to view, the non-shrink grout shall be recessed approximately 1/2-inch and the recessed area filled with cement mortar grout.

F. When new piping is to be connected to existing piping, the existing piping shall be cut square and ends properly prepared for the connection. Any damage to the lining and coating of the existing piping shall be repaired. Dielectric insulating joints shall be installed at interconnections between new and existing piping.

G. Where existing equipment, piping, and supports, electrical panels and devices, conduits, and associated appurtenances are removed, the Contractor shall rehabilitate the affected area such that little or no evidence of the previous installation remains. Openings in concrete floors, walls, and ceilings from piping, conduit, and fastener penetrations shall be filled with non-shrink grout and finished to match the adjacent area. Concrete pads, bases associated with equipment, supports, and appurtenances shall be removed by chipping away concrete and cutting any exposed reinforced steel and anchor bolts a minimum of 2-inches below finished grade and be painted with epoxy paint. The area of concrete to be rehabilitated shall be scored by saw cutting clean, straight lines to a minimum depth of 1-1/2 inches, and concrete within the scored lines removed to a depth of 1-1/2 inches (or the depth of cover over reinforcing steel, whichever is less). The area within the scored lines shall be patched with non-shrink grout to match the adjacent grade and finish. Abandoned connections to piping and conduits shall be terminated with blind flanges, caps, and plugs suited for the material, type, and service of the pipe or conduit.

H. Existing reinforcement to remain in place shall be protected, cleaned, and extended into new concrete. Existing reinforcement not to be retained shall be cut-off as follows:

1. Where new concrete joins existing concrete at the removal line, reinforcement shall be cut-off flush with the concrete surface at the removal line.
2. Where the concrete surface at the removal line is the finished surface, the reinforcement shall be cut back 2-inches below the finished concrete surface, the ends painted with epoxy paint and the remaining holes patched with a cement mortar grout.

I. Where existing handrailing is removed, post embedment's and anchors shall be removed, and post holes shall be filled with non-shrink grout flush to the floor surface. At the point of continuation of existing handrailing, a new post with rail connections matching the existing handrailing system shall be installed. New posts in existing concrete floors shall be installed in core-drilled socket holes and the annular space between the post and hole filled with non-shrink grout.

J. Where reconstruction activities damage the painting and coating of adjacent or nearby facilities, the damaged areas shall be surface prepared and coated to match the original painting and coating with a compatible system.

3.06 DISPOSAL

A. Demolition and removal of debris shall minimize interference with roads, streets, walks, and other adjacent occupied or used facilities that shall not be closed or obstructed without permission from the Owner. Alternate routes shall be provided around closed or obstructed traffic ways.

B. Site debris, rubbish, and other materials resulting from reconstruction operations shall be legally removed and disposed of. Structures and equipment to be demolished shall be cleaned prior to demolition and the wash water properly disposed of. No trace of these structures shall remain prior to placing of backfill in the areas from which structures were removed.

C. Refuse, debris, and waste materials resulting from demolition and clearing operations shall not be burned.

3.07 OCCUPANCY AND POLLUTION CONTROL

A. Water sprinkling, temporary enclosures, chutes, and other suitable methods shall be used to limit dust and dirt rising and scattering in the area. The Contractor shall comply with government regulations pertaining to environmental protection.

B. Water shall not be used if it creates hazardous or objectionable conditions such as ice, flooding, or pollution.

3.08 CLEANING

A. During and upon completion of Work, the Contractor shall promptly remove tools and equipment, surplus materials, rubbish, debris, and dust and shall leave areas affected by Work in a clean, approved condition.

B. Adjacent structures shall be cleaned of dust, dirt, and debris caused by reconstruction, as requested by the Owner's Engineer or directed by governing

authorities, and adjacent areas shall be returned to condition existing prior to start of Work.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

A. No separate measurement for the work of this Section will be made.

4.02 PAYMENT

A. Payment for work required under this Section will be a part of the lump sum price in the Bid for the following item:

B. Such payment will be considered full compensation for all costs incurred for the performance of the work necessary to complete the requirements of this Section.

Item No.	Item	Description	Unit
02220-1	SITE DEMOLITION AND RELOCATION	Site Demolition	LS

END OF SECTION

SECTION 02450
DRILLED MICROPILES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Section covers design and construction of micropiles for foundation support. The Contractor shall be fully experienced in all aspects of micropile design and construction, and shall furnish all necessary equipment, materials, skilled labor, and supervision to carry out the contract. The Contractor should have successfully constructed similar projects with the specified construction tolerances and the expected subsurface conditions.

B. The Contractor shall furnish all necessary engineering and design services, supervision, labor, materials, and equipment to perform all work necessary to design, install, prestress, and test the micropiles per the specifications described herein. Permanent casing shall be used to avoid drilling fluid and grout loss. Contractor required design elements include:

1. The Contractor is responsible for the design of the bond length of the micropiles into the rock, design of micropile casing and reinforcement, and micropile connection to the concrete footing, based on loads provided herein.
2. The Contractor is responsible for the selection of equipment and methods for drilling and grouting of the micropiles based on design requirements and site soils. Drilling in rockfill material with general aggregate sizes between ¾" to 12 inches and occasionally larger size boulder is expected. Three micropiles may have interference with a zone of geogrid soil reinforcement and 1.5-ft thick reinforced concrete slab located at about 10 feet below the ground surface.
3. The Contractor may propose alternative micropile detailing, casing and reinforcing sizes and strengths based on cost and availability. Proposed alternatives shall include all necessary engineering, signed and sealed by a registered design professional in the State of California.

1.02 REFERENCES, SPECIFICATIONS, CODES AND STANDARDS

A. Contractor's design, installation and testing responsibility shall be as described in Appendix C of Federal Highway Administration publication "Micropile Design and Construction Reference Manual (2005)", Publication No. FHWA NHI-05-039 (FHWA) unless otherwise indicated.

B. Geotechnical data (test boring and laboratory test results only) as presented in the Geotechnical Design Report by Stantec Consultants.

C. Previously placed earth fill data according to Pine Flat Turbine Bypass specifications (Section 02330 Earthwork).

D. AWS D1.1 Structural Welding Code, Steel.

E. USACE Earthquake Design and Evaluation of Concrete Hydraulic Structures (EM 1110-2-6053)

F. USACE Earthquake Design and Evaluation for Civil Works Projects (ER 1110-2-1806). The minimum MDE is an event with a 2% probability of occurrence in 50 years.

G. USACE Strength Design for Reinforced Concrete Hydraulic Structures (EM 1110-2-2104)

1.03 SUBMITTALS

A. Submittals shall be in accordance with Specification Section 01300, Contractor Submittals.

B. Installer Qualifications: Provide a list of five similar projects successfully completed, including names and resumes of the engineer in responsible charge, on-site superintendent, and drill rig operators. Provide contact information of the Owner for each project listed.

C. Product Data: For each micropile, components and grout material proposed.

1. If polymer drilling fluid is proposed, include data in submittal.

D. Equipment and Construction Procedures: Detailed description of equipment (including calibrations) and procedures proposed for installation of micropiles, including drill type and size, methods of placement of steel casing and core steel reinforcement, and methods for mixing and placing grout.

1. Proposed equipment and methods of controlling and disposal of drilling spoils, fluids, and grout.
2. Proposed methods for controlling location of core steel reinforcement within the pile cross-section.
3. Proposed methods to continuously monitor drilling rate, ground vibration, settlements, and movements to ensure that damage to existing buildings, underground structures, and site improvements is prevented.
4. Proposed methods for establishing and controlling micropile alignment, location, and elevations in the field.
5. Grout mix design and type of materials to be used in the grout including certified test data and trial batch reports. Include in the mix designs certified test results verifying that the mix designs provide the required grout strength, as specified in the submitted design calculations, for the 28-day strength and the strength required at the time of verification and proof load testing. Provide grout density requirements and estimated curing time for grout to achieve specified strength.

E. Shop Drawings: Prepared by or under the supervision of a qualified professional engineer detailing installation and material requirements.

1. Include all micropile components, pile-top attachment, and core steel reinforcement corrosion protection. Show details of core steel reinforcement and steel casing splices. Casing splices or threaded casing joints are only allowed at elevations lower than. 20 feet below the base of foundation.

F. Design Calculations and Drawings: Design calculations and drawings for pile capacity and connection to concrete footing shall be performed by the Contractor and stamped by a professional engineer licensed in the State of California. Design load (DL) shall be assumed to be consistent for all micropiles. Each micropile shall be designed for the following service (working) loads:

1) Tension Design Load = 220 Kips
2) Compression Design Load = 340 Kips

The allowable tension and compression bond strengths can be assumed based on Amphibolite rock and subsurface data provided in the geotechnical report.

G. Proposed Quality Control (QC) Procedures: Include procedures and frequency for sampling and testing of grout. If Contractor proposes using polymer drilling fluid, also

include procedures and frequency for sampling and maintaining viscosity of drilling fluid as part of QC submittal. Use of bentonite-containing drilling fluid is not allowed.

H. Proposed load testing procedures, materials, equipment, including diagrams and calculations for the test frame, and measures proposed for isolation of the ultimate load test pile above the micropile penetrating elevation.

I. Independent testing laboratory calibration reports for test jacks, pressure gauges, and load cells.

J. Material Certificates.

1. Permanent casing.
2. Based Drilling Fluid (if used).
3. Deformed reinforcement bars, including couplers.
4. Cement.
5. Aggregate for grout.
6. Reinforcement bar and corrosion protection.

1.04 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at project site.

1. Require representatives of each entity directly concerned with this work to attend including the following:
   a. Contractor's superintendent.
   b. Independent testing and inspection agency
   c. Owner's geotechnical engineer.
   d. Owner's micropile engineer-of-record.
   e. Micropile subcontractor's engineer-of-record.
   f. Micropile installer's on-site superintendent.
2. Review proposed Powerhouse layout, geotechnical engineering work, verification and proof tests, monitoring procedures, drilling, grouting, special inspection, testing and inspection agency's procedures for field quality control, micropile installation tolerances and plumbness measurements, core steel installation, and corrosion protection of steel casing and core steel.

1.05 QUALITY ASSURANCE

A. Design, install, and test micropiles in accordance with FHWA NHI-05-039, "Micropile Design and Construction Reference Manual" dated December 2005, unless otherwise noted.

B. Installer Qualifications: An entity (subcontractor) that has designed, installed, and tested micropiles on at least 5 similar projects in the last 5 years involving at least 50 micropiles each of similar capacity to those indicated.

1. The engineer in responsible charge shall have at least 5 years of experience in micropile design and installation like that specified and shown on the Drawings.
2. The on-site foreman and drill rig operators shall have at least 5 years of experience in micropile installation of similar design and installation to that specified and shown on the Drawings.

3. The onsite foreman and drill rig operators shall show project experience drilling in similar subsurface condition.

C. Welding: Qualify procedures and personnel according to AWS D 1.1, “Structural Welding Code – Steel”.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver, handle and store materials at project site to prevent cracking, distorting, warping, or other physical damage.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Reinforcement Bars: ASTM A615, Grade 80, All-thread.

B. Steel Casing: API 5CT (N-80).

C. Portland Cement: ASTM C150, Type II or V.

D. Fly Ash: ASTM C618, Class F.

E. Silica Fume: ASTM C1240, amorphous silica.

F. Normal-Weight Aggregates: ASTM C144.

G. Water: Potable.

H. Drilling Fluid (if used): Polymer based only.

2.02 ACCESSORIES

A. Couplers: Manufacturer’s standard. Coupler shall develop the ultimate tensile stress of the core steel reinforcement.

B. Double Corrosion Encapsulation Sheathing: ASTM D3350. Corrosion protection may be adjusted according to field tests and FHWA NHI-05-039 requirements for steel reinforcement protection.

C. Centralizers: Heavy plastic, wheel type.

D. Post grout tubes (if used): Schedule 40 PVC pipe maximum diameter 1-1/4 inch. Sleeved intervals in the uncased bond zone shall not exceed 5 feet.

2.03 GROUT MIXES

A. Prepare design mixes with strength adequate for the loads imposed, and of a consistency to allow free flow of grout. Minimum 28-day compressive strength of grout shall be 5,000 psi.

PART 3 - EXECUTION

3.01 PREPARATION

A. Carefully review available data, underground structures drawings, and site conditions prior to the start of design.

B. Carefully examine the adequacy of support conditions along drilling and other construction equipment paths of travel.

C. Provide measures for control and disposal of drilling spoils, fluids, and grouts.

1. All permits for disposal of drilling spoils, fluids, and grouts shall be acquired and all fees paid for by the Contractor.
2. Discharge of substances into the reservoir or the river is not allowed.
3. Discharge of uncontaminated or treated drill water used in the drilling process and treated per the drill water treatment and disposal plan is permitted.

D. Provide layout and elevation control for micropiles.

3.02 INSTALLATION TOLERANCE

A. Install micropiles not more than 1 inch horizontally from indicated plan location.

B. Piles shall be installed within 1:100 of the design alignment.

C. Top elevation of pile shall be plus 1 inch or minus 1 inch from elevation indicated.

D. Centerline of core steel reinforcement shall not be more than 1/2-inch from indicated location.

3.03 INSTALLATION

A. General: Piles installed when the Owner or Owner's designated Geotechnical Engineer are not present will be rejected. Replacement pile shall be at Contractor's expense.

B. Drilling: Drilling equipment and methods shall be suitable for drilling in the conditions to be encountered without causing damage to adjacent structures, utilities and site improvements. Injection pressures for any fluid or air shall be low enough to prevent hydraulic pressure fracturing or damage to structures. Contractor shall review available geotechnical data indicated in Paragraph 1.02B.

1. Provide a Vibration Monitoring Plan to the Engineer for approval. Include a preconstruction survey of affected structures and facilities. Describe methods and plans to monitor vibrations caused by micropile installation and other construction activities. Demonstrate the use of equipment to detect and prevent damage to affected structures and facilities. Do not begin any construction activity until the Engineer approves this Plan.
2. The use of clean water as drilling fluid is permitted. Use of drilling fluid containing bentonite is not allowed. Other drilling fluid that has been submitted, reviewed, and accepted by the Owner can be used. Provide a Drilling Fluid and Grouting Monitoring Plan to the Engineer for approval. Describe methods and plans to ensure that internal drainage features are not damaged or contaminated.
3. Competent Rock Identification: Drilling shall be used to identify the depth of unweathered rock. Based on the encountered rock elevation, an allowable uncased,

bond strength should be assigned to the specific micropile. The Contractor shall design the bond zone length verified by Micropile Load Testing.

4. Provide permanent steel casing with minimum length from the bottom of the pile cap down to the top of unweathered rock. Minimum permanent casing length shall be as indicated on the Drawings or as required based on actual site conditions.

C. Placement of reinforcement: Reinforcement may be placed either prior to grouting or placed into the grout-filled hole.

1. Reinforcement shall be free of soil, mud, grease, oil or any other substance that might contaminate the grout or reduce bond.
2. Centralizers shall be provided at 10-foot maximum vertical spacing on core steel reinforcement. The upper and lower most centralizers shall be located a maximum of 5 feet from the top and bottom of the micropile.
3. Core steel reinforcement with centralizers shall be lowered into the stabilized drill holes to the desired depth without difficulty. Partially inserted steel reinforcements shall not be driven or forced into the hole such that there will be no interconnection or damage to piles in which the grout has not achieved final set.
4. Core steel reinforcement corrosion protection must be evaluated per FHWA NHI-05-039.
5. Coupling system as required. Coupling shall maintain alignment and strength between the coupled sections. Threaded pipe casing joints shall be located at least two feet from a coupling in a reinforcing bar.

D. Grouting

1. Grout shall be placed in the load transfer bond length the same day that the load transfer bond length is drilled and fully cleaned from drill cuttings.
2. Provide mixing and placing equipment adequate to produce lump-free grout, and to measure grout quantity and consistency. Pressure gauges shall be provided at the grout pump and at the injection head.
3. Grout shall be injected from the lowest point of the drill hole. Injection shall continue until uncontaminated grout flows from the top of the drill hole. The tremie pipe shall always extend below the level of the existing grout in the drill hole.

E. Grout sampling and testing: Sample and test grout for compressive strength in accordance with ASTM C109 at a frequency of no less than one set of three grout cubes for each production micropile. The average compressive strength of three cubes shall be greater than 5000 psi.

1. Test grout consistency per ASTM C188 just prior to placement in each micropile. The owner will review the Contractor submittal for the acceptable range of grout density according to the pre-production grout test results.

F. Monitor drilling work: Immediately contact the Engineer if unanticipated existing subsurface drainage structures are discovered during drilling or existing drains are contaminated by drilling fluid. Suspend work in these areas until remedial measures meeting the Engineer's approval are implemented. Suspend drilling immediately if reinforced concrete or steel is encountered below elevation 588 ft. Observe the conditions in the vicinity of the micropile construction site daily for signs of ground heave or subsidence during construction. Immediately notify the Engineer if signs of movements are observed. Immediately suspend or modify drilling or grouting operations if ground heave or subsidence is observed, if the micropile structure is adversely affected, or if adjacent structures are damaged from the drilling or grouting.

G. Site Drainage: Control and properly manage all surface water that will affect construction of the micropile installation. Contain and properly dispose of all materials displaced from the drill hole or casing such as water, cuttings, and excess grout during drilling or grouting operations. Pump waste materials to a tank or basin. Do not allow grout to enter adjacent water ways or underground drains. Immediately cease drilling or grouting operations and notify the Engineer if such events occur.

H. Installation Records: Provide grout cube compressive strength and grout density test results to the Engineer within 24 hours of testing. Provide installation records in the form of installation logs as included in FHWA, Chapter 8. Provide separate log for each micropile.

3.04 PILE LOAD TESTS

A. General: Provide all required testing equipment, gauges, frames, and accessories for a complete testing system. Provide personnel as required to record loads and displacements. Provide the grout mix, consistency test results, and the grout compressive strength at 3-day, 7-day, and 28-day age. Previous test results for the proposed grout mix completed within one year of the start of work may be submitted for initial verification of the required compressive strengths for installation of pre-production verification test piles. Installation and testing will be observed by the Owner.

B. Verification Load Tests:

1. Perform pre-production verification pile load testing in accordance with ASTM D3689 to verify the design of the pile system and the construction methods proposed prior to installation of production piles. Two (2) sacrificial verification test piles of the same design as the type to be installed shall be constructed in conformance with the approved shop drawings at locations approved by the Owner.
    a. Test one (1) verification pile to Design Load (DL) of 340 kips in compression and one (1) verification pile to Design Load (DL) of 220 kips in tension. In lieu of the testing loads shown in the preceding sentence, the Contractor is permitted to test two (2) verification piles to 340 kips in tension if Contractor’s design calculations account for this loading.
    b. The verification pile load tests shall be made by incrementally loading the micropile in accordance with the following cyclic load schedule. Each load increment shall be held the duration specified in the table below. Pile top movement shall be measured at each load increment. The load-hold period shall start as soon as each test load increment is applied. The verification test pile shall be monitored for creep at the 1.30 DL. Pile movement during the creep test shall be measured and recorded at 1, 2, 3, 4, 5, 6, 10, and if required 20, 30, 50, and 60 minutes. The alignment load (AL) shall be the minimum required to remove slop or misalignment in the testing apparatus and shall not exceed 5 percent of the maximum test load. Provide sufficient cribbing or surface bearing pads to prevent tilting, settlement, or shifting of the testing apparatus during testing. Dial gauges shall be reset to zero after the initial alignment load is applied.

AL = Alignment Load			DL = Design Load
Step	**Loading**	**Applied Load**	**Minimum Hold Time (minute)**
1.	Apply AL (max 0.05 DL)		2.5
2.	Cycle 1	0.15 DL	2.5
		0.30 DL	2.5
		0.45 DL	2.5
		AL	1
3.	Cycle 2	0.15 DL	1
		0.45 DL	1
		0.60 DL	2.5
		0.75 DL	2.5
		0.90 DL	2.5
		1.00 DL	2.5
		AL	1
4.	Cycle 3	0.15 DL	1
		1.00 DL	1
		1.15 DL	2.5
		1.30 DL	10- or 60-minute Creep Test*
		1.45 DL	2.5
		AL	1
5.	Cycle 4	0.15 DL	1
		1.30 DL	1
		1.45 DL	1
		1.60 DL	1
		1.75 DL	2.5
		1.90 DL	2.5
		2.00 DL	10
		1.45 DL	5
		1.00 DL	5
		0.60 DL	5
		AL	5

* Depending on performance, either a 10 minute or 60-minute creep test shall be performed at the 1.30 DL. Where the pile top movement between 1 and 10 minutes exceeds 0.04 inch, the maximum test load shall be maintained an additional 50 minutes. Movements shall be recorded at 1, 2, 3, 5, 10, 20, 30, 50, and 60 minutes. The alignment load shall not exceed 2 percent of the design load. Dial gauges shall be reset to zero after the initial alignment load is applied.

c. Acceptance criteria for micropile verification load tests are:

(1) The piles shall sustain the tension or compression at 2.00 DL without excessive vertical movement at the top of the piles indicating an imminent failure or compromised capacity, as determined by the Owner.

(2) At the end of the 1.30 DL creep test load increment, test piles shall have a creep rate not exceeding 0.040 inches/log cycle time from 1 to 10 minutes or 0.080 inches/log cycle time from 6 to 60 minutes. The creep rate shall be linear or decreasing throughout the creep load hold period.

(3) Failure is defined as the load at which further increase in the test load simply results in continued pile movement.

d. The Contractor shall provide the Owner a written report confirming micropile geometry and construction details within 7 working days after the completion of verification load testing. This written confirmation will either confirm the bond lengths as shown in the shop drawings for micropiles or propose modifications based upon the results of the verification tests.

e. If a verification-tested micropile fails to meet the acceptance criteria, the Contractor shall modify the design, the construction procedure, or both. The modifications may include modifying the installation methods or increasing the bond length. Any modification that necessitates changes to the structure design shall require the Owner's prior review and acceptance. Any modification of design or construction procedures or cost of additional verification test piles and load testing shall be at the Contractor's expense. At the completion of verification testing, test piles shall be removed down to the elevation specified by the Owner.

C. Proof Load Testing:

1. Perform proof load tests on the first two (2) production piles determined by Owner prior to installation of the remaining production piles. Proof testing shall be also conducted for one (1) pile during installation of the remaining production piles as designated by the Owner to test loads as follows:

   a. Test one (1) production pile to Design Load (DL) of 340 kips in compression and one (1) production pile to Design Load (DL) of 220 kips in tension. In lieu of the testing loads shown in the preceding sentence, the Contractor is permitted to test two (2) production piles to 340 kips in tension if Contractor's design calculations account for this loading.

   b. The production pile load tests shall be made by incrementally loading the micropile in accordance with the following schedule:

AL = Alignment Load			DL = Design Load
Step	**Loading**	**Applied Load**	**Minimum Hold Time (minute)**
1	Apply AL (0.02 DL)		2.5
2	Load Cycle	0.15 DL	2.5
		0.30 DL	2.5
		0.45 DL	2.5
		0.60 DL	2.5
		0.75 DL	2.5
		0.90 DL	2.5
		1.00 DL	2.5
		1.10 DL	2.5
		1.20 DL	2.5
		1.30 DL	10- or 60-minute Creep Test*
3	Unload Cycle	1.30 DL	4
		1.00 DL	4
		0.75 DL	4
		0.45 DL	4
		0.15 DL	4
		AL	4

* Depending on performance, either a 10 minute or 60-minute creep test shall be performed at the 0.80 DL. Where the pile top movement between 1 and 10 minutes exceeds 0.04 inch, the maximum test load shall be maintained an additional 50 minutes. Movements shall be recorded at 1, 2, 3, 5, 10, 20, 30, 50, and 60 minutes. The alignment load shall not exceed 2 percent of the design load. Dial gauges shall be reset to zero after the initial alignment load is applied.

c. Acceptance criteria for micropile proof load tests are:

(1) The piles shall sustain the tension at 1.60 DL without excessive vertical movement at the top of the piles indicating an imminent failure or compromised capacity as determined by the Owner.

(2) At the end of the 1.3 DL creep test load increment, production test piles shall have a creep rate not exceeding 0.040 inches/log cycle time (1 to 10 minutes) or 0.080 inches/log cycle time (6 to 60 minutes). The creep rate shall be linear or decreasing throughout the creep load hold period.

(3) Failure is defined as the load at which further increase in the test load simply results in continued pile movement.

d. If a proof-tested micropile fails to meet the acceptance criteria, the Contractor shall immediately proof test another pile of that pile type. For failed piles and further construction of other piles, the Contractor shall modify the design or construction procedure, or both. The modifications may include installing replacement micropiles, modifying the installation methods, or increasing the bond length. Any

modification that necessitates changes to the structural design shall require the Owner Representative's prior review and acceptance. Any modification of design or construction procedures or cost of additional proof test piles and load testing shall be at the Contractor's expense. No extension of time will be provided for replacing or installing additional pile.

3.05 TESTING AND INSPECTION

A. The Owner will:

1. Review submittals for conformance with the requirements of Contract Documents.
2. Observe pile installation.
3. Observe and record results of pile load testing.
4. Perform final determination of the acceptability of piles installed; assign reduced capacity to piles that fail to comply with specified requirements.

B. The Owner's Testing Agency will perform compressive strength tests on grout samples in accordance with ASTM C109 (cubes). Test grout for production piles at 3, 7, and 28 days.

END OF SECTION

SECTION 03300
CAST IN PLACE CONCRETE

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This section covers the requirements for Pine Flat Hydroelectric Unit #4 cast-in-place concrete.

B. The Contractor shall design and provide cast-in-place concrete, joints in concrete, reinforcement steel and appurtenant work, formwork, bracing, shoring, supports, and shall design and construct falsework, complete and in place, in accordance with the Contract Documents.

1.02 REFERENCES, SPECIFICATIONS, CODES AND STANDARDS

A. The edition of the standards applicable to the Work shall be those editions referenced by the 2022 California Building Code (CBC). Where reference is made to any of the below, the revision in effect at the time of bid opening shall apply.

B. American Concrete Institute (ACI)

ACI 117	Specification for Tolerances for Concrete Construction and Materials
ACI 301	Specifications for Structural Concrete
ACI 304.2R	Placing Concrete by Pumping Methods
ACI 306.1	Standard Specification for Cold Weather Concreting
ACI 318	Building Code Requirements for Structural Concrete
ACI 347	Guide to Formwork for Concrete

C. ASTM International (ASTM)

ASTM A 615	Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM A 706	Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement
ASTM A 775	Standard Specification for Epoxy-Coated Steel Reinforcing Bars

ASTM A1064	Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
ASTM C 31	Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C 33	Standard Specification for Concrete Aggregates
ASTM C 39	Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
ASTM C 94	Standard Specification for Ready-Mixed Concrete
ASTM C 143	Standard Test Method for Slump of Hydraulic Cement Concrete
ASTM C 150	Standard Specification for Portland Cement
ASTM C 156	Standard Test Method for Water Retention by Concrete Curing Materials
ASTM C 260	Standard Specification for Air-Entraining Admixtures for Concrete
ASTM C 309	Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C 494	Standard Specification for Chemical Admixtures for Concrete
ASTM C 1077	Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation
ASTM D 1752	Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
ASTM E1745	Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs

D. American Welding Society (AWS)

AWS D1.4	Structural Welding Code – Reinforcing Steel

E. CBC 2022 California Building Code

F. Concrete Reinforcing Steel Institute (CRSI)

CRSI Manual of Standard Practice

G. National Institute of Standards and Technology (NIST)

Voluntary Product Standard PS 20 American Softwood Lumber Standard

Voluntary Product Standard PS 1 Structural Plywood

1.03 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 01330 - Submittal Procedures.

Issue for Construction Structural Design Drawings and Structural Concrete Design Calculations. Design Drawings and Calculations shall be prepared, signed, and stamped by a professional civil or structural engineer registered in the State of California.

B. Shop Drawings

1. Shop bending diagrams, placing lists, and drawings of reinforcing steel prior to fabrication.
2. Details of the concrete reinforcing steel and concrete inserts shall be submitted as soon as possible after receipt by the Contractor of the Notice to Proceed. Details of reinforcing steel for fabrication and erection shall conform to the CRSI Manual of Standard Practice and the requirements herein. The shop bending diagrams shall show the actual lengths of bars, to the nearest inch measured to the intersection of the extensions (tangents for bars of circular cross section) of the outside surface. Include bar placement diagrams which clearly indicate the dimensions of each bar splice.
3. Where mechanical couplers are required or permitted to be used to splice reinforcing steel, submit manufacturer's literature which contains instructions and recommendations for installation for each type of coupler used; certified test reports which verify the load capacity of each type and size of coupler used; and Shop Drawings that show the location of each coupler with details of how they are to be installed in the formwork.
4. If reinforcement steel is spliced by welding at any location, submit mill test reports that contain the information necessary for the determination of the carbon equivalent per AWS D1.4. The Contractor shall submit a written welding procedure for each type of weld for each size of bar which is to be spliced by welding; merely a statement that AWS procedures will be followed is not acceptable. The Contractor shall submit certifications of procedure qualifications for each welding procedure used and welder qualifications, for each welding procedure, and for each welder performing the Work. Such qualifications shall be as specified in AWS D1.4.
5. Manufacturer's information demonstrating compliance with requirements of the following:
    a. Bearing pads
    b. Neoprene sponge
    c. Preformed joint filler.
    d. Backing rod

e. Bond breaker
f. Slip dowels
g. PVC tubing
h. Form ties and related accessories
i. Form gaskets
j. Form release agent
k. List of form materials and locations of use
l. Mill tests for cement
m. Admixture certification. Chloride ion content shall be included.
n. Aggregate gradation test results and certification
o. Materials and methods for curing
p. Vapor retarder

6. Placement drawings showing the location and type of joints for each structure.

C. Mix Designs: Prior to beginning the Work, submit preliminary concrete mix designs which shall show the proportions and gradations of materials proposed for each class and type of concrete. The mix designs shall be checked by an independent testing laboratory acceptable to the Owner. Costs related to such checking shall be the Contractor's responsibility. When a water reducing admixture is to be used, the Contractor shall furnish mix designs for concrete both with and without the admixture.

D. Delivery Tickets: Where ready-mix concrete is used, the Contractor shall furnish certified delivery tickets at the time of delivery of each load of concrete. Each ticket shall show the state certified equipment used for measuring, and the total quantities, by weight, of cement, sand, each class of aggregate, admixtures, the amounts of water in the aggregate, added at the batching plant, and the amount allowed to be added at the Site for the specific design mix. In addition, each certificate shall state the mix number, total yield in cubic yards, and the time of day to the nearest minute, corresponding to the time when the batch was dispatched, when it left the plant, when it arrived at the Site, when unloading began, and when unloading was finished.

1.04 QUALITY ASSURANCE

A. Testing of Reinforcing Steel

1. If requested by the Owner, the Contractor shall furnish samples from each heat of reinforcing steel in a quantity adequate for testing. Costs of initial tests will be paid by the Owner. Costs of additional tests, if material fails initial tests, shall be the Contractor's responsibility.
2. If requested by the Owner, the Contractor shall furnish samples of each type of welded splice used in the Work in a quantity and of dimensions adequate for testing. At the discretion of the Owner, radiographic testing of direct butt-welded splices will be performed. The Contractor shall provide assistance necessary to facilitate testing. The Contractor shall repair any weld that fails to meet the requirements of AWS D1.4. The costs of testing will be paid by the Owner; but the costs of tests that fail to meet requirements shall be the Contractor's responsibility.

B. Testing of Materials

1. Tests on component materials and for compressive strength of concrete will be performed as indicated herein. Tests for determining slump will be in accordance with the requirements of ASTM C143.
2. Testing for aggregate shall include sand equivalence, reactivity, organic impurities, abrasion resistance, and soundness in accordance with ASTM C33.
3. The cost of laboratory tests on cement, aggregates, and concrete, will be paid by the Owner. However, the Contractor shall pay the cost of any additional tests and investigations on Work that does not meet the Specifications. The laboratory will meet or exceed the requirements of ASTM C1077.
4. Concrete for testing shall be furnished by the Contractor at no cost to the Owner, and the Contractor shall assist the Owner in obtaining samples and disposal and cleanup of excess material.

C. Inspections: Continuous inspection by a special inspector approved by the local building department having jurisdiction and by the Owner will be required where necessary to conform to code requirements. Costs of the special inspector shall be paid for by the Owner. Inspection reports shall be submitted to the Owner. The special inspector shall observe the following Work for conformance with the Drawings and Specifications:

1. During the preparation and taking of required test specimens.
2. Placing of concrete except sitework concrete fully supported on earth.

D. Field Compression Tests

1. Compression test specimens shall be taken during construction from the first placement of each class of concrete herein and at intervals thereafter as selected by the Owner to ensure continued compliance with these Specifications. Each set of test specimens will be a minimum of 4 cylinders.
2. Compression test specimens for concrete will be made in accordance with ASTM C31. Specimens will be 6-inches diameter by 12-inches high cylinders.
3. Compression tests will be performed in accordance with ASTM C39. One test cylinder will be tested at 7 Days and 2 at 28 Days. The remaining cylinder will be held to verify test results, if needed.

E. Evaluation and Acceptance of Concrete

1. Evaluation and acceptance of the compressive strength of concrete will be according to the requirements of ACI 318 and as indicated herein.
2. If any concrete fails to meet these requirements, immediate corrective action shall be taken to increase the compressive strength for subsequent batches of the type of concrete affected.
3. Concrete that fails to meet the ACI requirements and these Specifications is subject to removal and replacement as part of the Work.

F. Construction Tolerances: The Contractor shall set and maintain concrete forms and perform finishing operations so that the concrete is within the tolerances herein. Surface defects and irregularities are defined as finishes and are to be distinguished from tolerances. Tolerance is the permissible variation from lines, grades, or dimensions indicated. Where tolerances are not indicated, permissible deviations will be in accordance with ACI 117.

1. The variation from required lines or grades shall not exceed 1/4-inch in 10-feet and there shall be no offsets or visible waviness in the finished surface.

PART 2 - PRODUCTS

2.01 FORM AND FALSEWORK MATERIALS

A. Except as otherwise expressly accepted by the Owner, lumber for use as forms, shoring, or bracing shall be new material.

B. Materials for concrete forms, formwork, and falsework shall conform to the following requirements:

1. Lumber shall be Douglas Fir or Southern Yellow Pine, construction grade or better, in conformance with Voluntary Product Standard PS 20.
2. Plywood for concrete formwork shall be new, waterproof, synthetic resin bonded, exterior type Douglas Fir or Southern Yellow Pine plywood manufactured especially for concrete formwork and shall conform to the requirements of Voluntary Product Standard PS 1 – Exterior Plywood for Concrete Forms, Class I, and shall be edge sealed.
3. Form materials shall be metal, wood, plywood, or other material that will not adversely affect the concrete and will facilitate placement of concrete to the shape, form, line, and grade required. Metal forms shall be an approved type that will accomplish such results. Wood forms for surfaces to be painted shall confirm to the requirements of Voluntary Product Standard PS 1 – Exterior Plywood for Concrete Forms, Class I, Medium Density Overlaid (MDO) Grade.

C. Unless otherwise indicated, exterior corners in concrete members shall be provided with 3/4-inch chamfers or be tooled to a 1/2-inch radius. Re-entrant corners in concrete members shall not have fillets unless otherwise indicated.

D. Forms and falsework to support the roof and floor slabs shall be designed for the total dead load, plus a live load of 50 psf (minimum). The minimum design load for combined dead and live loads shall be 100 psf.

2.02 FORM TIES

A. Form ties shall be provided with a plastic cone or other suitable means for forming a conical hole to ensure that the form tie may be broken off back of the face of the concrete. The maximum diameter of removable cones for rod ties or other removable form-tie fasteners having a circular cross-section shall not exceed 1-1/2 inches; and such fasteners shall be such as to leave holes of regular shape for reaming. Form ties shall be ST-4 Hex Head Snaptie by MeadowBurke, A3 Snap-Ties by Dayton Superior, or equal.

B. Removable taper ties may be used when approved by the Owner. Taper ties shall be HD-9Taper-Tie by MeadowBurke, D9 Taper-Tie by Dayton Superior, or equal.

2.03 REINFORCEMENT STEEL

A. Reinforcement steel for cast-in-place reinforced concrete construction shall conform to the following requirements:

1. Deformed Bar Reinforcement
    a. Deformed bar reinforcement shall conform to ASTM A615 for Grade 60 reinforcement, unless otherwise indicated.
    b. Welded Reinforcement
        (1) Deformed bar and reinforcement that is welded shall conform to ASTM A706 for Grade 60 reinforcement, unless otherwise indicated.
        (2) The carbon equivalent in reinforcing that is welded shall not exceed 0.55 percent.
2. Spiral Reinforcement
    a. Spiral reinforcement shall conform to one of the following:
        (1) ASTM A615 for plain or deformed bars.
        (2) ASTM A706 for plain or deformed bars.
        (3) ASTM A1064 for plain wire.
    b. Welded Reinforcement
        (1) Spiral reinforcement that is welded shall conform to ASTM A706, unless otherwise indicated.
        (2) The carbon equivalent in spiral reinforcing that is welded shall not exceed 0.55 percent.
3. Welded wire fabric reinforcement shall conform to the requirements of ASTM A1064 and the details indicated. Welded wire fabric with longitudinal wire of W4 size wire and smaller shall be either furnished in flat sheets or in rolls with a core diameter of not less than 10-inches. Welded wire fabric with longitudinal wires larger than W4 size shall be furnished in flat sheets only.

B. Accessories

1. Accessories shall include necessary chairs, slab bolsters, concrete blocks, tie wires, dips, supports, spacers, and other devices to position reinforcement during concrete placement. Bar supports shall meet the requirements of the CRSI Manual of Standard Practice including special requirements for supporting epoxy coated reinforcing bars. Wire bar supports shall be CRSI Class 1 for maximum protection with a 1/8-inch minimum thickness of plastic coating which extends at least 1/2-inch from the concrete surface. Plastic shall be gray in color.
2. Concrete blocks (dobies) used to support and position reinforcement steel shall have the same or higher compressive strength than required for the concrete in which they are located. Where concrete blocks are used on concrete surfaces exposed to view, the color and texture of the concrete blocks shall match that required for the finished surface. Wire ties shall be embedded in concrete block bar supports.

C. Epoxy coating for reinforcing and accessories, where indicated, shall conform to ASTM A 775.

2.04 MECHANICAL COUPLERS

A. Mechanical couplers shall be provided where indicated and where approved by the Owner. Couplers shall develop a tensile strength that exceeds 125 percent of the yield strength of the reinforcing bars being spliced at each splice.

2.05 WELDED SPLICES

A. Welded splices shall be provided where indicated and where approved by the Owner. Welded splices of reinforcement steel shall develop a tensile strength exceeding 125 percent of the yield strength of the reinforcing bars that are connected.

B. Materials required to perform the welded splices to the requirements of AWS D1.4 shall be provided.

2.06 CONCRETE MATERIALS

A. Materials shall be delivered, stored, and handled to prevent damage by water or breakage. Only one brand of cement shall be used. Cement reclaimed from cleaning bags or leaking containers shall not be used. Cement shall be used in the sequence of receipt of shipments.

B. Materials for the Work shall comply with the requirements of ACI 301, as applicable.

C. Storage of materials shall conform to the requirements of ACI 301.

D. Materials for concrete shall conform to the following requirements:

1. Cement shall be standard brand Portland cement conforming to ASTM C150, Type II or Type V.
2. Water shall be potable, clean, and free from objectionable quantities of silty organic matter, alkali, salts, and other impurities. The water shall be considered potable, for the purposes of this Section only, if it meets the requirements of the local governmental agencies. Agricultural water with high total dissolved solids (over 1000 mg/l TDS) shall not be used.
3. Aggregates shall be obtained from pits acceptable to the Owner, shall be non-reactive, and shall conform to ASTM C33. Maximum size of coarse aggregate shall be as indicated. Lightweight sand for fine aggregate will not be permitted.
4. Ready-mix concrete shall conform to the requirements of ASTM C94.
5. Air-entraining agent meeting the requirements of ASTM C260 shall be used. Concrete floors to receive a dry-shake floor hardener shall have an air content not to exceed 3 percent. The Owner reserves the right, at any time, to sample and test the air-entraining agent. The air-entraining agent shall be added to the batch in a portion of the mixing water. The solution shall be batched by means of a mechanical batcher capable of accurate measurement. Air content shall be tested at the point of placement. Air entraining agent shall be MasterAir AE 90 by Master Builders Solutions US LLC, Daravair 1000 by GCP Applied Technologies, Sika AEA-14 by Sika Corporation, or equal.

6. Admixtures: Admixtures may be added at the Contractor's option to control the set, affect water reduction, and increase workability. In either case, the addition of an admixture shall be at the Contractor's expense. The use of an admixture shall be subject to acceptance by the Owner. Concrete containing an admixture shall be first placed at a location determined by the Owner. If the use of an admixture is producing an inferior result, the Contractor shall discontinue use of the admixture. Admixtures shall conform to the requirements of ASTM C494. The required quantity of cement shall be used in the mix regardless of whether or not an admixture is used. Admixtures shall contain no free chloride ions, shall be non-toxic after 30 Days, and shall be compatible with and made by the same manufacturer as the air entraining admixture.
    a. Concrete shall not contain more than one water-reducing admixture. Concrete containing an admixture shall be first placed at a location determined by the Owner.
    b. Set controlling admixture may be either with or without water-reducing properties. Where the air temperature at the time of placement is expected to be consistently over 80 degrees F, a set retarding admixture such as Plastocrete-161 by Sika Corporation, MasterPozzolith R300 by Master Builders Solutions US LLC, Daratard by GCP Applied Technologies, or equal shall be used. Where the air temperature at the time of placement is expected to be consistently under 40 degrees, a set accelerating admixture such as Plastocrete-161 by Sika Corporation, MasterSet FP 20 by Master Builders Solutions US LLC, Polarset by GCP Applied Technologies, or equal shall be used.
    c. Normal range water reducer shall conform to ASTM C 494, Type A. It shall be WRDA 79 by GCP Applied Technologies, MasterPozzolith 322 by Master Builders Solutions US LLC, Plastocrete-161 by Sika Corporation, or equal. The quantity of admixture used, and the method of mixing shall be in accordance with the manufacturer's instructions and recommendations.
7. Calcium Chloride: Calcium chloride will not be permitted in concrete.

2.07 CURING MATERIALS

A. Materials for curing concrete shall conform to the following requirements and ASTM C309:

1. Curing compounds shall be white-pigmented and resin-based. Sodium silicate compounds shall not be allowed. Concrete curing compound shall be Kurez VOX White Pigmented by Euclid Chemical Company, Cure R-2 by L&M Construction Chemicals, 1200-White by W.R. Meadows, or equal. When curing compound must be removed for finishes or grouting, curing compounds shall be Kurez DR VOX by Euclid Chemical Company, MasterKure CC 1315WB by Master Builders Solutions US LLC, L&M Cure R by L&M Construction Chemicals, 1100-Clear by WR Meadows, or equal. Curing compounds shall meet local VOC requirements.
2. Polyethylene sheet for use as concrete curing blanket shall be white and shall have a nominal thickness of 6-mils. The loss of moisture when determined in accordance with the requirements of ASTM C 156 shall not exceed 0.055 grams per square centimeter of surface.

3. Evaporation retardant shall be a material such as MasterKure ER 50 by Master Builders Solutions US LLC, Eucobar by Euclid Chemical Company, L&M E-CON by Laticrete, or equal.

2.08 JOINT MATERIALS

A. Materials for joints in concrete shall conform to the following requirements:

1. Joint filler material shall be of the preformed non-extruding type of joint filler constructed of cellular neoprene sponge rubber or polyurethane of firm texture. Bituminous fiber type will not be permitted. Non-extruding and resilient-type preformed expansion joint fillers shall conform to the requirements and tests set forth in ASTM D 1752 for Type I, except as otherwise indicated.
2. Elastomeric joint sealer shall be recommended by the Manufacturer for the installation indicated.
3. Mastic joint sealer shall be a material that does not contain evaporating solvents; that will tenaciously adhere to concrete surfaces; that will remain permanently resilient and pliable; that will not be affected by continuous presence of water and will not in any way contaminate potable water; and that will effectively seal the joints against moisture infiltration even when the joints are subject to movement due to expansion and contraction. The sealer shall be composed of special asphalts or similar materials blended with lubricating and plasticizing agents to form a tough, durable mastic substance containing no volatile oils or lubricants and shall be capable of meeting the test requirements set forth hereinafter, if testing is required by the Owner.

2.09 MISCELLANEOUS MATERIALS

A. Dampproofing agent shall be an asphalt emulsion such as Hydrocide 600 by ChemRex Sonneborn, Dehydratine75 Emulsified Asphalt by Euclid Chemical Company, Sealmastic Emulsion by W. R. Meadows Inc., or equal.

B. Epoxy adhesives shall be the following products:

1. For bonding freshly mixed, plastic concrete to hardened concrete, Sikadur 32 Hi-Mod Epoxy Adhesive by Sika Corporation, MasterEmaco ADH 326 by Master Builders Solutions US LLC; BurkEpoxy MV by Burke by Edoco, or equal.
2. or bonding hardened concrete or masonry to steel, Sikadur 31 Hi-Mod Gel by Sika Corporation, BurkEpoxy NS by Burke by Edoco, Concresive Paste (LPL) by Chem Rex MBT; or equal.

C. Vapor Retarder

1. The vapor retarder shall be a plastic sheet meeting the Class A permeance and strength requirements of ASTM E1745. The minimum thickness shall be 10 mils.
2. The vapor retarder shall be Griffolyn Type-65 G by Reef Industries, Inc., or equal.

2.10 CONCRETE DESIGN REQUIREMENTS

A. General

1. Concrete shall be composed of cement, admixtures, aggregates, and water of the qualities indicated. In general, the mix shall be designed to produce a concrete capable of being deposited so as to obtain maximum density and minimum shrinkage, and where deposited in forms, to have good consolidation properties and maximum smoothness of surface. The proportions shall be changed whenever necessary or desirable to meet the required results at no additional cost to the Owner. Mix changes shall be subject to review by the Owner.
2. The Contractor is cautioned that the limiting parameters below are NOT a mix design. Admixtures may be required to achieve workability required by the Contractor's construction methods and aggregates. The Contractor is responsible for providing concrete with the required workability.

B. Water-Cement Ratio and Compressive Strength: The minimum compressive strength and cement content of concrete shall be not less than the following tabulation.

Type of Work	Class of Concrete Min 28-Day Compressive Strength, psi	Max Size Aggregate in	Cement Content Per cu yd, lbs	Max W/C Ratio (by weight)
Structural concrete	4,000	1	564 (min)	0.45
Sitework concrete	3,000	1	470 (min)	0.50
Lean concrete	2,000	1	376 (min)	0.60

2.11 CONSISTENCY

A. Consistency of the concrete in successive batches shall be determined by slump tests in accordance with ASTM C 143. The slumps shall be as follows:

Part of Work	Slump (in
All concrete unless indicated otherwise	3-inches plus or minus 1-inch
Ductbank and pipe encasement	5-inches plus or minus 1-inch

2.12 MEASUREMENT OF CEMENT AND AGGREGATE

A. The amount of cement and of each separate size of aggregate entering into each batch of concrete shall be determined by direct weighing equipment furnished by the Contractor and acceptable to the Owner; provided that, where batches are so proportioned as to contain an integral number of conventional sacks of cement and the cement is delivered at the mixer in the original unbroken sacks, the weight of the cement contained in each sack may be taken without weighing as 94 pounds.

2.13 MEASUREMENT OF WATER

A. The quantity of water entering the mixer shall be measured by a suitable water meter or other measuring device of a type acceptable to the Owner and capable of measuring the water in variable amounts within a tolerance of one percent.

2.14 READY-MIXED CONCRETE

A. At the Contractor's option, ready-mixed concrete may be used if it meets the requirements as to materials, batching, mixing, transporting, placing, the supplementary requirements as required herein, and is in accordance with ASTM C 94.

B. Ready-mixed concrete shall be delivered to the Work, and discharge shall be completed within one hour after the addition of the cement to the aggregates or before the drum has been revolved 250 revolutions, whichever comes first. In hot weather, under conditions contributing to quick stiffening of the concrete, or when the temperature of the concrete is 85 degrees F or above, the time between the introduction of the cement to the aggregates and discharge shall not exceed 45 minutes.

C. Truck mixers shall be equipped with electrically actuated counters by which the number of revolutions of the drum or blades may be readily verified. The counter shall be of the resettable, recording type, and shall be mounted in the driver's cab. The counter shall be actuated at the time of starting the mixer at mixing speed.

D. Each batch of concrete shall be mixed in a truck mixer for not less than 70 revolutions of the drum or blades at the rate of rotation designated by the manufacturer of equipment. Additional mixing, if any, shall be at the speed designated by the manufacturer of the equipment as agitating speed. Materials including mixing water shall be in the mixer drum before actuating the revolution counter for determining the number of revolutions of mixing.

E. Each batch of ready-mixed concrete delivered to the Work shall be accompanied by a delivery ticket furnished to the Owner in accordance with the requirements above.

F. The use of non-agitating equipment for transporting ready-mixed concrete will not be permitted. Combination truck and trailer equipment for transporting ready-mixed concrete will not be permitted. The quality and quantity of materials used in ready-mixed concrete and in batch aggregates shall be subject to continuous inspection at the batching plant by the Owner.

PART 3 - EXECUTION

3.01 GENERAL FORMWORK REQUIREMENTS

A. Forms to confine the concrete and shape it to the required lines shall be used wherever necessary. The Contractor shall assume full responsibility for the adequate design of forms, and any forms that are unsafe or inadequate in any respect shall promptly be removed from the Work and replaced. A sufficient

number of forms of each kind shall be available to permit the required rate of progress to be maintained. The design and inspection of concrete forms, falsework, and shoring shall comply with applicable local, state and federal regulations. Design, construction, maintenance, preparation, and removal of forms shall be in accordance with ACI 347 and the requirements herein.

B. Forms shall be true in every respect to the required shape and size, shall conform to the established alignment and grade, and shall be of sufficient strength and rigidity to maintain their position and shape under the loads and operations incident to placing and vibrating the concrete.

3.02 CONSTRUCTION

A. Vertical Surfaces: Vertical surfaces of concrete members shall be formed, except where placement of the concrete against the ground is indicated. Not less than 1-inch of concrete shall be added to the indicated thickness of a concrete member where concrete is permitted to be placed against trimmed ground in lieu of forms. Permission to do this on other concrete members will be granted only for members of comparatively limited height and where the character of the ground is such that it can be trimmed to the required lines and will stand securely without caving or sloughing until the concrete has been placed.

B. Construction Joints: Concrete construction joints will not be permitted at locations other than those indicated, except as may be acceptable to the Owner. When a second lift is placed on hardened concrete, special precautions shall be taken in the way of the number, location, and tightening of ties at the top of the old lift and bottom of the new to prevent any unsatisfactory affect whatsoever on the concrete. Pipe stubs and anchor bolts shall be set in the forms where required.

C. Form Ties

1. Embedded Ties: Wire ties for holding forms will not be permitted. No form-tying device or part thereof, other than metal, shall be left embedded in the concrete. Ties shall not be removed in such manner as to leave a hole extending through the interior of the concrete members. The use of snap-ties which cause spalling of the concrete upon form stripping or tie removal will not be permitted. If steel panel forms are used, rubber grommets shall be provided where the ties pass through the form in order to prevent loss of cement paste. Where metal rods extending through the concrete are used to support or to strengthen forms, the rods shall remain embedded and shall terminate not less than 1-inch back from the formed face or faces of the concrete.
2. Removable Ties: Where taper ties are approved for use, after the taper tie is removed, the hole shall be thoroughly cleaned and roughened for bond. A precast neoprene or polyurethane tapered plug shall be located at the wall centerline. The hole shall be completely filled with non-shrink or regular cement grout. Exposed faces of walls shall have at least the outer 2-inches of the exposed face filled with a cement grout which shall match the color and texture of the surrounding wall surface.

3.03 REUSE OF FORMS

A. Forms may be reused only if in good condition and only if acceptable to the Owner. Light sanding between uses will be required wherever necessary to obtain uniform

surface texture on exposed concrete surfaces. Exposed concrete surfaces are defined as surfaces which are permanently exposed to view.

3.04 REMOVAL OF FORMS

A. Careful procedures for the removal of forms shall be strictly followed, and this Work shall be done with care to avoid injury to the concrete. No heavy loading on green concrete will be permitted. Members which must support their own weight shall not have their forms removed until they have attained at least 75 percent of the 28-Day strength of the concrete. Forms for vertical walls and columns shall remain in place at least 48 hours after the concrete has been placed. Forms for parts of the Work not specifically mentioned herein shall remain in place for periods of time as recommended in ACI 347.

3.05 GENERAL REINFORCEMENT REQUIREMENTS

A. Reinforcement steel, welded wire fabric, couplers, and other appurtenances shall be fabricated, and placed in accordance with the requirements of the CBC and the supplementary requirements indicated herein.

3.06 FABRICATION

A. General

1. Reinforcement steel shall be accurately formed to the dimensions and shapes indicated, and the fabricating details shall be prepared in accordance with the CRSI Manual of Standard Practice and ACI 318, except as modified by the Drawings.
2. The Contractor shall fabricate reinforcement bars for structures in accordance with bending diagrams, placing lists, and placing drawings. Said drawings, diagrams, and lists shall be prepared by the Contractor.
3. Unless otherwise indicated, dowels shall match the size and spacing of the spliced bar.

B. Bending or Straightening: Reinforcement shall not be straightened or rebent in a manner that will injure the material. Bars shall be bent or straight as indicated. Do not use bends different from the bends indicated. Bars shall be bent cold unless otherwise permitted by the Owner. No bars partially embedded in concrete shall be field-bent except as indicated or specifically permitted by the Owner.

3.07 PLACING

A. Reinforcement steel shall be accurately positioned as indicated and shall be supported and wired together to prevent displacement, using annealed iron wire ties or suitable clips at intersections. Reinforcement steel shall be supported by concrete, plastic or metal supports, spacers or metal hangers that are strong and rigid enough to prevent any displacement of the reinforcement steel. Where concrete is to be placed on the ground, supporting concrete blocks (or dobies) shall be used in sufficient numbers to support the bars without settlement, but in no case shall such support be continuous. Concrete blocks used to support reinforcement steel shall be tied to the steel with wire ties which are embedded in

the blocks. For concrete over formwork, the Contractor shall provide concrete, metal, plastic, or other acceptable bar chairs and spacers.

B. The portions of accessories in contact with the formwork shall be made of concrete, plastic, or steel coated with a 1/8-inch minimum thickness of plastic which extends at least 1/2-inch from the concrete surface. Plastic shall be gray in color.

C. Tie wires shall be bent away from the forms to provide the required concrete coverage.

D. Bars additional to those indicated which may be found necessary or desirable by the Contractor for the purpose of securing reinforcement in position shall be provided by the Contractor as part of the Work.

E. Unless otherwise indicated, reinforcement placing tolerances shall be within the limits specified in ACI 318 except where in conflict with the requirements of the Building Code.

F. The minimum spacing requirements of ACI 318 shall be followed for reinforcing steel.

G. Welded wire fabric reinforcement placed over horizontal forms shall be supported on slab bolsters having gray, plastic-coated standard type legs. Slab bolsters shall be spaced not more than 30-inches on centers, shall extend continuously across the entire width of the reinforcing mat, and shall support the reinforcing mat in the plane indicated.

H. Welded wire fabric placed over the ground shall be supported on wired concrete blocks (dobies) spaced not more than 3-feet on centers in any direction. The construction practice of placing welded wire fabric on the ground and hooking into place in the freshly placed concrete shall not be used.

3.08 SPLICING

A. General: Reinforcement bar splices shall only be used at locations indicated. When it is necessary to splice reinforcement at points other than where indicated, the character of the splice shall be reviewed and accepted by the Owner.

B. Splices of Reinforcement

1. The length of lap for reinforcement bars, unless otherwise indicated, shall be in accordance with ACI 318 for a Class B splice.
2. Welded splices shall be performed in accordance with AWS D1.4.
3. Laps of welded wire fabric shall be in accordance with ACI 318. Adjoining sheets shall be securely tied together with No. 14 tie wire, one tie for each 2 running feet. Wires shall be staggered and tied in such a manner that they cannot slip.

3.09 CLEANING AND PROTECTION

A. Reinforcement steel shall always be protected from conditions conductive to corrosion until concrete is placed around it.

B. The surfaces of reinforcement steel and other metalwork to be in contact with concrete shall be thoroughly cleaned of dirt, grease, loose scale and rust, grout, mortar, and other foreign substances immediately before the concrete is placed. Where there is delay in depositing concrete, reinforcing shall be reinspected and, if necessary recleaned.

3.10 PROPORTIONING AND MIXING

A. Proportioning: Proportioning of the concrete mix shall conform to the requirements of ACI 301.

B. Mixing: Mixing of concrete shall conform to the requirements of ACI 301.

C. Slump: Slumps shall be as indicated herein.

D. Retempering: Retempering of concrete or mortar which has partially hardened shall not be permitted.

3.11 PREPARATION OF SURFACES FOR CONCRETING

A. General: Earth surfaces shall be thoroughly wetted by sprinkling prior to the placing of any concrete, and these surfaces shall be kept moist by frequent sprinkling up to the time of placing concrete thereon. The surface shall be free from standing water, mud, and debris at the time of placing concrete.

B. Joints in Concrete: Concrete surfaces upon or against which concrete is to be placed, where the placement of the concrete has been stopped or interrupted so that, as determined by the Owner, the new concrete cannot be incorporated integrally with that previously placed, are defined as construction joints. The surfaces of horizontal joints shall be given a compacted, roughened surface for good bonding. Except where the Drawings call for joint surfaces to be coated, the joint surfaces shall be cleaned of laitance, loose or defective concrete, and foreign material, and be roughened to a minimum 1/4-inch amplitude. Such cleaning and roughening shall be accomplished by hydroblasting. Pools of water shall be removed from the surface of construction joints before the new concrete is placed.

C. Placing Interruptions: When placing of concrete is to be interrupted long enough for the concrete to take a set, the working face shall be given a shape by the use of forms or other means, that will secure proper union with subsequent Work; provided that construction joints shall be made only where acceptable to the Owner.

D. Embedded Items

1. No concrete shall be placed until formwork, installation of parts to be embedded, reinforcement steel, and preparation of surfaces involved in the

placing have been completed and accepted by the Owner at least 4 hours before placement of concrete. Surfaces of forms and embedded items that have become encrusted with dried grout from previous usage shall be cleaned before the surrounding or adjacent concrete is placed.

2. Reinforcement, anchor bolts, sleeves, inserts, and similar items shall be set and secured in the forms at locations indicated or by Shop Drawings and shall be acceptable to the Owner before any concrete is placed. Accuracy of placement is the responsibility of the Contractor.

E. Casting New Concrete Against Old: Where concrete is to be cast against old concrete (defined as any concrete which is greater than 60 Days of age), the surface of the old concrete shall be thoroughly cleaned and roughened by hydroblasting (exposing aggregate) prior to the application of an epoxy bonding agent. Application shall be according to the bonding agent manufacturer's instructions and recommendations.

F. No concrete shall be placed in any structure until water entering the space to be filled with concrete has been properly cut off or has been diverted by pipes, or other means, and carried out of the forms, clear of the Work. No concrete shall be deposited underwater, nor shall the Contractor allow still water to rise on any concrete until the concrete has attained its initial set. Water shall not be permitted to flow over the surface of any concrete in such manner and at such velocity as will injure the surface finish of the concrete. Pumping or other necessary dewatering operations for removing ground water, if required, shall be subject to the review of the Owner.

G. Corrosion Protection: Pipe, conduit, dowels, and other ferrous items required to be embedded in concrete construction shall be so positioned and supported prior to placement of concrete that there will be a minimum of 2-inches clearance between said items and any part of the concrete reinforcement. Securing such items in position by wiring or welding them to the reinforcement will not be permitted.

H. Openings for pipes, inserts for pipe hangers and brackets, and anchors shall, where practicable, be provided for during the placing of concrete.

I. Anchor bolts shall be accurately set and shall be maintained in position by templates while being embedded in concrete.

3.12 HANDLING, TRANSPORTING, AND PLACING

A. General: Placing of concrete shall conform to the applicable requirements of ACI 301 and the requirements of this Section. No aluminum materials shall be used in conveying any concrete.

B. Non-Conforming Work or Materials: Concrete which during or before placing is found not to conform to the requirements indicated herein shall be rejected and immediately removed from the Work. Concrete which is not placed in accordance with these Specifications, or which is of inferior quality shall be removed and replaced.

C. Unauthorized Placement: No concrete shall be placed except in the presence of a duly authorized representative of the Owner. The Contractor shall notify the Owner in writing at least 24 hours in advance of placement of any concrete.

D. Placement in Wall and Column Forms

1. Concrete shall not be dropped through reinforcement steel or into any deep form nor shall concrete be placed in any form in such a manner as to leave accumulation of mortar on the form surfaces above the placed concrete. In such cases, some means such as the use of hoppers and, if necessary, vertical ducts of canvas, rubber, or metal shall be used for placing concrete in the forms in a manner that it may reach the place of final deposit without separation. In no case shall the free fall of concrete exceed 4-feet in walls and 8-feet in columns below the ends of ducts, chutes, or buggies. Concrete shall be uniformly distributed during the process of depositing and in no case after depositing shall any portion be displaced in the forms more than 6-feet in horizontal direction. Concrete in wall forms shall be deposited in uniform horizontal layers not deeper than 2-feet; and care shall be taken to avoid inclined layers or inclined construction joints except where such are required for sloping members. Each layer shall be placed while the previous layer is still soft. The rate of placing concrete in wall forms shall not exceed 5-feet of vertical rise per hour. Sufficient illumination shall be provided in the interior of forms so that the concrete at the places of deposit is visible from the deck or runway.
2. The surface of the concrete shall be level whenever a run of concrete is stopped. To ensure a level, straight joint on the exposed surface of walls, a wood strip at least 3/4-inch thick shall be tacked to the forms on these surfaces. The concrete shall be carried about 1/2-inch above the underside of the strip. About one hour after the concrete is placed, the strip shall be removed and any irregularities in the edge formed by the strip shall be leveled with a trowel, and laitance shall be removed.

E. Conveyor Belts and Chutes: Ends of chutes, hopper gates, and other points of concrete discharge throughout the Contractor's conveying, hoisting, and placing system shall be so designed and arranged that concrete passing from them will not fall separated into whatever receptacle immediately receives it. Conveyor belts, if used, shall be of a type acceptable to the Owner. Chutes longer than 50-feet will not be permitted. Minimum slopes of chutes shall be such that concrete of the required consistency will readily flow in them. If a conveyor belt is used, it shall be wiped clean by a device operated in such a manner that none of the mortar adhering to the belt will be wasted. Conveyor belts and chutes shall be covered.

F. Temperature of Concrete: The temperature of concrete when it is being placed shall be not more than 90 degrees F nor less than 40 degrees F in moderate weather, and not less than 50 degrees F in weather during which the mean daily temperature drops below 40 degrees F. Concrete ingredients shall not be heated to a temperature higher than that necessary to keep the temperature of the mixed concrete, as placed, from falling below the required minimum temperature. If concrete is placed when the weather is such that the temperature of the concrete would exceed 90 degrees F, the Contractor shall employ effective means, such as precooling of aggregates and mixing water, using ice, or placing at night, as necessary to maintain the temperature of the concrete, as it is placed, below 90 degrees F. The Contractor shall be entitled to no additional compensation on account of the foregoing requirements.

G. Cold Weather Placement

1. Placement of concrete shall conform to ACI 306.1. and the following.
2. Earth foundations shall be free from frost or ice when concrete is placed upon or against them.
3. Maintain the concrete temperature above 50 degrees F for at least 72-hours after placement.

3.13 PUMPING OF CONCRETE

A. General: If the pumped concrete does not produce satisfactory end results, the Contractor shall discontinue the pumping operation and proceed with the placing of concrete using conventional methods.

B. Pumping Equipment

1. The pumping equipment shall have 2 cylinders and be designed to operate with one cylinder only in case the other one is not functioning. In lieu of this requirement, the Contractor may have a standby pump on the Site during pumping.
2. The minimum diameter of the hose conduits shall be in accordance with ACI 304.2R - Placing Concrete by Pumping Methods.
3. Pumping equipment and hose conduits that are not functioning properly, shall be replaced.
4. Aluminum conduits for conveying the concrete shall not be permitted.

3.14 TAMPING AND VIBRATING

A. As concrete is placed in the forms or in excavations, it shall be thoroughly settled and compacted, throughout the entire depth of the layer, which is being consolidated, into a dense, homogeneous mass, filling all corners and angles, thoroughly embedding the reinforcement, eliminating rock pockets, and bringing only a slight excess of water to the exposed surface of concrete. Vibrators shall be high speed power vibrators (8,000 to 12,000 rpm) of an immersion type in sufficient number and with at least one standby unit as required.

B. Concrete in walls shall be internally vibrated and at the same time rammed, stirred, or worked with suitable appliances, tamping bars, shovels, or forked tools until it completely fills the forms or excavations and closes snugly against all surfaces. Subsequent layers of concrete shall not be placed until the layers previously placed have been worked thoroughly. Vibrators shall be provided in sufficient numbers, with standby units as required, to accomplish the required results within 15 minutes after concrete of the prescribed consistency is placed in the forms. The vibrating head shall not contact the surfaces of the forms. Care shall be taken not to vibrate concrete excessively or to work it in any manner that causes segregation of its constituents.

3.15 FINISHING CONCRETE SURFACES

A. General: Surfaces shall be free from fins, bulges, ridges, offsets, honeycombing, or roughness of any kind, and shall present a finished, smooth, continuous hard surface. Allowable deviations from plumb or level and from the alignment, profiles,

and dimensions indicated are defined as tolerances and are indicated above. These tolerances are to be distinguished from irregularities in finish as described herein. Aluminum finishing tools shall not be used.

B. Formed Surfaces:

1. No treatment shall be required after form removal except for curing, repair of defective concrete, and treatment of surface defects.
2. Form tie holes and defective concrete shall be repaired.
3. Where architectural finish is required, treatment(s) shall be as indicated.

C. Unformed Surfaces: After proper and adequate vibration and tamping, unformed top surfaces of slabs, floors, walls, and curbs shall be brought to a uniform surface with suitable tools. Whenever the air temperature exceeds 85 degrees F or the wind speed exceeds 25 mph at the time of placement, the concrete shall be treated as follows. Immediately after the concrete has been screeded, it shall be treated with a liquid evaporation retardant. The retardant shall be used again after each Work operation as necessary to prevent drying shrinkage cracks. The classes of finish for unformed concrete surfaces are designated and defined as follows:

1. Finish U1 - Sufficient leveling and screeding to produce an even, uniform surface with surface irregularities not to exceed 3/8-inch. No further special finish is required.
2. Finish U2 - After sufficient stiffening of the screeded concrete, surfaces shall be float finished with wood or metal floats or with a finishing machine using float blades. Excessive floating of surfaces while the concrete is plastic and dusting of dry cement and sand on the concrete surface to absorb excess moisture will not be permitted. Floating shall be the minimum necessary to produce a surface that is free from screed marks and is uniform in texture. Surface irregularities shall not exceed 1/4-inch. Joints and edges shall be tooled where indicated or as determined by the Owner.
3. Finish U3 - After the Finish U2 surface has hardened sufficiently to prevent excess of fine material from being drawn to the surface, steel troweling shall be performed with firm pressure such as will flatten the sandy texture of the floated surface and produce a dense, uniform surface free from blemishes, ripples, and trowel marks. The finish shall be smooth and free of irregularities.
4. Finish U4 - Trowel the Finish U3 surface to remove local depressions or high points. In addition, the surface shall be given a light broom finish with brooming perpendicular to drainage unless otherwise indicated. The resulting surface shall be rough enough to provide a nonskid finish.

D. Unformed surfaces shall be finished according to the following schedule:

UNFORMED SURFACE FINISH SCHEDULE	
Area	**Finish**
Grade slabs and foundations to be covered with concrete or fill material	U1
Interior slabs and floors to receive architectural finish	U3
Slabs and top surfaces of concrete blocks	U4
Top surface of walls	U3

3.16 CURING AND DAMPPROOFING

A. General: Concrete shall be cured for not less than 7 Days after placing, in accordance with the methods indicated below for the different parts of the Work.

Surface to be Cured or Dampproofed	Method
Unstripped forms	1
Construction joints between footings and walls, between floor slab and concrete block, and between floor slab and columns	2
Encasement and duct bank concrete and thrust blocks	3
Concrete surfaces not specifically provided for elsewhere in this Paragraph	4
Buried slabs and backfilled walls	5

B. Method 1: Wooden forms shall be wetted immediately after concrete has been placed and shall be kept wet with water until removal. If steel forms are used, the exposed concrete surfaces shall be kept continuously wet until the forms are removed. If forms are removed within 7 Days of placing the concrete, curing shall be continued in accordance with Method 4 below.

C. Method 2: The surface shall be covered with burlap mats which shall be kept wet with water for the duration of the curing period, until the concrete in the walls has been placed. No curing compound shall be applied to surfaces cured under Method 2.

D. Method 3: The surface shall be covered with moist earth not less than 4 hours nor more than 24 hours after the concrete is placed. Earthwork operations that may damage the concrete shall not begin until at least 7 Days after placement of concrete.

E. Method 4: The surface shall be sprayed with a liquid curing compound.

1. It shall be applied in accordance with the manufacturer's printed instructions at a maximum coverage rate of 200 square feet per gallon and in such a manner as to cover the surface with a uniform film that will seal thoroughly.
2. Where the curing compound method is used, care shall be exercised to avoid damage to the seal during the 7 Day curing period. If the seal is damaged or broken before the expiration of the curing period, the break shall be repaired immediately by the application of additional curing compound over the damaged portion.
3. Wherever curing compound has been applied by mistake to surfaces against which concrete subsequently is to be placed and to which it is to adhere, compound shall be entirely removed by wet sandblasting just prior to the placing of new concrete.
4. Curing compound shall be applied as soon as the concrete has hardened enough to prevent marring on unformed surfaces, and within 2 hours after removal of forms. Repairs required to be made to formed surfaces shall be made within the said 2-hour period; provided, however, that any such repairs which cannot be made within the said 2 hour period shall be delayed until after the curing compound has been applied. When repairs are to be made to an

area on which curing compound has been applied, the area involved shall first be wet-sandblasted to remove the curing compound.

5. During the curing period, no traffic of any nature and no depositing of any materials, temporary or otherwise, shall be permitted on surfaces coated with curing compound. Foot traffic and the depositing of materials may be allowed after 3 Days if the surface is covered with 5/8-inch plywood placed over polyethylene sheets.

F. Method 5: This method applies to both buried slabs and walls to be backfilled.

1. The concrete shall be kept continuously wet by the application of water for a minimum period of at least 7 Days beginning immediately after the concrete has reached final set or forms have been removed.
2. Until the concrete surface is covered with the curing medium, the entire surface shall be kept damp by applying water through nozzles that atomize the flow so that the surface is not marred or washed.
3. Heavy curing mats shall be used as a curing medium to retain the moisture during the curing period. The curing medium shall be weighted or otherwise held substantially in contact with the concrete surface to prevent being dislodged by wind or any other causes. Edges shall be continuously held in place.
4. The curing blankets and concrete shall be kept continuously wet by the use of sprinklers or other means both during and after normal working hours.
5. Immediately after the application of water has terminated at the end of the curing period, the curing medium shall be removed, any dry spots shall be rewetted, and curing compound shall be immediately applied in accordance with Method 4 above.
6. The Contractor shall dispose of excess water from the curing operation to avoid damage to the Work.
7. Dampproofing: The exterior surfaces of buried roof slabs and backfilled walls shall be dampproofed as follows.
    a. Immediately after completion of curing, the surface shall be sprayed with a dampproofing agent consisting of an asphalt emulsion. Application shall be in 2 coats. The first coat shall be diluted to one-half strength by the addition of water and shall be sprayed on so as to provide a maximum coverage rate of 100 square feet per gallon of dilute solution. The second coat shall consist of an application of the undiluted material and shall be sprayed on so as to provide a maximum coverage rate of 100 square feet per gallon. Dampproofing material shall be as indicated above.
    b. As soon as the material has taken an initial set, the entire area thus coated shall be coated with whitewash. Any formula for mixing the whitewash may be used if it produces a uniformly coated white surface and remains until placing of the backfill. If the whitewash fails to remain on the surface until the backfill is placed, the Contractor shall apply additional whitewash.

G. The Contractor may submit alternate methods of curing which maintain the concrete in a continuously wet condition for acceptance by the Owner.

3.17 PROTECTION

A. The Contractor shall protect concrete against injury until final acceptance.

B. Fresh concrete shall be protected from damage due to rain, hail, sleet, or snow. The Contractor shall provide such protection while the concrete is still plastic and whenever precipitation is imminent or occurring.

3.18 CURING IN COLD WEATHER

A. Water curing of concrete may be reduced to 6 Days during periods when the mean daily temperature in the vicinity of the Site is less than 40 degrees F; provided that, during the prescribed period of water curing, when temperatures are such that concrete surfaces may freeze, water curing shall be temporarily discontinued.

B. Concrete cured by an application of curing compound will require no additional protection from freezing if the protection at 50 degrees F for 72 hours is obtained by means of approved insulation in contact with the forms or concrete surfaces; otherwise, the concrete shall be protected against freezing temperatures for 72 hours immediately following 72 hours protection at 50 degrees F. Concrete cured by water shall be protected against freezing temperatures for 72 hours immediately following the 72 hours of protection at 50 degrees F.

C. Discontinuance of protection against freezing temperatures shall be such that the drop in temperature of any portion of the concrete will be gradual and will not exceed 40 degrees F in 24 hours. In the spring, when the mean daily temperature rises above 40 degrees F for more than 3 Days, 72-hour protection at a temperature not lower than 50 degrees F may be discontinued for as long as the mean daily temperature remains above 40 degrees F; provided, that the concrete shall be protected against freezing temperatures for not less than 48 hours after placement.

D. Where artificial heat is employed, special care shall be taken to prevent the concrete from drying. Use of unvented heaters will be permitted only when unformed surfaces of concrete adjacent to the heaters are protected for the first 24 hours from an excessive carbon dioxide atmosphere by application of curing compound; provided, that the use of curing compound for such surfaces is otherwise permitted by these Specifications.

3.19 TREATMENT OF SURFACE DEFECTS

A. As soon as forms are removed, exposed concrete surfaces shall be carefully examined and any irregularities shall be immediately rubbed or ground in a satisfactory manner in order to secure a smooth, uniform, and continuous surface. Plastering or coating of surfaces to be smoothed will not be permitted. No repairs shall be made until after inspection by the Owner. In no case will extensively patching of honeycombed concrete be permitted. Concrete containing minor voids, holes, honeycombing, or similar depression defects shall be repaired as indicated below. Concrete containing extensive voids, holes, honeycombing, or similar depression defects, shall be completely removed and replaced. Repairs and replacements shall be performed promptly.

B. Defective surfaces to be repaired shall be cut back from trueline a minimum depth of 1/2-inch over the entire area. Feathered edges will not be permitted. Where chipping or cutting tools are not required to deepen the area properly, the surface shall be prepared for bonding by the removal of laitance or soft material, plus not

less than 1/32-inch depth of the surface film from hard portions by means of an efficient sandblast. After cutting and sandblasting, the surface shall be wetted sufficiently in advance of shooting with shotcrete or with cement mortar so that while the repair material is being applied, the surfaces underneath will remain moist but not so wet as to overcome the suction upon which a good bond depends. The material used for repair shall consist of a mixture of one sack of cement to 3 cubic feet of sand. For exposed walls, the cement shall contain such a proportion of Atlas white portland cement as is required to make the color of the patch match the color of the surrounding concrete.

C. Holes left by tie-rod cones shall be reamed with suitable toothed reamers so as to leave the surfaces of the holes clean and rough. These holes then shall be repaired in an approved manner with dry-packed cement grout. Holes left by form-tying devices having a rectangular cross-section, and other imperfections having a depth greater than their least surface dimension, shall not be reamed but shall be repaired in an approved manner with dry-packed cement grout.

D. Repairs shall be built up and shaped in such a manner that the completed Work will conform to the requirements of this Section as applicable, using approved methods which will not disturb the bond, cause sagging, or cause horizontal fractures. Surfaces of repairs shall receive the same kind and amount of curing treatment as required for the concrete in the repaired section.

3.20 CARE AND REPAIR OF CONCRETE

A. The Contractor shall protect concrete against injury or damage from excessive heat, lack of moisture, overstress, or any other cause until final acceptance. Particular care shall be taken to prevent the drying of concrete and to avoid roughening or otherwise damaging the surface. Any concrete found to be damaged, or which may have been originally defective, which becomes defective at any time prior to the final acceptance of the completed Work, which departs from the established line or grade, or which, for any other reason, does not conform to the requirements of the Contract Documents, shall be satisfactorily repaired or removed and replaced with acceptable concrete.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

A. Measurement for payment for the contract item Cast In Place Concrete will be by the Cubic Yard (CY) and will be the number of Cubic Yards (CYs) of Cast-in-Place Concrete.

4.02 PAYMENT

A. The contract prices will be paid for Cast in Place Concrete which shall include full compensation for all costs incurred under this section.

END OF SECTION

SECTION 03700
MASS CONCRETE

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This section covers the requirements for Pine Flat Hydroelectric Unit #4 mass concrete.

B. The Contractor shall design and provide mass concrete, joints in concrete, reinforcement steel and appurtenant work, formwork, bracing, shoring, supports, and shall design and construct falsework, complete and in place, in accordance with the Contract Documents.

1.02 REFERENCES, SPECIFICATIONS, CODES AND STANDARDS

A. The edition of the standards applicable to the Work shall be those editions referenced by the 2022 California Building Code (CBC). Where reference is made to any of the below, the revision in effect at the time of bid opening shall apply.

B. American Concrete Institute (ACI)

ACI 207.1R	Guide to Mass Concrete

C. ASTM International (ASTM)

ASTM C150	Standard Specification for Portland Cement
ASTM C494	Standard Specification for Chemical Admixtures for Concrete
ASTM C618	Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete

1.03 DEFINITIONS

A. Mass concrete: Concrete 4 feet or greater in thickness, or as called out on the Contract Drawings.

B. Cooling period: The time required for the interior temperature of the concrete placement to stabilize. Minimum of 14 days from the time of placement.

1.04 SYSTEM DESCRIPTION

A. Thermal Control Plan:

a. Submit a Thermal Control Plan signed by a licensed Civil or Structural Engineer, registered in the State of California. Include the following as a minimum:

(1) Calculations for maximum concrete temperature and maximum differential concrete temperature for each mass concrete element.

(2) Concrete mix design.

(3) Duration and method of curing.

(4) Procedures to control concrete temperature at time of placement.

(5) Methods of controlling temperature differentials.

(6) Temperature sensor types and locations.

(7) Temperature monitoring and recording system.

(8) Field measures to ensure conformance with the maximum concrete temperature and maximum temperature differential requirements.

(9) Corrective measure to take if it appears the specified maximum temperature and differential temperature will be exceeded.

b. Have temperature control measures in place during the placement of concrete to limit the maximum initial concrete temperature rise to 20 degrees Fahrenheit.

c. Difference in temperature between concrete interior and surface temperatures shall not exceed 35 degrees Fahrenheit.

d. Allow the interior of the concrete to cool down and stabilize.

e. The maximum allowable concrete temperature: 145 degrees Fahrenheit.

f. Do not place mass concrete until the Owner's Engineer has accepted in writing, the Thermal Control Plan.

B. Pre-cooling of concrete:

1. Cooling of the concrete mix, prior to placement, may be attained by following means:

a. Cool batch water. Ice may be substituted for a portion of the batch water.

b. Continuously spray coarse aggregate with water to cool the aggregate. Adjust the water content of the concrete mix to account for the cooling water.

c. Alternative means proposed by the Contractor and acceptable to the Owner's Engineer.

C. Post-cooling of concrete:

1. At Contractor's option, use embedded thin-walled piping for circulating water to control temperature gain in the previously cast concrete:

a. Clearly indicate in the Thermal Control Plan if cooling piping will be embedded in the concrete.

b. Do not install embedded piping within the top 20 inches of the slab or wall.

c. Operate cooling pipe system for the duration of the cooling period.

d. After use of cooling pipes to cool the concrete is complete, fill pipes with grout.

D. Misting concrete:

1. Use fog sprayers to reduce the ambient air temperature and increase the humidity during concrete placement.

E. Curing concrete:

1. Water cure or plastic membrane cure as soon as possible following placement of concrete as specified in Section 03300- Cast-in-Place Concrete.

a. If water curing is used, use methods that minimize differential concrete temperature.

b. Consider the type of curing in the Thermal Control Plan.

F. Temperature monitoring program:

1. Temperature monitoring and recording system:

a. Consist of temperature sensors connected to a data acquisition system capable of printing, storing, and downloading data to a computer.

b. Locate temperature sensors such that the maximum temperature difference within a mass concrete element can be monitored.

c. As a minimum, monitor concrete temperatures at the calculated hottest location, on at least 2 outer faces, 2 corners, and top surfaces.

2. Temperature readings:

a. Automatically recorded on an hourly or more frequent basis.

b. Hourly temperature recording may be discontinued when:

(1) Maximum internal temperature is falling.

(2) Difference between the interior concrete temperature and the average daily air temperature is less than the allowable temperature difference for 3 consecutive days.

(3) There are no mass concrete elements to be cast adjacent.

c. Print and submit data to the Owner's Engineer daily.

3. Methods of concrete consolidation: Prevent damage to the temperature monitoring and recording system.

a. Protect wiring connected to temperature sensors cast into the concrete to prevent movement.

b. Keep wire runs as short as possible.

c. Do not allow ends of the temperature sensors to come into contact with either a support or concrete form or reinforcing bar.

4. When any equipment used in the temperature control and monitoring and recording system fails during the mass concrete construction operation, take immediate measures to correct the situation in accordance with Thermal Control Plan. Failure to conform to the temperature requirements will be cause for rejection of the concrete.

1.05 SUBMITTALS

A. Product data.

B. Thermal Control Plan.

C. Temperature Monitoring Program.

1. Temperature monitoring data:

a. Tabular data of hourly temperature for each temperature sensor.

b. Tabular data for hourly temperature differential for each temperature sensor.

c. Plot of temperature and temperature differential for each temperature sensor.

D. Layout of cooling pipe system, if used, showing pipe sizes and material type, connections, location, spacing, method of support, and system for monitoring the temperature of the water in the cooling pipes.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Storage and protection:

1. Store coarse and fine aggregate in a covered area. Shade aggregates to prevent heating by direct sunlight.

2. Store cementitious materials in covered, shaded silos to prevent heating by direct sunlight.

PART 2 - PRODUCTS

2.01 CONCRETE MATERIALS

A. Concrete admixtures:

1. Air entraining admixture:

a. As specified in Section 03300 - Cast-in-Place Concrete.

2. Retarding admixture:

a. At the Contractor's option, a set retarding admixture may be used to control set time and minimize premature setting of concrete and formation of cold joints.

b. As specified in Section 03300 - Cast-in-Place Concrete.

c. Dosage: In accordance with manufacturer's written requirements.

3. Water reducing admixture:

a. As specified in Section 03300 - Cast-in-Place Concrete.

B. Coarse aggregate:

1. As specified in Section 03300 - Cast-in-Place Concrete.

2. Maximum coarse aggregate size: 1-1/2 inches.

3. Coarse aggregate grading: In accordance with Table 2.5.8 of ACI 207.1R.

C. Fine aggregate:

1. As specified in Section 03300 - Cast-in-Place Concrete.

D. Portland cement:

1. Cement shall conform to the requirements of ASTM C 150 Type II (MH).

E. Fly Ash:

1. Fly ash in accordance with ASTM C618 Class F may be used in mass concrete made with Type II (MH) Portland cement.

F. Water and ice:

1. Mixing water: As specified in Section 03300 - Cast-in-Place Concrete.

2. Water for making ice: Meet the requirements of mixing water as specified in Section 03 30 00 Cast-in-Place Concrete.

3. Ice may be substituted for mixing water on a 1 to 1 ratio based on weight.

2.02 MIXES

A. As specified in Section 03300 - Cast-in-Place Concrete for Structural concrete, except as modified by this Section.

B. Concrete mix for mass concrete:

1. Water-cementitious material ratio: Not to exceed 0.45.

2. Entrained air content range: 2 to 4 percent.

3. Slump range: 2 inches to 4 inches.

4. Fly Ash:

a. Minimum of 15 percent fly ash.

b. Maximum of 25 percent fly ash.

5. The water/cement ratio shall be calculated based on the total amount of cement materials.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Concrete placement: As specified in Section 03300 – Cast-In-Place Concrete except as modified in this Section.

3.02 FIELD QUALITY CONTROL

A. Temperature Monitoring Program:

1. Install a temperature monitoring system to measure temperatures in the interior and near the surface of the concrete.

2. Continuously monitor the temperature of the interior of the concrete and surfaces of the concrete during the cooling period.

3. Temperature monitoring data not conforming to requirements of this Section:

a. Stop placing mass concrete.

b. Concrete not conforming to temperature requirements of this Section will be rejected. Remove rejected mass concrete at Contractor's expense.

c. Modify Thermal Control Plan and calculations to correct problem and resubmit.

d. Do not place mass concrete until revised Thermal Control Plan and calculations have been accepted by Owner's Engineer.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

A. Measurement for payment for the contract item Mass Concrete will be by the Cubic Yard (CY) and will be the number of Cubic Yards (CYs) of Mass Concrete.

4.02 PAYMENT

A. The contract prices will be paid for Mass Concrete which shall include full compensation for all costs incurred under this section.

END OF SECTION

SECTION 05500
METAL FABRICATIONS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This section covers the requirements for Pine Flat Hydroelectric Unit #4 project miscellaneous metalwork and appurtenances.

B. Design and provide miscellaneous metalwork and appurtenances, complete and in place, as indicated in accordance with the Contract Documents.

1.02 REFERENCES, SPECIFICATIONS, CODES AND STANDARDS

A. The edition of the standards applicable to the Work shall be those editions referenced by the 2022 California Building Code (CBC). Where reference is made to any of the below, the revision in effect at the time of bid opening shall apply.

B. American Institute of Steel Construction (AISC)

AISC	Steel Construction Manual
AISC	Detailing for Steel Construction

C. American Iron and Steel Institute (AISI)

AISI S100	North American Specification for the Design of Cold - Formed Steel Structural Members

D. ASTM International (ASTM)

ASTM A36	Standard Specification for Carbon Structural Steel
ASTM A48	Standard Specification for Gray Iron Castings
ASTM A53	Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A123	Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A153	Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

ASTM A193	Standard Specification for Alloy-Steel and Stainless-Steel Bolting for High Temperature or High-Pressure Service and Other Special Purpose Applications
ASTM A194	Standard Specification for Carbon Steel, Alloy Steel, and Stainless-Steel Nuts for Bolts for High Pressure or High Temperature Service
ASTM A307	Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength
ASTM A500	Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A572	Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel
ASTM A780	Standard Specification for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM A992	Standard Specification for Structural Steel Shapes
ASTM F1554	Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength
ASTM F3125	Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi and 150 ksi Minimum Tensile Strength

E. American Welding Society (AWS)

AWS B1.5	Standard for the Qualification of Welding Inspectors
AWS D1.1	Structural Welding Code – Steel
AWS QC1	Qualification and Certification of Welding Inspectors

F. CBC 2022 California Building Code

G. National Association of Architectural Metal Manufacturers (NAAMM)

NAAMM MBG531	Metal Bar Grating Manual
NAAMM MBG532	Heavy Duty Metal Bar Grating Manual

1.03 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with the requirements of Section 01330 – Submittal Procedures.

B. Design and Shop Drawings

1. Design and Shop Drawings shall conform to AISC Detailing for Steel Construction, and shall show all holes, material grades, and location of parts/pieces in the completed Work.

2. Shop Drawings shall include complete details of members and connections, anchor bolt layouts, schedules for fabrication procedures, and diagrams for the sequence of erection.

C. Design Calculations

1. Design calculations shall include a complete stress and deflection analysis of all structural components and connections.

D. Grating

1. Submit layout drawings for grating, showing the direction of span, type and depth of grating, size and shape of grating panels, seat angle details, and details of grating hold down fasteners.

2. Submit load and deflection tables for each style and depth of grating used.

E. Anchor Submittals

1. For cast-in-place anchors and post-installed anchors, complete structural calculations and anchorage details shall be prepared and submitted by the Contractor for all anchors and anchor groups that are shown but not detailed (type, size, location, spacing and embedment) on the Contract Documents. Calculations and anchorage details shall be signed and stamped by a Professional Engineer registered in the state of California.

1.04 QUALITY ASSURANCE

A. Weld procedures and welder qualifications shall be available in the Contractor's field office for review.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Steel

1. Wide Flange Shapes: ASTM A992

2. Shapes, Plates, Bars: ASTM A36 unless indicated otherwise

3. Structural Pipe, Pipe Columns, Bollards: ASTM A53, Type E or S, Grade B standard weight unless indicated otherwise

4. HSS: ASTM A500 Grade B

B. Corrosion Protection

1. Miscellaneous steel metalwork shall be hot-dip galvanized after fabrication. Weight of galvanizing shall be G90 unless noted otherwise.

C. Stainless Steel

1. Unless otherwise indicated, stainless steel metalwork and bolts shall be fabricated from Type 316 stainless steel.

2.02 STEEL PIPE HANDRAILS

A. Steel pipe handrails shall be standard 1-1/2-inch black steel pipe made up by welding and shall be hot-dip galvanized after fabrication.

2.03 METAL STAIRS

A. Metal Stairs

1. Metal stairs shall be composed of steel stringers and supports.

2. Steel stair members shall be hot dip galvanized after fabrication.

2.04 GRATING STAIR TREADS

A. Grating stair treads shall be designed to support a distributed live load of 100 psf or a concentrated live load at mid-span of 300 pounds, whichever creates the higher stress.

B. The maximum deflection due to the uniform live load shall be as required for metal grating, below.

C. Grating stair treads shall be provided with an integral non-slip nosing.

2.05 METAL GRATING

A. General

1. Metal grating shall be of the indicated design, size, and type.

2. Grating shall be supported around an opening by support members.

3. Where grating is supported on concrete, provide embedded support angles, unless otherwise indicated. Support angles shall match the grating material and mitered and welded at their corners.

4. Banding

    a. The grating shall be completely banded at edges and cutouts.

    b. The banding material and cross-section thickness shall be equivalent to the bearing bars.

    c. The banding shall be welded to each cut bearing bar.

5. The grating pieces shall be fastened to each support by positive means in 2 locations.

6. Where grating forms the landing at the top of a stairway, the edge of the grating that forms the top riser shall have an integral non-slip nosing with a width equal to that of the stairway.

7. Design Loading

    a. For standard duty plank and safety grating, unless otherwise indicated, the loading to be used for determining stresses and deflections shall be the 100 psf, or a concentrated load of 1000 pounds.

B. Standard Duty Grating

1. Except where indicated otherwise, bar grating shall be fabricated entirely of:

    a. galvanized steel

2. No single piece of grating shall weigh more than 80 pounds, unless indicated otherwise.

3. Standard duty grating shall be composed of serrated bar grating.

4. Cross bars shall be welded or mechanically locked tightly into position such that there is no movement between the bearing and cross bars.

C. Heavy-Duty Grating

1. Heavy-duty grating shall be fabricated from welded steel, galvanized after fabrication.

2. Crossbars shall be welded in position.

3. Banding bars shall have a minimum thickness of ¼".

2.06 CHECKERED PLATE

A. Checkered plate shall be provided with a pattern of raised lugs on one face and shall be smooth on the opposite face.

B. The plate shall be fabricated from galvanized steel.

C. Unless indicated otherwise, the minimum plate thickness shall be as required to limit deflection resulting from a live load of 100 psf to 1/4 inch, or the span divided by 240, whichever is less.

2.07 BOLTS AND ANCHORS

A. Standard Service (Non-Corrosive Application)

1. Bolts, anchor rods, anchor bolts, washers, and nuts shall be fabricated from steel as indicated.

2. Threads on galvanized bolts, rods and nuts shall be formed with suitable taps and dies such that they retain their normal clearance after hot-dip galvanizing.

3. Except as otherwise indicated, steel for bolt material, anchor rods, anchor bolts, and cap screws shall be in accordance with the following requirements:

   a. Structural Connections: ASTM A307, Grade A or B, hot-dip galvanized.

   b. Headed Anchor Rods and Anchor Bolts: ASTM F1554, Grade 36, hot-dip or mechanically galvanized with Grade A matching nuts.

   c. High-Strength Bolts, where indicated: ASTM F3125, Grade A325.

B. Corrosive Service

1. Corrosive service locations to be provided with stainless steel bolts.

C. Unless otherwise indicated, stainless steel bolts, nuts, anchor rods, and washers shall be fabricated from Type 316 stainless steel, Class 2, conforming to ASTM A193 for bolts and to ASTM A194 for nuts.

D. Bolt Requirements

1. The bolt and nut material shall be free-cutting steel.

2. The nuts shall be capable of developing the full strength of the bolts.

3. Threads shall be Coarse Thread Series conforming to the requirements of the American Standard for Screw Threads.

4. Bolts and cap screws shall have hexagon heads and nuts shall be Heavy Hexagon Series.

5. Bolts and nuts shall be installed with washers fabricated from material matching the base material of bolts, except that hardened washers for high-strength bolts shall conform to the requirements of the AISC Specification.

6. Lock washers fabricated from material matching the bolts shall be installed where indicated.

7. The length of each bolt shall be such that the bolt extends at least 1/8 inch beyond the outside face of the nut before tightening, except for anchor bolts which shall be flush with the face of the nut before tightening.

PART 3 - EXECUTION

3.01 FABRICATION AND INSTALLATION REQUIREMENTS

A. Fabrication and Erection: Except as otherwise indicated, the fabrication and erection of structural steel shall conform to the requirements of the American Institute of Steel Construction "Manual of Steel Construction."

B. Steel Railings: Field welding of steel pipe handrail joints will be permitted only if approved by the Owner's Engineer, and then only in accordance with the Owner Engineer's instructions.

3.02 WELDING

A. Method

1. Welding shall be performed by the metal-arc method or gas-shielded arc method as described in the American Welding Society "Welding Handbook" as supplemented by other pertinent standards of the AWS.

2. The qualification of the welders shall be in accordance with the AWS Standards.

B. Quality

1. In assembly and during welding, the component parts shall be adequately clamped, supported, and restrained to minimize distortion and for control of dimensions.

2. Weld reinforcement shall be as indicated by the AWS Code.

3. Upon completion of welding, remove weld splatter, flux, slag, and burrs left by attachments.

4. Welds shall be repaired to produce a workmanlike appearance, with uniform weld contours and dimensions.

5. Sharp corners of material that is to be painted or coated shall be ground to a minimum of 1/32 inch on the flat.

3.03 GALVANIZING

A. Structural steel plates shapes, bars, and fabricated assemblies required to be galvanized shall, after the steel has been thoroughly cleaned of rust and scale, be galvanized in accordance with the requirements of ASTM A123.

B. Any galvanized part that becomes warped during the galvanizing operation shall be straightened.

C. Bolts, anchor rods, anchor bolts, nuts, and similar threaded fasteners, after being properly cleaned, shall be galvanized in accordance with the requirements of ASTM A153.

D. Field Repairs

1. Galvanizing shall be repaired in accordance with ASTM A780.

2. Surface preparation shall consist of removing oil, grease, soil, and soluble material by cleaning with water and detergent (SSPC SP1) followed by brush-off blast cleaning (SSPC SP7) over an area extending at least 4 inches into the undamaged area.

3. The coating shall be applied to at least 3 mils dry film thickness, and shall be Zinc-Clad XI by Sherwin-Williams, Galvax by Alvin Products, Galvite by ZRC Worldwide, or equal.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

A. No separate measurement for the work of this Section will be made.

4.02 PAYMENT

A. Payment for work required under this Section will be a part of the lump sum price in the Bid for the following item:

B. Such payment will be considered full compensation for all costs incurred for the performance of the work necessary to complete the requirements of this Section.

Item No.	Item	Description	Unit
05500-1	Pre-engineered metal powerhouse building steel stairs	Steel Stairs located inside and outside pre-engineered metal powerhouse building	LS
05500-2	Pre-engineered metal powerhouse building steel handrails	Steel handrails located inside and outside pre-engineered metal powerhouse building	LS
05500-3	Pipe supports	Hydroelectric Unit #4 pipe supports: manifold support and discharge pipe supports	LS
05500-4	Pre-engineered metal powerhouse building grating supports	Steel supports for stair landings and walkways outside and inside of pre-engineered metal powerhouse building	LS

05500-5	Pre-engineered metal powerhouse building steel grating	Steel grating for stair landings and walkways outside and inside of pre-engineered metal powerhouse building	LS
05500-6	Pre-engineered metal powerhouse building steel heavy duty grating	Steel grating for stair landings and walkways outside and inside of pre-engineered metal powerhouse building	LS
05500-7	Spray wall penetration block out bulkhead	Steal bulkhead around discharge pipe end bloking of the cutout in spray wall.	LS

END OF SECTION

SECTION 09900
PAINTS AND COATINGS

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section covers requirements for materials and application of painting and coating systems.

B. Related work specified elsewhere:

1. All specification sections in which painting and/or coating is specified.

1.02 SUBMITTALS

A. General: Make submittals in accordance with Section 01300.

B. Product Data

1. Product Manufacturer's data sheets shall show the following information:

a. Percent solids by volume.

b. Minimum and maximum recommended dry-film thickness per coat for prime, intermediate, and finish coats.

c. Recommended surface preparation.

d. Recommended thinners.

e. Statement verifying that the specified prime coat is recommended by the Manufacturer for use with the specified intermediate and finish coats.

f. Application instructions including recommended equipment and temperature limitations.

g. Curing requirements and instructions.

1.03 REFERENCE STANDARDS

A. American National Standards Institute (ANSI)

A159.1 Surface Preparation Specifications

B. American Society for Testing and Materials (ASTM)

D2697 Test Method for Volume Non-Volatile Matter in Clear or Pigmented Coatings

C. American Water Works Association (AWWA)

C105 Polyethylene Encasement for Ductile Iron Pipe Systems

D. National Sanitation Foundation (NSF)

NSF-61 Drinking Water System Components Health Effects

PART 2 - PRODUCTS

2.01 MATERIALS

A. Coating Materials:

1. Material Time Limits: Materials shall be used within the time limit as recommended by the manufacturer.

Manufacturer's Recommendations: Copies of the manufacturer's recommendations for mixing and applying materials shall be furnished to the Owner's Engineer prior to mixing or applying the materials.

2. Manufacturer's Standards: Comply with manufacturer's recommendations and standards unless otherwise specified.

The top coat and any intermediate coat shall be a product of the manufacturer of the prime coat.

3. Coating materials shall conform to the following:

Material	Specification or Manufacturer
Alternative Finish	The manufacturer's standard coating materials and procedures may be submitted for consideration, provided the materials and procedures are equivalent or greater than what is specified and that such coating has been properly applied, and is compatible with subsequent coatings. Surface preparation, coatings, coating manufacturer's data sheet, dry film thickness, application procedures, and inspection techniques shall be submitted to the Owner's Engineer at least 30 days prior to coating
Corrosion Preventive Compound	Military Specifications MIL-C-16173E Grade 4. Chemsol Co., Mil-C-16173E Grade 4; Valvoline, TECTYL 846; or equal.
Fusion Bonded Epoxy	ANSI/AWWA C550. Epoxy resin shall be one hundred percent dry powder type epoxy resin conforming to Minnesota Mining and Manufacturing Co., Scotchkote No. 134 or Scotchkote No. 206N; Morton International, Corvel ECA-1626; or equal.
High Build Aliphatic Urethane	Carboline 133 HB; Devoe Devthane 359; or equal. Hi-build aliphatic urethane shall be a product of the manufacturer of the aluminum epoxy mastic.
High Solids Epoxy NSF Approved to Standard 61	Carboline/KopCoat, Super HiGard 891; Ameron Protective Coating Div., Amercoat 395; Devoe Coating Co., BarRust 233; or equal.
Reinforced Epoxy	Chesterton, ARC S2; Carboline, Plasite 4550S; or equal.
Fast Cure Epoxy Mastic	Macropoxy 646 PW epoxy by Sherwin Williams or equal.

B. Abrasive Blast Material:

1. Abrasive blast material shall be dry, clean angular material as recommended by the coating manufacturer. The blast material shall be new and shall not be reused or recycled.

Contractor may propose alternative materials, only to be used upon approval by the Owner's Engineer.

PART 3 - EXECUTION

3.01 COATING SCHEDULE

A. Method of surface preparation, type of coating, number of coats, dry film thickness, time of application and colors shall conform to the schedule below:

B. COATING SCHEDULE

Item	Method of Surface Preparation	Coating	No. of Coats and Mils Dry Film Thickness	Time of Application
Exterior ferrous surfaces exposed to the atmosphere Interior and exterior ferrous surfaces located indoors	SP 5 or 2.0-3.0 mil profile depth	High build modified aluminum Epoxy Mastic High Build Aliphatic Urethane Top Coat or approved alternative finish	2 coats 1st coat 4.0-5.0 mils 2nd coat 3.0-4.0 mils Total 7.0-9.0 mils	Shop applied
Interior and exterior of ferrous surfaces exposed to moisture: Turbine, carbon steel pipe sections, and valve parts	SP 5 3.0 mils Profile depth.	High Solids Epoxy	3 coats 1st coat 6.0 max. 2nd coat 6.0 max. 3rd coat as Required Total: 16.0 min.	Shop applied
Machined or finished ferrous surfaces exposed during shipment.	SP 1	Corrosion preventive compound	According to product application instructions.	Prior to shipment

3.02 WEATHER CONDITIONS

A. Do not paint in the rain, wind, snow, mist, and fog or when steel or metal surface temperatures are less than five degrees Fahrenheit above the dew point.

B. Do not apply paint when the relative humidity is above 85 percent or the temperature is above 90 degrees Fahrenheit.

C. Do not paint when temperature of metal to be painted is above 120 degrees Fahrenheit.

D. Do not apply alkyd or inorganic zinc paints if air or surface temperature is below 40 degrees Fahrenheit or expected to be below 40 degrees Fahrenheit within 24 hours.

E. Do not apply epoxy and polyurethane paints on an exterior or interior surface if air or surface temperature is below 60 degrees Fahrenheit or expected to drop below 60 degrees Fahrenheit in 24 hours.

3.03 SURFACE PREPARATION

A. Do not sandblast or prepare more surface area in one day than can be coated in one day; prepare surfaces and apply coatings the same day. Remove all sharp edges, burrs, and weld spatter. Do not sandblast PVC, CPVC, or FRP piping or equipment. Do not sandblast epoxy- or enamel-coated pipe that has already been factory coated, except to repair scratched or damaged coatings.

B. Surface preparation shall conform with the SSPC (Steel Structure Painting Council, Surface Preparation Specifications, ANSI A159.1) specifications as follows:

1.	Solvent Cleaning	SP-1
2.	Hand Tool Cleaning	SP-2
3.	Power Tool Cleaning	SP-3
4.	White Metal Blast Cleaning	SP-5
5.	Commercial Blast Cleaning	SP-6
6.	Brush-Off Blast Cleaning	SP-7
7.	Near-White Blast Cleaning	SP-10

C. Wherever the words "solvent cleaning," "hand tool cleaning," "wire brushing," "blast cleaning," or similar words are used in these specifications or in paint Manufacturer's specifications, understand they refer to the applicable SSPC specifications listed above.

D. Dust blasting is defined as cleaning the surface through the use of very fine abrasives, such as siliceous or mineral abrasives, 80-mesh to 100-mesh. Apply a fine etch to the metal surface to clean the surface of any contamination or oxide.

E. Remove oil and grease from metal surfaces in accordance with SSPC SP-1. Use clean cloths and cleaning solvents and wipe dry with clean cloths. Do not leave a film or greasy residue on the cleaned surfaces before sandblasting.

F. Remove weld spatter and weld slag from metal surfaces and grind smoothly rough welds, beads, peaked corners, and sharp edges including erection lugs in accordance with SSPC SP-2 and SSPC SP-3.

G. Neutralize welds with a chemical solvent that is compatible with the specified coating materials. Use clean cloths and chemical solvent. Wipe dry with clean cloths. Do not leave a residue on the cleaned surfaces.

3.04 FIELD TOUCH-UP OF SHOP-APPLIED PRIME COATS

A. Remove oil and grease surface contaminants on metal surfaces in accordance with SSPC SP-1. Use clean rags wetted with a degreasing solution, rinse with clean water, and wipe dry.

B. Remove dust, dirt, salts, moisture, chalking primers, or other surface contaminants that will affect the adhesion or durability of the coating system. Use a high-pressure water blaster or scrub surfaces with a broom or brush wetted with a solution of trisodium phosphate, detergent, and water. Before applying intermediate or finish coats to inorganic zinc primers, remove any soluble zinc salts that have formed by means of scrubbing with a stiff bristle brush. Rinse scrubbed surfaces with clean water. Wash water needs to be contained and properly disposed of.

C. Remove loose or peeling primer and other surface contaminants not easily removed by the previous cleaning methods in accordance with SSPC SP-7. Take care that remaining primers are not damaged by the blast cleaning operation. Remaining primers shall be firmly bonded to the steel surfaces with blast cleaned edges feathered.

D. Remove rust, scaling, or primer damaged by welding or during shipment, storage, and erection in accordance with SSPC SP-10. Take care that remaining primers are not damaged by the blast cleaning operation. Remaining primers shall be firmly bonded to the steel surfaces with blast cleaned edges feathered.

E. Use repair procedures on damaged primer which protects adjacent primer. Blast cleaning shall require the use of lower air pressure, smaller nozzles, and abrasive particle sizes, short blast nozzle distance from surface, shielding, and/or masking.

F. Remove dust, blast particles, and other debris after abrasive blast cleaning of damaged and defective areas by dusting, sweeping, and vacuuming; then apply the specified touch-up coating.

G. Field touch-up surfaces that are shop primed with inorganic zinc primers with organic zinc primer to cover all scratches or abraded areas.

H. Field touch-up other surfaces that are shop primed with the same primer used in the original prime coat.

3.05 PAINTING SYSTEMS

A. Provide materials for a specified painting system, including primer, intermediate, and finish coats by the same manufacturer. Thinners, cleaners, driers, and other additives shall be as recommended by the paint manufacturer for the particular coating system.

B. Deliver paints to the jobsite in the original, unopened containers.

3.06 QUALITY CONTROL

A. Inspection Notification:

1. The Contractor shall notify the Owner's Engineer 5 days in advance of the start of any surface preparation work or coating application work. Such work shall be performed in the presence of the Owner's Engineer unless otherwise approved in writing.

2. Illumination and illumination supports shall be provided while work and inspection is in progress. Illumination shall be by an electrical lighting system equivalent to at least 100-foot-cnadles intensity on all surfaces to be inspected.

B. Surface Preparation Inspection Procedures:

1. Visual: Surface preparation shall conform to SSPC VIS 1 for the appropriate level of surface preparation as specified in the coating schedule.

2. Profile: Surface profile shall be sharp and angular, and shall conform to the specifications in the coating schedule. The abrasive cleaned surface will be measured in accordance with ASTM D 4417 Method B or Method C and SSPC PA-17. Method B apparatus shall be capable of saving and printing results of measurements which shall be submitted. Method C replica tape impressions shall be submitted.

3. Chloride Contamination: Surfaces to be coated shall be testing for the presence of chlorides on the surface to be coated immediately prior to coating. Testing shall conform to SSPC Technology Guide 15 Method A2. An acceptable test kit is the Chlor Test Kit, available from Chlor Rid International. Tests shall be performed adjacent to the weld areas, if present, otherwise, test sites shall be selected to be representative of the surface as a whole. The rate of testing shall be as follows:

   a. Five tests for the first 1,000 square feet.

   b. Two tests for each additional 1,000 square feet for the next 3,000 square feet.

   c. One test for each additional 2,000 square feet.

   d. One or more chloride measurements greater than 3 micrograms per square centimeter shall be cause for rejection. The supplier will then be required to removed soluble salts.

C. Coating Inspection Procedures:

1. Dry Film Thickness: Dry film thickness will be measured using Elcometer Instruments, Ltd.; DeFelsko Corporation, Positector; Minitest/Elecktro-Physik; or equal.

2. Holiday Detection: Holiday detection shall be performed over 100 percent of the coated surface. The holiday detection method shall be determined by the total film thickness specified. The voltage shall be maintained through the inspection. Test shall be conducted in accordance with ASTM D 5162.

a. Coating systems with a dry film thickness of less than 20 mils shall be inspected for discontinuities and voids with a low voltage detector of the wet sponge type, Tinker and Rasor, Model MI; KD Bird Dog, Model KD Bird Dog Holiday Detector; Elcometer 270; or equal.

b. Coatings with a dry film thickness of more than 20 mils shall be inspected for discontinuities and voids with a high voltage low current spark type detector, Tinker and Rasor, Model AP-W Series; Pipeline Inspection Co., Spy No. 700 and 900 Series Holiday Detector; Elcometer Model 236 DC; or equal. The minimum voltage of the detector shall be adjusted to 100 volts per mil of the average thickness of the coating to be inspected. The voltage shall be maintained throughout the inspection.

3. Adhesion: Test shall be conducted in accordance with ASTM D4541, Test Method D, using apparatus under Appendix D. Coating must meet a minimum value of 1,700 psi.

D. Test Equipment: The Contractor shall have calibrated equipment to meet the requirements of the specifications.

E. Test Equipment Use: The test equipment specified shall be made available for use by the Owner's Engineer in performing duplicate or additional coating inspections as deemed necessary by the Owner's Engineer.

F. Coating Log: For Daily Coating Inspection Reports, the Contractor should use the form that will be provided.

G. The Contractor shall arrange for the presence of the coating manufacturer's technical representative on-site if quality control or application problems arise, or at the request of the Owner's Engineer.

3.07 REPAIR OF IMPROPERLY COATED SURFACES

A. If the item has an improper finish color or insufficient film thickness, clean and recoat the surface with the specified paint material to obtain the specified color and coverage. Sandblast or power-sand visible areas of chipped, peeled, or abraded paint, feathering the edges. Then prime and finish coat in accordance with the specifications. Work shall be free of runs, bridges, shiners, laps, or other imperfections.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

A. No Separate measurement for the work covered under this section will be made.

4.02 PAYMENT

A. The work performed and products delivered according to this section will be paid under each other contract section product upon which coating was applied.

END OF SECTION

SECTION 11050
OPERATION AND MAINTENANCE MANUALS

PART 1 - GENERAL

1.01 O&M MANUAL

A. The Contractor shall submit technical operation and maintenance information for each item of mechanical, electrical and instrumentation equipment, furnished under this contract, in an organized manner in the Technical Manual. It shall be written so that it can be used and understood by the Owner's operation and maintenance staff.

B. The Technical Manual shall be subdivided first by specification section number; second, by equipment item; and last, by "Category." "Categories" shall conform to the following (as applicable):

1. Category 1 - Equipment Summary:

   a. Summary: A summary table shall indicate the equipment name, equipment number, and process area in which the equipment is installed.

   b. Form: The Contractor shall supply an Equipment Summary for each item of mechanical, electrical and instrumentation equipment in the Work. The Contractor shall include the relevant information in Part 1.

2. Category 2 - Operational Procedures:

   a. Procedures: Manufacturer-recommended procedures on the following shall be included in Part 2:

      (1) Installation

      (2) Adjustment

      (3) Startup

      (4) Location of controls, special tools, equipment required, or related instrumentation needed for operation

      (5) Operation procedures

      (6) Load changes

      (7) Calibration

      (8) Shutdown

      (9) Troubleshooting

      (10) Disassembly

      (11) Reassembly

(12) Realignment

(13) Testing to determine performance efficiency

(14) Tabulation of proper settings for all pressure relief valves, low and high pressure switches, and other protection devices

(15) List of all electrical relay settings including alarm and contact settings

3. Category 3 - Preventive Maintenance Procedures:

   a. Procedures: Preventive maintenance procedures shall include all manufacturer-recommended procedures to be performed on a periodic basis, both by removing and replacing the equipment or component, and by leaving the equipment in place.

   b. Schedules: Recommended frequency of preventive maintenance procedures shall be included. Lubrication schedules, including lubricant SAE grade, type, and temperature ranges, shall be covered.

4. Category 4 - Parts List:

   a. Parts List: A complete parts list shall be furnished, including a generic description and manufacturer's identification number for each part. Addresses and telephone numbers of the nearest supplier and parts warehouse shall be included.

   b. Drawings: Cross-sectional or exploded view drawings shall accompany the parts list.

5. Category 5 - Wiring Diagrams: Part 5 shall include complete internal and connection wiring diagrams for electrical equipment items.

6. Category 6 - Shop Drawings: This part shall include approved shop or fabrication drawings, complete with dimensions.

7. Category 7 - Safety Procedures: This part describes the safety precautions to be taken when operating and maintaining the equipment or working near it.

8. Category 8 - Documentation: All equipment warranties, affidavits, and certifications required by the Technical Specifications shall be placed in this part.

9. Category 9 – Troubleshooting. This part shall include troubleshooting guides for each piece of equipment or system.

C. The Contractor shall furnish to the Owner’s Engineer six (6) identical Technical Manuals. Each set shall consist of one or more volumes, each of which shall be bound in a standard size, 3-ring, looseleaf, vinyl plastic hard cover binder

suitable for bookshelf storage. Binder ring size shall not exceed 2.5 inches. A table of contents indicating all equipment in the manuals shall be prepared.

D. Manuals shall be submitted in final form to the Owner's Engineer as mutually agreed upon with Equipment Supplier and the Owner.

E. Three sets of draft manuals shall be submitted 60 days prior to required manufacturer training, as indicated in Section 01730. Within 30 days of completion of training submit final copies of manuals as indicated above.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

A. No Separate measurement for the work covered under this section will be made.

4.02 PAYMENT

A. The work performed and products delivered according to this section will be paid under each other applicable contract section.

END OF SECTION

SECTION 13120
PRE-ENGINEERED METAL POWERHOUSE BUILDING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This section covers the requirements for Pine Flat Hydroelectric Unit #4 pre-engineered metal powerhouse building.

B. The Contractor shall provide pre-engineered metal powerhouse building and appurtenant Work, complete and in place, with operational components, in accordance with the Contract Documents.

C. The Contractor shall furnish professional design and engineering services as required for pre-engineered metal powerhouse building and appurtenances as indicated herein.

1. Professional design and engineering services may be provided by the manufacturer or by an independent licensed professional engineer retained by the Contractor, either of which shall comply with the requirements indicated.

D. The Contractor shall coordinate color samples with other Sections through the submittal process.

1.02 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. The edition of the standards applicable to the Work shall be those editions referenced by the 2022 California Building Code (CBC). Where reference is made to any of the below, the revision in effect at the time of bid opening shall apply.

B. American Institute of Steel Construction (AISC)

AISC 341	Seismic Provisions for Structural Steel Buildings
AISC 360	Specification for Structural Steel Buildings
AISC	Steel Construction Manual

C. American Iron and Steel Institute (AISI)

AISI S100	North American Specification for the Design of Cold-Formed Steel Structural Members

D. American Society for Testing and Materials (ASTM)

ASTM A36	Standard Specification for Carbon Structural Steel

ASTM A307	Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength
ASTM A529	Standard Specification for High-Strength Carbon-Manganese Steel of Structural Quality
ASTM A572	Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel
ASTM A653	Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A992	Standard Specification for Structural Steel Shapes
ASTM A1008	Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High- Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable
ASTM A1011	Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength
ASTM F1554	Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength
ASTM F3125	Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength

E. American Welding Society (AWS)

AWS D1.1	Structural Welding Code-Steel
AWS D1.3	Structural Welding Code - Sheet Steel

F. CBC 2022 California Building Code

G. Metal Building Manufacturer's Association (MBMA)

Metal Building Systems Manual

Seismic Design Guide for Metal Building Systems

H. The Society for Protective Coatings (SSPC)

SSPC-SP 2	Hand Tool Cleaning
SSPC-SP 8	Pickling

1.03 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 01330 – Submittal Procedures.

B. Literature: Manufacturer's specifications, technical data, installation methods, and maintenance instructions, and the following:

1. Manufacturer's full-range color charts, indicating custom color availability for color selection by the Owner.

2. Additional information for the building system, roof panels, wall panels, accessories and components.

C. Warranty: Submit a copy of the warranty.

D. Certifications

1. Certification of compliance with the Structural Requirements of paragraph 2.1.A.

2. Certification of manufacturer qualifications demonstrating compliance with the qualifications requirements indicated. Include a list of 5 similar completed projects with addresses of the project location, date of project completion, manufacturer's products, and contact information of the consultant firm of record, general contractor, and owner.

3. Certification of installer qualifications demonstrating compliance with the qualifications requirements indicated. Include a list of 5 similar completed projects with addresses of the project location, date of project completion, and contact information of the consultant firm of record, general contractor and Owner.

4. Certification from the manufacturer stating that galvanizing has been completed in accordance with these specifications.

5. Certification of welder qualifications in accordance with AWS requirements.

6. When requested by the Owner’s Engineer, furnish other certifications as may be required to demonstrate compliance with the Contract Documents.

E. Design Drawings and Design Calculations: Complete Design Drawings showing location and details of installation, and design calculations.

1. Design Drawings and Design Calculations shall be prepared, signed, and stamped by a professional civil or structural engineer registered in the State of California.

2. Design Drawings shall be drawn to sufficient scale, showing fully-dimensioned layout, including plans, sections, elevations and details of construction, connections to the foundation, joints, penetration details, preformed metal closures, flashing, gutters, and downspouts, fastenings, system caulking, sealants, gaskets, appurtenances, locations of framed openings, special project specific conditions, location of custom-cut panels, provisions for expansion and contraction, doors, windows, louvers, connections, accessories, and trim.

    a. Design Drawings shall include material descriptions, finish, color, details of construction, installation, and accessories of pre-engineered metal powerhouse building and shall include, as a minimum:

        (1) Erection drawings with written procedures to clearly explain proper installation of fasteners, trim, gaskets, and sealants. Erection drawings shall also include a notation requiring the installer to coordinate with other trades.

        (2) Transverse cross sections.

        (3) Roof plans showing sizes and locations of structural panels and connections and location of removable panels.

        (4) Elevations of walls showing sizes and locations of structural panels and connections, openings for doors, removable wall panels, HVAC and other mechanical and electrical equipment.

        (5) Details of door, door frames, and other openings and accessories.

        (6) Design and detail penetrations, including hot pipe penetrations, to be weathertight. Coordinate locations of penetrations.

        (7) Manufacturer's standard details may be used in addition to the shop drawings listed above provided that the portions that apply are clearly marked and those parts that do not apply are clearly marked.

        (8) Foundation plan with anchor rods, shear lugs (if required), and base plate details. A diagram shall be included showing the vertical and lateral loads applied on the foundation for each load combination.

3. Design Calculations

    a. Design calculations shall include a complete stress and deflection analysis of all structural components and connections.

    b. Design calculations shall substantiate a complete load path for the wind and seismic lateral force resisting system including design of drag, collector and bracing elements (including connections) required to transfer loading, including overstrength factors, to the foundation. The design calculations shall specifically address anchorage of the structural system to the foundation, including detailing of baseplates and anchor rods. Detailing shall consider edge distance and clearance requirements at slab edges, blockouts and curbs.

4. Specifications for the painting system including paint manufacturer's name, product trade name, and preparation for shop and field coats.

F. Deferred Approval: The design drawings and design calculations are considered a delegated design/deferred approval item and shall be submitted to the Building

Official(s) having jurisdiction for review and approval prior to construction. The Contractor shall provide all engineering support as necessary during the review process with all Building Official(s) having jurisdiction, including providing responses to review comments, attendance at meetings, and submitting all requested documentation.

G. Samples: The Contractor shall submit 2 samples of each of the following. Unless otherwise indicated, samples shall be full size and shall show gauges, configuration, construction, finish and color proposed for the various components. Samples shall be clearly marked to show the manufacturer's name, product identification, finish and color. New samples shall be resubmitted of each, as required, until approved by the Owner's Engineer. Upon approval, the samples shall become the standard for acceptance for the project with regard to color, finish, and quality of each item. Approval of samples shall not relieve the Contractor from compliance with the Contract Documents.

1. Metal Wall and Roof Panels

    a. Assembled half panels, with representative panel support framing, showing seam, and appurtenances; one-foot long, in color and finish indicated.

    b. Three-inches by 4-inch color samples showing substrate, finish, and color.

2. Gutter and downspout: One-foot long section of each in material, profile, finish, and color indicated.

3. Finish trim, closure pieces, and sealant, one-foot long each.

4. Samples of each type fastener required, identified as to use.

1.04 QUALITY ASSURANCE

A. Single Source Responsibility: Pre-engineered metal powerhouse building and components shall be provided by a single manufacturer.

B. Manufacturer Qualifications

1. Pre-engineered metal powerhouse building manufacturer shall be a current member of the MBMA.

2. Pre-engineered metal powerhouse building manufacturer shall have a minimum of 20 years of Pre-engineered metal building manufacturing experience.

3. Pre-engineered metal powerhouse building manufacturer shall have a minimum of 5 similar successful projects over the most recent 10 years, employing similar products, materials, applications, and performance requirements.

4. Manufacturers without these qualifications will not be accepted.

C. Installer Qualifications

1. Installer shall have a minimum of 5 years' experience in the successful completion of at least 5 projects of similar size and scope, employing similar products, materials, applications, and performance requirements.

2. Installer shall be trained, certified, and authorized by the manufacturer to install the manufacturer's product.

3. Installers without these qualifications will not be accepted.

1.05 SPECIAL WARRANTY PROVISIONS

A. For pre-engineered metal powerhouse building and appurtenances furnish manufacturer's 5-year written warranty to cover defects in materials, products, and manufacturing workmanship.

B. Installation Warranty: At the time of Substantial Completion, the manufacturer shall warrant that the installation is not defective and conforms to the manufacturer's erection drawings, except for reasonable variances not impairing the usefulness thereof.

C. Finish Warranty: The manufacturer shall warrant against spalling, fading, chalking, peeling, cracking, checking, chipping, or erosion to base metal of the exterior panel finish, for a period of 10 years from the date of Substantial Completion. The finish shall not change color more than eight NBS units for a period of 10 years from the date of Substantial Completion.

D. Weathertight Warranty: Manufacturer shall provide a weathertight warranty against water penetration of the pre-engineered metal powerhouse building system, including panel joints and trim conditions for a period of 20 years from date of Substantial Completion.

E. In the event that the pre-engineered metal powerhouse building fails to meet the warranty standards above, the manufacturer shall, at the manufacturer's sole cost (including labor and materials), replace or repair the pre-engineered metal powerhouse building, as agreeable to the Owner throughout the term of the warranty.

F. The Contractor shall furnish separate, but concurrently running, 5-year written warranty to cover installation and associated labor.

G. The term of the warranties shall begin on the date of Substantial Completion, unless otherwise indicated.

PART 2 - PRODUCTS

2.01 GENERAL

A. New Structural Requirements

1. Pre-engineered metal powerhouse building, including structural framing, accessories, related assemblies, components, appurtenances, and

attachment details, shall comply with the CBC and shall be designed and installed for resistance to the structural design criteria in accordance with the CBC. Where a conflict occurs between the requirements of this Section and the CBC, the more stringent shall apply.

2. The Contractor shall provide additional non-standard bracing, reinforcements, anchors, and heavier gauge materials in order to conform to the structural design criteria indicated and to other performance requirements indicated.

3. Pre-engineered metal powerhouse building, including related assemblies, components, and accessories, shall be manufactured and installed to maintain the specified performance requirements under the structural design criteria indicated without defects, damage, or failure.

B. Thermal Movements: Pre-engineered metal powerhouse building and accessories shall be designed to provide for such expansion and contraction of component materials as will be caused by temperature changes without causing buckling, stresses or other cladding components, failure of joints, undue stress on structural elements, damaging loads on fasteners, reduction of performance, or other visual or technical detrimental effects.

C. Description

1. Pre-engineered metal powerhouse building shall be provided complete and shall include the structural framing, connections, anchor rods, framed openings for wall and penetrations, and framed openings for doors, windows and louvers; metal roofing and scrim faced insulation with metal wall panel system, gutters and downspouts, pipe flashing, gable trim, flashing, closures, fasteners, sealants, and all other component parts for a complete weathertight, exterior envelope. Building shall be fully insulated in walls and roof.

   a. Footprint

      (1) The building's footprint shall cover the Unit 4 powerhouse foundation slabs as provided by the Contractor.

   b. Structural System

      (1) The building's structural system shall be a span clear-span rigid frame system as determined by the manufacturer.

      (2) The building’s structural system shall be selected such that it is compatible with the foundation system.

   c. Access

      (1) The building's system shall include removable roof panels and secondary structural members if necessary to provide temporary lifting access to equipment throughout the building's footprint.

2.02 MATERIALS

A. Metals

1. Members fabricated from plate or bar stock: provide 42,000-psi minimum yield strength and comply with the requirements of ASTM A529, A1011, or A572.

2. Members fabricated by cold forming: ASTM A 1008, Grade 50

3. Galvanized Steel Sheet: ASTM A 653 with G90 coating.

4. Bolts for Structural Framing: ASTM F3125.

5. Anchors into concrete: ASTM F1554 Grade 36.

6. Hot rolled structural shapes: ASTM A36, A992, or A1011.

2.03 DESIGN CRITERIA

A. Design Loads

1. Roof live load, Wind load, and Seismic load shall be per the CBC Chapter 16 Structural Design.

2. Collateral loads shall include dead and live loads resulting from HVAC, piping, and other items suspended from the roof. This loading shall be coordinated with the drawings of all disciplines and manufacturer's shop drawings.

3. Crane loads shall be as required by the crane manufacturer for the required crane capacity and type, including impact and runway horizontal forces.

B. Design Requirements

1. Design structural panels and exterior covering materials for applicable loads and combinations of loads in accordance with the MBMA Metal Building Design Manual.

2. For design of structural members, comply with the requirements of the AISC.

3. For design of light gage steel members, comply with AISI for design requirements and allowable stresses.

4. Welded connections shall comply with AWS.

5. Design framing to withstand stresses resulting from combinations of loads that produce the maximum allowable stresses in that member as prescribed in MBMA's Metal Building Design Manual.

6. The building shall be designed to withstand all loading conditions both with and without wall panels in place.

2.04 FOUNDATION AND FLOOR SLAB

A. The foundation slab (matt) shall be reinforced concrete conforming to the requirements of the CBC and shall be provided by the Contractor.

B. The pre-engineered metal powerhouse building manufacturer shall design the anchorages for the pre-engineered metal powerhouse building and make any recommendations for base plate revision based on actual loading. The Contractor shall coordinate the anchorage and base plate details with the foundation and pre-engineered metal powerhouse building engineer.

C. The Contractor shall coordinate the details of anchorages of the pre-engineered metal powerhouse building to its foundation. The Contractor shall provide the anchor rods and layout templates and allow for any foundation revisions necessary to adapt or support the pre-engineered powerhouse metal building during construction.

2.05 STRUCTURAL FRAMING

A. Description

1. Design of the structural system for the pre-engineered metal powerhouse building shall be a clear span rigid frame with tapered columns, tapered roof beams, and gable roof.

2. Primary Framing

a. Rigid Frames

(1) Frames shall consist of welded plate section columns and roof beams complete with necessary splice plates for bolted field assembly.

(2) Welding shall be performed in accordance with AWS requirements.

(3) All base plates, cap plates, compression plates, and stiffener plates shall be factory-welded into place and have the connection holes shop fabricated.

(4) All splice plates shall be shop fabricated complete with bolt connection holes.

(5) Columns and roof beams shall be fabricated complete with holes in webs and flanges for the attachment of secondary structural members and bracing.

b. All bolts for field assembly of frame members shall be high strength bolts as indicated on erection drawings.

c. Endwall Structurals

(1) Endwall frames shall consist of endwall corner posts, endwall roof beams, and endwall posts.

(2) All splice plates and connection clips shall be shop fabricated complete with bolt connection holes.

(3) Beams and posts shall be shop fabricated complete with holes for the attachment of secondary structural members.

3. Secondary Structural Members

    a. Purlins and Girts

        (1) Outer flange of all purlins and girts shall contain factory-punched holes for panel connections.

    b. Eave Struts

        (1) Outer flange of all eave struts shall contain factory-punched holes for panel connections.

    c. Bracing

        (1) Diagonal bracing shall be designed by the building manufacturer and attached to columns and roof beams.

        (2) Flange braces, sag angles, etc., when required, shall be supplied by the building manufacturer.

        (3) All bracing locations shall be coordinated with ductwork, piping, door openings, and ventilation openings.

    d. Secondary Framing

        (1) Provide framing for wall openings where windows, doors, ventilation equipment, and removable wall panels occur shall be stiffened flange channels and shall be provided by the prefabricated metal powerhouse building manufacturer.

        (2) Base channel shall not be less than 14-gauge shop painted cold-formed sections.

4. Structural Painting

    a. Structural steel shall be shop prepared, shop primed, and field painted prior to erection.

        (1) Primary Frames - Clean all steel per SSPC-SP2. Apply one coat of water reducible alkyd primer by spray or dip method to a minimum coating thickness of 1.0 mil.

        (2) Secondary Structural - Clean all steel per SSPC-SP8. Apply one coat of coil applied polyester primer to a minimum coating thickness of 0.5 mil (purlins and grits).

2.06 METAL ROOF PANELS

A. Manufacturer and Product, or Equal

1. Subject to the requirements indicated, provide manufacturer and product listed below, or equal.

    a. McElroy Metal; R-Panel

2. Metal roof panels shall be installed per Manufacturer’s recommendations.

3. Ridge assembly shall be designed to allow for expansion and contraction.

4. Eave panels shall extend beyond the building structural line.

5. Panel Material

    a. Panel material shall galvalume steel sheet; 22-gauge sheet thickness.

2.07 METAL WALL PANELS

A. Manufacturer and Product, or Equal

1. Subject to the requirements indicated, provide manufacturer and product listed below, or equal.

    a. McElroy Metal; R-Panel

2. Metal wall panels shall be installed per Manufacturer’s recommendations.

3. Panel material shall be galvalume steel sheet; 22-gauge sheet thickness.

2.08 METAL WALL AND ROOF PANEL FINISH AND COLOR

A. Color shall be selected and approved by the Owner from manufacturer's full color range.

1. Color shall be uniform with no variation in shade, and panels of different color batches will not be acceptable.

2.09 BUILDING ACCESSORIES

A. Accessories

1. Accessories shall be manufacturer's standard unless otherwise indicated. Location of standard accessories shall be indicated on the erection drawings.

    a. All miscellaneous trim and accessories shall match adjacent panels.

    b. Roof Insulation: Insulation shall be 6-inches vinyl faced, fiberglass blanket insulation with a R-19 value. The heat loss caused by the compression of blanket insulation shall be minimized by the use of spacer blocks.

    c. Wall Installation: The exterior walls shall be insulated with 4-inch vinyl faced, fiberglass blanket insulation with an R-13 value.

    d. Vapor retarder/insulation liner shall be 0.0032-inch minimum thick vinyl.

    e. Metal curbs and pipe flashing shall be manufacturer standard except that interior faces of curbs must be fully enclosed also.

    f. Gutters, downspouts, and trim pieces shall be provided by the manufacturer.

    g. Trim materials shall be:

        (1) Outside corner trim shall be of the same material and finish as the exterior of wall panel.

        (2) Gutters, downspouts, eave trim and gable trim shall be prepainted galvanized steel.

B. Roof Fasteners

1. Roof fasteners shall be as per manufacturer's erection drawings.

C. Wall Fasteners

1. Wall fasteners shall be as per manufacturer's erection drawings.

2. All exposed fasteners shall be prepainted to match wall color.

D. Sealants

1. Sealants shall be as recommended by pre-engineered metal powerhouse building fabricator.

E. Roll-up Doors

1. Roll-up doors shall be of the metal-curtain slat design and shall be motor-operated with a hand chain for backup operation and shall be weather and dust-resistant. Wiring diagrams shall be submitted for motor-operated doors. Doors shall be provided complete with slats, guides, hoods, reduction gears, galvanized hand chain, operating mechanism, motors, controls, wiring, brackets, gears, head, bottom and side weather stripping, hardware, and all other items necessary for installation and operation.

F. Flashing

1. Preformed metal closures, trim pieces, flashings, sheets, clips, and associated appurtenances shall be as indicated or as otherwise required for weather tightness or completeness, and shall be of the same material, color, and finish as the adjacent panels, unless otherwise indicated.

2. Flashing shall be provided for penetrations. Provide penetration enclosures to be weathertight. Coordinate locations of protruding pipes.

G. Skylights

1. The skylight shall be fully factory assembled consisting of a plastic dome that is sealed by interior and exterior gaskets to a frame fabricated of thermal break material to prevent thermal losses through the frame and the formation of condensation on its interior surfaces. The frame is to have an integral condensation channel. The retaining cap fasteners are to be corrosive resistant.

H. Roof hatches

1. Roof hatches be constructed of galvanized steel unless otherwise indicated and shall be provided with stainless steel hardware, including padlocking hardware inside and outside and neoprene gaskets and seals. The roof hatch shall be pre-assembled from the manufacturer. Roof hatches located in damp environments shall be provided with stainless steel hardware. Covers shall be reinforced to support a minimum live load of 40 psf, made of 14 gauge G-90 galvanized steel. Cover insulation shall be 1-inch thick fiberglass, fully covered

and protected by a 22 gauge G-90 galvanized steel liner. Cover shall be provided turn handles and equipped with interior and exterior padlock hasps. Roof hatches shall be double leaf. Contractor shall coordinate roof hatches clear opening size with mechanical equipment shop drawings to make sure hatch opening is adequate to lift of lower mechanical equipment through hatch clear opening.

PART 3 - EXECUTION

3.01 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Site in manufacturer's original, unopened packages, containers, or bundles with labels intact, which clearly identify contents.

1. Materials shall be delivered to Site in a dry and undamaged condition and unloaded per the manufacturer's instructions. The installer shall inspect materials for damage and stains upon arrival to the Site.

B. Store materials carefully in accordance with the manufacturer's written instructions, in an area that is protected from deleterious elements, and in a manner that will prevent damage to the products.

C. Verify that foundation, floor slab, mechanical and electrical utilities, and placed anchors are in correct position.

3.02 PRODUCT CONDITIONS

A. Comply with manufacturer's written instructions for environmental conditions before, during and after installation.

B. Protect surrounds Work from damage that may result from operations under this Section.

3.03 INSPECTION

A. The Contractor shall be totally responsible for the proper performance and completion of the Work under this Section.

B. The Contractor shall inspect materials for damage and shall confirm conformance with the specifications, erection drawings, and shop drawings prior to installation.

C. Systems and components shall be inspected before installation.

1. Damaged or defective items shall be rejected and marked as such and shall be removed from the Site.

2. Exposed surfaces that exhibit pitting, seam marks, roller marks, stains, discoloration, or other surface imperfections on the finished units shall be rejected.

D. The Contractor shall verify dimensions, tolerances, and method of attachment with adjacent Work.

1. Examine substrates, areas, and conditions where metal wall, roof and soffit panels, system support framing, and appurtenances will be installed for compliances with the requirements for installation, taking into account tolerances, and other conditions affecting performances of installed metal panels and appurtenances.

a. Provide inserts, backing blocking, anchoring devices, and reinforcements that must be built into other Work for the installation of metal wall, roof and soffit panels, system support framing, and appurtenances. Coordinate delivery with other Work to avoid delay.

b. Prior to installing the pre-engineered metal powerhouse building the Contractor and the pre-engineered metal powerhouse building installer shall verify final alignment of the foundation, floor slab, mechanical and electrical utilities to be in compliance with these specifications, with the erection drawings, and with the detailed design drawings.

2. Do not proceed with the Work until satisfactory conditions have been corrected in an acceptable manner.

3. Commencement of the installation by the Contractor shall indicate Contractor's acceptance of the substrate, areas, and conditions.

3.04 FABRICATION

A. The building shall be factory fabricated and erected to the manufacturer's written standards and shall be in accordance with AISC and MBMA standards.

B. The prefabricated building shall be completely fabricated and prepared for shipment including any necessary crating or bundling. All parts of the building shall be accurately made and true to dimension so that all parts will easily fit during installation.

3.05 PREPARATION

A. Sequence installation properly with the installation and protection of other Work, so that neither will be damaged by the installation of the other.

3.06 INSTALLATION

A. General

1. Installation shall comply with applicable references, with AISC, AISI, MBMA, with the requirements of the CBC, and with manufacturer's written instructions. Where a conflict occurs among these requirements, the more stringent shall apply.

2. The Contractor shall provide corrosion resistant fasteners, anchors, and shims required for a complete installation, and shall be secure, plumb, level, straight,

and true to line, allowing for required movement, including expansion and contraction.

3. The Contractor shall provide separation of dissimilar materials to ensure no galvanic action occurs.

   a. Paint, bituminou`s coating, or sealant as recommended by the metal panel manufacturer shall separate dissimilar metals.

4. Horizontal lines shall be level, and vertical lines shall be plumb.

5. Manufacturer shall provide detailed instructions covering the tools, fasteners, sealants, gaskets, and procedures required to assure performance of the metal panel assembly.

6. Work shall be coordinated as required to ensure proper flashing and seals to adjoining construction.

7. Install panels in one continuous length, without horizontal seams, joints or laps.

B. Installation and Erection

1. Installation and erection of the building shall be in accordance with the manufacturer's standards and shall be workmanship of the highest quality. No field cutting of structural parts will be permitted. Field cutting and patching of panels and accessories will not be permitted unless authorized by the Owner’s Engineer. Such field modifications, when authorized, shall be performed in a manner which will not impair the appearance, weather tightness, or structural quality of the material. Erection shall be accomplished in sufficient time to meet the schedule specified.

3.07 ROOF AND WALL PANELS

A. General: Apply panels and associated items for neat and weather tight enclosure. Avoid "panel creep" or application not true to line. Protect factory finishes from damage.

B. Roof Panel Application

1. Flash and seal roof panels at eave and rake with rubber, neoprene or other closures to exclude weather.

2. Panel sidelaps and endlaps shall be sealed with weather sealing compound to prevent the entry of capillary moisture.

3. Fasteners shall be installed with proper tools, in a workmanlike manner according to the recommendations of the Manufacturer.

C. Wall Panel Application

1. Structural system shall be plumb before wall panels are attached.

2. Panels shall be aligned and attached in accordance with the erection drawings.

3. Panels shall be closed at base by metal closure.

3.08 CLEANING, FINISHING, AND PROTECTION

A. Adhesive papers used for masking which become firmly bonded when exposed to heat and/or light shall not be used.

1. Remove masking film and temporary labels as soon as possible after installation. Films and labels left in place after installation shall be the responsibility of the Contractor.

2. Residue shall not be left on any surfaces.

B. Upon completion of the installation of pre-engineered metal building and appurtenances shall be cleaned of dirt and other foreign matter to the satisfaction of the Owner's Engineer.

C. Cleaning shall be performed again immediately prior to acceptance of the Work, as determined by the Owner's Engineer.

1. Cleaning shall be performed in accordance with the manufacturer's written instructions.

2. Pre-engineered metal powerhouse building shall be protected from damage from subsequent construction operations.

D. The Contractor shall make adjustments required until accepted.

E. The Contractor shall remove scratches and blemishes to the satisfaction of the Owner's Engineer.

F. Damaged or defective items shall be removed and replaced at the direction of the Owner's Engineer.

G. When pre-engineered metal powerhouse building Work is completed, remove unused materials, containers, and equipment, and clean the Site of debris.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

A. No separate measurement for the work of this Section will be made.

4.02 PAYMENT

A. Payment for work required under this Section will be a part of the lump sum price in the Bid for the following item:

B. Such payment will be considered full compensation for all costs incurred for the performance of the work necessary to complete the requirements of this Section.

Item No.	Item	Description	Unit
13120-1	PRE-ENGINEERED METAL POWERHOUSE BUILDING	Pre-engineered metal powerhouse building	LS

END OF SECTION

SECTION 15000
LARGE DIAMETER STEEL PIPE

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section covers design, materials, fabrication, and installation of bifurcations, bypass piping and unit 4 turbine inlet welded steel pipe and turbine discharge piping, with fittings and hardware in accordance with AWWA C200, as modified herein. This pipe consists of the following:

1. Welded inlet pipe assembly for new turbine inlet for tying into the Existing Bifurcation Pipe

2. Draft tube and turbine discharge piping according to water to wire design for turbine discharge requirements.

3. All required demolition work will be included in pricing covered under section 02220 – Demolition.

B. For smaller piping, including the cooling water system, refer to Section 15050.

C. A single pipe manufacturer shall be made responsible for furnishing steel pipe, fittings, and appurtenances such as bolts and gaskets for the Work.

D. Related work specified elsewhere:

1. Section 09900, Paints and Coatings

E. Definitions:

1. Fitting: Any piece of pipe other than a normal full length of straight section pipe. This includes elbows, manhole sections, short pieces, reducers, adapter sections with special ends, sections with outlets, etc.

1.02 SYSTEM DESCRIPTION

A. Design Criteria

1. General: The pipes shall be suitable to transmit raw water under the conditions indicated in the Contract Documents. The steel pipes shall have field welded joints as indicated in Section 05620. The pipes shall consist of a steel cylinder, shop-lined in accordance with Section 09900.

2. The pipe shall be designed, manufactured, tested, inspected, and marked according to applicable requirements previously stated and, except as hereinafter modified, shall conform to AWWA C200. Fittings shall also be in accordance with AWWA C208.

3. Design working pressure = 150 psi; Design transient pressure = 175 psi

4. The proportioning and detailing of fabricated fittings, manholes, and outlets and the fabrication thereof, shall be performed in accordance with the requirements of the latest edition of the ASME Boiler and Pressure Vessel Code, Section VIII, Division 1, Pressure Vessels; provided, that if the details shown on the Drawings are better suited for the Work, in the opinion of the Owner's Engineer, such details shall be controlling. The design of wyes, tees and fitting reinforcement shall be in accordance with the applicable procedures of AWWA Manual M11.

5. The contractor is responsible for designing and supplying all necessary materials and labor for the supports and restraints necessary for hydraulic forces at the pipe elbow.

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. American National Standards Institute (ANSI)

B. B16.1 Cast Iron Pipe Flanges and Flanged Fittings.

C. B16.5 Pipe Flanges and Flanges Hinges.

D. B36.10 Welded and Seamless Wrought Steel Pipe.

E. American Petroleum Institute (API)

F. Standard 1104 Welding of Pipelines and Related Facilities.

G. American Society of Mechanical Engineers (ASME)

1. ASME Boiler and Pressure Vessel Code.

H. ASTM International (ASTM)

1. A36 Specification for Structural Steel.

2. A53 Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.

3. A105 Specification for Forgings, Carbon Steel, for Piping Components.

4. A106 Specification for Seamless Carbon Steel Pipe for High-Temperature Service.

5. A181 Specification for Forgings, Carbon Steel, for General-Purpose Piping.

6. A234 Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures.

7. A283 Specification for Low and Intermediate Tensile Strength Carbon Steel Plates.

8. A516 Specification for Low and Intermediate Tensile Strength Carbon Steel Plates.

9. A537 Standard Specification for Pressure Vessel Plates, Heat-Treated, Carbon-Manganese-Silicon Steel

10. A570 Specification for Steel, Sheet and Strip, Carbon, Hot-Rolled, Structural Quality.

11. A572 Specification for High Strength Low-Alloy Columbium-Vanadium Structural Steel.

12. A1018 Steel, Sheet and Strip, Heavy Thickness Coils, Hot-Rolled Carbon, Structural, High-Strength Low-Alloy Columbium or Vanadium, and High-Strength Low-Alloy with Improved Formability.

13. E165 Practice for Liquid Penetrant Inspection Method.

14. E709 Practice for Magnetic Particle Examination.

I. American Water Works Association (AWWA)

1. C200 Steel Water Pipe 6 Inch and Larger.

2. C205 Cement-Mortar Protective Lining and Coating for Steel Water Pipe – 4 in and Larger – Shop Applied

3. C207 Steel Pipe Flanges for Waterworks Service-Sizes 4 Inch Through 144 Inches.

4. C208 Dimensions for Fabricated Steel Water Pipe Fittings.

5. C216 Heat-Shrinkable Cross-Linked Polyolefin Coatings for the Exterior of Special Sections, Connections, and Fittings for Steel Water Pipelines

6. M11 Steel Pipe Guide for Design and Installation.

J. American Welding Society (AWS)

1. AWS D1.1 Structural Welding Code, Steel.

1.04 SUBMITTALS

A. In accordance with the requirements of Section 01300, submit Drawings, Manuals, Shop Drawings, and other technical information as indicated herein.

B. Design Drawings, Data, Calculations, and Reports

1. Piping layout drawings showing all necessary dimensions and complete bill of material (including the type and grade of materials).

2. Operation and Maintenance clearances for any man doors, equipment or miscellaneous.

3. Demolition plan.

4. Installation drawings and procedures showing valves, supports, pipe extensions, anchoring, and auxiliary piping installed at the dam site. Drawings shall include measured field dimensions.

5. Calculations Free body diagrams showing forces, moments, and torque on pipe assembly including reaction forces from supporting elements.

C. Within 30 days, following the Notice to Proceed and prior to the submittal of any Shop Drawing for pipe, pipe coating or pipe lining, the pipe manufacturer shall submit a detailed Pipe Fabrication Plan and Quality Control Program Manual for each pipe fabrication plant, as described below. Do not manufacture any pipe until the Pipe Fabrication Plan and Quality Control Program Manual have been reviewed and accepted by the Owner's Engineer. Failure to submit, implement and adhere to the submitted Pipe Fabrication Plan and the Quality Control Program Manual will be reason to reject delivery of steel pipe.

1. Pipe Fabrication Plan providing a description of the actual steel pipe fabrication process covering all phases of fabrication to finish pipe. The Pipe Fabrication Plan shall include, as a minimum, the following:

a. Qualifications of plant staff directly involved, including qualifications of welders.

b. Current and anticipated workload of the plant. State how other work will affect the fabrication schedule.

c. Plant quality control record keeping and means for transmittal to the Owner's Engineer's in-plant inspectors.

d. Shop drawing submittal process.

(1) Shop Drawings shall be stamped by a licensed professional engineer in the State of California

e. Sources of materials, and plant quality control procedures regarding these materials.

f. Schedule of material delivery to the plant.

g. Fabrication schedule.

h. Material, pipe handling and storage at the plant.

i. Steel fabrication process.

j. Welding procedures.

k. Physical testing methods and procedures for the steel pipe and welds.

l. Coating and lining materials and procedures.

m. Curing methods.

n. Repair methods and limits of repairs.

o. Bracing/Stulling/Strutting Plan.

p. Shipping and transportation methods from the plant to the job site.

q. Storage and handling of pipe at the job site.

2. Quality Control Program Manual providing hold points, documentation, staffing, and appropriate sign-off regarding adherence to the Contract Documents. Include a system for documenting the pertinent information for each pipe section. Complete documentation as each pipe section is fabricated, and a copy shall accompany the pipe section to the job site. Include certification of Compliance with the Contract requirements as part of the Quality Control Program Manual.

D. Submit the following on the Shop Drawings:

1. The location, length, plate thickness, and designation by number of each steel pipe section and fabrication.

2. The invert station and elevation of the pipe, for straight section and within the limits of horizontal or vertical curves, will be laid.

3. The elements of curves and bends, both in horizontal and vertical alignment, including elements of the resultant true angular deflections in cases of combined curvature.

4. Full and complete information regarding location, type, size, and extent of welds. Distinguish between shop and field welds. Indicate welds by welding symbols or sketches of the details of the welded joints and the preparation of parent metal required to make them.

5. The limits of each reach of each type of field-welded joint and of concrete encasement.

6. Locations of and details of longitudinal and circumferential joints in the pipe, fabricated fittings, and outlets.

7. Details, locations, and calculations for bulkheads, pipe restraint and all methods required to prevent excessive pipe wall stresses for hydrostatic testing of pipeline.

8. Details and locations of closures for length adjustment and for construction convenience.

9. Details of fittings.

10. Details of all valves, meters, pumps and other equipment determining pipe dimensions.

11. Details of backing bars that are to be shipped separately.

E. Submit certified copies of mill test reports on each heat from which steel is rolled. Tests shall include physical and chemical properties. Submit certified copies of mill test reports for flanges including details of stress relief used.

F. Submit weld procedure specifications, procedure qualification records including all destructive and non-destructive test results and welding bead profiles. Procedures for joints or groups of joints to minimize shrinkage stresses and distortion.

G. Welder qualification certificates in accordance with AWS D1.1 or the ASME Boiler and Pressure Vessel Code, Section IX.

H. Submit certificates of welding rods used for shop welding. Submit welding procedure specifications including drawings of bevel surfaces to be automatically welded and procedure qualification records.

I. Submit affidavits of compliance with referenced standards (e.g., AWWA C200, C207, etc.) with each required submittal.

J. Provide 14 day written notice to the Owner's Engineer to start of pipe fabrication.

K. Within 30 days following completion of pipe fabrication, submit mill test reports on each heat, dimensional check report, shop hydrostatic test report, and results of production weld test for each pie section by mark number. Certify each report. Include a summary list cross-referencing heat numbers and pipe shop numbers with pipe mark numbers.

1.05 QUALIFICATIONS OF MANUFACTURERS

A. The pipe manufacturer shall be certified to ISO 9000, the Steel Plate Fabricator's Association (SPFA), or Lloyd's Register Quality Assurance (LRQA) and shall be experienced in fabrication of AWWA C200 pipe of similar diameters, lengths, and wall thickness to this Work.

B. Furnish a copy of manufacturer's certification to ISO 9000, SPFA, or LRQA, and documentation of manufacturer's experience in fabricating AWWA C200 pipe.

1.06 QUALIFICATIONS OF WELDERS

A. Welding procedures used to fabricate and install pipe shall be prequalified under the provisions of ANSI/AWS D1.1 - Structural Welding Code - Steel or the ASME Boiler and Pressure Vessel Code, Section IX. Welding procedures shall be required for longitudinal and girth or spiral welds for pipe cylinders, spigot and bell ring attachments, reinforcing plates and ring flange welds, and plates for lug connections.

B. Welding shall be done by skilled and certified welders, welding operators, and tackers who have had adequate experience in the methods and materials to be used. Welders shall be qualified under the provisions of ANSI/AWS D1.1 or the ASME Boiler and Pressure Vessel Code, Section IX not more than 6 months prior to commencing Work on the pipeline. Machines and electrodes similar to those used in the Work shall be used in qualification tests.

PART 2 - MATERIALS

2.01 PIPE MATERIAL

A. Pipe may be spirally welded or made from rolled sheet or plate in accordance with AWWA C200. Fabricate pipe from steel meeting ASTM A537, Class 1. The steel shall be fine grained, fully killed and manufactured using a continuous casting process. The maximum carbon content shall not exceed 0.25 percent. The maximum sulfur content shall not exceed 0.015 percent.

2.02 STRUCTURAL STEEL

A. Backing bars shall conform to the requirements of ASTM A533, Type B, Class 2.

B. Outlet reinforcement shall conform to the requirements of ASTM A36.

2.03 FLANGES

A. Conform to the material and dimensional requirements of AWWA C207. Class E flanges shall be used for design pressures up to 150 psi. Provide weld neck flanges where flanges are shown on the Drawings or required at wrought fittings.

B. Flange bolting material shall be ASTM A 193 Grade for bolts and ASTM A 194 Grade 7 for nuts.

2.04 JOINTS

A. Contractor shall design standard field joints and display on design drawings. Backing material shall be submitted for approval.

B. Shop-applied interior linings and exterior coatings shall be held back from the ends of the pipe at welded joints as specified, as indicated on the Drawings, as required or as otherwise acceptable to the Owner's Engineer.

2.05 FITTINGS

A. Design: Except as otherwise indicated, materials, fabrication and shop testing of fittings shall conform to the requirements stated above for pipe and shall conform to the dimensions of AWWA C208. The minimum thickness of plate for pipe from which fittings are to be fabricated shall be the greatest of those determined by the following three criteria:

1. Working and Transient Pressure Design

$$T = \frac{P_w D/2}{Y/S_w} \qquad T = \frac{P_t D/2}{Y/S_t}$$

Where:

T = Steel cylinder thickness in inches

D = Outside diameter of steel cylinder in inches

P_w = Design working pressure in psi

P_t = Design transient pressure in psi

Y = Specified minimum yield point of steel in psi

S_w = Safety factor of 2.5 at design working pressure

S_t = Safety factor at design transient pressure; for elbows 1.875 and 2.0 for other fittings

2. Mainline Pipe Thickness: Plate thickness for fitting shall not be less than for the adjacent mainline pipe.

3. Minimum Thickness Based on Pipe Diameter

Nominal Pipe Diameter, inch	THICKNESS
24 and under	3/16
over 24 to 48	1/4
over 48	5/16

B. Reinforcement for wyes, tees, outlets, and nozzles shall be designed in accordance with AWWA Manual M11. Reinforcement shall be designed for the design pressure indicated and shall be in accordance with the Drawings. Fittings shall be equal in pressure design strength and shall have the same lining and coating as the adjoining pipe.

C. Outlets, Tees, Wyes, Elbows, and Crosses

1. Spirally welded or rolled and welded steel plate pipe may be used for fabrication of fittings.

2. Unless otherwise indicated, the minimum radius of elbows shall be 2.5 times the pipe diameter and the maximum miter angle on each section of the elbow shall not exceed 11.25 degrees.

3. Outlets 12-inches and smaller may be fabricated from Schedule 30 or heavier steel pipe in the standard outside diameters, i.e., 12-3/4 inch, 10-3/4 inch, 8-5/8 inch, 6-5/8 inch, and 4-1/2 inch. Minimum plate thickness for reinforcements shall be 10-gauge.

4. The design of outlet reinforcement shall be in accordance with the procedures given in Chapter 13 of AWWA Manual M11 and the design pressures and factors of safety above.

5. In lieu of saddle or wrapper reinforcement as provided by the design procedure in Manual M11, pipe or fittings with outlets may be fabricated entirely of steel plate having a thickness equal to the sum of the pipe wall plus the required reinforcement.

6. Outlets shall be fabricated so that there is always at least a 12-inch distance between the outer edge of the reinforcing plate and any field welded joints. For outlets without reinforcing plates, outlets shall penetrate the steel cylinders so that there is at least a 12-inch clearance between the outlet and any field-welded joints.

7. Tees, wyes, crosses, elbows, and manifolds shall be fabricated so that the outlet clearances and reinforcing plates from any weld joints are a minimum of 5 times cylinder thickness or 2-inches, whichever is greater. Longitudinal weld joints in adjacent cylinder sections shall be oriented so that there is a minimum offset of 5 times cylinder thickness or 2-inches, whichever is greater.

D. Steel Welding Fittings: Steel welding fittings shall conform to ASTM A234 - Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service.

E. Ends for Mechanical-Type Fittings: Except as otherwise indicated, where mechanical-type fittings are indicated, the ends of pipe shall be banded with Type C collared ends using double fillet welds. Where pipe 12-inches and smaller is furnished in standard schedule thickness and where the wall thickness equals or exceeds the fitting manufacturer's minimum wall thickness, the pipe ends may be grooved.

2.06 PIPE JOINT COMPOUND

A. Use American National Taper pipe threads on all threaded joints. Apply joint compound to the male threads only. Pipe Joint compound shall be Teflon thread sealant, Bakerseal by Radiator Specialty Company, La-Co SlicTite by Lake Chemical Company, or equal.

2.07 THREADED OPENINGS

A. Provide threaded openings not less than 2 inches, no more than 4 inches in nominal size. Threaded openings shall be a standard weight, flat-bottom, threaded welding outlet. Where the mounting surface is curved to a diameter of 36 inches or less, the mounting diameter shall be the same as that of the surface upon which it is to be mounted.

B. Provide threaded outlet and its plug forged from steel conforming to ASTM A105 or ASTM A181, Class 70. Provide Weldolet outlets or equal.

2.08 WELDING OUTLETS

A. Provide welding-type outlets with a mounting diameter the same as that of the surface upon which they are to be mounted. Where the mounting surface is curved to a diameter of 36 inches or more, the outlet bottom may be flat. Provide welding-type outlets forged from steel conforming to the requirements specified for threaded outlets. Provide Weldolet outlets or equal.

2.09 COATINGS

A. Coating shall be according to Section 09900.

2.10 HEAT-SHRINKABLE SLEEVES

A. Heat shrinkable sleeves for field joints where indicated shall conform to the requirements of AWWA C216. Sleeves shall have a minimum thickness of 0.9 mm and have a minimum width of 16 inches.

2.11 PETROLATUM TAPE

A. Tape shall be Densyl Tape by Denso, Temcoat by Trenton or equal.

2.12 PIPE APPURTENANCES

A. Pipe appurtenances shall be in accordance with the requirements of Division 15 of the Specifications. Access manholes with covers shall be as indicated, installed during fabrication, not in the field. Threaded outlets shall be forged steel suitable for 3000 psi service, and shall be as manufactured by Vogt, or equal.

PART 3 - EXECUTION

3.01 DIAMETER AND LENGTH OF PIPE SECTIONS

A. The diameters shown on the Drawings shall be considered the inside diameter for that section of pipe.

B. Maximum pipe laying lengths shall be 50-feet with shorter lengths provided as required according to contractor's approved design submittals.

C. Closures and correction pieces shall be provided as required so that closures may be made due to different headings in the pipe laying operation and so that correction may be made to adjust the pipe laying to conform to pipe stationing indicated.

D. Do not locate shop joints or field closure assemblies within four feet of the end of a concrete encased section of pipe. Concrete encased pipe sections are to be located according to Contractor's approved Design Drawings.

3.02 WELDED JOINTS

A. Prior to the beginning of the welding procedure, any tack welds used to position the pipe shall be removed. The weld shall then be made in accordance with AWWA C206. Where more than one pass is required, each pass except the first and final ones shall be peened to relieve shrinkage stresses, and dirt, slag, and flux shall be removed before the succeeding bead is applied.

B. Inspection of Welded Joints: An independent testing laboratory acceptable to the Owner's Engineer but paid by the Contractor shall inspect the joints. Inspection shall be as soon as practicable after the welds are completed by either:

1. The Magnetic Particle Inspection Method in accordance with ASME Section VIII, Division 1, Appendix VI.

2. ASTM E 165 - Standard Test Methods for Liquid Penetrant Examination, Method A.

C. Repair of Welds: Welds that are defective shall be repaired by the Contractor to meet the requirements of this Specification. Defects in welds or defective welds shall be removed, and that section of the joint shall then be rewelded. 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.

3.03 SHOP TESTING

A. Except as modified herein, materials used in the manufacture of the pipe shall be tested in accordance with the requirements of AWWA C200 and C205 as applicable.

1. After the joint configuration is completed and prior to lining with cement mortar, each length of pipe of each diameter and pressure class shall be shop-tested and certified to a pressure of at least 75 percent of the yield strength of the steel. The test pressure shall be held for 2 minutes and the pipe visually inspected to confirm that welds are sound and leak-free.

2. In addition to the tests required in AWWA C200, weld tests shall be conducted on each 5,000-feet of production welds and at any other times there is a change in the grade of steel, welding procedure, or welding equipment.

3. Fittings fabricated from straight pipe previously passing a hydrostatic test need not have an additional hydrostatic test provided welds are tested by nondestructive means and demonstrated to be sound.

B. Shop Testing of Steel Plate Fittings:

1. If any fitting has been fabricated from straight pipe not previously tested and is of the type listed below, the fitting shall be hydrostatically tested with a pressure equal to 1-1/2 times the design working pressure: bends, wyes, crosses, tees with side outlet diameter greater than 30 percent of the main pipe diameter, and manifolds.

2. Fittings not required to be hydrostatically tested shall be tested by liquid dye penetrant inspection method in accordance with ASTM E 165 - Standard Test Methods for Liquid Penetrant Examination, Method A or the magnetic particle method in ASME Section VIII, Division 1, Appendix VI.

3. Reinforcing plates shall be tested by the solution method using approximately 40 psi air pressure introduced between the plates through a threaded test hole. Test hole shall be properly plugged following successful testing.

4. Any weld defects, cracks, leaks, distortion, or signs of distress during testing shall require corrective measures. Weld defects shall be gouged out and rewelded. After corrections, the fitting shall be retested.

5. Where welded test heads or bulkheads are used, extra length shall be provided to each opening of the fitting. After removal of each test head, the fitting shall be trimmed back to the design points with finished plate edges ground smooth, straight, and prepared for the field joint.

6. Testing shall be performed before joints have been coated or lined.

7. Ultrasonic examination shall be performed in accordance with the following:

a. Steel plate that will be in welded joints or welded stiffener elements shall be examined ultrasonically for laminar discontinuities where both of the following conditions exist:

(1) Any plate in the welded joint has a thickness exceeding 1/2-inch.

(2) Any plate in the welded joint is subject to transverse tensile stress through its thickness during the welding or service.

b. Ultrasonic examination may be waived where joints are designated to minimize potential laminar tearing.

c. The ultrasonic examination shall be in accordance with ASTM A 578 - Straight Beam Ultrasonic Examination of Plain and Clad Steel Plates for Special Applications with a Level I acceptance standard.

8. Plates that are not in conformance with the acceptance criteria in ASTM A 578 may be used in the Work if the areas that contain the discontinuities are a distance at least 4 times the greatest dimension of the discontinuity away from the weld joint.

C. The Contractor shall be responsible for performing and paying for said material tests. The Owner's Engineer has the right to witness testing conducted by the Contractor; provided, that the Contractor's schedule is not delayed for the convenience of the Owner's Engineer. Provide 72 hours' notice of such tests.

D. In addition to those tests specifically required, the Owner's Engineer may request additional samples of any material including mortar lining and coating for testing by the District. The additional samples shall be furnished as part of the Work.

E. Field Testing: Field testing shall conform to the requirements of Section 02676 - Pressure Testing of Pipe.

3.04 PIPE APPURTENANCES

A. Install manholes and outlets according to contractor's approved design Drawings.

B. The Contractor may provide, at his own expense and as approved by the Owner's Engineer, additional flanged outlets in the steel pipe for use in passing hose, lead wires, equipment, or materials into the pipe.

C. The Contractor may also provide, at his own expense and as approved by the Owner's Engineer, forged steel threaded outlets for use in passing hose or lead wires into the pipe. Tap the outlets for standard pipe thread, weld to the pipe, and close after use with solid forged steel plugs. The plugs shall not project beyond the inner surface of the pipe shell. Apply a seal weld made by at least two passes around the inside or outside of the plug after it has been inserted in final position in the field.

D. Coat outlets, plugs, and closures inside and outside to match the adjacent coated surfaces in the same manner as specified for outlets and as required at field joints in the pipe.

3.05 PIPELINE LININGS AND COATINGS

A. Coatings shall be according to section 09900 and identified on arrangement drawings showing the coating type and dry film thickness of each coat applied.

3.06 BLIND FLANGES

A. At outlets not indicated to be connected to valves or to other pipes, provide blind flanges with bolts, nuts, and gaskets. Provide blind flange thickness at least equal to thickness of mating flange or in accordance with AWWA C207, whichever is greater.

3.07 PRODUCT MARKING

A. The manufacturer shall legibly mark pipe and fittings in accordance with the laying schedule and marking diagram. Each pipe and fitting shall be numbered in sequence and said number shall appear on the laying schedule and marking diagram in its proper location for installation. Each pipe and fitting shall be marked at each end with top field centerline. Show the mark number in 4-inch tall letters at springline of pipe.

3.08 STRUTTING

A. Adequate strutting shall be provided on all fittings and straight pipe so as to avoid damage to the pipe and fittings during handling, storage, hauling, and encasement in concrete. The following requirements shall apply:

1. The strutting shall be placed as soon as practical after the mortar lining has been applied and shall remain in place while the pipe is loaded, transported, unloaded at the job-site, and encased in concrete.

2. The strutting materials, size, and spacing shall be adequate to support the concrete encasing loads that may be imposed.

3. Piping shall be transported with vertical and horizontal strutting per manufacturer's plan. Any pipe damaged during handling, hauling, storage, or encasement in concrete due to improper strutting shall be repaired or replaced.

4. Strutting may be reused, provided all damaged ends are redressed to provide square and uniform bearing and all previously used fasteners are removed.

5. Repair locations where strutting was attached to the pipe and other coating and lining damage in accordance with this section and Section 09900.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

A. Measurement for payment for Large Diameter Steel Piping will be by the Pound (LB) and will be the number of Pounds (LBS) of pipe. The contractor shall provide unit prices in section 00310 – Bid Schedule

4.02 PAYMENT

A. The contract prices will be paid for Piping which shall include full compensation for all costs incurred under this section.

B. Such payment will be considered full compensation for all costs incurred for the performance of the work necessary to complete the requirements of this Section.

Item No.	Item	Description	Unit
15000-1	Large Diameter Steel Pipe	Large Diameter Steel Pipe	LB
15000-2	Large Diameter Steel Pipe Fittings	Fittings, couplings, hardware, and accessories for large diameter steel pipe.	LS

END OF SECTION

SECTION 15060
PIPING AND APPURTENANCES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope: This Section provides the requirements for the supply and installation of all piping systems.

1. Contractor shall design, supply, and install all piping and valves for the Work covered by this Section including, but not necessarily limited to:

a. TSV drain piping

b. Service water

c. Unit dewatering

d. Plant drainage

e. Compressed air

f. Turbine instrumentation

g. Pre-Action Sprinkler System

h. HVAC piping

2. Contractor shall also install equipment manufacturer furnished, turbine-generator piping and valves including, but not necessarily limited to:

a. Hydraulic power

(1) Turbine jacking

(2) Wicket gate

b. Turbine guide bearing and shaft seal water

c. Generator brake air

d. Generator cooling water (bearings and air coolers)

e. Turbine atmospheric air (if required)

f. Hydraulic system piping at inlet turbine shutoff valve

g. Turbine and generator bearing oil piping.

3. Contractor shall supply and install all appurtenances required to complete the piping systems including but not limited to gaskets, joint compound, pipe hangers, and flange and anchor bolting.

4. Contractor shall clean, flush, inspect and test all complete piping systems. Contractor shall provide all testing equipment and medium.

1.02 CODES AND STANDARDS

A. Piping shall comply with all national, state, and local regulations. Piping shall comply with the applicable codes and standards listed in Section 01060 in Codes and Standards.

1.03 SUBMITTALS

A. The following items shall be submitted to the Owner's Engineer in accordance with Section 01300:

1. Detailed piping arrangement and routing drawings.

2. Operation and Maintenance manual.

3. Bill of materials.

4. Manufacturer's certified mill test reports.

5. Detailed welding procedures.

6. Certified test reports.

B. Upon request of the Owner's Engineer, welder and welding operator qualification test records shall be submitted.

C. Warranties covering all products shall be submitted in accordance with Section 01750.

PART 2 - PRODUCTS

2.01 MATERIALS

A. All materials, including Owner furnished equipment, shall be installed in accordance with the Manufacturer's procedures and the Manufacturer's drawings.

B. Pipe Materials

Pipe Service	Pipe Material
Service Water	316 Stainless Steel
Oil & Compressed Air	304 Stainless Steel

Pipe Service	Pipe Material
Turbine Instrumentation	316 Stainless Steel
HVAC	Copper Alloy
Drainage and Dewatering	ASTM A53

C. Isolation kit shall be provided at joints of dissimilar metals.

D. Flexible Couplings: Flexible couplings indicated on the drawings shall be Dresser Style 38 or approved equal. Flange-to-pipe-coupling adapters shall be Rockwell Type 913 or approved equal. The coupling rated working pressure shall be not less than the service rating of the pipeline. Middle ring shall have a minimum thickness of 3/8-inch, and follower ring minimum thickness shall be 1/4-inch. Coupling gaskets shall be supplied by the coupling manufacturer and shall be designed to accommodate the pipe dimensions being joined.

E. Victaulic Couplings: Shall be standard coupling Style 77, malleable iron housing with factory standard, orange enamel housing coating. Gaskets shall be Grade 7 Buna N with temperature range from -20 degrees F to +180 degrees F. Bolts and nuts shall be heat treated carbon steel, ASTM A183. Grooves on pipes fitted with Victaulic couplings shall have factory recommended groove cuts suitable for Style 77 couplings. Gasket for swinging standpipe on raceway drain shall be manufactured or buffed oversized to allow for smooth standpipe operation.

F. Slotted Drain: Shall be fabricated as shown on contractor drawings approved by the Owner's Engineer with 1 3/4-inch-wide slot openings, and 6" high grate section. Slotted drain shall be fabricated from corrugated steel pipe and shall be manufactured by Contec Construction Products or approved equal.

G. Pipe Thimbles: Pipe thimbles for connection to concrete structures as shown on contractor drawings approved by the Owner's Engineer shall be fabricated from welded steel pipe in accordance with AWWA Standard C200. Seep rings shall be fabricated from same material as pipe. Welding for pipe fabrication and seep ring connections shall conform to AWS standards and be performed by AWS certified welders.

2.02 FABRICATION

A. Piping may be either field or shop fabrication. All fabrications of pipe shall conform to the requirements of ANSI B31.1, ANSI B93 and other applicable codes.

B. Flange bolt holes shall straddle the normal vertical centerline unless otherwise indicated on the Approved Drawings or mating equipment.

C. All shop fabricated piping shall be prepared for shipment in a manner that ensures delivery to destination in good condition. Particular attention shall be given to the

protection of flange faces and threads. Flange faces shall have a rust preventative coating and plywood cover.

D. Pipe support, guide and anchor attachments and any other attachments which weld directly to the pipe wall shall be of a material that is compatible to the pipe wall material; the weld electrode used shall be compatible to the attachment and pipe wall material.

E. Pipe supports shall be furnished by the Contractor as required by ANSI standards.

2.03 THERMOMETERS AND THERMOMETER WELLS

A. Thermometers and wells shall be furnished and installed as indicated on the plans. They shall be placed so that they can be read by a person standing on the floor with normal illumination. Multi-angle industrial liquid-in-glass type, Federal Specification GG-T-321c, red reading type. Nominal scale length of not less than 7 inches. Standard temperature range having a maximum reading not less than 50oF above operating conditions. Aluminum alloy case. Pipeline thermometers shall have a separable well connection, tapered bulb chamber and matching taper on well. Stem length shall be as necessary to reach the centerline of the pipes in which they are installed. Thermometers and wells shall be as supplied by Taylor Thermometer Corporation of America or equal.

2.04 PRESSURE SWITCHES

A. Unless otherwise noted, pressure switches shall be diaphragm type switch with an adjustable set point. The pressure range on pump discharges shall be as recommended by the pump Manufacturer of the pump it is connected to. Wetted parts within the switch shall be corrosion resistant to the applicable fluid. Electrical rating for the switch shall be 120 volt, single phase. All pressure switches used for alarm and/or shutdown shall have manual reset. The diaphragm type pressure switch shall be as supplied by Ashcroft, Harwill, or equal.

2.05 FLOW SWITCHES

A. Flow switches shall be a vane type switch. The switches pressure rating and size shall be that of adjacent piping. Wetted parts within the switch shall be corrosion resistant to the applicable fluid. There shall be an adjustment for flow sensitivity. Electrical rating for the switches shall be 120 volt, single phase. The flow switches shall be as supplied by W. E. Anderson, McDonnell & Miller (ITT), or equal.

2.06 FLOW INDICATORS

A. Flow indicators shall provide sight viewing to show flow/no-flow of piped fluids with an internal ball for flow indication. The indicators shall be of the size and pressure rating of adjacent piping and shall be installed where shown on the Approved Drawings. Corrosion resistant materials for the applicable fluid shall be used. The indicators shall be as supplied by Ametek Division of Shutte and Koerting, or equal.

2.07 ORIFICE PLATES

A. Orifice plates shall be of the same diameter as the flanges they are to be bolted between, with a smooth finished concentric hole of the diameter and the plate thickness noted on the Approved Drawings. The orifice plates shall be Type 316 stainless steel.

PART 3 - EXECUTION

3.01 STORAGE OF MATERIALS AND EQUIPMENT

A. After purchasing Contractor supplied piping and fittings, the Contractor shall be responsible for any loss or damage occurring thereafter.

3.02 INSTALLATION

A. Piping shall be installed in accordance with the appropriate Contractor Drawings approved by the Owner's Engineer, and the piping Specification.

B. All piping and piping fittings shall be installed in a neat, accurate, and workman-like manner.

C. Where specific tolerances are not specified, final piping dimensions shall not deviate from dimensions shown on the Contractor Drawings approved by the Owner's Engineer, by more than 1/8 inch.

D. All debris, loose materials and weld slag shall be removed from the ID of piping sections prior to installation.

E. Any compound or lubricant used on threaded piping shall be suitable for the service conditions and shall not react unfavorably with either the service fluid or the piping material. Thread lubricant shall be applied to the male side of connections only. After cutting and before threading, all screwed piping shall be reamed and all burrs removed. After make-up, no more than three threads shall be exposed at any joint.

F. All piping shall be firmly anchored using Owner's Engineer approved methods. Piping supports and expansion anchor bolts shall be supplied and installed by the Contractor.

G. Trenching, bedding and backfilling shall be as shown on contractor drawings approved by the Owner's Engineer and conform to the requirements of 02300 AND 02315.

H. Buried piping shall have concrete thrust blocks as shown on contractor drawings approved by the Owner's Engineer. In general, no forms or reinforcing will be required, the concrete will bear directly against the undisturbed trench wall. However, the Contractor shall shape and compact the trench backfill to minimize the amount of concrete used. Thrust blocks shall be poured and cured before the pipe is subjected to any hydrostatic pressure. Thrust block concrete shall have a minimum 28-day strength of 2,000 pounds per square inch. Bond breaker (90-pound asphalt paper) shall be placed wherever concrete thrust blocks contact the pipe.

3.03 PAINTING

All piping shall be wire brushed to remove all scale and loose material. Piping shall be made clean and free from all oil, dirt, rust and mill scale. Piping shall then be given one primer coat of LZI Rust Inhibitive Red Primer and two coats of gray low-lead enamel paint.

3.04 EXAMINATION AND INSPECTION

All examination and inspection shall be performed in accordance with the requirements of ASME B31.1. Inspection shall be made of all Work to check compliance with codes and to determine good workmanship throughout.

3.05 CLEANING AND FLUSHING

A. The inside of all pipe and fittings shall be clean and free from extraneous material such as loose mill scale, sand, grease, welding metal and dirt when erected.

B. Suction lines shall be given special consideration to ensure the removal of all loose mill scale, rust or dirt which may clog suction strainers or damage equipment.

C. Piping supplied with Supplier- furnished equipment shall be pickled in accordance with the Manufacturer's procedures.

D. All oil systems shall be flushed by recirculating oil through a 10 micron or comparable filter.

3.06 ACCEPTANCE TESTING

A. The Contractor Shall hydrostatically test all piping prior to initial operation. Contractor shall notify the Owner’s Engineer of all testing a minimum of 1 day in advance. Test pressure shall be 1.5 times the pressure rating and shall be done in accordance with ANSI B31.1. No leaks will be acceptable.

B. Piping sections shall only be tested between the farthest upstream and farthest downstream connection. Pumps and heat exchangers shall be isolated and not tested along with connecting pipe spools. When hydrotesting is completed and all piping systems are made up into their final connections, a service test will be conducted by the Owner’s Engineer to locate any possible leaks resulting from the final connections. The Contractor shall repair any such leaks to the Owner’s Engineer’s satisfaction. All testing shall be at the Contractor's expense.

C. The Contractor shall furnish suitable testing media which are not harmful to the piping systems. Precautions shall be taken to prevent freezing of the testing media which could cause damage to the piping system.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

A. Measurement for payment for the contract item Piping will be by the Pound (LB) and will be the number of Pounds (LBs) of each pipe material, nominal diameter, and schedule used for execution of this spec section. The contractor shall provide unit prices in section 00310 – Bid Schedule

B. There will be no additional measurement for payment for contract items Furnish and Install Valves and pipe accessories and Design of Piping System.

4.02 PAYMENT

A. The contract prices will be paid for Piping which shall include full compensation for all costs incurred under this section.

B. Such payment will be considered full compensation for all costs incurred for the performance of the work necessary to complete the requirements of this Section.

Item No.	Item	Description	Unit
15060-1	Furnish and install stainless steel piping	NA	LB
15060-2	Furnish and install coated carbon steel piping	NA	LB
15101-3	Furnish and install valves and piping accessories	Furnish all required items for completing of the piping system such as valves, couplings, drain covers and any other miscellaneous items.	LS
15101-4	Design of piping systems	Provide engineer and design work for all piping systems covered.	LS

END OF SECTION

SECTION 15101
KNIFE GATE VALVES

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section covers the contract item Knife Gate Valves:

1. Furnish, install, and commissioning of the two knife gate valves including any items required for the function of the valves not covered under another bid item.

B. Requirements for designing, manufacturing, painting, shop testing, installing, and field testing of engineered 48” bonneted knife gate valves to be used for isolation downstream of Penstock #1 and #2 butterfly valves.

C. Requirements for furnishing materials, installation, and testing of engineered electric motor actuators for 48” bonneted knife gate valves in accordance with AWWA C542. The electric motor actuator shall include any necessary intermediate gearing between the actuator motor and the valves to which it is attached.

1.02 CODES AND STANDARDS

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only. The following list includes but is not limited to:

A. American National Standards Institute/American Water Works Association (ANSI/AWWA):

B. C207 Steel Pipe Flanges for Waterworks Services.

C. C520 Knife Gate Valves

D. C542 Standard for Electric Motor Actuators for Valves and Slide Gates.

E. C550 Protective Interior Coatings for Valves and Hydrants.

F. C606 Grooved and Shouldered Joints.

G. American National Standards Institute (ANSI)/American Society of Mechanical Engineers (ASME):

B16.1 Cast Iron Pipe Flanges and Flange Fittings.

B18.2.1 Square and Hex Bolts and Screws.

B18.2.2 Square and Hex Nuts.

H. American Petroleum Institute (API):

API Std 598 – Valve Inspection and Testing

I. American Society for Testing and Materials (ASTM):

A36 Specification for Carbon Structural Steel.

A 276 Specification for Stainless Steel Bars and Shapes.

A 536 Specification for Ductile Iron Castings.

A 564 Specification for Hot-Rolled and Cold-Finished Age-Hardening Stainless and Heat-Resisting Steel Bars, and Shapes.

J. American Society of Mechanical Engineers (ASME):

Boiler and Pressure Vessel Code; Section VIII, Division I

K. National Sanitation Foundation (NSF):

Standard 61 Drinking Water System Components – Health Effects

L. Section 16050 – Basic Electrical Materials and Methods

1.03 SUBMITTALS

A. In accordance with the requirements of Section 01300, submit Drawings, Manuals, Shop Drawings, and other technical information is indicated herein.

B. Design drawings, Data, Calculations, and Reports shall consist of the following at a minimum:

1. Demolition drawings indicating the complete scope of demolition required for implementation of the contractor’s design construction.

2. Layout drawings showing all necessary dimensions and design element including civil/structural, mechanical, and electrical features.

3. Bills of material and cutsheets corresponding to parts called out on layout and arrangement drawings.

4. Operations and Maintenance clearances for any man doors, equipment, or miscellaneous.

5. Installation drawings and procedures showing valves, supports, pipe extensions, anchoring, and auxiliary piping installed at the dam site. Drawings shall include measured field dimensions.

6. Calculations Free body diagrams showing forces, moments, and torque on pipe assembly including reaction forces from supporting elements.

C. Manufacturer's catalog data showing motor actuator parts and materials of construction, referenced by AISI, NEMA, ASTM, SAE, or CDA specification and grade. Show motor actuator dimensions and weights. Show coatings.

D. Open/close travel times meeting the valve travel times shown or specified. The open/close travel time is defined as the time required for the valve to travel from close-to-open or open-to-close. A cycle is defined as close to open and back to close. Intermittent or pulsed operation shall not be allowed to achieve the specified travel time.

E. Electrical schematic drawings and physical wiring diagrams showing all components.

F. Certified factory performance test records, including written cycle test results as specified herein.

G. Drawings of the electrical components enclosure (physical layout in three dimensions or views).

H. Information showing the relationship between the operator output torque and torque limit switch settings.

I. Complete specifications and ordering information for replacement motors.

J. Warranty certification, from actuator manufacturer, that actuator meets or exceeds all parts of this specification.

K. Valve Manufacturer Drawings and Data shall include:

1. General arrangement drawings of valve and actuator assembly. Provide sufficient detail on the drawings so that all aspects of design and construction are shown and documented.

    a. Cross-sectional drawing of valve and actuator.

    b. Details of valve fabrication, including body, gate, seal assemblies, stem assemblies, anchorages, and other fabricated parts of valve.

2. Details of seismic restraint, including a loading diagram showing all forces imparted to the surrounding pipes and structures.

3. Electrical schematics and wiring diagrams for the power and control system, showing all components interconnects for power, control, monitoring, and protective circuits.

4. Installation and handling drawings and procedures.

5. Drawings shall show the construction, principal dimensions, dimensions and tolerances of all wear parts, and materials used for all parts of valve and actuator.

6. Bill of material (complete part list).

7. Overload protection and monitoring devices.

8. Equipment list with associated catalog data (product specifications and descriptions) for items of standard manufacture.

9. Six weeks prior to shipment for the bonneted knife gate valve, provide service manuals for and any pertinent installation instructions for the gate and motor-operator.

10. Rating curve showing discharge coefficient for range of opening form 0 to 100 percent, in both graphic and tabular form.

11. Electrical schematics and wiring diagrams for the power and control system, showing all components interconnects for power, control, monitoring, and protective circuits.

12. List of recommended spare parts.

13. List of special tools for installation, maintenance, or repair and adjustments.

14. Recommended storage practice, also to be included in the manufacturer's operation and maintenance manual or on the outside of the shipping container.

15. Operations and maintenance manual.

L. Calculations shall include:

1. Sizing calculations of major parts for operational loads for specified normal and overload conditions, including seismic loads;

2. Anchorage design for operational loads for specified normal and overload conditions, including seismic loads; and

3. Mechanical design calculations for actuator selection.

M. Quality Assurance/Control documents shall include:

1. Painting procedure and product literature;

2. Valve summary data sheet that provides the station, valve structure, type, manufacturer, size, pressure rating, drilling pattern and model number of each valve; and type, manufacturer, and model number of the valve actuator;

3. Manufacturer's required and recommended site storage conditions, and the Contractor's site storage methods;

4. Manufacturer's installation instructions;

5. Manufacturer's shop and field test reports, including test results;

6. Affidavit of compliance with AWWA standards; and

7. Operation and maintenance manuals.

8. Certified factory test reports

9. Certified mill test reports

1.04 DESIGN PARAMETERS

A. Design Pressure: 150 psi.

1. Working Pressure: Zero to full static head pressure from valve location to reservoir full up to dam crest at El. 951.5.

B. Maximum Design Flow shall be as generated by full static head up to the Dam Crest at El. 951.5 minus the head losses through the flow path from reservoir to outlet.

1. Centerline Elevation of Valves: as shown on the conceptual preliminary drawings.

C. Operating Time: As recommended by the Manufacturer with a minimum of one minute per six inches of nominal valve diameter.

D. Actuation

1. Electric motor actuator.

2. Power Supply: 480V, three phase.

E. Location: Inside partially open valve house on dam face, subject to weather and sunlight.

F. The design of the equipment shall include an allowance for earthquake loading caused by a horizontal and vertical acceleration.

1.05 OPERATING REQUIREMENTS

A. Normal Operation.

1. Continuous operation with the valve in the open position, passing normal flows in one direction from zero to full design pressure

2. Opening and closing valve against balanced pressure and zero flow.

3. Cracking open valve against unbalanced head from zero to full design pressure.

4. Valve in closed position withstanding pressure in one direction.

5. Valve may be operated at any time of the year.

1.06 DESIGN CRITERIA

A. Pressure-containing, weld-fabricated components shall be designed, fabricated, inspected, and tested in accordance with the requirements of ASME BPV Code, Section VIII, Division I, unless otherwise specified. Components shall be stress relieved before final machining.

B. Design valves to operate safely, reliably, and smoothly without binding, vibration, cavitation, or noise.

C. Valves shall be complete with all parts and components specified and/or required for installation, operation, and maintenance

D. Design valves for normal opening and closing under maximum unbalanced head conditions.

E. Valve leakage shall not exceed limits per AWWA C520 (zero visible leakage) over the full range design pressure.

F. The operating mechanism connections, mountings, and other parts of the equipment subject to such forces shall withstand, without damage, the maximum output of the operating device

G. Working stresses, bearing pressure, and other design criteria such as limits of deflection, torsional distortion, and alternating stress shall be determined foremost on the basis of producing a functionally reliable, long-life and trouble-free design. Provide an adequate design based on factors proven in practice and use lower working stresses wherever deemed necessary or desirable. Use adequate factors of safety throughout the design, especially in the design of parts subject to alternating stresses, vibration, impact, or shock.

H. Use stress concentration factors where applicable.

I. Design actuators in accordance with ANSI/AWWA C542.

J. Contractor shall inspect and as-built all necessary dimensions and information at the site and in each valve house location.

1.07 MANUFACTURER AND QUALIFICATIONS

A. Manufacturer: Hilton Valve Company, Rodney Hunt, or District-approved equal.

1.08 QUALITY ASSURANCE

A. The manufacturer shall be ISO 9001 Certified.

B. Certification: Before shipment, submit a shipping release with certified copies of all torque and hydrostatic factory tests, for all valves and actuators, showing compliance with this section and the applicable standards of AWWA, ANSI, ASTM, etc.

C. Valve manufacturers shall have a minimum of 10 years of recent continuous product history in the United States waterworks industry.

D. Qualification of welders and welding operators shall conform to the requirements of ASME

1.09 FIELD REPRESENTATIVE

A. Furnish field representative for field assembly, checkout, and testing, who is an employee of the manufacturer. Field representative shall be knowledgeable in and shall supervise installation and testing of equipment supplied under this section.

PART 2 - MATERIALS

2.01 GENERAL

A. Supply valves complete with all appurtenances required for operation.

B. Valves shall have the name of the manufacturer and size of the valve cast or molded onto the valve body or shown on a permanently attached plate.

C. Direction of flow shall be cast or stamped on the valve body unless valve is bidirectional.

D. Coordinate the drilling pattern and orientation of bolt holes between valves and adjacent flanges. Use only flat-faced flanges on valves.

2.02 KNIFE GATE VALVE

A. Valve: bonneted, rising stem, knife gate type with carbon steel body with stainless steel 304 wetted parts.

B. Actuator: Electric motor actuator with handwheel according to Paragraph 2.10.

2.03 VALVE BODY

A. Body: Flanged with internal location for housing the packing gland, and with lower body flushing ports

B. Material: Fabricated steel construction per ASTM A516 Gr 60 or better.

2.04 END FLANGES

A. Dimensions: Flat-faced, conforming to AWWA C207 Class E.

B. Flanges shall be provided with an O-ring groove for sealing

2.05 PACKING, O-RINGS, AND GASKETS

A. Packing, O-rings, and gaskets shall be one of the following non-asbestos materials

1. Teflon or TPFE;

2. Kevlar aramid fiber;

3. Acrylic or aramid fiber bound by nitrile Products: Garlock Bluegard, Klinger Klingersil C4400, or equal;

4. Buna-N (Nitrile); and

5. Cotton impregnated with Buna-N.

2.06 RUBBER PARTS

A. Rubber parts exposed to water shall be made of a rubber compound that is resistant to free chlorine and monochloramine concentrations up to 10 mg/l in the fluid conveyed.

2.07 VALVE SEATS

A. Type: 304 stainless steel metal to metal seat with UHMW anti-vibration ring and Buna-N seal

B. Connection: Clamped to body using corrosion-resistant seal clamps, retaining rings, and fasteners. Seats to be removable and replaceable without dismantling valve. Seats shall be retained in the body of the valve.

C. Mating Surfaces: In accordance with ANSI/AWWA C520.

2.08 GATE LEAF

A. Gate leaf shall have a square shape designed for minimal vibration when operated at intermediate positions.

2.09 VALVE STEM

A. Stem shall include an additional seal at the connection to the gate leaf such that the packing can be accessed and changed while the pipeline and valve are pressurized.

2.10 VALVE ACTUATOR

A. General

1. Where spec requirements differ from section 16050 Basic Electrical Materials and Methods the requirements here shall govern for the knife gate electric actuators.

B. Manufacturers

1. Actuators shall be AUMA SA series or District-approved equal.

2. Actuator manufacturers shall have Minimum of ten years of experience manufacturing and installing valve actuators.

3. Actuator must have a minimum maintenance history of 50 units, of the same basic model and similar option package as the submitted actuator, and have each functioned in a field installation for a period of at least one year without defect or malfunction. Valve actuator manufacturer shall provide complete documentation to meet this requirement, including contact names, telephone and fax numbers, and email addresses that can be used to verify the field installations. Approval of the validity of submitted maintenance history is solely at the discretion of the District.

C. Actuator Identification

1. Identify electric motor actuators by model number and serial number shown cast or molded onto the actuator body or on a permanently attached plate in raised letters.

D. Geared Operators

1. Intermediate Geared Operators

a. Provide intermediate operators of spur, helical, or bevel gears, between the new electric motor actuator and the new or existing geared valve operators, if needed to provide the specified open/close time, and to provide proper operation of the valve. Design the intermediate geared operators with bearings suitable for adapting to an electric actuator. Operators designed with bushings are not permitted.

b. Enclose intermediate geared operators, provide seals on shafts to prevent entry of dirt and water into the operator, and lubricate with oil or grease. Intermediate geared operators do not need a dial indicating the position of the valve.

c. Intermediate geared operators shall be of the totally enclosed design and proportioned as to permit operation of the valve under full differential pressure equal to the pressure rating of the valve, with a maximum input of 150 foot-pounds on the operating shaft. Orient intermediate geared operators to operate with valve stem and electric actuator as directed by the Owner's Engineer.

d. Support gear shaft at each end by ball or tapered roller bearings. Provide reduction gearing to meet maximum torque and pull design requirement. The reduction gearing shall run in a proper lubricant.

e. Intermediate geared operators shall open valves by turning counterclockwise.

f. Gear housing shall be ductile iron construction.

2. Handwheel

a. Provide a handwheel for manual operation with arrow and wording to indicate "open" or “close” rotation. The handwheel shall not rotate during motor operation, and operation of the handwheel shall not cause the motor to rotate. When in manual operating mode, the actuator shall remain in this mode until the motor is energized, at which time the actuator shall automatically return to electric operation. Accomplish movement from motor operation to handwheel operation by a positive, pad-lockable declutching lever, which mechanically disengages the motor and related gearing. Friction type declutch mechanisms are not acceptable. Size the handwheel for a maximum pull of 50 pounds under full differential pressure at any point through valve travel, and including seating or unseating.

E. Motors for electric actuators

1. Provide totally enclosed, high torque, engineered motors, suitable for the facility electrical service as shown on the Plans

2. Provide motors with Class F or H insulation, specifically designed for valve actuation service, and 100 start/stops per hour without overheating. Heat rise after 100 start/stops in an hour shall be less than 50 degrees C. Heat rise after three full consecutive valve cycles (open-close) shall be less than 50 degrees C.

3. Provide motor output capacity sufficient to open or close the valve against the maximum differential pressure when the voltage is 10 percent above or below normal at the specified service conditions.

4. Motor bearings shall be of the anti-friction type, and permanently lubricated.

5. Provide overload protection by automatically resetting thermal overload sensors placed in the motor windings and accessible through the motor end bell.

6. For ease of motor or gear replacement, the motor shall be an independent sub-assembly of the actuator power unit such that the power gearing shall not be an integral part of the motor assembly. The wiring shall be easily disconnected during replacement.

7. At the time electric actuators are delivered to the jobsite provide the District with one spare motor or motor assembly for each size or style of motor supplied for this project.

F. Actuator torque requirements

1. Provide actuator with rated output torque at least 1.5 times the maximum torque required to operate the valve at any position, including seating and unseating conditions and neglecting hammer-blow effect.

2. Maximum torque requirement is defined as the torque required at the most severe operating conditions, including maximum differential pressure across the valve, and maximum mechanical friction or other restrictive conditions inherent in the valve assembly.

3. Calculate actuator maximum torque with the applied voltage 10 percent below the nominal motor voltage rating.

4. Coordinate with the valve manufacturer to ensure that the motor actuator stall torque output does not exceed the torque limits of the valve operating stem or shaft.

5. The differential pressure across the valve is defined as the pressure rating of the valve, or as specified herein.

G. Electric motor actuators

1. General Design

a. Include as one integral modular assembly, the motor, internal reduction gearing, position limit switches, torque switches, travel limit switches, position indicator, declutch lever, handwheel, and reversing starter. The actuator shall be of a modular design, allowing rapid replacement of faulty modules or sub-sections. Actuators shall be AUMA SA- series or equal.

b. The actuator shall use discrete electromagnetic control components.

c. Actuator shall be suitable for service within the temperature range from minus 10 degrees C to plus 70 degrees C.

d. The motor shall be removable without draining oil or grease from the gearbox.

e. Electric heaters shall be provided within the drive motor enclosure and within the control enclosure. The heaters shall be sized to prevent condensation within the enclosures.

2. Actuator shall supply 120-VAC or 24-VDC control power for remote control and space heaters. Automatically protect internal actuator power supplies against overcurrent or short circuit conditions.

3. Control Panel Interface

a. No pushbuttons, switches, or indicating lights shall be provided on the face of the actuator. A separate local control panel shall be provided adjacent to the operator for local operation of the actuator.

b. The local control panel shall have a LOCAL-OFF-REMOTE mode control switch, and CLOSE-STOP-OPEN pushbuttons. The LOCAL-OFF-REMOTE switch shall be key operated. Indicating lights for full open and full closed shall be provided along with a digital position display (0-100%).

c. Provide contacts for remote indication of valve fully open and fully closed position. These contacts shall be rated 125-VAC/30-VDC, 2 amps.

4. Position/Limit/Torque Sensors

    a. The motor shall automatically de-energize if an over-torque condition is sensed. Torque limit protection shall automatically adjust for initial valve un-seating, or for programmed torque seating of valves. A valve movement in the opposite direction of the over torque move shall reset the torque limit protection.

    b. The actuator shall be provided with a position sensing potentiometer. The local control panel shall be provided with a potentiometer transmitter with a 4-20 mA analog output signal that is proportional to valve position.

5. Controls

    a. Actuator motor control shall use an electromechanical reversing starter operated by the Local Control Panel switches or remotely via dry contact type inputs.

    b. Control power for the reversing starter controls shall be provided by an internal 115V control power transformer. Both line side and load side of the transformer shall be fused.

    c. The control package shall be capable of 100 starts per hour for modulating service.

    d. All control transformers shall include vacuum impregnated coils, and have dual primary fuses.

    e. Thermal overload switches shall be provided in the motor winding for automatically disconnecting the motor power upon detection of an overload condition. The thermal switches shall be automatic reset type.

6. Power/Control Wiring

    a. The wiring connections compartment shall contain a suitable number of screw-type terminals to allow connection of step-mode controls, and the control wiring shall be physically separated from the power wiring. The terminals shall be easily accessible without removing components or the use of special tools.

H. Local Control

1. The local control panel shall include controls for locally operating the guard and outlet valves. Panel arrangement and connection details shall be shown on contractor design drawings. The local control panel shall interface with the Valve Control Panel located in the Pre-engineered Powerhouse Building for remote control and monitoring of the valves.

2. The local control panel enclosure shall be NEMA 4X, stainless steel construction. The panels shall be furnished with a painted steel interior pack pan for mounting the interior devices. The back pan shall be finished white. The panels shall be furnished with thermostatically controlled space heaters.

3. Nameplates

a. Furnish nameplates for instruments, relays, control switches, push buttons, indicating lights, and other items where the circuit and function of the particular device cannot be otherwise readily determined.

b. Nameplates shall be made of white plastic cut through to a black background. The lettering shall be of a size and design such that it will be legible from reasonable angles of observation and from distances of at least 10 feet.

c. Nameplates shall be screw-retained type

4. Control Wiring

a. The panels shall be completely wired, and wires for connections to remote equipment shall be brought to terminal blocks. All wiring shall be neat and workmanlike, without splices and with a uniform arrangement of circuits. Wire bundles or single wires shall run in straight lines with 90º corners, where change of direction is required.

b. Wiring, inside the panels, shall be #18 AWG or larger. Wiring shall be UL type, SIS, or MTW, flexible stranded copper, control wire. Minimum conductor sizes shall be as follows:

(1) Control circuits: #14 AWG minimum

(2) Alarm circuits: #16 AWG minimum

(3) Instrument and communication circuits: #18 AWG minimum

c. Where possible wiring shall be run in plastic wire duct with covers. Where it is not possible to contain the wiring in the duct, the wiring shall be wrapped with plastic spiral binding. The plastic wire duct and spiral binding shall be as manufactured by the Panduit Company, Hoffman or equal.

d. Wire bundles crossing hinges shall be securely clamped to both the door and the panel, and run parallel to the hinge for at least half the door length to prevent chafing. No splicing shall be permitted in the wire duct or spiral wrapped wire bundles.

e. The wires connecting the various devices to each other and terminal blocks shall be labeled at both ends with destination codes. Wire labels shall be white heat shrink polyolefin sleeves with black lettering. Wire labels shall be Floy Tag & Manufacturing, Inc. Type FT-200S, or equal.

f. Terminal blocks shall be DIN rail mounted Phoenix Contact, or equal. Terminal type shall be as follows:

(1) Power and general terminations: UK 5N

(2) Discrete I/O terminations: UKK 5-TG

(3) Analog terminations: DOKD 1.5-TG

(4) Fuse plug with indicator: ST-SILED 24-UK 4

(5) Ground terminations: USLKG 5.

5. Indicating Instruments

   a. All instrumentation shall be of the semi-flush mounted, back-connected, direct reading. Instruments shall have a 3-1/2, 7-segment, .56-inch red LED digital display unless otherwise specified. Instrument cases shall be dust tight with antiglare faceplates. Indicating instruments shall be Newport Q2000P, or District approved equal.

6. Control Switches

   a. All control switches shall be 30mm, round, oiltight, heavy-duty type units. Switches shall be Square D Type K, Class 9001, or District approved equal.

   b. Key operated switches shall be keyed alike. Key type shall be coordinated with the District.

   c. The selector switches shall be furnished with legend plates engraved as indicated on the Drawings.

7. Pushbuttons

   a. All pushbuttons shall be 30mm, round, oiltight, heavy-duty type units. Pushbuttons shall be Square D Type K, Class 9001, or District approved equal.

   b. The pushbuttons shall be furnished with legend plates engraved as indicated on the Drawings.

8. Indicating Lights

   a. Indicating lamp assemblies shall be LED assemblies of the panelboard type, suitable for 120V ac service, with appropriate color caps. The LED lamps shall be replaceable from the front of the panel. All color caps shall be interchangeable, and all LED lamps shall be of the same type and rating. The lamp assemblies shall be Square D Type K, Class 9001, or District approved equal.

   b. Indicating lamp cap colors shall be the following:

      (1) Closed: RED.

      (2) Open: GREEN.

      (3) Intermediate Position: Both RED and GREEN.

      (4) Valve Moving: Both RED and GREEN lights flashing.

   c. The lights shall be furnished with legend plates engraved as indicated on the Drawings.

9. Potentiometer Transmitter

a. The potentiometer transmitters shall be 115 Vac powered with 3-way isolation between the input, output and power supply. The transmitter shall convert a 0-1000 ohm input to a proportional 4-20mA dc output. The transmitters shall be Acromag, Series 450T-P-Y, or District approved equal with the following features:

(1) 0-1000 ohm input

(2) 4-20mA dc output

(3) 115 Vac power supply

(4) ±0.1% of calibrated span accuracy

(5) DIN rail mounting

I. Remote Control

1. Remote control functionality to be included in control panel with included terminals to be left unwired for future use.

J. Drive Sleeve

1. Provide a drop-in stem nut held in place with a snap ring, torque bushing, or threaded locknut and keyway which couples the actuator to the intermediate geared operator or valve stem and provides a versatile means of disassembling the actuator from the operator or valve.

2.11 VALVE SUPPORTS

A. Provide valves with integral baseplates or feet suitable to mounting on steel-reinforced concrete with grouted baseplates.

B. The floor shall have a grouted bottom baseplate and drilled and epoxy grouted anchor bolts. Place the bottom baseplate on leveling nuts and level. Once valve is positioned, grout the space under the bottom baseplate with non-shrink grout.

C. The Contractor, in conjunction with the manufacturer, shall be responsible for the structural design of the valve anchorages. Provide a design as necessary based on the actual loads, design, and layout of equipment supplied. The design shall meet the seismic requirements stated herein. The design shall be stamped by a registered professional engineer in the State of California

2.12 SPARE PARTS

A. Provide manufacturer’s recommended spare parts

2.13 SHOP ASSEMBLY AND TESTS

A. Prior to shop assembly and tests, submit a detailed shop inspection and test plan to demonstrate quality and function.

B. Each valve and appurtenances shall be completely assembled, tested, and inspected in the shop, unless otherwise approved. Adjoining components shall be fitted, doweled, and bolted together to ensure proper fit during field erection and assembly. Assembled components shall be shop-welded in their final positions as much as shipping limitations and field installation conditions will permit.

C. All valves and piping shall be hydrostatically tested in the shop up to 150% of the design pressure for not less than 60 minutes.

D. Leakage tests shall be performed to meet the requirements set forth by AWWA C520.

E. Each valve shall be tested with electric actuator attached in the shop to confirm functionality under actual or simulated working conditions. Testing shall be in accordance with AWWA C542.

2.14 WORKMANSHIP

A. Valves shall be free from manufacturing defects.

B. Provide a certificate of compliance with the purchaser’s material specifications, and furnish the manufacturer’s quality assurance program with each valve.

2.15 COATING

A. Coating shall be according to section 09900 and in compliance with AWWA C550.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install valves as according to contractor’s approved installation procedure and contractor’s approved layout drawings.

3.02 FIELD TESTING

A. Perform field testing in accordance with AWWA C520 and Contractor's approved field testing and commissioning procedure.

B. Field testing shall repeat shop tests at a minimum.

C. In addition to reproduced shop tests, field testing shall be performed to demonstrate functionality under normal operating conditions are met, and quality standards according to AWWA C520 are met.

3.03 MANUFACTURER'S WARRANTY

A. Obtain and provide the valve manufacturer's warranty for its products, including actuators incorporated in the work, and ensure the warranty includes products to be free from defects in materials, workmanship and performance for a period of six (6) years from the date of completion of the work. Upon notice, any damage or defect found during the warranty period shall be promptly repaired or replaced by the Manufacturer at no additional cost to the District

PART 4 - PAYMENT

4.01 MEASUREMENT

A. No separate measurement for the work of this Section will be made.

4.02 PAYMENT

A. Payment for work required under this Section will be the lump sum price in the in the Bid for the following item:

B. Such payment will be considered full compensation for all costs incurred for the performance of the work necessary to complete the requirements of this Section.

Item No.	Item	Description	Unit
15101-1	Furnish, install, and commissioning penstock #1 48 Inch knife gate valve	Furnish and install knife gate valves including any item required in this section not covered by another section. Perform commissioning of the valves.	LS

Item No.	Item	Description	Unit
15101-2	Furnish, install, and commissioning penstock #2 48 Inch knife gate valve	Furnish and install knife gate valves including any item required in this section not covered by another section. Perform commissioning of the valves.	LS

END OF SECTION

SECTION 15400
PLUMBING

PART 1 - General

1.01 DESCRIPTION

A. This section covers requirements for plumbing for powerhouse piping.

1. Work performed for this section will be paid under section 15060 – Piping and Appurtenances.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 15060 – Piping and Appurtenances

1.03 SCOPE OF WORK

A. Work includes, but is not necessarily limited to, the design, procurement, and installation of the following piping systems for the new powerhouse:

1. Drainage piping.

2. Service water.

3. Compressed air.

4. Connection of drainage piping to existing oil/water separator and existing plant's water drainage sump.

a. Calculations to ensure existing oil/water separator's capacity can accommodate additional drainage from new plant.

5. Testing.

1.04 QUALITY ASSURANCE

A. Install plumbing to meet requirements of local and state codes.

B. Provide manufacturer's certification that materials meet or exceed minimum requirements as specified.

1.05 SUBMITTALS

A. Design drawings and data

1. Layout drawings

2. Bills of material

3. Cutsheets

B. Certificates: Submit manufacturer's certificates of conformance.

C. Test Reports: Submit certified copies of test reports.

D. Descriptive Literature: Submit documentation on plumbing fixtures, trim, and floor drains.

E. Hangers and Supports: Submit layout showing type, spacing, maximum loads and materials.

F. Warranties: Submit manufacturer's warranty statements.

PART 2 - Products

2.01 POWERHOUSE BUILDING DRAINS

A. Powerhouse building drains shall be designed by the contractor and included on arrangement drawings.

B. Drain locations where oil containing equipment is located shall pass through an oil/water separator.

PART 3 - Execution

3.01 CODES, ORDINANCES, STANDARDS AND PERMITS

A. Comply with all local, state and national code restrictions and requirements. In case of conflict between the contract documents and a governing code, the higher standard shall prevail. Extra payment will not be allowed for work or changes required by local code enforcement authorities.

3.02 INSTALLATION OF THE WORK

A. Connections: Indicated equipment connections are necessarily based on equipment of a given manufacturer. Contractor assumes responsibility for proper arrangement of pipes, valves, power connections, etc. to connect approved equipment in a proper and approved manner. Follow equipment manufacturer's detailed instructions and recommendations in the installation and connection of all equipment. No equipment installation or connections shall be made in a manner that voids the manufacturer's warranty.

B. Miscellaneous Hardware: Provide all required trim including sleeves, inserts, flashing, valves, fittings, connections, traps, floor and wall plates, accessories, etc. necessary for a complete installation.

C. Drainage Piping System:

1. Trenches: Bottoms of trenches shall be shaped to give substantially uniform circumferential support to the lower fourth of each pipe. Trenches shall be kept free from water and pipe shall not be laid when the condition of the trench or the

weather is unsuitable for such work. At times when work is not in progress, open ends of pipe and fittings shall be securely and satisfactorily closed so that no water, earth, or other substance will enter the pipe or fitting.

2. Slope: Horizontal lines shall have a grade of 1/4 inch per foot unless otherwise indicated on the drawings. The grade may be reduced too not less than 1/8 inch per foot on overhead pipes that otherwise would reduce the headroom too much.

3. Exposure: For piping within buildings, all piping shall be concealed. All overhead pipes shall be kept as close to the ceilings as possible, unless otherwise indicated on the plans.

4. Joints: Soil pipe hubs shall extend a minimum of 6 inches above the floor where the pipe rises through the floor.

5. Reducers: Changes in pipe size shall be made with reducing fittings only.

6. Bends: All changes in direction (except minor misalignments) shall be made by the appropriate use of 45-degree wyes (with screwed plug), long or short sweep bends, or equivalent fittings. The use of long sweep bends is preferred over the short type.

7. Slip Joints: Will be permitted only in trap seals or on the inlet side of the traps.

8. Bushings: Will not be permitted.

9. Cleanouts (CO's):

    a. General: Cleanouts shall consist of a long-sweep 1/4 bend or 1/8 bends extended to the place indicated on the drawings or as required by code. "T"-pattern cleanouts shall be used only if there is no alternative.

    b. Concealed Pipes: Where cleanouts or test tees occur in concealed installations in finished rooms, they shall be provided with a 1/8-inch thick finished chrome plated brass cover plate of sufficient diameter to cover the opening in the finished wall. The cleanout plug shall have a solid head, tapped for a 1/4-inch chrome-plated brass screw to secure the cover plate. Where cleanout plugs extend beyond the wall finish, the cover plates shall be only of sufficient depth to fit against the wall to cover plug.

10. Traps:

    a. General: Each fixture and piece of equipment requiring connections to the drainage system shall be equipped with a trap, except where a general system trap is shown or specified, or if piped to a vented sump. Each trap shall be placed as near the fixture as possible, and no fixture shall be double-trapped. Installation shall be in strict observance of all governing codes.

11. Indirect Waste Connections: For drains from equipment such as pumps, air compressors, and similar equipment requiring seal water and/or cooling water. The indirect waste pipes must discharge into, and above the overflow rim of floor drains, or through an air gap to the inlet side of a trap serving the fixture, device or apparatus. The air gap shall have an opening at least twice the effective opening of the waste pipe.

12. Vents: Vent pipes shall project above roof line not less than 10 inches nor more than 18 inches unless other dimensions are noted on the plans.

13. Flashings:

    a. General: All pipes passing through the roof shall be flashed.

    b. Vent Pipes: Shall be flashed and soldered watertight and the lead shall be turned over and down into the pipe.

    c. Sheet Lead: 24 inches by 24 inches, weighing not less than 4 pounds per square foot, extending up around vent pipes. All seems soldered watertight.

D. Plumbing Fixtures:

1. Setting: Shall be absolutely tight and rigid on proper grounds. All setting surfaces must be properly caulked.

2. Fasteners: All exposed fasteners shall be chrome-plated brass.

E. Water Systems:

1. Piping Drainage: Water lines are to be installed so as to be drained. Drainage can be accomplished by using plugged or capped fittings or by disconnecting the supply pipe at the fixture.

2. Pipe Location: Run pipes parallel with the lines of the buildings wherever possible. No water pipe shall be buried in floors except as indicated on the plans or approved by the Owner's Engineer.

3. Reducers: Changes in pipe size shall be made with reducing fittings only.

4. Reducing Bushings: Will not be permitted.

5. Bends: Pipe bending for other than minor misalignment corrections shall not be permitted. Changes in direction shall be made with fittings.

6. Water Hammer Arresters: An air chamber shall be provided on hot and cold water lines near each solenoid valve, control valve, or flush valve. Unless shown otherwise on the plans, air chambers consist of a 12-inch length of pipe of the same diameter as the branch supply, capped. Commercial type snubbers, if installed, shall be accessible for maintenance.

7. Dielectric Unions: Connections between ferrous and nonferrous metallic pipe and connections to water heaters shall be made with insulating unions or flanges.

8. Unions: Shall be provided where required for disconnection and shall not be concealed in walls, ceilings, or partitions.

9. Valves:

    a. Branch Line Valves: Shall be gate valves unless otherwise specified. Valves to be all brass with threaded ends for ferrous pipe and sweat type connection for copper tubing.

b. Fixture Stops: Each hot and cold water supply to each fixture shall be provided with a compression angle valve in an accessible location near the fixture.

10. Wall and Floor Penetrations: Pipes passing through concrete or masonry walls or concrete floors shall be provided with pipe sleeves fitted into place at the time of construction.

11. Escutcheons: Shall be provided at all finished surfaces where exposed piping, bare or insulated, passes through floors, walls, or ceilings. Escutcheons to be fastened securely to pipe or pipe covering and are chromium-plated iron or chromium-plated brass, either one piece or split-pattern, held in place by internal spring tension or set-screw.

12. Access Panels: Furnish panels of approved adequate size for all valves and equipment requiring service and installed above ceilings, behind walls or in furring, complete with correct frame for type of building construction involved. Use no panel smaller than 12 inches x 12 inches for simple manual access or smaller than 16 inches x 20 inches where personnel must pass through.

13. Pipe Support: Horizontal runs of pipe shall be supported by adjustable hangers near joints. Spacing shall be not over 10 feet for galvanized steel pipe, 8 feet for hard drawn copper tubing and 5 feet for cast iron soil pipe. Anchors shall be located near the midpoints of the runs so as to force the expansion equally to the ends or in a direction where expansion can take place without excessive strain.

14. Expansion: Swing joints, offsets, expansion joints, etc., shall be provided where necessary to accommodate expansion of piping, which will be approximately 2 inches in 100 feet of copper hot water piping.

3.03 TESTING

A. Drainage and Water Supply Piping:

1. General: Drainage and water piping shall be tested by the Contractor and approved before acceptance. Underground piping shall be tested before backfilling. All equipment required for testing shall be furnished by the Contractor.

2. Approval: All tests shall be made in the presence of the Owner’s Engineer and results submitted for approval by the Owner’s Engineer.

3. Procedure:

a. Water test shall be applied to the drainage and venting system either in its entirety or in sections. If the entire system is tested, all openings in the pipes shall be tightly closed except the highest opening, and the system shall be filled with water to the point of overflow. If the system is tested in sections, each opening except the highest opening of the section under test shall be tightly plugged, and each section shall be filled with water and tested with at least a 10-foot head of water. In testing successive sections, at least the upper 10 feet of the next preceding section shall be tested so that each joint or pipe in the building except the uppermost 10 feet of the system has been submitted to a test of at least a 10-foot head of water. The water shall be kept in the system, or in the portion under test, for at least 15 minutes before the inspection starts; the system shall then be tight at all joints.

b. When the roughing-in is completed and before fixtures are set, the entire hot- and cold-water piping systems shall be tested at a hydrostatic pressure of not less than 100 pounds per square inch gauge, and proven tight at this pressure for not less than 30 minutes in order to permit inspection of all joints. Where a portion of the water-piping system is to be concealed before completion, this portion shall be tested separately as specified for the entire system.

4. Defects: If inspection or test shows defects, such defective work or material shall be replaced or repaired as necessary and inspection and tests repeated. Repairs to piping shall be made with new materials. No caulking of screwed joints or holes will be acceptable. All corrections and retests shall be made without additional cost to the Owner.

3.04 CLEANING

A. General: Equipment, pipes, valves, fittings, fixtures, appliances, etc., shall be thoroughly cleaned of grease, dirt, metal cuttings, etc., and left in a satisfactory condition for use.

B. Piping: Drain and flush to remove grease and foreign matter. Thoroughly clean out valves, traps, and strainers.

3.05 REPAIRS AND ADJUSTMENTS

A. General: Any stoppage, discoloration, or other damage to the finish, furnishings, or pats of the buildings, shall be repaired to the satisfaction of the Owner's Engineer. Check, adjust, and lubricate all automatic plumbing equipment, valves, fixtures, accessories, appliances, etc., for smooth and proper operation.

B. Flush Valves and Automatic Control Devices. Adjust water flow for correct settings.

END OF SECTION

SECTION 15500
Pre-Action Sprinkler System

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section provides the following requirements for Dry-Pipe Sprinkler System:

1. Pre-action sprinkler system

2. Fire extinguishers with mounting brackets to be furnished and installed, in the powerhouse.

1.02 CODES AND STANDARDS

A. Fire protection equipment shall comply with all national, state and local regulations.

B. Fire protection equipment shall conform to the requirements of the following codes:

1. National Fire Protection Association (NFPA).

2. Compressed Gas Association (CGA).

3. Occupational Safety and Health Administration (OSHA).

C. Underwriters' Laboratories: Fire extinguishers shall meet UL requirements for rating.

D. Factory Mutual: Fire extinguishers shall be FM approved.

E. Section 15060 – Piping.

1.03 SUBMITTALS

A. Design Submittals – The contractor shall be responsible for designing the complete sprinkler system sufficient to provide fire protection for unit 4 plant building, the turbine generator unit, and auxiliary equipment contained within the building. The contractor shall submit the following design documents for approval.

1. Detailed Layout drawings indicating the piping, valves, devices used throughout the sprinkler system. Coordinate with all building trades:

a. Compressed air piping

b. Process piping

2. Design Data:

a. Approved sprinkler piping working plans, prepared according to NFPA 13

b. Hydraulic calculations.

B. Product data for each type of product.

1. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

C. Shop drawings for dry-pipe sprinkler systems.

1. Include plans, elevations, sections, and attachment details.

2. Include diagrams for power, signal, and control wiring.

D. Welding documents:

1. WPS

2. PQR

3. WPQR

E. Field Test Reports

1. Test reports for testing conducted according to NFPA 13.

F. Complete manufacturer data shall be submitted to the Owner's Engineer in accordance with Section 01300.

G. Warranties covering all products shall be submitted in accordance with Section 01750.

H. Qualification Data for qualified installers and fire systems design engineer.

I. Operations and Maintenance Manual.

J. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Sprinkler Cabinets: Finished, wall-mounted, steel cabinet with hinged cover, and with space for minimum of six spare sprinklers plus sprinkler wrench. Include number of sprinklers required by NFPA 13 and sprinkler wrench. Include separate cabinet with sprinklers and wrench for each type of sprinkler used on Project.

PART 2 - PRODUCTS

2.01 SYSTEM DESCRIPTIONS

A. Double-Interlock Pre-action Sprinkler System: Automatic sprinklers are attached to piping containing low-pressure air or nitrogen. Actuation of a fire-detection system, located in same area as sprinklers, will activate the normally closed solenoid but will not open the pre-action valve. Activation of a sprinkler head will not permit water to flow into sprinkler piping. Activation of both the normally closed solenoid valve and automatic sprinkler is required to cause the pre-action valve to open, permitting water to flow into sprinkler piping, and water will then discharge from opened sprinkler.

2.02 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Sprinkler system equipment, specialties, accessories, installation, and testing to comply with NFPA 13.

C. Standard-Pressure Piping System Component: Listed for 175-psig minimum working pressure.

D. Delegated Design: Engage a qualified professional ENGINEER, as defined in Section 01 14 00 – Work Restrictions to design dry-pipe sprinkler systems.

1. The margin-of-safety requirement may not be required by authorities having jurisdiction. Retain "Margin of Safety for Available Water Flow and Pressure" Subparagraph below to require the application of a margin of safety in Contractor's design.

2. Margin of Safety for Available Water Flow and Pressure: 10 percent, including losses through water-service piping, valves, and backflow preventers.

3. Sprinkler Occupancy Hazard Classifications:

    a. Utility Tunnels/Mechanical Equipment Rooms: Ordinary Hazard, Group 1.

    b. Minimum Density for Automatic-Sprinkler Piping Design:

    c. Ordinary-Hazard, Group 1 Occupancy: 0.15 gpm/sq. ft. over 1500 sq. ft. area.

    d. Ordinary-Hazard, Group 2 Occupancy: 0.20 gpm/sq. ft. over 1500 sq. ft. area.

    e. Extra-Hazard, Group 1 Occupancy: 0.30 gpm/sq. ft. over 2500 sq. ft. area.

4. Maximum protection area per sprinkler according to UL listing.

5. Total Combined Hose-Stream Demand Requirement: According to NFPA 13 unless otherwise indicated:

a. Ordinary-Hazard Occupancies: 250 gpm for 60 to 90 minutes.

b. Extra-Hazard Occupancies: 500 gpm for 90 to 120 minutes.

E. Obtain documented approval of sprinkler system design from authorities having jurisdiction.

F. Seismic Performance: Sprinkler piping to withstand the effects of earthquake motions determined according to NFPA 13 and ASCE/SEI 7.

2.03 STEEL PIPE AND FITTINGS

A. Mains to be Pipe Schedule 10, ASTM A795 Galvanized with grooved fittings and welded branch outlets.

B. Branch lines to be Pipe Schedule 40, ASTM A53 or A135. Fittings; Galvanized Class 125, ANSI B16.4.

C. All grooved couplings to be Galvanized.

2.04 SPECIALTY VALVES

A. Listed in UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."

B. Pressure Rating:

1. Standard-Pressure Piping Specialty Valves: 175-psig minimum.

C. Body Material: Cast or ductile iron.

D. Size: Same as connected piping.

E. End Connections: Flanged or grooved.

F. Dry-Pipe Valves:

1. Standard: UL 260.

2. Design: Differential-pressure type.

3. Include UL 1486, quick-opening devices, trim sets for air supply, drain, priming level, alarm connections, ball drip valves, pressure gauges, priming chamber attachment, and fill-line attachment.

4. Air Compressor:

a. Standard: UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."

b. Motor Horsepower: Fractional.

(1) Power: 120-V ac, 60 Hz, single phase.

c. Sized for application and capable of achieving system supervisory pressure within 30 minutes in accordance with requirements of NFPA 13. Provide ASME air receiver tank as required to meet requirements on larger systems.

d. Include filters, relief valves, coolers, automatic drains, and gauges.

G. Automatic (Ball Drip) Drain Valves:

1. Standard: UL 1726.

2. Pressure Rating: 175-psig minimum.

3. Type: Automatic draining, ball check.

4. Size: NPS 3/4.

5. End Connections: Threaded.

2.05 SPRINKLER PIPING SPECIALTIES

A. General Requirements for Dry-Pipe System Fittings: UL listed for dry-pipe service.

B. Branch Outlet Fittings:

1. Standard: UL 213.

2. Pressure Rating: 175-psig minimum.

3. Body Material: Ductile-iron housing with EPDM seals and bolts and nuts.

4. Type: Mechanical-tee and -cross fittings.

5. Configurations: Snap-on and strapless, ductile-iron housing with branch outlets.

6. Size: Of dimension to fit onto sprinkler main and with outlet connections as required to match connected branch piping.

7. Branch Outlets: Grooved, plain-end pipe, or threaded.

C. Flow Detection and Test Assemblies:

1. Standard: UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."

2. Pressure Rating: 175-psig minimum.

3. Body Material: Cast- or ductile-iron housing with orifice, sight glass, and integral test valve.

4. Size: Same as connected piping.

5. Inlet and Outlet: Threaded.

D. Branch Line Testers:

1. Standard: UL 199.

2. Pressure Rating: 175-psig minimum.

3. Body Material: Brass.

4. Size: Same as connected piping.

5. Inlet: Threaded.

6. Drain Outlet: Threaded and capped.

7. Branch Outlet: Threaded, for sprinkler.

E. Sprinkler Inspector's Test Fittings:

1. Standard: UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."

2. Pressure Rating: 175-psig minimum.

3. Body Material: Cast- or ductile-iron housing with sight glass.

4. Size: Same as connected piping.

5. Inlet and Outlet: Threaded.

F. Adjustable Drop Nipples:

1. Standard: UL 1474.

2. Pressure Rating: 250-psig minimum.

3. Body Material: Steel pipe with EPDM O-ring seals.

4. Size: Same as connected piping.

5. Length: Adjustable.

6. Inlet and Outlet: Threaded.

G. Flexible Sprinkler Hose Fittings:

1. Standard: UL 1474.

2. Type: Flexible hose for connection to sprinkler, and with bracket for connection to ceiling grid.

3. Pressure Rating: 175-psig minimum.

4. Size: Same as connected piping, for sprinkler.

2.06 SPRINKLERS

A. Listed in UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."

B. Pressure Rating for Automatic Sprinklers: 175-psig minimum.

C. Automatic Sprinklers with Heat-Responsive Element:

1. Application: UL 199.

2. Characteristics: Nominal 1/2-inch orifice with Discharge Coefficient K of 5.6, and for "Ordinary" temperature classification rating unless otherwise indicated or required by application.

D. Sprinkler Finishes: bronze.

E. Sprinkler Guards:

1. Standard: UL 199.

2. Type: Wire cage with fastening device for attaching to sprinkler.

2.07 DEVICES

A. Device types to match piping and equipment connections.

B. Pressure Switches - Water-Flow Alarm Detection:

1. Standard: UL 346.

2. Type: Electrically supervised, pressure-activated water-flow switch.

3. Components: Two single-pole, double-throw switches.

4. Design Operation: Rising pressure to 6 psi, plus or minus 2 psi signals water flow.

5. Adjustability: Each switch is to be independently adjustable.

6. Wire Separation: Pressure switch to provide separation of wiring to each switch connection to allow for low and high volume connections to comply with NFPA 70 Article 760 requirements.

C. Valve Supervisory Switches:

1. General Requirements for Valve Supervisory Switches:

a. Standard: UL 346.

b. Type: Electrically supervised.

c. Design: Signals that controlled valve is in other than fully open position.

d. Wire Terminal Designations: Indicates normal switch position when switch is properly installed on the valve and valve is fully open.

2. Requirements for OS&Y Valve Supervisory Switches:

a. Components: One or two single-pole, double-throw switches.

b. NEMA Rating: NEMA 4 and NEMA 6P enclosures suitable for mounting in any position indoors or outdoors.

c. Visual Switch Indication: Indicates device is properly installed and OS&Y valve is fully open.

d. Mounting Hardware: Mounting bracket to grip valve yoke and prevent movement of switch assembly on OS&Y valve.

e. Trip Rod Length: Adjustable.

3. Requirements for PIV and Butterfly Valve Supervisory Switches:

a. Components: Two single-pole, double-throw switches.

b. NEMA Rating: NEMA 4 and NEMA 6P enclosures suitable for mounting in any position indoors or outdoors.

c. Mounting Hardware: Removable nipple.

d. Trip Rod Length: Adjustable.

4. Requirements for Ball Valve Supervisory Switch:

a. Components: One single-pole, double-throw switch.

b. NEMA Rating: NEMA 4 enclosure suitable for mounting in any position indoors or outdoors.

c. Mounting Hardware: Suitable for mounting directly to pipe, ball valves or backflow preventers sized from up to NPS 2.

2.08 PRESSURE GAUGES

A. Standard: UL 393.

B. Dial Size: 3-1/2- to 4-1/2-inch diameter.

C. Pressure Gauge Range: 0- to 250-psig minimum.

D. Label: Include "WATER" or "AIR/WATER" label on dial face.

E. Air System Piping Gauge: Include retard feature and "AIR" or "AIR/WATER" label on dial face.

2.09 FIRE EXTINGUISHERS

The fire extinguishers shall meet the following requirements:

A. Type of Agent: Multi-purpose dry chemical.

B. UL Rating: 4A60B:C.

C. Construction: Fire extinguishers shall have a heavy duty steel cylinder, metal valves and siphon tube, corrosion resistant finish, pull pin squeeze grip operation, visual indicating gauge and replaceable seals.

D. Mounting Bracket: The extinguisher shall be mounted using the manufacturer's standard mounting bracket, attached with suitable expansion bolts.

E. Acceptable Manufacturers:

1. Kidde or Owner’s Engineer approved equal.

2. Larsen's, Model No. MP-10.

3. J.L. Industries, Model: Cosmic 10E.

4. Or Owner’s Engineer approved equal.

PART 3 - EXECUTION

3.01 PREPARATION

A. Perform fire-hydrant flow test according to NFPA 13 and NFPA 291.

B. Report test results promptly and in writing.

3.02 SERVICE-ENTRANCE PIPING

A. Connect sprinkler piping to water-service piping for service entrance to building.

B. Install shutoff valve, backflow preventer, pressure gauge, drain, and other accessories indicated at connection to water-service piping.

C. Install shutoff valve, check valve, pressure gauge, and drain at connection to water service.

3.03 WATER-SUPPLY CONNECTIONS

A. Install shutoff valve, check valve, pressure gauge, and drain at connection to water supply.

3.04 INSTALLATION OF PIPING

A. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated on approved working plans.

1. Deviations from approved working plans for piping require written approval from authorities having jurisdiction. File written approval with Architect before deviating from approved working plans.

B. Piping Standard: Comply with NFPA 13 requirements for installation of sprinkler piping.

C. Install seismic restraints on piping. Comply with NFPA 13 requirements for seismic-restraint device materials and installation.

D. Use listed fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.

E. Install unions adjacent to each valve in pipes NPS 2 and smaller.

F. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.

G. Install "Inspector's Test Connections" in sprinkler system piping, complete with shutoff valve, and sized and located according to NFPA 13.

H. Install sprinkler piping with drains for complete system drainage.

I. Install sprinkler control valves, test assemblies, and drain risers adjacent to standpipes when sprinkler piping is connected to standpipes.

J. Install automatic (ball drip) drain valves to drain piping between fire department connections and check valves. Drain to floor drain or to outside building.

K. Connect compressed-air supply to dry-pipe sprinkler piping.

L. Connect air compressor to the following piping and wiring:

1. Pressure gauges and controls.

2. Electrical power system.

3. Fire-alarm devices, including low-pressure alarm.

M. Install alarm devices in piping systems.

N. Install hangers and supports for sprinkler system piping according to NFPA 13. Comply with requirements in NFPA 13.

O. Install pressure gauges on riser or feed main, at each sprinkler test connection, and at top of each standpipe. Include pressure gauges with connection not less than NPS 1/4 and with soft-metal seated globe valve, arranged for draining pipe between gauge and valve. Install gauges to permit removal, and install where they are not subject to freezing.

P. Drain dry-pipe sprinkler piping.

Q. Pressurize and check dry-pipe sprinkler system piping and air compressors.

R. Install sleeve seals for piping penetrations of concrete walls and slabs.

3.05 JOINT CONSTRUCTION

A. Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure ratings same as or higher than system's pressure rating for aboveground applications unless otherwise indicated.

B. Install unions adjacent to each valve in pipes NPS 2 and smaller.

C. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.

D. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

E. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

F. Flanged Joints: Select appropriate gasket material in size, type, and thickness suitable for water service. Join flanges with gasket and bolts according to ASME B31.9.

G. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads.

2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

H. Twist-Locked Joints: Insert plain end of steel pipe into plain-end-pipe fitting. Rotate retainer lugs one-quarter turn or tighten retainer pin.

I. Steel-Piping, Cut-Grooved Joints: Cut square-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe joints.

J. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

3.06 INSTALLATION OF VALVES AND SPECIALTIES

A. Install listed fire-protection valves, trim and drain valves, specialty valves and trim, controls, and specialties according to NFPA 13 and authorities having jurisdiction.

B. Install listed fire-protection shutoff valves supervised open, located to control sources of water supply except from fire-department connections. Install permanent identification signs indicating portion of system controlled by each valve.

C. Install check valve in each water-supply connection. Install backflow preventers instead of check valves in potable-water-supply sources.

D. Specialty Valves:

1. Install valves in vertical position for proper direction of flow, in main supply to system.

2. Install dry-pipe valves with trim sets for air supply, drain, priming level, alarm connections, ball drip valves, pressure gauges, priming chamber attachment, and fill-line attachment.

3.07 IDENTIFICATION

A. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13.

B. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 26 05 53 – Electrical Identification.

3.08 FIELD QUALITY CONTROL

A. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. Leak Test: After installation, charge systems and test for leaks. Repair leaks and retest until no leaks exist.

2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3. Flush, test, and inspect sprinkler systems according to NFPA 13, "Systems Acceptance" Chapter.

4. Energize circuits to electrical equipment and devices.

5. Start and run air compressors.

6. Coordinate with fire-alarm tests. Operate as required.

7. Coordinate with fire-pump tests. Operate as required.

8. Verify that equipment hose threads are same as local fire department equipment.

B. Sprinkler piping system will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.09 CLEANING

A. Clean dirt and debris from sprinklers.

B. Only sprinklers with their original factory finish are acceptable. Remove and replace any sprinklers that are painted or have any other finish than their original factory finish.

3.10 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain specialty valves.

PART 4 - PAYMENT

4.01 MEASUREMENT

A. No separate measurement for the work of this Section will be made.

4.02 PAYMENT

A. Payment for work required under this Section will be the lump sum price in the in the Bid for the following item:

B. Such payment will be considered full compensation for all costs incurred for the performance of the work necessary to complete the requirements of this Section.

Item No.	Item	Description	Unit
15500-1	Design and Installation of Sprinkler system	No additional description	LS

Item No.	Item	Description	Unit
15500-2	Furnish Sprinkler System Components	Furnishment of items not covered under section 15060 Piping	LS

END OF SECTION

SECTION 15800
HEATING AND VENTILATING

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope: This Section provides the requirements for heating and ventilating of the powerhouse.

B. Related work specified elsewhere: Electrical, Division 16.

1.02 RELATED SPECIFICATIONS, CODES, AND STANDARDS

A. Specifications:

1. Section 05500 – Metal Fabrications
2. Section 15060 – Piping
3. Section 15400 – Plumbing
4. Section 16050 – Basic Electrical Materials and Methods
5. Section 16720 – Fire Detection and Alarm Systems

B. Codes: Equipment shall comply with all national, state, and local regulations.

C. Standards:

1. Air Movement and Control Association (AMCA).
    a. Standard 210, Laboratory Methods of Testing Fans for Rating.
    b. Standard 211, Certified Ratings Program-Air Performance.
    c. Standard 301, Methods for Calculating Fan Ratings from Laboratory Test Data.
    d. Standard 311, Certified Sound Ratings Program for Air Moving Devices.
2. California Mechanical Code (CMC).
3. California Fire Code (CFC)
4. National Fire Protection Association (NFPA), National Electric Code (NEC).
    a. NFPA 72 – National Fire Alarm Code, Calif. Amended.
    b. NFPA 90A – Standard for the Installation of Air Conditioning and Ventilating Systems.

5. Sheet Metal and Air Conditioning Contractors National Association (SMACNA)

    a. SMACNA HVAC Duct Construction Standards (DCS) – Metal and Flexible, 3rd Edition, 2005.

    b. SMACNA Architectural Sheet Metal Manual, 7th Edition.

D. Underwriters' Laboratories: Electrical equipment shall be UL listed.

    a. UL 181 – Standard for Safety Factory-Made Air Ducts and Connectors, 11th Edition.

    b. UL 268A – Standard for Safety Smoke Detectors for Duct Application, 1998 Edition.

    c. UL 555 – Standard for Safety Fire Damper and Ceiling Fire Damper. 2006 Edition.

    d. UL 555S – Standard for Safety Leakage Rated Dampers for Use in Smoke Control Systems, 1999 Edition with revisions through July, 2006.

    e. Building Materials Directory.

E. Provide manufacturer's certification that materials meet or exceed minimum requirements as specified.

1.03 EQUIPMENT

A. Equipment will be located at an elevation of approximately 600 feet above sea level.

1.04 SUBMITTALS

A. Outline drawings and manufacturer's literature shall be submitted to the Owner’s Engineer in accordance with Section 01300.

B. In the Specifications and on the Drawings, equipment is identified by assigned numbers for reference and location purposes. The appropriate equipment numbers shall be indicated on the shop drawings. Submittals shall include, but not be limited to:

1. Design Drawings, Data, Calculations, and Reports

    a. Duct layout drawings showing all necessary dimensions and complete bill of material (including the type and grade of materials).

    b. Operation and Maintenance clearances for any maintenance doors, equipment or miscellaneous.

    c. Installation drawings and procedures showing equipment, supports, anchoring, and auxiliary piping installed at the dam site. Drawings shall include measured field dimensions.

2. Manufacturer's certificates of conformance and certified copies of test reports.

3. Documentation including: Name of manufacturer, type and model, design rotative speed, BHP, rated motor HP, performance characteristics including capacity and

pressures, materials used, weight of assembled unit, list of accessories to be furnished with unit, finish, and voltage.

4. Fabrication drawings for supports, vibration isolators, and similar items especially fabricated for this installation.

5. Complete assembly and installation drawings for all rotating equipment.

6. Layout showing type, spacing, maximum loads and materials of hangers supports.

7. Electrical wiring schematics indicating each terminal connection, unit symbol, and control description.

C. Operation and maintenance information shall be submitted to the Owner's Engineer in accordance with Section 01730.

D. Manufacturer's warranty shall be submitted to the Owner's Engineer in accordance with Section 01750.

1.05 Design Parameters

A. Listed below are parameters that directly impact the Heating, Ventilation, and Cooling requirements for the HVAC system. Items marked with an asterisk (*) are preliminary estimates and shall be coordinated with the water to wire contractor (Owner Furnished Equipment Supplier) during the design process. Heat and cooling loads of equipment supplied by the contractor under this contract shall also be considered in the HVAC system design.

Parameter	Value
Latitude and longitude coordinates	36.832668, -119.326850
Minimum Temperature in past 2 years	28.0°F
Maximum Temperature in past 2 years	118.0°F
Maintain Powerhouse Internal Temperature	75°F
Horizontal Generator Cooling Method (water or air)*	TBD
Maximum Turbine Generator Power*	7100 kW
HPU Motor Power*	3.73 kW

PART 2 - PRODUCTS

2.01 DUCTWORK AND MISCELLANEOUS ACCESSORIES

A. Duct shall meet SMACNA's Leakage requirements.

B. Duct and sheet metal construction and installation shall be in accordance with SMACNA HVAC DCS, NFPA Standard 90A and CMC.

C. Metal ducts 18 inches or more in greatest dimension shall be diagonally creased on all four sides. Longitudinal seams shall be double crimped, bent, and hammered airtight.

D. Bar slip or reinforced bar slip seams may be used only when seams are inaccessible for hammering down, and upon approval.

E. Metal duct radius elbows shall be made with a centerline radius of 1.5 times the duct width whenever possible. In no case shall the centerline radius be less than the width of the duct except where shown otherwise. The duct width shall be the width of the duct in the direction of the radius.

F. Where space does not permit the use of metal duct radius elbows, approved turning vanes shall be installed. Turning vanes shall be double walled vane type and conform to SMACNA HVAC DCS, Figures 2-3 and 2-4. Vanes shall be constructed of the same material as the ductwork. Splitter vanes in elbows shall be single walled and turning vanes in mitered elbows shall be double walled.

G. Ferrous angles, bars, structural members, and joining collars used in the construction and support of ductwork and plenums shall be galvanized.

H. No "S" seams will be accepted.

I. Construction:

1. Sheet metal ducts and plenums shall be constructed with airtight joints and seams in accordance with the latest editions of ASHRAE standards and SMACNA Duct Construction Manual. Ductwork materials shall be galvanized steel or aluminum, unless otherwise noted. Minimum duct gauges required are as follows:

Maximum Size of Ducts (inches)	Galvanized Steel U.S. Standard Gauge	Aluminum Thickness (inches)
12 or less	26	.025
13 through 30	24	.032
31 through 54	22	.040
55 through 60	20	.050

2. Fabrication shall be airtight and shall include all necessary reinforcements, bracing, supports, framing, gasketing, sealing and fastening to provide rigid constructions and freedom from vibration, airflow-induced motion and noise, and excessive deflection at specified maximum system air pressure and velocity. Sheet metal surfaces to be painted and surfaces to which adhesives will be applied, shall be clean and free of all oil, grease and deleterious substances. Duct

strength shall be adequate to prevent failure under pressure service or vacuum created by fast closure of ductwork devices.

3. Metal sheets used to fabricate ducts, casings, plenums, etc., shall be free from blisters, slivers, pits and imperfectly galvanized spots. Sheet metal ducts and fittings over 18 inches shall be cross-broken, or otherwise stiffened, to reduce vibration to a minimum. Vertical and horizontal sheet metal barriers, duct offsets, and elbows shall be cross-broken. Cross-breaking shall be applied to the sheet metal between the standing seams or reinforcing angles; the center of cross-break shall be of the required height to ensure surfaces being rigid. Radius duct elbows shall have a minimum inside radius equal to 1 1/2 times the width or diameter of the duct. All flanged joints shall be gasketed, full-faced 1/8-inch thick. Gaskets shall be one piece. Material shall be cork (Dodge Cork Co., Lancaster, PA; or equivalent).

J. Miscellaneous Accessories: Supports for horizontal ducts and plenums shall be galvanized steel angles. Supports for vertical ducts shall be band iron strap or angle bracket type. Inlet ducts shall be amply braced to withstand maximum negative pressure. Supports shall be sized and designed for adequate seismic restraints for UBC Seismic Zone 3.

K. Balancing Dampers: Butterfly or multi-blade dampers shall be provided as required for balancing air quantities to meet the HVAC needs of the powerhouse and equipment under a variety of known ambient conditions. An indicating locking quadrant shall be provided on each manual damper, with easy access for operation. Dampers in ducts having width perpendicular to the axis of the damper greater than 12 inches shall be of the multiblade type having a substantial frame with blades fabricated of 16 gauge metal.

L. Insect Screens. Removable insect screens shall be provided on all outside air intakes and exhaust air discharges to outside air. Screens shall be secured in frames of same metal as screens. Screens shall be of same material and finish as duct, louver or equipment to which the screens are attached.

M. Flexible Connectors. Flexible duct connections shall be made with banded or flanged 8-ounce canvas or reinforced plastic, or equal at each point where a blower unit is connected to a duct. A minimum clearance of 3 inches between the duct and source of vibration shall be maintained. The connectors shall be waterproof, fire retardant and airtight.

N. Registers.

1. Supply and return registers shall be of aluminum construction 1/2 inch x 1/2 inch x 1/2 inch aluminum grid, opposed blade damper, Titus Model 50-FS or equivalent.

2. Sizes shall be selected in terms of specific airflow requirements, spacing and sound. Air diffusion device construction shall be such that no flutter, rattle or vibration occurs.

O. Turning Vanes: Square-turn elbows shall be fitted with shop-fabricated double-blade turning vanes mounted inside rails. Construction shall be of the same material as the duct work and rigid enough to prevent vibration at high air flow.

P. Duct Probe Access: Holes shall be provided with neat patches, threaded plugs, or threaded or twist-on caps where indicated or necessary for air balancing Pitot tube access. Extended neck fittings shall be provided where problem access area is insulated. Sizes shall be selected in terms of specific air flow requirements spacing and sound. Air diffusion device construction and mounting shall be such that no flutter, rattle or vibration occurs.

2.02 CONTROLS

A. General: All heating and ventilating equipment shall be provided with manual or automatic control systems and shall be shown on contractor's arrangement drawings, subject to approval by the Owner's Engineer. Individual exhaust fans shall have manual switches for single or 2-speed motors. Electric unit heaters shall have unit-mounted contactors, unless otherwise approved, and they shall be controlled from wall-mounted heating thermostats.

B. Coordination with Electrical: The work under this section must be coordinated with the electrical work in order to accomplish the interfacing necessary to provide a complete and operable system in conformance with the requirements of the Contract Documents. The electrical drawings, plans, and schematics should be referenced for specific details of work being furnished under Division 16 and coordination requirements between HVAC and electrical.

C. Thermostats: Room thermostats shall be of the modulating electric type, except where 2-position action is required. Thermostats location shall be shown on contractor drawings, subject to approval by the Owner's Engineer, and shall have ranges to suit the known site conditions. All thermostats shall have exposed adjustment dials and a thermometer on the front face. Mounting height shall be 5 feet. An insulating back shall be provided where exterior wall mounting is indicated. Guards shall be provided for room thermostats installed in areas other than offices. See plans for temperature range of thermostats.

D. Manufacturers: Control system components and thermostats shall be as manufactured by Honeywell; Johnson Controls Company; General Controls; or equivalent. All control wiring and conduit from thermostat to equipment, and appurtenances shall conform to Division 16.

2.03 FANS

A. General: Location, type, capacity, and motor horsepower shall be specified or shown. All units shall be heavy duty, rated for continuous 24 hours per day service and of totally enclosed (waterproof) design. Fans shall be complete with motors, flexible connections to supply and/or suction ducts, vibration isolators, and necessary accessories. All exhaust fans shall be furnished with back draft dampers. Belt-driven fans shall be complete with adjustable motor bases and belt guards. All exposed fan propellers located 8 feet or less above working floor elevation, or otherwise easily accessible, shall be provided with a finger proof wire guard.

B. Wall-Mounted Fans: Wall-mounted exhaust fans shall be direct motor-driven and shall be supported on metal frames for mounting, with safety guards. Wall openings shall be of sufficient size for the fan capacity. Fan weather hoods shall be provided and

special provisions shall be provided for draining rain water away from walls to prevent stains or water streaks on hoods.

C. Ceiling Exhauster: The outer box and housing shall be galvanized steel. Unit shall be complete with white finished grille.

D. Performance: Fans shall be guaranteed to deliver the quantities of standard air against the respective static pressure without deviating by more than 5 percent. Every fan wheel, regardless of size, shall be statically and dynamically balanced, and shall be free from objectionable vibration or noises.

2.04 ELECTRIC HEATERS

A. General: Electric heaters shall be furnished and installed as required to maintain building temperature. Heaters shall be controlled from wall-mounted thermostats furnished under this section. Heaters shall have built-in magnetic contactors and safety devices to meet UL listing, National Electrical Code, and local regulations. Heater capacity and size shall be adequate to maintain building temperature during the worst-case ambient conditions resulting in the greatest rate of heat loss.

B. Unit Heaters: Unless otherwise approved by the Owner's Engineer, all unit heaters shall be of the electric, horizontal discharge type, with enameled steel cabinet, mounting bracket, adjustable four-way louvers, spiral finned, enclosed heating element, automatic reset overheat protection, thermal protected, permanently lubricated fan and motor, fuses and contactors. Where unit heaters are supplied with wall-mounted low voltage thermostats, the heaters shall be equipped with control transformers. Electrical characteristics shall be in accordance with the Electric Drawings. All unit heaters shall be as manufactured by Trane, Markel or equivalent.

C. Electric Baseboard Heaters: The baseboard heater shall be complete with an aluminum finned heating element with wattage as called out on drawings, housing with snap-on cover for access to wiring, thermal protector and thermostats with range of 40 degrees to 85 degrees F. Unit shall be UL listed. Heaters shall be Chromalox type BBF, Markel Series 2200, or equivalent.

2.05 LOUVERS

A. The contractor shall incorporate louvers into their design as required to meet the HVAC needs of the equipment at various times of the year.

2.06 AIR FILTERS

A. Air filters shall be disposable panel filters, 1-inch thick with woven scrim retainer, American air filter type Amer-Glas or equivalent.

PART 3 - Part 3 - Execution

3.01 Codes, Ordinances, Standards and Permits

A. Comply with all local, state and national code restrictions and requirements. In case of conflict between the contract documents and a governing code, the higher standard shall prevail. Extra payment will not be allowed for work or changes required by local code enforcement authorities.

3.02 INSTALLATION OF WORK

A. Location and Access: Observe good common practice in locating and installing mechanical equipment and accessories so that completed installation presents the least possible hazard. Maintain adequate clearances to all fixtures, valves, and equipment so as to permit clearances to all fixtures, valves, and equipment so as to permit ready access to all parts requiring adjustments, inspection, service, and repair. Installation of any equipment with less than minimum clearances indicated by manufacturer as required for proper maintenance will not be accepted.

B. Connections: Indicated equipment connections are necessarily based on equipment of a given manufacturer. Contractor assumes responsibility for proper arrangement of ducts, pipes, valves, power connections, etc., to connect approved equipment in a proper and approved manner. Follow equipment manufacturer's detailed instructions and recommendations in the installation and connection of all equipment. No equipment installation or connections shall be made in a manner that voids the manufacturer's warranty.

C. Miscellaneous Hardware: Provide all required trim including sturdy and adequate bases or support systems, braces, supports, inserts, flashing, floor, ceiling and wall plates, valves, fittings, sleeves, accessories, etc., necessary for a complete installation.

D. Motor Starters:

1. General: Furnish each motor with starter or switch where starters are not included in motor control centers, as approved and recommended by manufacturer of motor or equipment of which motor is a part.

2. Labeling: Label all mechanical equipment starters and switches with equipment identification name and mark number. Use Bakelite labels.

E. Drives and Guards:

1. Direction of Rotation: Before installing, check motor direction of rotation against that marked on driven equipment.

2. Clearances: Maintain proper clearances between stationary and rotating parts.

F. Vibration Isolators:

1. General: Mount all rotating or reciprocating mechanical equipment to be isolated from the building structure by vibration isolators.

G. Sheet Metal Work:

1. General: All necessary allowances and provisions shall be made in the installation of sheet-metal ducts for the structural conditions of the structures. During the installation, the open ends of all ducts shall be protected to prevent debris and dirt from entering. Installation and workmanship shall be such that the system is free from buckling, warping, breathing, and vibration.

2. Hangers: Hangers and supports shall conform with the SMACNA Duct Manual and the following: Ducts with cross-sectional areas up to 4 square feet shall have hangers spaced not more than 8 feet apart. Ducts between 4- and 10-square-foot area shall have supports spaced at not more than 4 feet. Hangers shall be installed plumb and shall present a neat appearance. All strap- or band-type hangers shall be constructed from galvanized steel. The use of perforated band iron for duct support is prohibited. Strap hangers shall extend the full depth of the duct, bend and extend 2 inches under and against the bottom of the duct. Attach hangers to the ducts using rivets or sheet metal screws of appropriate sizes 6 inches on centers (minimum of 2 each side) and on the bottom return.

3. Flexible Connections: Provide flexible connections, not less than 4 inches wide, constructed of fireproof, heavy waterproof woven asbestos or glass fabric at the inlet and outlet connection of each fan unit, securely fastened to the unit and to the ductwork by a galvanized iron band provided with tightening screws. Install the flexible connection so there will be no metal to metal contact, nor stretching of the flexible material.

4. Sealing: All ducts shall be sealed airtight.

5. Wall Openings: Where ducts connect to masonry openings, provide a continuous 2-inch by 2-inch by 1/8-inch galvanized angle iron frame which shall be bolted to the construction and made airtight with caulking. Ducts shall be fastened to the angle iron.

6. Access Openings: Install all necessary access openings and covers for cleaning, wiring, or servicing motors, fans, and other equipment located within or blocked by sheet metal work.

7. Volume Dampers and Splitter Dampers: Provide as required to meet design parameters.

H. Air Grilles, Registers and Diffusers: Duct dampers shall be installed to provide the required air distribution. All diffusers, registers, and grilles shall be installed tight to the mounting surface.

3.03 TESTING

A. Ductwork and Air Flow Regulating Devices:

1. Air Leakage: Shall not be tolerated except at outlets where a nominal amount of air is allowed to escape when outlet is shut.

2. Air Quantities: All air quantities shall be in accordance with the established limits under Paragraph 3.05D.

B. Defects: If inspection or test shows defects, such defective work or material shall be replaced or repaired as necessary and inspection and test repeated. Paint system or finish damage shall be repaired or replaced also without additional costs to the Owner.

3.04 CLEANING

A. General: Equipment, ducts, pipes, valves, fittings, fixtures, etc., shall be thoroughly cleaned of glass, dirt, metal cuttings, etc., and left in a satisfactory condition for use.

3.05 FINAL ADJUSTMENTS

A. Direction of Rotation: Check direction of equipment rotation against that marked on it.

B. Alignment: Check and adjust alignment between motor/drive/equipment.

C. Bolt Tension: Check and tighten as required.

D. Air Handling Systems: Adjust and balance all portions of the systems to produce indicated or specified results within the limits of minus 5 percent or plus 10 percent or as subsequently directed by Owner's Engineer. Balancing in the powerhouse shall be with the main supply fan at high speed.

1. Record: Submit complete record of all data concerned with testing and balancing to Owner's Engineer.

2. Required Data: Minimum information includes exact motor loadings and overload heater sizes, fan RPM and drive sizes, airflow in CFM at all ventilation openings, and outdoor weather conditions at time of test.

3. Final Air Balancing: Use vane or electronic anemometer or approved instrument for final air balancing. Clearly mark final setting of all balancing valves and dampers.

3.06 TOUCH-UP PAINTING AND GALVANIZING

A. Following installation painted surfaces which have been damaged shall be touched-up. All galvanized surfaces which have been damaged shall receive two coats of galvanizing repair paint.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

A. No separate measurement for the work of this Section will be made.

4.02 PAYMENT

A. Payment for work required under this Section will be a part of the lump sum price in the Bid for the following item:

B. Such payment will be considered full compensation for all costs incurred for the performance of the work necessary to complete the requirements of this Section.

Item No.	Item	Description	Unit
15152-1	HVAC System	Design, Furnish, and Install HVAC System and components not covered under another section.	LS

END OF SECTION

SECTION 16050
BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This section covers the basic electrical materials and methods required for installing power, instrumentation, and communication distribution equipment.

B. The Contractor shall furnish and install all the required wire, cable, raceway, and auxiliary equipment required for interconnecting the equipment as required for this project.

C. This section covers the supply and installation of the following categories of basic materials.

1. Conduit and fittings.
2. Cable tray.
3. Wires and cables.
4. Wire connections and devices.
5. Pull and junction boxes.
6. Wiring devices
7. Panelboards.
8. Circuit breakers.
9. Safety switches.
10. Low voltage distribution transformers.
11. Grounding.

1.02 REFERENCES, SPECIFICATIONS, CODES AND STANDARDS

A. Rating tests and characteristics shall be in accordance with the following:

1. American National Standards Institute (ANSI)

ANSI C80.1	Specifications for Rigid Steel Conduit, Zinc Coated

2. American Society for Testing and Materials (ASTM)

ASTM A607	Standard Specification for Steel, Sheet and Strip, High-Strength, Low-Alloy, Columbium or Vanadium, or both, Hot-Rolled and Cold-Rolled
ASTM A653-SS	Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM B1	Standard Specification for Hard-Drawn Copper Wire

ASTM B8	Standard Specification for Concentric –Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
ASTM B33	Standard Specification for Tinned Soft or Annealed Copper Wire for Electrical Purposes
ASTM B189	Standard Specification for Lead-Coated and Lead-Alloy-Coated Soft Copper Wire for Electrical Purposes
ASTM B633	Standard Specification for Electrodeposited Coatings of Zinc on Iron Steel

3. Institute of Electrical and Electronics Engineers (IEEE)

IEEE 665	Guide for Generating Station Grounding
IEEE 80	Guide for Safety in AC Substation Grounding.
IEEE 81	Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System.

4. National Electrical Manufacturers Association (NEMA)

NEMA PB1	Panel Boards
NEMA WD1	General Purpose Wiring Devices
NEMA KS-1	Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum)
NEMA ST-20	Dry-Type Transformers for General Applications
NEMA TC-6	PVC and ABS Plastic Utilities Duct for Underground Installation

5. National Fire Protection Association (NFPA)

NFPA 70-2020	National Electric Code

1.03 SUBMITTALS

A. Submittals for this section shall be submitted in accordance with Section 01300.

B. The following shall be submitted by the Contractor:
   1. Manufacturer data sheets for the following equipment:
      a. Pull and junction boxes
      b. Panelboards
      c. Circuit breakers
      d. Low voltage distribution transformers

2. Plan, section, and detail drawings for equipment installation and interconnection. Drawings shall be to scale and show all new equipment locations and conduit routing. All conduit sizes and number designations shall be indicated on the drawings. The drawings shall be drawn to scale and indicate locations of all equipment. Drawings shall be generated using AutoCAD®. Drawings shall include the Owner's standard title block. Interior plan drawings shall be drawn to minimum scale of 1/4'' = 1'-0"
3. A raceway and cable schedule shall be furnished indicating the following for all raceway and cable to be installed:
   a. Raceway number, size, type, approximate length, % conductor fill, and beginning and end point locations.
   b. Cable number, quantity, number of conductors, description, beginning and end point locations, routing, and function.
4. The raceway/cable schedule shall be developed using a standard PC based database system and the as-built electronic files shall be presented to the Owner at the conclusion of the project.

PART 2 - PRODUCTS

2.01 GENERAL

A. Provide the products specified herein where required. Products shall be new, free from defects, of current manufacturer, and Underwriters' Laboratories, Inc (UL) listed. Products shall be furnished complete with all fasteners, accessories, and appurtenances necessary for a complete installation.

2.02 RIGID CONDUIT AND FITTINGS

A. Rigid steel conduit shall conform to ANSI C80.1, shall be UL labeled and shall be hot-dip galvanized inside and outside, threads included. Rigid Galvanized Steel (RGS) conduit shall be shipped with thread protectors and shall be as manufactured by Allied Tube and Conduit Corporation or equal.

B. Locknuts shall be plated steel or malleable iron as manufactured by O/Z/Gedney or equal.

C. Bushings
   1. Bushings shall be plated steel, malleable iron, or aluminum with a molded phenolic or nylon insulating collar. Bushings shall be O.Z./Gedney, Type B or equal.
   2. Grounding bushings shall be plated steel malleable iron with a molded phenolic or nylon insulating collar and shall include a conduit set-screw and lay-in type lug for ground cable, O.Z./Gedney, Type BLG or equal.
   3. Phenolic bushings for protection of cables passing through metal partitions or barriers shall be O.Z./Gedney, Type ABB or equal.

D. Chase Nipples: Connection between contiguous enclosures shall be made by chase nipple with locknut and insulating bushing. Chase nipple shall be galvanized steel or malleable iron with nylon insulator as manufactured by Thomas and Betts or equal.

E. Conduit unions shall be zinc plated steel or malleable iron, Erickson Type, as manufactured by Thomas and Betts or equal.

F. Conduit bodies shall be oblong galvanized malleable iron, or aluminum Crouse-Hind Form 8 or equal. When fittings are used with conductor 2 AWG or larger or with multi-conductor cables, the fittings shall be Mogul Type.

G. Covers for conduit bodies shall be of the same manufacture as the conduit bodies on which installed.

H. Conduit clamps shall be two-hole type with spacers (clamp backs) and nest backs. Clamps shall be hot-dip galvanized, malleable iron as manufactured by O.Z./Gedney or equal.

I. Hubs for attaching conduit to sheet metal boxes in areas where weathertight connections are required shall be bullet type as manufactured by Thomas and Betts or equal.

J. Conduit Seals

1. Sealing fittings shall be O.Z./Gedney CSM Type, or equal, for sealing around pipe or conduit and CSB Type, or equal, for sealing around cables in conduit. CSB fittings shall be factory prepared for each cable application.
2. Fire stop sealing shall be Nelson Type FSP fire stop putty, or approved equal.

K. Miscellaneous Hardware

1. Fasteners and miscellaneous fittings shall be steel or malleable iron, or hot-dip galvanized. Cadmium plated hardware will be acceptable only where the coatings specified are unavailable.
2. Anticorrosion pastes shall be Kopr-Shield and Aluma-Shield, trademarks of Jet-lube, Inc., as distributed by Thomas and Betts or equal
3. Cable lubricating compounds shall be CRC Teflon or equal.

2.03 LIQUID-TIGHT FLEXIBLE METALLIC CONDUIT

A. Liquid-tight flexible metallic conduit shall be spirally wound, galvanized steel with interlocking convolutions. Conduits in the 1/2 inch through 1-1/4 inch trade size shall be constructed with integral spiral copper bonding strip. Jacket shall be gray vinyl, extended around and into the helical grooves of the core. Products shall be Electri-Flex Type LA as manufactured by Electri-Flex Company or equal.

B. Fittings for liquid-tight flexible conduit shall be galvanized steel or malleable iron insulated type. Fittings 1-1/2 inch trade size and larger shall be provided with external grounding lugs. Products shall be Type STB as manufactured by Appleton Electric Co., or equal.

2.04 POLYVINLYCHLORIDE CONDUIT (PVC)

A. PVC conduit shall be used for underground concrete encased duct banks only.

B. All PVC conduits shall be heavy wall type Schedule 40. PVC conduit and fittings shall conform to the latest edition of NEMA TC6.

C. Couplings

1. PVC couplings shall be socket type for use with solvent weld cement. Couplings shall be Carlon Type PV-Duit or equal.
2. PVC to RGS couplings shall be PVC with a socket type connection on one end and Iron Pipe Straight (IPS) threaded connection on the other end. Couplings shall be Carlon Type PV-Duit or equal.
3. All PVC conduits shall be furnished with a bell end fitting upon termination in any concrete manhole, handhole or pull box.

D. Spacers

1. Plastic interlocking spacers shall be used for maintaining spacing between PVC conduits on duct bank runs.
2. Intermediate spacers shall be sized to maintain conduit to conduit spacing. Base spacers shall be sized to maintain conduit to ground spacing.

2.05 RACEWAY SUPPORTS

A. Conduit supports shall be a system of channels, brackets, fittings, and fasteners based on a continuous slotted steel channel (strut) system. All channels, channel brackets and fittings shall be galvanized steel. Fasteners and threaded products shall be electro-galvanized. Strut system shall be P-1000 series as manufactured by Unistrut Corp. or equal.

B. Conduit clamps shall be electro-galvanized Unistrut Series or equal.

C. Ceiling hangers for single conduit shall be by ring hanger, Grinnel Fig. 260. Hanger rod diameter shall be 3/8 inch for conduits to 2 inch trade size, 1/2 inch for up to 3 inch trade size and 5/8 inch for 4 inch trade size. Ceiling flanges shall be Unistrut type M30, 31 or equal. Hanger hardware shall be electro-galvanized.

D. Ceiling hangers for multiple conduits shall be trapeze type. Trapeze, clamps and Ceiling flanges shall be as specified above. Hanger rods shall be 1/2 inch diameter minimum.

2.06 CABLE TRAY

A. The cable tray shall be fabricated from pre-galvanized steel. All sections shall be made from steel meeting the minimum mechanical properties and mill galvanized in accordance with ASTM A653SS, Grade 33, coating designation G90. Cable tray shall be B-Line Series 2 or approved equal.

B. The tray shall be ladder type construction. The trays shall consist of two side rails with transverse rungs welded to the side rails. Rungs shall be spaced 9 inches on center unless otherwise specified on the Drawings. The rungs shall have a minimum cable bearing surface of 7/8” with radiused edges. Cable tray width shall be as required to meet NEC requirements for cable fill. The tray shall have a minimum usable load depth of 3-inches.

C. All fittings shall have a 3-inch tangent and a minimum radius of 12-inches. Splice plates shall be manufactured of high strength steel, meeting the minimum mechanical properties of ASTM A607, Grade 50. All hardware shall be zinc plated in accordance with ASTM B633 SCI.

D. Cable tray supports shall be placed so that the support spans do not exceed the maximum span recommended by the manufacturer. Supports shall be constructed from formed channel members 1-5/8" x 1-5/8" with necessary hardware such as that manufactured by Unistrut or B-Line Systems. Trapeze hangers and center hung supports shall be supported by 1/2" minimum diameter rods.

E. Special accessories shall be furnished as required to protect, support and install the cable tray system. Accessories shall consist of, but are not limited to, section splice plates, expansion plates, blind-end plates, ladder drop-outs, barriers, etc.

F. The cable trays shall meet NEMA Class 12C designation. The cable tray shall be capable of carrying a uniformly distributed load of 103 lbs/ft on a 12 ft. support span with a safety factor of 1.5 when supported as a simple span and tested per NEMA VE1-4.01.

2.07 WIRES AND CABLES

A. 600 Volt Power and Control Cable

1. The 600-volt power and control cable shall be suitable for installation indoors or outdoors in conduit and metal trays, and in wet or dry locations. The cable shall be suitable for continuous duty at conductor operating temperatures not exceeding 90ºC for dry or wet locations. The cable shall meet the UL Standard 1581 for cable tray use and UL Standard 1277 for direct burial and sunlight resistance.
2. The conductor shall be coated soft-drawn or annealed copper, conforming to ASTM B33 and B189. Unless otherwise specified, all conductors shall be stranded with stranding conforming to ASTM B8, Class B.
3. 600-volt power and control conductors shall be insulated with a flame-retardant cross-linked polyethylene material (XHHW-2). No jacket shall be required for single conductor cables.
4. Multiconductor 600-volt power and control cables shall have flame-retardant cross-linked polyethylene (XLPE) insulated conductors with a low smoke, zero halogen, moisture, sunlight, oil and heat resistant, flame retardant cross-linked polyolefin outer jacket. The cable shall meet the UL Standard 1581 for cable tray use and UL Standard 1277 for direct burial and sunlight resistance. All multiconductor power cables shall be equipped with copper ground conductor(s).
5. Control cable conductors shall be color coded per ICEA S-61-402, Method 1, Table E-2.
6. Power conductors shall be color coded by integral pigmentation (#8 AWG and smaller) or with plastic tape as indicated below:

System	Conductors				
	A	B	C	Neutral	Ground
208Y/120 V	Black	Red	Blue	White	Green
480Y/277 V	Brown	Orange	Yellow	Gray	Green

B. Medium Voltage Power Cable

1. Voltage Rating: 15kV
2. Number of Conductors: 1/C (single-conductor, concentric-lay-stranded, copper conductor)
3. Size: As shown on drawings
4. Application: Cables are intended to be used as power feeders from the Unit 4 generator to the switchyard, with applications in wet or dry locations, including conduit, duct, cable tray, direct burial, submersible, and aerial installation.
5. Cable shall be Okonite Okoguard-Okoseal Type MV-105 15kV shielded power cable or Owner approved equal.
6. Conductor: Soft-drawn, Class B stranded uncoated copper compact stranded per ASTM B8, with:
   a. 105°C continuous operating temperature
   b. 140°C emergency rating
   c. 250°C short circuit rating
7. Conductor Shield:
   a. Extruded layer of semi-conducting ethylene-propylene rubber shield material.
   b. Meets or exceeds electrical and physical requirements of NEMA WC 74.
   c. The thickness of the conductor shield shall be according to NEMA WC 74.
8. Insulation:
   a. Ethylene propylene rubber (EPR)
   b. Meets or exceeds electrical and physical requirements of NEMA WC 74.
   c. The thickness of the conductor shield shall be according to NEMA WC 74.
9. Insulation Level: 133%
10. Insulation shield material:
    a. Semi-conducting thermosetting material extruded over the insulation to serve as an electrostatic shield.
    b. Meets or exceeds electrical and physical requirements of NEMA WC 74.
    c. The thickness of the conductor shield shall be according to NEMA WC 74.
    d. The shield compound shall be compatible with the insulation and legibly identified as semi-conducting.
11. Metallic Shield
    a. Helically applied copper tape directly over the extruded insulation shield.
    b. Meets or exceeds electrical and physical requirements of NEMA WC 74.
12. Jacketing
    a. Overall black PVC (polyvinyl chloride)
    b. The jacket shall be tight fitting, but allow for free stripping from the insulation shield.

c. Shall be suitable for wet and dry locations, meeting or exceeding the physical requirements of NEMA WC 74.

d. Shall be sunlight resistant as per UL Standard 1072.

e. Shall be moisture and oil resistant and flame retardant.

13. Shielded power cable shall be terminated with pre-assembled stress cones in a manner approved by the cable and terminal manufacturer. Shielded power cable shall be terminated using a 3M Cold Shrink QT-III termination kit 7649-T or 7650-T series or Owner approved equal.

C. Instrumentation cables shall be individually shielded, twisted-pairs or twisted-triads with an overall shield. Conductors shall be copper and a minimum of #18 AWG with flame retardant insulation and low smoke, zero halogen jacket. Cables shall be type TC, 600 volt, rated for 90ºC dry and 75ºC wet applications.

D. Bare grounding and bonding conductors shall be ASTM B 1, solid bare copper wire for sizes #8 AWG and smaller; and ASTM B 8, Class B, stranded bare copper wire for sizes #6 AWG and larger.

2.08 WIRE CONNECTIONS AND DEVICES

A. Terminals and Wire Terminating Devices

1. Terminals for 600V power cable, AWG No. 8 or smaller, shall be seamless tubular copper-ring tongue terminals. Terminals shall be tin-plated. Terminals shall be Type YAV box as manufactured by Burndy Corporation or equal.
2. Terminals for 600V power cable, AWG No. 6 and larger, shall be tin-plated copper. Terminals shall be Type YA as manufactured by Burndy Corporation or equal.
3. Terminals for control and instrumentation cable shall be tin-plated, copper-ring tongue terminals. Terminal barrel shall be internally serrate and shall be covered with color-coded, polyvinyl chloride insulation sleeve. Terminals shall be Type TP as manufactured by Burndy Corporation or equal. Control Circuits, Splices and Taps: "Pigtail" or connections between wires AWG No. 8 and smaller shall be made by a compression connection having a thermoplastic insulating cover. Connector shall be 30-400 Series as manufactured by Ideal Industries or equal.
4. Splices in wires shall not be permitted for new installations. All cables damaged during installation shall be removed and replaced with new cable.

B. Cable and Wire Markers

1. Cables and wires shall be labeled at both ends with destination codes.
2. Cable markers shall be plastic identification ties, hot stamped with black letters a minimum of 5/32 inch high. Markers shall be Type FT-201 as manufactured by Floy Tag & Manufacturing, Inc. or approved equal.
3. Where space is limited in small junction boxes, cable markers shall be embossed fiber floaters, Type FT 205 as manufactured by Floy Tag & Manufacturing, Inc. or approved equal.
4. Wire markers shall be hot-stamped heat shrink polyolefin sleeving. Sleeving shall be white for uniform appearance. Sleeving length shall be held to a uniform length at each terminal board. Sleeving shall be Type FT 200S as manufactured by Floy Tag & Manufacturing Inc., or approved equal.

C. Wire and cable supports in boxes shall consist of baskets, grips, clamps, wedge assemblies and other devices designed for cable support. Supports in manholes shall consist of galvanized steel bracket assemblies with vertical and horizontal members anchored to masonry walls with attached cable insulators. Assemblies shall be as manufactured by Line Material, Unistrut, Joslyn or equal.

2.09 BOXES AND CABINETS

A. Device boxes shall be cast malleable iron with cast-in conduit hubs. Surface mounted boxes shall be furnished with mounting lugs. Boxes shall be Appleton Type FS, or equal.

B. Pull and junction boxes shall be screw-cover type, fabricated without knockouts and shall be painted steel with ANSI 61 gray exterior finish and white interior finish. Fasteners shall be corrosion resistant. Products shall be as manufactured by Hoffman or equal.

1. Indoor pull and junction boxes shall be NEMA 12/13
2. Outdoor pull and junction boxes shall be NEMA 4 with gasketed and flanged cover.
3. Pull and junction boxes located in corrosive areas shall be NEMA 4X, fiberglass or stainless steel.

C. Underground pull and junction boxes shall be concrete construction with galvanized steel diamond plate cover. The boxes shall be standard weight concrete construction with open bottom and knockouts on each side for conduit entrance. Boxes shall be Utility Vault Series 37-1220 PB with Style DP cover, or equal.

1. The box cover shall be rated for H-10 wheel incidental traffic loading.
2. The cover shall be furnished with two locking bolts. The cover shall be marked “ELECTRIC”.

D. Spacers

Spacers for use with wall-mounted boxes and cabinets shall be steel or iron and shall be hot-dip galvanized. If spaces are cut from galvanized stock, all cut surfaces shall be coated with two coats of cold galvanizing compound.

2.10 WIRING DEVICES

A. Wiring devices shall be UL listed for the current and voltage indicated and shall comply with NEMA Standard Publication WD-1. They shall be heavy duty grade with captive binding screws. All receptacles shall be grounding type.

B. Heavy duty switches for 120-227 Volts service shall be toggle type, totally enclosed in a melamine or melamine and urea plastic face and body, with ivory toggle handle and screw terminals. Switches shall be rated 20 Amperes at 120-227 Volts ac and 1 horsepower at 120 Volts ac.

C. Receptacles

1. Unless otherwise noted, receptacles shall be parallel blade grounding type for heavy duty 20 Ampere, 125-Volt applications. Receptacles shall be specification grade, grounding type, with NEMA contact 5-20R configuration, and shall be UL listed for the circuit application.
2. Ground fault receptacles (GFCI) shall be parallel blade grounding type for general duty 20 Ampere 125-volt applications. The receptacles shall be equipped with front mounted test features for periodic testing of the ground fault current interrupt circuit.

D. Device Plates and Covers

1. Stainless steel device plates shall be furnished for all interior switch and receptacle boxes. Covers shall be Hubbell S series or equal.
2. Outdoor switch plates shall be gasketed, galvanized, malleable iron with corrosion-resistant plunger and fasteners. The plates shall be Appleton FSK-1VTS series or equal. Receptacle plates shall be gasketed, cast aluminum with self-closing covers. The receptacle plates shall be Hubbell 5211 series or equal.

2.11 PANELBOARDS

A. General

1. The distribution panelboards shall conform to the requirements of NEMA PB1 and be of the circuit breaker type. Panelboards shall be, NEMA 1, as manufactured by Square D, or equal.

B. Enclosures

1. The panelboards shall be manufacturer's standard and shall conform to NEMA PB1. The box shall be of sufficient width and depth to accommodate the conduits required for the project.
2. The panel cover shall be single door type construction. The back side of the door shall be provided with an interior directory frame and cover.
3. An engraved nameplate shall be furnished on the door front.

C. Bus bars shall be tin plated copper. The panel frame shall be furnished with a ground bus and lug.

D. Circuit breakers shall be bolt on type and UL listed.

E. Panelboards and circuit breakers shall be properly rated to withstand the available rms symmetrical short circuit current.

2.12 INDIVIDUAL ENCLOSED CIRCUIT BREAKERS

A. Circuit breakers shall be molded case thermal/magnetic type. Circuit breakers in frame sizes larger than 150 amperes shall have interchangeable trip units. Breaker overload and interrupting ratings shall be as indicated on the Drawings. Circuit breakers shall be UL listed. Enclosures shall be NEMA 12 for indoor installations and NEMA 4 for outdoor installations.

B. Each circuit breaker shall be identified with an engraved nameplate.

2.13 SAFETY SWITCHES

A. Safety switches shall be mill duty meeting NEMA Standard KS1 for Type HD and UL Listed. The switches shall be equipped with full cover interlocks and quick-make, quick-break operating mechanisms. The switches shall be rated 480-volt ac with current rating as required. Enclosures shall be NEMA 12 for indoor installations and NEMA 4 for outdoor installations. Switches shall be equipped with fuses when required.

B. Each safety switch shall be identified with an engraved nameplate.

2.14 LV DISTRIBUTION TRANSFORMERS

A. Transformers shall be 3-phase with 480-volt primary. Secondary windings shall be 120/208 volt 3-phase.

B. Transformers shall be rated at 115ºC temperature rise above a 40ºC ambient. All insulating material shall be in accordance with NEMA ST20 standards for a 185ºC UL component recognized insulation system.

2.15 GROUNDING

A. Ground rods shall be one-piece, 1018 steel with a metallically bonded outer layer of electrolytically applied copper. The finished rod shall be cold drawn, 3/4-inch diameter by 10-feet in length. Rods shall be UL listed. The rod ends shall be chamfered to prevent mushrooming during driving. Where multiple lengths are shown they shall be sectional 10-foot lengths, coupled together by a chamfered coupling designed for the purpose.

B. All cable to cable and cable to ground rod connections shall utilize compression type connectors. Connectors shall be Burndy Hyground or approved equal.

2.16 LIGHTNING PROTECTION

A. Lightning rods shall be used for Unit 4 Powerhouse lightning protection by collecting the strike and carrying the current into the ground away from equipment.

PART 3 - EXECUTION

3.01 GENERAL

A. The Contractor shall install and test all the necessary electrical distribution equipment, specified in Part 2 above, to produce a complete and operable electrical system as indicated in other sections of this specification.

3.02 INSTALLATION

A. General

1. Fasten hanger rods, conduit clamps and outlet and junction boxes to building structure using beam clamps.
2. Use self-drilling anchors or expansion anchors on concrete surfaces. Do not use powder-actuated anchors.
3. Do not fasten supports to piping, ductwork, mechanical equipment or conduit.
4. Do not drill or cut structural steel members.

B. Exposed Raceway

1. Exposed raceways and conduits shall be run parallel to and at right angles to building lines. Conduits shall be continuous from outlets to cabinets, pull or junction boxes and shall be secured to all boxes with locknuts and insulated bushings in such a manner that each system shall be electrically continuous throughout. Conduit ends shall be capped during construction to prevent entrance of foreign material.
2. All conduit systems shall be installed complete with insulated, grounding bushing before conductors are pulled in. Conduits shall be securely supported at all elbows and adjacent to each termination at box or cabinet. Intervals between conduit supports shall not exceed the spacing indicated below. Supports shall be by hangers or clamps including strut system channel as required. Perforated metal "plumber's tape" is not permitted. Raceways and conduits run on building surfaces shall be spaced out from the surface 1/4 inch minimum using clamp backs and nest backs. Offset bends at boxes or cabinet generally shall not be used.
3. Maximum spacing between conduit supports shall not exceed that stated in the NEC 344-30.
4. Trapeze hangers shall be adequately sway-braced. Conduits shall be clamped to hanger at the end of each run and at each elbow. Runs of conduit shall have clamps installed at each trapeze hanger.
5. Connections from metallic to non-metallic conduits shall be made with approved fittings.
6. Maintain a minimum of 6-inches clearance between conduit and piping. Maintain a minimum of 12-inches clearance between conduit and heat sources such as flues, steam pipes and heating appliances.
7. Provide a suitable pull-string in all spare conduits installed, except sleeves and nipples.
8. All horizontal outdoor and indoor runs exposed to moisture shall be sloped to a low point or to a down turned elbow to drain all internal moisture. All low points shall be equipped with automatic drains, Crouse-Hinds ECD or equal.
9. Seal between raceway and building where raceway passes through exterior wall or rated firewall per the following:
    a. Concrete Construction: Cast conduit in the wall or core drill wall and pack around the conduit with fire stop putty or an equivalent method as approved by the Owner.
    b. Frame Construction: Seal with fire stop rated material compatible with building material through which the raceway passes, as approved by the Owner.

C. Conduit Installation Schedule

1. The following schedule shall apply unless specifically indicated otherwise on the Drawings.
    a. Installations Under Concrete Slab or Underground: PVC conduit shall be utilized.
    b. Exposed Outdoor Locations: RGS conduit shall be utilized.
    c. Dry Interior Locations: RGS conduit shall be utilized.
    d. Motor Terminals: Liquid-tight flexible metallic conduit shall be utilized.

D. Direct Buried Conduit

1. All direct buried conduit shall be PVC Schedule 40 unless otherwise indicated.
2. The top of the conduits shall be a minimum of 24-inches below grade unless otherwise indicated.
3. The conduits shall continuously slope away from buildings with a pitch of not less than 3-inches in 100-feet. Except at conduit risers, changes in direction of runs exceeding a total of 10 degrees, either vertical or horizontal, shall be accomplished by long sweep bends having a minimum radius of 25 feet. Manufactured bends shall have a minimum radius of 18-inches for use with conduits less than 3-inches in diameter and a minimum radius of 36-inches for conduits of 3-inches in diameter and larger.
4. Conduits shall terminate in end-bells where they enter manholes or handholes. Conduit separators shall be high impact plastic. The joints of the conduits shall be staggered by row and layers to provide a duct line having maximum strength. During construction, partially completed duct lines shall be protected from the entrance of debris by means of suitable conduit plugs.
5. When the conduit installation is complete, a testing mandrel shall be drawn through each conduit, after which a brush having the diameter of the conduit shall be drawn through until the conduit is clear of all particles of earth, sand or gravel. The conduits shall then be plugged. Provide each conduit with a plastic pull string with 3-feet of spare length at each end.

E. Cable Tray

1. Install the cable trays per the equipment manufacturer's instructions. Coordinate installation of the cable tray with the lighting and conduit installation for proper interface and to avoid interferences.
2. Provide sufficient space encompassing cable trays to permit access for installing and maintaining cables.

F. Wire and Cable

1. No conductors or cables shall be installed in conduits, ducts, or trays until the raceway system has been completed. All embedded or buried conduits and ducts shall be brushed and scraped or swabbed before pulling in conductors. When installing conductors, the Contractor shall exercise care to prevent damage to conductors or insulation. Only those cable lubricants approved by the cable manufacturer shall be used.
2. Wire and Cable Pulling
    a. Wires and cables shall be pulled with grips and ball-bearing swivels using hand or capstan type pullers. Cables pulled over floor or ground shall be protected by lumber troughs, running boards or plywood sheets.

b. Pulls into or out of manholes shall be protected with properly rigged blocks or rollers and flexible guide-in tubing.

3. Taps, Splices and Terminations
   a. No feeders shall be spliced without specific approval of the Owner.
   b. All cable terminals, taps and splices shall be made secure with solderless compression or mechanical type connectors as specified in Part 2, above.
   c. Compression type connectors shall be installed only with the specified hydraulic or mechanical tooling and in accordance with the manufacturer's installation instructions to ensure a permanent, secure, high-conductivity joint.
   d. 600V cable splices shall be made using compression sleeves. Sleeves shall be staggered to minimize the diameter of the completed splice. Each sleeve shall be covered with a Thermofit insulation sleeve, which extends no less than three wire diameters beyond each end of the compression sleeve after shrinking. Heat source and shrinking techniques shall be in accordance with manufacturer's instructions.
4. Contractor shall furnish and install hangers, racks, cable cleats and supports required to make a neat and substantial cable installation. Splices shall be racked and adequately supported, including supports in manholes. Supports shall be approved by Owner. Cables shall be tied in trays at all fittings, bends, offsets and vertical sections. Cables shall be arranged with no excess tension at any point in the tray. The cables shall be properly supported at each termination point to limit tension at the device terminal.
5. Cable shall be identified on both ends and in each manhole, junction box and pillbox. Where space for cable marker is restricted, the cable may be marked with an embossed fiber floater tied to the cable.

G. Boxes

1. Surface boxes, cabinets and apparatus shall be securely mounted. Unless otherwise specified, all wall-mounted boxes, cabinets and apparatus enclosures shall be spaced out from the wall. All NEMA 4 boxes and any box located in a wet location shall be equipped with an automatic drain, Crouse-Hinds ECD or equal.
2. Underground pull and junction boxes shall be installed with covers flush with grade. Backfill around the boxes with compacted native backfill.

3.03 POWERHOUSE, EQUIPMENT AND RACEWAY GROUNDING

A. Provide a bonding and grounding system in compliance with the NEC and State of California electrical codes. This system shall bond together and effectively ground all exposed non-energized metal surfaces containing energized devices, parts or conductors, all building steel or other metals, all metallic electrical raceways and the neutrals of all transformers and generators.

B. The grounding grid shall be of adequate capacity to dissipate heat from ground current under the most severe conditions in the areas of high ground fault current concentrations, with grid spacing such that safe voltage gradients are maintained. The grounding system shall be designed in accordance with the latest edition of the industry standards listed in section 1.02 to obtain a total ground resistance of less than 1 ohm.

C. Minimum ground conductor sizes shall be as required by the NEC.

D. Powerhouse

1. New Unit 4 Powerhouse structural steel members shall be grounded as required per design.
2. New Unit 4 Powerhouse grounding system shall be tied to existing Pine Flat Powerhouse and Switchyard grounding system.

E. Equipment Grounding

1. Enclosures of all items of electrical equipment shall be grounded. Major equipment shall be grounded with a minimum 4/0 bare copper ground cable.
2. All mechanical equipment, including motors, tanks, pumps, casings, compressors, and similar equipment, shall be grounded.

F. Raceway Grounding

Metallic conduits or raceways or any metallic portions of non-metallic conduits or raceways shall be grounded. Grounding shall be at both ends of a conduit wherever possible.

3.04 EMBEDDED AND BURIED GROUNDING

A. Installation of the embedded ground cables shall be coordinated with the concrete work.

B. Ground rods, when required, shall be driven into earth as required per design drawings.

C. Pigtails at structures or risers shall extend 6-feet above the finished grade. Pigtails shall be protected from damage by coiling, tying, and bagging in 10 mil polyethylene.

D. Each ground rod or ground rod system shall be tested. The test shall be made by the “Fall of Potential” method using a commercial ground test instrument such as the Biddle Bulletin 25-2 Megger. The ground resistance readings shall be taken with the current reference rod driven at least 200-feet from the ground grid connection point. Measurements shall be made at 20-foot intervals starting at the grid or rod connection and ending at the current reference electrode. Tests shall be conducted at least 48-hours after the last precipitation. A plot of resistance vs. distance from the grid shall be submitted to the Owner.

3.05 TESTING

A. General

1. Completed wiring systems shall receive a thorough visual inspection. All connections shall be examined for tightness and proper use of compression tools.

B. High Potential and Insulation Resistance

1. Each power conductor of a completed low voltage (480 volt) or medium voltage wiring system shall receive an insulation resistance test. Prior to the test, all instruments, and devices, which may be damaged by the test, shall be disconnected or suitably protected.
2. Insulation resistance tests on circuits rated 600V and below shall be performed by applying 1000V DC for 30 seconds. Minimum acceptable insulation resistance is 1,000,000 ohms.
3. Strict adherence to good safety practices is mandatory in all tests involving high voltage. Safety practices shall include, but are not limited to, the following requirements:
    a. Latest edition of the Occupational Safety and Health Act, OSHA.
    b. Accident Prevention manual for Industrial Operations, Seventh Edition, National Safety Council, Chapter 4.
    c. Applicable state and local safety operating procedures.
4. Tests shall be conducted within the framework of the following procedures:
    a. All acceptance tests shall be performed with apparatus de-energized, except where otherwise specifically required.
    b. The Contractor shall have a designated safety representative who shall be present on the project and supervise operations with respect to safety.
    c. Circuits operating more than 600 volts between conductors shall have conductors shorted to ground by a hot-line grounded device designed for the purpose.
    d. In all cases, work shall not proceed until the Contractor's safety representative has determined that it is safe to do so.
    e. The Contractor shall have available sufficient protective barriers and warning signs to conduct specified tests safely.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

A. Measurement for payment for the contract items will be according to the following table. The contractor shall provide unit prices and estimated quantities in section 00310 – Bid Schedule

B. There will be no additional measurement for payment for contract item Design of electrical systems nor items included in Item No. 106050-1.

4.02 PAYMENT

A. The contract prices will be paid for Basic Electrical Materials and Methods which shall include full compensation for all costs incurred under this section.

B. Such payment will be considered full compensation for all costs incurred for the performance of the work necessary to complete the requirements of this Section.

Item No.	Item	Description	Unit
16050-1	Junction boxes, pull boxes, cable tray, conduit and fittings, plugs, transformers, and panelboards.	NA	LS
16050-2	Multi-conductor 600 Volt power cable.	NA	LF
16050-3	Multi-conductor 600 Volt control cable.	NA	LF
16050-4	Medium Voltage 8Kv power cable	NA	LF
16050-5	Instrumentation cable	NA	LF
16050-6	Unit 4 powerhouse bare grounding/bonding conductors and accessories.	NA	LBS
16050-7	Design of electrical systems	Design work for all electrical systems under this contract	LS

END OF SECTION

SECTION 16240
CABLE BUS DUCT

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. The Contractor shall design, manufacture, test, and install a 15 kV, 800-amp copper cable duct assembly interconnecting the Unit 4 Generator to the Generator Switchgear.

B. The contractor shall refer to drawing PF4-PLT-LYT-1006 included with this bid packet, for estimated cable bus duct lengths and routes.

1.02 REFERENCES, SPECIFICATIONS, CODES AND STANDARDS

A. Rating tests and characteristics shall be in accordance with the following:

1. American Society for Testing and Materials (ASTM)

ASTM B1	Standard Specification for Hard-Drawn Copper Wire
ASTM B3	Standard Specification for Soft or Annealed Copper Wire
ASTM B8	Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft

2. Insulated Cable Engineers Association (ICEA)

ICEA S-66-524	Cross-Linked Thermosetting Polyethylene Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy
ICAE S-93-639/NEMA WC-74	5-46kV Shielded Power Cable for Use in the Transmission and Distribution of Electric energy

3. Institute of Electrical and Electronic Engineers (IEEE)

IEEE C37.23	Standard for Metal-Enclosed Bus
IEEE 48	Standard Test Procedures and Requirements for Alternating-Current Cable Terminations 2.5 kV Through 765 kV
IEEE 400	Guide for Field Testing and Evaluation of the Insulation of Shielded Power Cable Systems
IEEE 400.1	Guide for Field Testing of Laminated Dielectric, Shielded Power Cable Systems Rated 5 kV and Above with High Direct Current Voltage
IEEE 400.2	Guide for Field Testing of Shielded Power Cable Systems using Very Low Frequency (VLF)

4. International Electrical Testing Association (NETA)

ATS	Acceptance Testing Specifications for Electrical Power Equipment & Systems

5. National Electrical Manufacturers Association (NEMA)

NEMA VE 1	Metal Cable Trays
NEMA VE 2	Cable Tray Installation Guidelines

6. Underwriter's Laboratory (UL)
   UL 1072 Standard for Medium Voltage Power Cables

1.03 SUBMITTALS

A. Submittals for this section shall be submitted in accordance with Section 01300.

B. The following shall be submitted by the Contractor:
   1. Manufacturer data sheets for the following equipment:
      a. Cable bus duct component details.
      b. Cable type.
      c. Copper compression type lugs.
      d. Supports.
   2. Plan, section, and detail drawings for equipment installation and interconnection. Drawings shall be to scale and show all new equipment locations and conduit routing. All conduit sizes and number designations shall be indicated on the drawings. The drawings shall be drawn to scale and indicate locations of all equipment. Drawings shall be generated using AutoCAD®. Drawings shall include the Owner's standard title block. Interior plan drawings shall be drawn to minimum scale of 1/4'' = 1'-0"
   3. Instructions
      a. Factory test procedures
      b. Installation instructions
      c. Operation and maintenance manuals
   4. Reports
      a. Factory test reports
      b. Field test reports.

PART 2 - PRODUCTS

2.01 CABLE BUS DUCT

A. General
   1. The cable duct assemblies shall be of the insulated cable, metal enclosed, ventilated, indoor type and outdoor type, where applicable as shown on the Drawings, complete with all components and appurtenances necessary to terminate the cable duct ends. The cable duct shall be rated for 800 amp continuous at 15 kV from the generator to the switchgear. The cable duct system shall be engineered and manufactured in accordance with IEEE 835 and IEEE C37.23, Annex A. The cable duct system shall be MP Husky, or equal.
   2. A complete metal enclosed cable system shall be provided, including all necessary fittings, enclosure connectors, entrance fittings, insulated conductors, electrical connectors, terminating kits, and other accessories as required.
   3. The cable duct shall be suitable for indoor or outdoor, as required, use with conductor spacing and ventilation maintained throughout the system. The

Drawings show the location of the cable duct. Cable duct located inside of the powerhouse shall be suitable for indoor installation. Cable duct located in the 11 kV switchyard shall be suitable for outdoor installation.

2.02 RATINGS

A. The cable duct shall conform to the following ratings and characteristics for the section from the generator to the switchgear:

1. Nominal voltage rating 6.9 kV
2. Maximum voltage rating 15 kV
3. Continuous current 800 A
4. System Maximum Operational Current: 510 A
5. Maximum short circuit current 100,000 A rms symmetrical
6. Frequency 60 Hz
7. Number of phases 3
8. Max. cable operating temperature 105°C
9. Cable Criteria:
   a. Configuration: Two (2) Parallel Conductors per Phase
   b. Size: 250 kcmil

2.03 ENCLOSURE

A. The cable duct enclosure shall be fabricated from aluminum alloy. The enclosure design shall be ladder type construction with ventilated top and bottom covers. The load carrying members of the system shall be fabricated from extrusions of 6063-T6 aluminum alloy.

B. The enclosure shall have a continuous current rating of not less than 1,000-amp, 50°C rise. The resistance across the enclosure section splice shall not exceed 50 microhms.

C. The ventilated duct top cover shall be screw retained with provisions for removal. The bottom ventilated cover shall be welded in place.

D. Conductor support blocks shall be designed in segments to maintain a minimum of one conductor diameter in both the horizontal and vertical planes to meet the “free air” conductor rating.

E. All cable duct enclosure sections shall be electrically bonded together.

F. Expansion joints shall be provided as required to prevent damage to the bus and equipment due to the expansion and contraction of the bus housing.

G. The enclosure shall be designed to withstand the forces due to maximum fault currents with the maximum support span as per NFPA 70, Article 370.30A.

2.04 DUCT SUPPORTS

A. The cable duct assemblies shall be supported independently of the generator main terminal cabinet and the generator switchgear.

B. Cable duct supports shall be placed so that the support spans do not exceed the maximum span recommended by the manufacturer. Supports shall be constructed from formed 304 stainless steel channel members 1-5/8” x 1-5/8” with necessary hardware such as that manufactured by Unistrut. Trapeze hangers supports shall be supported by 1/2” minimum diameter rods. All hardware shall be stainless steel.

2.05 CONDUCTORS

A. The cable shall be 15 kV, type MV 105 suitable for installation indoors or outdoors, and in wet or dry locations. The cable conductor shall be soft bare annealed copper per ASTM B3, and Class B stranding per ASTM B8. Cable insulation shall be ethylene propylene rubber (EPR), 15 kV, 133 percent. Conductor shield shall be extruded, semi-conducting EPR thermosetting material. Insulation shield shall be extruded semi-conducting EPR compound and shall be clean stripping. Cable metallic shield shall be bare copper tape with 25 percent overlap. Cable jacket shall be vulcanized, polyethelene.

B. Maximum conductor temperature rise is 65°C per IEEE C37.23.

C. The conductors shall be phased and supported to maintain low impedance and assure the mechanical strength necessary to prevent cable movement or damage under short circuit currents up to 25,000-amp rms symmetrical.

D. The conductors shall be arranged in a phasing pattern which exhibits minimal inter-phase and intra-phase imbalance.

E. The conductors shall be of continuous length and shall be pulled in after the cable duct enclosure has been installed.

2.06 TERMINATIONS

A. Termination kits shall be provided for all cable terminations. Terminations shall be cold-shrink type meeting the requirements of IEEE 48.

2.07 GROUNDING

A. A continuous 250 AWG bare copper ground conductor shall be provided in parallel with the cable duct to ensure that the duct enclosure and supporting structures are solidly grounded.

B. XHHW 600V insulated copper ground conductors shall be run in the duct bank with the medium voltage feeder conductors and bonded to the powerhouse cable bus duct ground and the switchyard cable bus duct ground for a continuous ground connection.

2.08 NAMEPLATES

A. Stainless steel nameplates shall be provided in accordance with the applicable information contained in IEEE 37.23, Article 7.11.5.

PART 3 - EXECUTION

3.01 GENERAL

A. The Contractor shall install and test all the required cable bus duct sections, specified in Part 2 above, to produce a complete and operable electrical distribution system as indicated.

3.02 INSTALLATION

A. General

1. Install cable bus duct per NEMA VE-1 and equipment manufacturer's instructions. Coordinate installation of the cable bus duct with W2W supplier for proper interface and to avoid interferences.
2. Provide sufficient space encompassing cable bus duct to permit access for installation and maintenance.
3. Do not fasten supports to piping, ductwork, mechanical equipment, or conduit.
4. Do not drill or cut structural steel members.

3.03 TESTING

A. General

1. Completed cable bus duct system shall receive a thorough visual inspection. All connections shall be examined for tightness and proper use of compression tools.

B. Each power conductor of the completed cable duct system shall receive a high potential acceptance test. Prior to the test, all instruments and devices, which may be damaged by the test, shall be disconnected or suitably protected.

C. The following field tests shall be performed before final acceptance of the cable installation:

1. Continuity test for the cable shields shall be performed prior to installing terminations. Resistance shall be checked between shield and conductor to verify that no shields have become shorted to the conductor. Shield resistance shall be checked and recorded.
2. Each power conductor of a completed medium voltage wiring system shall receive a one-minute insulation resistance test at a minimum 2500V DC, unless recommended otherwise by the cable manufacturer. Prior to the test, all instruments, and devices, which may be damaged by the test, shall be disconnected, or suitably protected.

3. A jacket integrity test shall be performed by measuring the jacket resistance between the metallic shield and ground using a 2.5 kV DC test voltage for 1 minute. Cable temperature shall be recorded along with the measured values.
4. A very low frequency high potential test shall be performed in accordance with IEEE 400.2. The VLF withstand test shall be conducted at 0.1 Hz with a test voltage of 2.5 times the cable normal line to ground rating, unless recommended otherwise by the cable manufacturer. The test potential shall be applied for 30-minutes, unless otherwise recommended by the cable manufacturer.
5. Strict adherence to good safety practices is mandatory in all tests involving high voltage. Safety practices shall include, but are not limited to, the following requirements:
    a. Latest edition of the Occupational Safety and Health Act, OSHA.
    b. Accident Prevention manual for Industrial Operations, Seventh Edition, National Safety Council, Chapter 4.
    c. Applicable state and local safety operating procedures.
6. Tests shall be conducted within the framework of the following procedures:
    a. All acceptance tests shall be performed with apparatus de-energized, except where otherwise specifically required.
    b. The Contractor shall have a designated safety representative who shall be present on the project and supervise operations with respect to safety.
    c. Circuits operating more than 600 volts between conductors shall have conductors shorted to ground by a hot-line grounded device designed for the purpose.
    d. In all cases, work shall not proceed until the Contractor's safety representative has determined that it is safe to do so.
    e. The Contractor shall have available sufficient protective barriers and warning signs to conduct specified tests safely.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

A. There will be no additional measurement for payment for the contract items according to the following table.

4.02 PAYMENT

A. The contract prices will be paid for Cable Bus Duct which shall include full compensation for all costs incurred under this section.

B. Such payment will be considered full compensation for all costs incurred for the performance of the work necessary to complete the requirements of this Section.

Item No.	Item	Description	Unit

16240-1	Cable bus duct segment from Unit 4 to generator switchgear (procurement and installation only)	NA	LS
16240-2	Cable bus duct segment from generator switchgear to GSU transformer.	NA	LS

END OF SECTION

SECTION 16300
SWITCHYARD

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. The Contractor shall furnish all labor, materials, and equipment required to design, manufacture, factory test, deliver to Site, erect, field test, and commission all 230 kV switchyard (located adjacent to existing powerhouse) equipment and interface with powerhouse structures, materials, and maintenance equipment.

1. One (1) SF6 Circuit Switcher complete with One (1) group operated, three phase Disconnect Switch with grounding switch. d
2. Optional in lieu of the Circuit Switcher- One (1) SF6 Circuit Breaker dead tank type with bushing current transformers (CTs). One (1) group operated, three phase Disconnect Switch with grounding switch.
3. (1) set of three 230 kV Coupling Capacitor Voltage Transformers (CCVTs), if deemed necessary.

(1) set of three 50:1 Current Transformers (CTs)

4. (1) set of three 230 kV Voltage Transformers (VTs).
5. (1) set of three combination 230 kV Voltage Transformers (VTs) and Current Transformers (CTs).
6. Switchyard steel structures, including all equipment supporting structures.
7. Switchyard power connections
8. Grounding grid and accessories as required.

B. All additional equipment, including lightning protection, and supervision/monitoring for a complete and functional installation.

C. All equipment and materials furnished under this Part shall be designed, manufactured, installed, and tested in accordance with current accepted standards. Unless otherwise specified, all accessories required for achieving successful fabrication, delivery, installation, testing, commissioning, and operation of the complete switchyard shall be provided, whether such items are specifically mentioned in these Specifications.

D. In an effort to optimize the existing space available for new electrical equipment withing switchyard The Contractor is encouraged to propose an alternate solution to what is specified herein. Such solution may be in the form of a HV switchgear that will include a circuit breaker, disconnect switch, current and potential transformers for both protection and metering.

1.02 REFERENCES, SPECIFICATIONS, CODES AND STANDARDS

A. All designs by the Contractor shall be carried out to national recognized standards. The latest version or edition of the following codes, standards and references are

preferred. Alternatives may be used if proposed by the Contractor and accepted by the Owner's Engineer:

1. American Society for Testing and Materials (ASTM).

ASTM B230/B230M	Standard Specification for Aluminum 1350-H19 Wire for Electrical Purposes
ASTM B8	Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
ASTM B232/B232M	Standard Specification for Concentric-Lay-Stranded Aluminum Conductors, Coated-Steel Reinforced (ACSR)
ASTM B498/B498M	Standard Specification for Zinc-Coated (Galvanized) Steel Core Wire for Use in Overhead Electrical Conductors
ASTM D2472	Standard Specification for Sulfur Hexafluoride

2. Insulated Cable Engineers Association, Inc. (ICEA).

ICEA S-73-532	Standard for Control, Thermocouple Extension, and Instrumentation Cables

3. Institute of Electrical and Electronics Engineers (IEEE).

IEEE C37.30.1	Requirements for AC High-Voltage Air Switches Rated Above 1000 V
IEEE C57.13	Requirements for Instrument Transformers
IEEE 80	Guide for Safety in AC Substation Grounding
IEEE 81	Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System
IEEE/ANSI C93.1	Requirements for Power-Line Carrier Coupling Capacitors and Coupling Capacitor Voltage Transformers (CCVT)
IEEE 693	Recommended Practice for Seismic Design of Substations
IEEE 1202	Standard for Flame-Propagation Testing of Wire and Cable

IEEE C2	National Electric Safety Code (NESC)
IEEE 37.016	Standard for AC High Voltage Circuit Switchers rated 15.5kV through 245kV

4. Underwriters Laboratories (UL).

UL 467	UL Standard for Safety Grounding and Bonding Equipment

5. National Fire Protection Association (NFPA).

NFPA 70	National Electric Code.

6. Section 16400 Generator Step-Up Transformer
7. Section 16240 Cable Bus Duct
8. Section 16050 Basic Electrical Materials and Methods

1.03 SUBMITTALS

A. Design Submittals. The Contractor shall submit as a minimum the study reports for short-circuit, insulation coordination, grounding, and lightning protection, etc. Submittals for the switchyard layout, elevation views, bill of materials, single line and three-line drawings, cable and conduit routing etc. shall be submitted for Owner's review and approval.

B. Contractor's Drawings. The Contractor shall submit point-to-point wiring diagrams, schematics, one-line diagrams, three-line diagrams and, outline drawings showing dimensions, weights, and location of accessories. Control schematics, wiring diagrams are to be detailed for both internal and external connections from the switchyard equipment to protective relaying, control annunciation, and power terminal blocks located remote to the switchyard.

C. The following Contractor's Drawings, calculations and documents shall be submitted for all support structures within the switchyard including those for circuit breaker, disconnect switches, CCVTs, combination CT/VT, VTs post insulators, standalone boxes etc.

1. Steel structure, attachment, and fabrication details, including Contractor-proposed construction attachments and associated concrete foundations.
2. Erection details for each structure type, including match markings to be used, actual calculated scale weights of members, and structure orientation with the transverse and longitudinal axis shown.
3. Details of proposed anchor bolt assemblies and concrete foundation reinforcement.
4. Details of proposed steel structure grounding provisions.

D. Product Data. Product data on all equipment and components utilized for the substation (support structures, precast trenches, cables, circuit breakers, current transformers (CTs), coupling capacitor voltage transformers (CCVTs), voltage transformers (VTs), combination CT/VTs, and junction boxes, etc.) shall be

submitted to the Owner's Engineer for review and approval. Product data shall include but not be limited to such items.

1.04 SWITCHYARD INTERFACE WITH THE W2W SUPPLIER

A. The Contractor shall be responsible for interfacing with the W2W Supplier for:

1. AC power requirements for switchyard electrical equipment.
2. Interface with new Unit 4 control system for the required signals for alarm and display from the switchyard equipment.

1.05 BASIC DESIGN REQUIREMENTS

A. The Contractor shall be responsible for engineering, calculations, design, drafting, studies, and reports required for the complete execution of the switchyard. All calculations, drawings, and reports (such as insulation coordination, grounding, short circuit analysis, structural loadings, foundations etc.) required prior to a final design shall be submitted to the Company for approval.

B. Switchyard grounding to be coordinated and interconnected with new Unit 4 powerhouse and existing powerhouse grid.

C. The equipment to be installed in the switchyard will be designed for the following ratings:

1.	Nominal System Voltage	230 kV
2.	Maximum Voltage	245 kV
3.	Rated Frequency	60 Hz
4.	Nominal rated current on 230kV line circuit*	17 A
5.	Nominal rated current on 6.9kV line circuit*	628 A
6.	Rated short time current (3sec)	50 kA
7.	Basic Impulse Level (BIL)	1050kV
8.	Power frequency withstand voltage	460 kV

(*) Subject to confirmation during the design phase after the unit rating is selected by W2W Supplier

D. Electrical clearance shall be per Standards ANSI C37.32 and RUS Bulletin 1724E-300.

1.	Metal-to-metal clearance for rigid conductors*	10.75ft
2.	Clearance to ground for rigid conductors*	8.9 ft
3.	Clearance b/w overhead conductors and ground for personal safety*	18ft

(*) A 2-foot buffer is added to the minimum clearance from the standards to account for construction and design tolerances, line sag etc.

E. The switchyard will be located at an altitude is 955 feet. Correction factors to be applied to the current rating, creepage distance and dielectric strength of the equipment in accordance with ANSI C37.30.

PART 2 - PRODUCTS

2.01 GENERAL

A. The switchyard shall be outdoor type air insulated connecting Unit 4 to existing 230kV transmission line through generator step-up transformer circuit.

2.02 SWITCHYARD POWER CONNECTIONS

A. The conductors shall be designed with a mechanical strength sufficient to withstand the mechanical and electromechanical stresses that may occur in service with the specified factors of safety.

B. Stranded ACSR (Aluminum Conductor Steel Reinforced) conductor to be used for switchyard power connections.

C. Contractor to verify and calculate the insulation ratio and creepage distances to meet the insulation values because of altitude above sea level.

D. Fittings for conductor jumpers shall be compression type to a bolted NEMA standard pad.

E. Jumpers shall be designed so that they may be unbolted for equipment replacement or maintenance.

F. Compression fittings, welded connectors, bolted connectors, expansion stud connectors, clamps, flexible copper braid connectors, expansion terminals and all materials necessary for a complete connection, conductors and taps shall be designed by the Contractor.

G. Connections of stranded conductor for use within the switchyard shall be of either the compression or bolted type. No splices on stranded conductor will be allowed in a conductor span between connections to other line segments or to equipment.

2.03 CIRCUIT SWITCHER

A. One (1) Circuit Switcher to be installed in the switchyard shall be of the outdoor, 3-pole, horizontally mounted SF6 interrupter as the arc extinction medium. Owner's preferred manufacturers are in the following order- S&C Electric Company, Southern States, Siemens or approved equal. The Circuit Switcher shall be of Fault Interrupting Class capable of transformer switching and protection. Bidders may submit option for Vertical Interrupter if this style offers significant space saving at the installation location.

B. The assembly shall also be equipped with suitably rated integrated disconnect switch and interlocked ground switch.

C. The circuit switcher shall have the following characteristics:

1.	Nominal voltage	230 kV
2.	Maximum Voltage	242 kV
3.	Rated continuous current	1200 A
4.	Power Frequency	60 Hz
5.	Basic Impulse Insulation Level (BIL)	900 kV
6.	Short Time Withstand rating, 1 sec	40 kA rms
7.	Short Time Withstand rating, momentary	64 kA rms
8.	Fault Interrupting rating, primary faults	20 kA rms
9.	Fault Interrupting rating, secondary faults	4 kA rms
10.	Fault Interrupting Time cycles	less than or equal to 3
11.	Duty Cycle	O--0.3s–CO--15s--CO
12.	Insulator Design	Porcelain
13.	Control Voltage/ Operator	48V DC

D. The circuit switcher shall use SF6 single gap interrupters. Each interrupter shall be provided with an overpressure relief device and shall be field refillable. Hermetically sealed interrupters are not acceptable due to the inherent dangers to personnel associated with handling fully pressurized SF6 devices during installation and also due to potential hazards encountered during transportation and offloading.

E. The circuit switcher shall have a gas system constructed of rigid copper piping or a combination of rigid copper piping and flexible stainless-steel tubing that allows each interrupter to be pressurized through a fill port. The gas system shall include the insulator and a color coded, temperature compensated density gauge that is visible from the ground and which is furnished with low-pressure alarm and lockout contacts. The density gauge must be at ground potential. Battery powered gas density monitors are not acceptable. The system shall be constructed such that the density gauge can be isolated from the interrupter to allow the low-pressure alarm and lockout contact set points to be verified. A means for refilling the system in the field without disassembling the circuit switcher must be provided. The device shall have a leak rate of less than 0.5% per year. A two-stage pressure gauge shall be provided to monitor SF6 gas pressure. The first stage shall initiate low pressure alarms which will be remotely monitored by Owner. The second stage will block the circuit switcher from tripping or closing. SF6 gas shall conform to ASTM D2472.

F. Terminal pads shall be unplated aluminum with 4-hole NEMA drilling pattern for use with furnished terminal connectors. The terminal pads shall be reversible for mounting at the top, bottom, or either side of the interrupter.

G. The circuit switcher shall be tested in accordance with IEEE C37.09.

H. All current carrying parts shall be designed and manufactured to fulfill the requirements with respect to rated current, rated short-time current, rated breaking capacity, rated making current, etc.

I. Each circuit switcher shall be provided with a spring open-spring close mechanism capable of a duty cycle of O-0.3 seconds-CO-15 seconds-CO. The spring shall be charged via an electric motor in 15 seconds or less. Pneumatic, hydraulic, or combination pneumatic/hydraulic mechanisms are not acceptable. Devices utilizing multiple mechanisms are not acceptable. The circuit switcher shall be equipped for manual-control from the operating mechanism and remote-control from the powerhouse control room.

J. Insulator shall be ANSI 70 gray color.

K. Adequate number of auxiliary contacts shall be provided for the purpose of controls, and indication. At a minimum, eight (8) “a” and eight (8) “b” auxiliary switch contacts shall be provided for Owner’s use. In addition, four spare NO and four spare NC contacts shall be provided.

L. Control/indication signals to/from each circuit switcher from/to the switchyard control building and the Plant Control System shall be provided and final list of signals to be determined during the detailed design stage and to be coordinated with W2W Supplier.

M. The circuit switcher assembly shall be furnished with structural steel supports, grounding connectors, and anchor bolts.

N. Operating Mechanism.

1. An ANSI 70 gray painted steel mechanism housing shall be furnished and shall be provided with the following accessories:
    a. 1. Electric spring charging motor
    b. 2. Color coded, temperature compensated gas density gauge with low-pressure alarm contact and low-pressure lockout contact
    c. 3. Trip-close pistol grip switch
    d. 4. Close coil
    e. 5. Dual trip coils
    f. 6. Anti-pump relay
    g. 7. Local-remote selector switch
    h. 8. Thermostatically controlled cabinet heater
    i. 9. Molded case circuit breakers for protection of motor circuit, control circuit, and heater circuit
    j. 10. Spring charged-discharged indicator
    k. 11. Manual closing spring charging handle
    l. 12. Open-Close position indicator
    m. 13. Position indicating lights (green=open, red=closed)
    n. 14. Manual trip lever (not included with 245kV units)
    o. 15. Operations counter
    p. 16. 120 VAC cabinet light with door actuated switch
    q. 17. View window in cabinet door

r. 18. 120 VAC duplex receptacle with GFCI 20. Hinged cabinet door with 3-point latch, open position door stop, and padlocking provisions

O. Shipping and Delivery

1. The circuit switcher shall be match-marked and disassembled as necessary to accommodate shipping dimensional clearance restrictions. Each interrupter shall be shipped with a positive pressure of 5–10 psi of SF6, eliminating the need to pull a vacuum on the interrupters in the field. An SF6 fill kit shall be provided to fill the interrupters to rated pressure during installation.

2.04 CIRCUIT BREAKER (Optional- bidders may submit the proposal for the HV circuit breaker in lieu of Circuit Switcher, if the bidders see a better value. Contractor's proposing HV circuit breaker responsible for verification that the unit will fit inside of the existing switchyard footprint.)

A. One (1) circuit breaker to be installed in the switchyard shall be of the outdoor, dead tank, 3-pole, single-throw type with spring type operating mechanism and with SF6 as the arc extinction medium. Owner's preferred manufacturers are in the following order- ABB-Hitachi, GE, Siemens or approved equal.

B. The breaker shall have the following characteristics:

1.	Rated continuous current	1200 A
2.	Maximum interrupting time, ms	50
3.	Closing and latching current, kA (Peak)	40
4.	Chopped wave impulse withstand voltage, with 2 microseconds to flashover, crest(kV)	1160
5.	Operating sequence	O-0.3 sec-CO-3min.-CO
6.	Auxiliary supply voltage	Coordinate w/ W2W
7.	Control Voltage	125V DC

C. The circuit breakers shall be tested in accordance with IEEE C37.09.

D. The circuit breaker current ratings shall be based on load, fault duty and short circuit calculations and in accordance with IEEE C37.04 and IEEE C37.06 and with an insulation structure in compliance with IEEE C37.12.

E. All current carrying parts shall be designed and manufactured to fulfill the requirements with respect to rated current, rated short-time current, rated breaking capacity, rated making current, etc.

F. The circuit breakers shall be equipped for manual-control from the operating mechanism and remote-control from the switchyard control building and powerhouse control room. All breakers shall be suitable for three phase high speed auto-reclosure.

G. Bushing terminals shall be silver plated. Terminals shall be corona free.

H. Bushings shall have ANSI 70 gray color and be interchangeable. The bushings shall be equipped with suitable bolted-type expansion connectors.

I. Adequate number of auxiliary contacts shall be provided for the purpose of controls, and indication. In addition, four spare NO and four spare NC contacts shall be provided.

J. The breakers shall have minimum two trip coils and each coil to have independent power supplies. Minimum of one closing coil to be also provided.

K. Control/indication signals to/from each circuit breaker from/to the switchyard control building and the Plant Control System shall be provided and final list of signals to be determined during the detailed design stage and to be coordinated with W2W Supplier.

L. The breaker shall be furnished with structural steel supports, grounding connectors, and anchor bolts.

M. Operating Mechanism.

1. The three (3) circuit breaker poles shall operate simultaneously by a single operating mechanism from a common shaft.
2. Breaker controls shall be capable of operating within the following control voltage ranges:
   a. Closing and auxiliary functions 90 to 135 V DC
   b. Tripping 70 to 140 V DC
3. The SF6 gas system shall have provisions to monitor, sample, remove and refill the gas from the interrupter tanks. The system shall allow isolating any single pole while monitoring, sampling, or processing the remaining pole(s). Alarms to be provided for gas monitoring.
4. All operating mechanisms, controls, indications and alarms, and auxiliary equipment, shall be enclosed in a weatherproof, dustproof NEMA 4 enclosure with a rubber gasketed, hinged door. A suitable means/ interlock shall be provided to prevent operation of the mechanism when maintenance work is being done.
5. The tripping and the closing springs shall be compression type and shall never be in tension.
6. The housing shall have a padlocking cleat and an opening handle.
7. All devices inside the control enclosure shall be front-mounted and wired.
8. The enclosure shall contain at a minimum the position indicator, space heater to prevent condensation, operations counter, terminal blocks (including 20% spares), local/remote selector switch, single phase convenience outlet etc.

N. Bushing Type Current Transformers

1. The circuit breakers shall be equipped with bushing-type current transformers (CTs) in each phase terminal. There shall be a minimum of two (2) current transformers on each bushing, for a total of twelve (12) CTs inside the breaker. The CTs shall be designed, rated, and tested in accordance with IEEE C57.13.
2. The current transformers shall be interchangeable.

3. The current transformers shall be multi-ratio types conforming to IEEE C57.13 and NEMA SG4. Suggested ratio for each current transformer shall be 600:5 for the incoming lines and 1200:5 for outgoing line with taps for the multiple ratios in accordance with IEEE C57.13.
4. All secondary CT connections shall be wired to terminal blocks within the weatherproof circuit breaker control panel.
5. Each current transformer used for relaying shall have a relaying accuracy classification of C400. Each current transformer used for metering shall have a metering accuracy class of 0.3 for burdens from B-0.1 through B-0.9.
6. Minimum continuous thermal rating factor of the CT's shall be 1.5.

2.05 MANUAL OPERATED DISCONECT AND GROUND SWITCHES

A. The contractor shall supply one (1) group-operated, 3-pole, horizontal single side-break disconnect switch for the circuit breaker rated at 1200 A continuous current complete with required accessories for a complete operating installation.

B. The disconnect switch of the line from the powerhouse shall be equipped with a grounding switch, which shall be manually operated and shall ground the line side of the disconnect switch.

C. A mechanical interlock shall be provided between the disconnect switch for the lines and its grounding switch, such that it shall not be possible to close the ground switch when the disconnect switch is closed and vice versa.

D. All switches shall be provided with auxiliary contacts as required. Padlock open and close provisions shall be provided on the disconnect switch.

E. The main contacts of the disconnect switches shall be silver-coated to provide low resistance current paths. The switch blades shall be aluminum.

F. A flexible grounding strap shall be connected between the earthed steel structure and the operating shaft immediately above the mechanism.

G. Provision shall be made for locking the switch in either the closed or open position.

H. The disconnect switches shall be manufactured and tested in accordance with IEEE C37.30.1.

I. All mounting hardware shall be non-corrosive or hot-dip zinc galvanized.

J. Color of porcelain insulators shall be ANSI 70 gray.

2.06 COUPLING CAPACITOR VOLTAGE TRANSFORMER (if deemed necessary)

A. The Contractor shall supply and install three (3) pedestal mounted CCVTs. The CCVT shall be designed, rated, and tested in accordance with IEEE 93.1. The CCVTs shall be oil filled, outdoor type, single phase, complete with terminal

connectors, and accessories and shall have tapped dual secondary windings each rated at 115/67.08 V for 132.7 kV line to ground primary voltage.

B. Secondary connections shall be wired to a terminal block within a weatherproof housing forming the base of the CCVT assembly.

C. The CCVT porcelain shall be of ANSI 70 gray color.

D. Coupling capacitor voltage transformers shall conform to IEEE (ANSI/NEMA) C93.1 standard as to materials, design, manufacture, and tests.

E. The CCVT shall have the following ratings:

1.	Max. rated voltage, kV	242
2.	Basic Insulation Level (BIL), kV	1050
3.	Insulator Type	P145
4.	Number of secondary windings	2 (relaying/ metering)
5.	Transformation ratio, kV	230/√3kV:115V-115/√3V
6.	Accuracy class	0.3 WXYZ, ZZ
7.	Capacitor Dielectric Insulating Fluid	Synthetic Oil
8.	Electromagnetic Dielectric Insulating Fluid	Mineral Oil

F. CCVT shall be type TEMP 245H as manufactured by Trench Limited or Approved Equal by the owner.

2.07 CURRENT TRANSFORMER

A. The Contractor shall supply and install three (3) pedestal mounted oil insulated Current Transformers (CTs) in the existing switchyard for relaying application. The CTs shall be designed, rated, and tested in accordance with IEEE C57.13. The CTs shall be top core design with metallic expansion bellow. Energized components shall be supported by porcelain insulating column and internally insulated with oil/paper. Suitable methods shall be provided for sampling and monitoring the level of insulating medium.

B. Secondary connections shall be wired to a terminal block within a weatherproof housing forming the base of the VT assembly.

C. The CT shall have high-grade porcelain insulators and shall be of ANSI 70 gray color.

D. CTs shall conform to IEEE C57.13 standard as to materials, design, manufacture, and tests.

E. Primary terminal connection shall be Aluminum material with NEMA-4 hole patterns predrilled to facilitate field connections. Tin plated NEMA-2 hole pattern shall be furnished for Ground connections. Secondary tap connections shall be Screw type connections enclosed in a sealed terminal box.

F. The CT shall have the following ratings:

1.	Design	Wound type, top core
2.	Max. rated voltage, kV	230
3.	Basic Insulation Level (BIL), kV	1050
4.	Current ratio, A	50:5
5.	Burden	B4
6.	Accuracy class	C400
7.	Thermal rating factor	1.5
8.	Short Time Thermal current	45kA/1 sec

G. CT shall be IOSK 245 as manufactured by Trench Limited or Approved Equal by the owner.

2.08 VOLTAGE TRANSFORMER

A. The Contractor shall supply and install three (3) pedestal mounted hermetically sealed Voltage Transformers (VTs). The VT shall be designed, rated, and tested in accordance with IEEE C57.13. The VTs shall be oil filled, outdoor type, single phase, complete with terminal connectors, and accessories and shall have tapped dual secondary windings each rated at 115/69 V for 138 kV line to ground primary voltage.

B. Secondary connections shall be wired to a terminal block within a weatherproof housing forming the base of the VT assembly.

C. The VT porcelain shall be of ANSI 70 gray color.

D. Voltage transformers shall conform to IEEE C57.13 standard as to materials, design, manufacture, and tests.

E. The VT shall have the following ratings:

1.	Max. rated voltage, kV	230
2.	Basic Insulation Level (BIL), kV	1050
3.	Number of secondary windings	2 (relaying/ metering)
4.	Transformation ratio, kV	138kV:115V/69V
5.	Porcelain Creepage Distance (minimum), in	248
6.	Accuracy class	0.3 WXYZ, ZZ
7.	Dielectric Insulating Fluid	Mineral Oil

F. VT shall be type VEOTA 245 as manufactured by Trench Limited or Approved Equal by the owner

2.09 COMBINATION CURRENT AND VOLTAGE TRANSFORMER (Combination CT/VT) for Revenue Metering

A. Due to the space constraints in the existing switchyard, the Contractor shall supply and install three (3) pedestal mounted Oil-paper insulated combined Current and Voltage Transformers for high accuracy revenue metering. The VT shall be designed, rated, and tested in accordance with IEEE C57.13 and be suitable for outdoor installation. The combination CT/PT shall be single phase, complete with terminal connectors, and accessories.

B. Secondary connections shall be wired to a terminal block within a weatherproof housing forming the base of the CT/VT assembly.

C. The bushings shall be of high-grade porcelain material and shall be of ANSI 70 gray color.

D. Both Current and Voltage transformers shall conform to IEEE C57.13 standard as to materials, design, manufacture, and tests.

E. Stainless steel nameplate shall be provided that bears all information of the instrumentation transformers as per IEEE C57.13 sections-6.8 and 7.5.

F. Primary terminal connection shall be Aluminum material with NEMA-4 hole patterns predrilled to facilitate field connections. Tin plated NEMA-2 hole pattern shall be furnished for Ground connections. Secondary tap connections shall be Screw type connections enclosed in a sealed terminal box.

G. The VTs shall have the following ratings:

1.	1.	Design	Line to Ground Inductive VT
2.	2.	Max. rated voltage, kV	230
3.	3.	Basic Insulation Level (BIL), kV	1050
4.	4.	Number of secondary windings	2 (metering)
5.	5.	Transformation ratio, kV	138kV:115V/69V
6.	6.	Porcelain Creepage Distance (minimum), in	248
7.	7.	Accuracy class	0.3 WXYZ, ZZ
8.	8.	Dielectric Insulating Fluid	Mineral Oil

H. The CTs shall have the following ratings:

1.	1.	Design	Wound type, top core
2.	2.	Max. rated voltage, kV	230
3.	3.	Basic Insulation Level (BIL), kV	1050
4.	4.	Current ratio, A	50:5
5.	5.	Burden	B1.8
6.	6.	Accuracy class	0.3
7.	7.	Thermal rating factor	1.5
8.	8.	Short Time Thermal current	45kA/1 sec

I. The combination CT/PT shall be manufactured by Hitachi or Approved Equal by the owner.

2.10 CABLES AND RACEWAYS

A. Cables. Cables shall conform to as outlined in Section 16050 “Basic Electrical Materials and Methods”.

B. Trenches.

1. Underground cable trench system to be provided to route the power and control cables within the switchyard. A partition would be provided to segregate power and control cables.
2. The trench system shall consist of precast concrete support brackets, sidewalls and removable covers assembled to form a completely enclosed trench, and a concrete bottom.
3. The trench system will be designed to support pedestrian traffic and vehicle crossing (where applicable).
4. Precast trench covers shall be furnished in sections and shall be of a lightweight construction, sized to permit removal by a single person. Each cover shall have slots for lifting tools. Covers shall be made of fiber and steel reinforced concrete.
5. Trench design shall facilitate the flow of water and prevent water accumulation.

C. Conduits.

1. Contractor shall route the conduits from the trench to the various equipment with minimum amount of bends.
2. Refer to Section 16050 “Basic Electrical Materials and Methods”, for details.
3. All cables to in the switchyard from the trench to the various equipment shall run in buried schedule 40 PVC conduits. At least one (1) spare conduit shall be laid form the trench to every major equipment for future use.

2.11 GROUNDING

A. The switchyard shall have an adequate grounding system to dissipate faults and maintain a safe step and touch potential in all areas of the switchyard. The design of the grounding grid shall consider a grounding mesh or a grid with all joints thermal welded and ground rods in sufficient number and length to maintain required minimum resistance. The maximum ground electrical resistance value shall not exceed 1 ohms.

B. The contractor is responsible for determining the type and electrical resistivity of the soil where the switchyard will be built.

C. Based on the soil studies and in compliance with IEEE 80, an adequate grounding system to be designed to which all metal structures, equipment supports,

fence/gates, disconnecting switch handles, cable trays, surge arresters will be connected.

D. Contractor to coordinate with the W2W supplier and connect to the powerhouse grounding grid.

E. All switch handles shall be connected to the grounding platform below the switch operating mechanism. The grounding platform shall be placed on top of the crushed rock and be connected to grounding system.

F. Metal parts of all equipment, other than those forming an electrical circuit, shall be directly connected to the main station ground system. All metallic conduits, junction boxes, equipment cabinets, panels etc., shall be connected to the switchyard ground grid.

2.12 STEEL STRUCTURES

A. All switchyard steel structures shall be designed, manufactured, furnished and installed as required, but not limited to the following:

1. One (1) SF6 circuit breaker support structure.
2. One (1) disconnect switch support structure.
3. One (1) support structure for the CCVTs.
4. One (1) support structure for the VTs.

B. The Contractor shall design all equipment structures in accordance with the static and dynamic loadings and as recommended by the respective equipment manufacturer.

C. All equipment support structures shall be fabricated by manufacturers who specialize in similar structure design and fabrication or shall be recommended by the relevant equipment manufacturer.

D. Conductor Tensions and Loadings. Calculations shall be conducted to determine the conductor tension under the worst conditions of temperature and wind pressure. Wind loading conditions and overload factors for conductor and OPGW/shield wire shall conform to IEEE C2.

E. Material Requirements.

1. All steel shall comply, at the thickness used, with the physical requirements of the latest revisions of American Society for Testing and Material Specifications A-6, A-20, A36, A-572 or A-588. Other steels may be used only with the specific written approval of the Owner's Engineer.
2. Equipment supports and conductor brackets and vangs shall conform to ASTM A36, ASTM A572, ASTM A588, or ASTM A595 Base plate shall conform to ASTM A572, ASTM A588, ASTM A633, or ASTM A36.
3. Anchor bolts shall conform to ASTM A615, Grade 60 or 75.
4. Other bolts and nuts shall conform, as applicable, to ASTM A307, ASTM A325, ASTM A354, ASTM A394, or ASTM A687.

F. Equipment Support Structures.

1. The structural analysis, design and fabrication of steel structures for equipment and bus support shall be in accordance with the AISC and AWS D1.1 Specifications.
2. Short Circuit Forces. Equipment support stands shall be able to withstand the short circuit forces. Short circuit reactions plus extreme wind shall be applied to the structure to calculate these forces. These calculations shall be done by the Contractor and approved by the Company.
3. Seismic Loading. The structure shall be able to withstand the seismic forces based on the acceleration values. These forces shall be calculated by the Contractor and submitted to the Company for his approval. The structure shall be loaded with all the equipment and structure dead weights, without ice or wind, shall be applied to calculate this force.
4. Loads to be applied to the structure shall be determined for electrical short circuit currents, wind, ice, seismic and be in accordance with IEEE 605 and ASCE 7.

G. Anchor bolts shall be galvanized and long enough to transfer the foundation loads into the footing through bonding.

H. Grounding provisions at the bottom of each structure shall be provided. A two (2) hole NEMA pad above each base plate shall be provided.

I. Allowable Stresses: The switchyard structures shall be designed manufactured and constructed so that the sum of the maximum stresses for the worst possible loading condition for each member shall not exceed the allowable stresses of the materials utilized.

2.13 OTHER EQUIPMENT AND MATERIALS

A. Contractor is responsible for the supply of all miscellaneous equipment and materials required for a complete implementation of the switchyard.

2.14 NAMEPLATES AND SIGNS

A. All equipment furnished and installed shall be provided with stainless steel nameplates with engraved black lettering, containing the information required in the applicable standards.

PART 3 - EXECUTION

3.01 CONSTRUCTION

A. Site Preparation

1. Contractor shall grade site and provide a uniform level surface for the switchyard.
2. As required, the site shall be elevated above existing grade and fill shall be placed and compacted to achieve a stable surface.

B. Electrical Equipment

1. Installation of electrical equipment in the switchyard shall be made in accordance with manufacturers recommended procedures.
2. Installation shall be made with due care and diligence, using craftspeople experienced in handling and installation of high voltage equipment of this type.

3.02 CABLES, RACEWAYS AND WIRING

A. Raceways, conduits and cableways and wiring shall be in accordance with the industry standards and the requirements indicated in Section 16050 “Basic Electrical Materials and Methods”, shall apply.

3.03 GROUNDING

A. Construction of the ground grid shall be in accordance with accepted industry standards and the requirements indicated in Section 16050 “Basic Electrical Materials and Methods”, shall apply.

3.04 TESTING AND COMMISSIONING

A. Contractor shall develop and deliver to Company a procedure for testing and commissioning program together with a schedule. The program shall be comprehensive and shall include all items in the switchyard scope.

B. Testing shall include tests as site as well as tests at equipment manufacturers facilities. Contractor shall inform the Company of the dates when the testing is scheduled at manufacturers facilities and Company shall have the option to send its representatives to witness the tests.

C. The Contractor shall field test the equipment following the manufacturer recommended and applicable requisites of industry standard tests which shall include but are not limited to:

1. IEEE C37.09
2. IEEE C57.13, C57.13.2
3. ANSI C29.1

D. As a minimum the following tests will be performed:

1. Five manual open-close operations of the 230 kV disconnect switch.
2. A capacitance and dissipation factor test on each CCVT.
3. A ground grid continuity and resistance test. The ground resistance value measured shall be less than one ohm, or additional ground cable connections shall be added to achieve this value.

E. The Contractor shall be responsible for functional testing and commissioning to verify conformance with the design, operating and performance requirements.

F. General requirements as applicable listed in Sections 1.11, Startup Testing & Turnover and 1.12, Training Operation & Maintenance shall apply.

G. Turnover Package for the Switchyard to be provided after testing and commissioning is complete.

3.05 SPARE PARTS

A. The following minimum spare parts shall be provided:

1. One (1) coupling capacitor voltage transformer
2. One (1) set of stationary contact fingers for the switch blade of the disconnect switch.

B. The Contractor shall provide a list and description of recommended spare parts required for five years of operation of the switchyard equipment in addition to the mandatory parts and supply them after Owner Engineer's approval.

3.06 SPECIAL TOOLS

A. Contractor shall provide all tools, instruments and other equipment required to maintain, repair, and operate switchyard equipment. Any special tools required for regular operation, testing, alignment, repair, or realignment shall also be provided.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

A. Measurement for payment for the contract item Furnish and install switchyard grounding grid and accessories due to switchyard modifications will be by Pound.

B. There will be no additional measurement for payment for the remaining contract items according to the following table.

4.02 PAYMENT

A. The contract prices will be paid for Switchyard which shall include full compensation for all costs incurred under this section.

B. Such payment will be considered full compensation for all costs incurred for the performance of the work necessary to complete the requirements of this Section.

Item No.	Item	Unit
16300-1	Furnish, install and commission one (1) 230kV Circuit Switchyard including steel support structure.	
16300-2	(OPTIONAL) Furnish, install and commission one (1) SF6 Circuit Breaker dead tank type with bushing current transformers (CTs) including steel support structure.	LS
16300-3	Furnish, install and commission one (1) group operated, three phase disconnect switch with interlocked grounding switch including steel support structure. (This item can be combined with 16300-1, if furnished all together)	LS
16300-4	Furnish, install and commission one (1) set of three 230 kV Coupling Capacitor Voltage Transformers (CCVTs) including steel support structure.	LS
16300-5	Furnish, install and commission one (1) set of three 230 kV Voltage Transformers (VTs) including steel support structure.	LS
16300-6	Furnish and install switchyard air insulated conductor and power connections.	LS
16300-7	Update/design switchyard grounding grid due to switchyard modifications.	LS
16300-8	Furnish and install switchyard grounding grid and accessories due to switchyard modifications.	LBS

END OF SECTION

SECTION 16400
GENERATOR STEP-UP TRANSFORMER

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. The Contractor shall furnish all labor, materials, and equipment required to design, manufacture, factory test, deliver to Site, erect, field test, and commission one (1) Generator Step-Up (GSU) transformer with associated equipment as described below.

1. One (1) unit transformer rated 6 / 8 MVA, three phase, three winding step-up type transformer unit, for outdoor erection, mineral oil-immersed, ONAN/ ONAF-cooled, 230 Gnd. Wye / 6.9 kV Delta, 60 Hz, complete with cooling equipment, online monitoring system and all required accessories.

B. All materials, construction and characteristics shall be in accordance with the latest applicable standards listed in Section 1.02 and be Underwriters' Laboratories, Inc (UL), or by a Nationally Recognized Testing Laboratory (NRTL), certified and labeled.

1.02 REFERENCES, SPECIFICATIONS, CODES AND STANDARDS

A. Rating tests and characteristics shall be in accordance with the following:

1. American National Standards Institute (ANSI).

CGA V-1	Compressed Gas Cylinder Valve Outlet and Inlet Connections
ANSI C29.9	Wet Process Porcelain Insulators – Apparatus, Post Type
ANSI C57.13	Requirements for Instrument Transformers
ANSI C57.19.00	General Requirements and Test Procedure for Outdoor Power Apparatus Bushings
ANSI C57.19.01	Standard Performance Characteristics and Dimensions for Outdoor Apparatus Bushings
ANSI C57.98	Guide for Transformer Impulse Test
ANSI C57.116 -	Guide for Transformers Directly Connected to Generators.
ANSI C57.106	Guide for Acceptance and Maintenance of Insulating Oil in Equipment
ANSI C57.148	Standard for Control Cabinets for Power Transformers

ANSI C62.11 Standard for Metal-Oxide Surge Arresters for Alternating Current Power Circuits

ANSI C62.22 Standard Guide for the application of Metal-Oxide Surge Arresters for Alternating-Current Systems

2. Institute of Electrical and Electronics Engineers (IEEE).

IEEE C57.12.00 General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers."

IEEE C57.12.10 Standard Requirements for Liquid-Immersed Power Transformers."

IEEE C57.12.70 Terminal Markings and Connections for Distribution and Power Transformers.

IEEE C57.12.80 Standard Terminology for Power and Distribution Transformers."

IEEE C57.12.90 Test Code for Liquid-Immersed Distribution, Power and Regulating Transformers.

IEEE C57.91 Guide for Loading Mineral-Oil-Immersed Transformers and Step-Voltage Regulators.

IEEE C57.131 Standard Requirements for Tap Changers.

IEEE C57.143 Guide for Application for Monitoring Equipment to Liquid-Immersed Transformers and Components.

IEEE 80 Guide for Safety in Substation Grounding.

IEEE STD 4 Standard Techniques for High Voltage Testing.

3. National Electrical Manufacturers Association (NEMA)

NEMA CC1 Electric Power Connectors for Substations

NEMA ICS2 Standards for Industrial Control Devices, Controllers and Assemblies

4. National Fire Protection Association (NFPA).

NFPA 70-2020 National Electric Code (NEC).

5. Section 16300 Switchyard
6. Section 16240 Cable Bus Duct
7. Section 16050 Basic Electrical Material and Methods

1.03 SUBMITTALS

A. Submittals for this section shall be submitted in accordance with Section 01300.

B. Plan, section, and detail drawings for equipment installation and interconnection. Drawings shall be to scale and show all new equipment locations. The drawings shall be drawn to scale and indicate locations of all equipment. Drawings shall be generated using AutoCAD®. Drawings shall include the Owner's standard title block. Interior plan drawings shall be drawn to minimum scale of 1/4'' = 1'-0"

C. The following design submittals shall be submitted by the Contractor:

1. Outline/layout and nameplate drawings
2. Schematic and wiring drawings
3. Component/equipment specifications and technical design data
4. Bill of material
5. Inspection and test plan
6. Completed and certified factory test results for each transformer
7. Operation and maintenance manuals

PART 2 - PRODUCTS

2.01 GENERAL

A. Complete transformer shall be designed, manufactured, installed, and tested in accordance with current accepted standards. Unless otherwise specified, all accessories required for achieving successful fabrication, delivery, installation, testing, commissioning, and operation of the transformer shall be provided, whether or not such items are specifically mentioned herein.

B. There will be one (1) three phase step-up transformer in the existing 230 kV plant switchyard for energy evacuation to the 230 kV grid system. On the low voltage (LV) side the connection will be made via cable bus ducts. On the high voltage (HV) side the transformer will be directly connected to a new 230 kV SF6 plant switchyard circuit breaker via air insulated wire or bar connections. The voltage level on the LV side shall be coordinated with the generator supplier provided under the Water to Wire (W2W) package. Currently, the generator is rated for 6.9kV.

C. GSU transformer shall be installed in the outdoor switchyard inside the existing transformer bay directly adjacent to transformer #3, which is phase-C transformer for all existing three units combined.

D. The continuous rating when the forced cooling system is out of service shall be as high as possible for economic considerations.

E. The no load excitation current shall be as low as possible for economic considerations. The maximum tolerance for no load and load losses shall be 5% of the declared losses.

F. The winding of the transformers shall withstand mechanical and thermal stresses caused by short-circuit fault current as stipulated in the applicable IEEE standard.

G. The transformers shall be designed to withstand, without injury, a voltage of 30% greater than the rated generator voltage, when the generator full load is rejected.

H. The transformers must be capable of continuous operation at the rated power of 8 MVA in the whole voltage control range of the generators 6.9 kV ± 10% without exceeding the rated temperature rise. The transformers shall be capable of continuous operation under frequency variations according to the applicable IEEE standard.

I. The transformer shall be designed for the corresponding lightning impulse withstand voltage according to IEEE and the insulation coordination study. Documentary evidence of such design shall be submitted.

J. Owners preferred manufacturers are ABB-Hitachi, Siemens, or approved equal, in the order of preference.

2.02 RATINGS AND CHARACTERISTICS

A. The ratings of the transformer shall be as follows:

Number of units	1
Installation	Outdoors
Number of Windings	2
Number of phases	3
Rated frequency	60 Hz
Type	Oil immersed unit
Cooling system	ONAN / ONAF
Rated unit power (ONAN/ONAF)	6 MVA / 8 MVA
Rated Voltage, kV: HV winding (Secondary) LV Winding (Primary)	 230 6.9 (to be verified w/ generator voltage)
Off load Tap Changer (LTC)	+/-8 x 1.25% (HV winding)
Short-circuit impedance	10% (to be confirmed by Contractor)

Three phase vector diagrams	YNd11
Neutral	Solidly grounded
Max. average sound level (at 2 m)	According to IEEE C57.12
Power frequency withstand volt, 60 Hz 1 min HV (230 kV) LV (6.9 kV)	 460 kV 20 kV
Lighting impulse withstand voltage 1.2/50 µs HV (230 kV) LV (6.9 kV)	 1050 kV 60 kV

B. Temperature Rise. The observable temperature rise of the transformer or parts thereof, as determined by resistance of the windings, shall not exceed 65°C at rated kVA on the tap connections that give the highest winding temperature rise, and the winding hottest spot temperature shall not exceed 80°C.

C. Short Circuit Capability. The transformer shall be designed and constructed to successfully withstand, without failure or injury, the mechanical and thermal stresses caused by current in any winding due to any type phase or ground fault occurring on the transformer high voltage or low voltage terminal, for the time period (as a minimum value) specified by ANSI C57.12.00, Section 7, when the transformer is applied at a location where infinite short circuit currents are available on both the high voltage bus and the low voltage bus. No windings shall be below the mechanical and thermal requirements defined by Section 7 of ANSI C57.12.00.

D. Loading Cycle. The subject main power transformer is intended for a pumped storage hydro facility. The transformer will not be subjected to high motor starting currents since a static frequency converter is applied for starting, however, the transformer will experience frequent synchronization (approximately twice daily). This frequent switching duty and synchronizing power surges shall be incorporated in the design of this transformer. This loading cycle shall be factored into the design of the transformer.

2.03 CORE

A. The core of the transformer shall be constructed of the highest quality, non-aging, high-permeability silicon steel especially suitable for the purpose. The steel shall be in thin laminations, properly annealed after cutting to suitable size and rolled to ensure smooth surfaces at the edges. Both sides of each sheet shall be insulated with a durable, heat-resistant enamel or varnish, baked on. The core shall be carefully assembled and rigidly clamped to ensure adequate

mechanical strength to support the windings, to prevent shifting of the laminations during shipment, and to reduce vibration to a minimum under operating conditions.

2.04 WINDINGS

A. The windings for the transformer shall be made of copper and assembled in such a manner as are best suited for the particular application. Proper consideration shall be given to all factors of service such as high dielectric and mechanical strength of insulation, coil characteristics, and minimum restrictions to free circulation of oil. Coils shall be made up, shaped, and braced to provide for expansion and contraction due to temperature changes in order to avoid abrasion of insulation and to provide rigidity to resist movement and distortion caused by abnormal operating conditions. Adequate barriers shall be provided between windings and core and between high-voltage and low-voltage windings.

B. End coils shall have additional protection against abnormal line disturbances. The entire design, construction, and treatment of the windings and their assembly on the core shall embody the latest improvements in the art and conform to best modern practice. The transformer windings shall be designed to withstand impulse, induced, and dielectric test voltages in accordance with ANSI C57.12.90.

C. The windings shall be capable of withstanding without injury the mechanical and thermal stresses caused by short circuits on the external terminals of any winding, or windings, with rated voltages maintained across the terminals of all other windings with infinite bus on the non-faulted windings.

2.05 OFF-LOAD TAP CHANGER

A. GSU transformer shall be provided with a three-phase, resistor oil type off-load tap changer (LTC), rated for outdoor use, self-cooled, self-contained and installed in the transformer. Each tap shall be rated for the full transformer capacity. The LTC shall be connected to the HV winding and equipped with a manual operating handle conveniently located on the side of the tank for control of the taps. The basic insulation level (BIL) of the LTC shall be the same of the winding where it is connected.

B. LTC shall be designed such that the voltage on the transformer HV side can be changed in a range of 10% (from 253 kV to 207 kV). The tap changer shall have 8 steps up and 8 steps down with each step at 1.25% of nominal voltage.

C. LTC shall comply with the requirements of the latest revision of IEEE C57.131, Standard Requirements for Tap Changers.

D. LTC manual operating handle shall have provisions for padlocking and provide visual indication of tap changer position without unlocking or requiring the use of tools to remove LTC cover.

2.06 TANKS AND FITTINGS

A. The transformer tanks will be constructed in welded sheets of high-quality carbon steel, reinforced in order to withstand the most severe conditions of operation, transport and vacuum treatment. The transformer tank construction shall be of the bolted cover type, however the welded bottom "bell" design, is also acceptable.

B. All the transformer tanks shall be absolutely water and hot oil tight and resistant to 100% Vacuum.

C. The necessary gaskets will be tight under all conditions especially against the hot oils (synthetic rubber or neoprene bonded cork will be preferred). Means shall be provided to prevent over compression of the gaskets.

D. All tanks will be suitably braced to withstand, without distortion or buckling, the stress imposed during transport and operation. The necessary lifting lugs and shackles shall be provided to enable the whole transformer to be lifted by crane.

E. The tanks shall be designed for easy removal of the bushings and easy connection to the windings. Suitable guides shall be provided within the tank to ensure correct positioning of the active part.

F. The construction of the base frame shall permit the handling of the entire weight of the completely filled transformer. Pulling eyes shall be provided to allow the attachment of pulling rigs and moving the transformer horizontally on wheels or rollers in either direction.

G. Jacking pads shall be available at convenient locations on the transformer tanks to allow the jacking of the completely filled transformer.

H. Each transformer shall have two earth connections of adequate dimensions. These shall be located near the bottom of the tank at diagonally opposite sides.

I. For corrosion protection a multilayer corrosion protection of different thicknesses (2 base layers, outer layer 1) will be applied. The inside of the tank, the cover and the expansion vessel are coated with an oil-resistant paint.

J. Painting and corrosion protection shall be according to the GTS.

2.07 COOLING

A. The units shall be executed by ONAN/ONAF (oil natural air natural/ oil natural air forced, for additional loading capacity above 6 MVA) cooling system.

B. The losses will be absorbed in the tank by the insulating oil and discharged with the oil flow to oil-air coolers and discharged to the ambient air. For the additional cooling capacity above 6MVA, the transformer shall be equipped with external cooling fans that operate when the transformer oil temperature reaches above the user defined temperature setting thresholds. The fans shall be operable both

in auto and manual mode. In auto mode, the fans shall turn-off once the oil temperature reaches below the user defined setting.

C. The maximum permissible temperature rises must not be exceeded when the ambient air temperature is at its maximum value.

D. The transformer must be able to release the residual heat in switched off condition in case of grid failure without exceeding the permitted temperature limits (given in the technical data).

E. The transformer cooling equipment shall be furnished complete in every respect and shall include piping, valves, and all supplementary equipment required for adequate transformer cooling.

F. The cooling system sizing shall be based on continuous rated power transfer with one of the cooling units out of service. Even in this case the admitted temperature rises shall be within the admitted borders.

G. Each cooler unit or group shall be provided with valves on the tank side and be designed such, that it can be removed for service or be replaced, without disturbing major parts of the transformer and without the need of interruption of the transformer operation. Lifting lugs, drain- and vent plugs shall be provided for each cooler unit.

2.08 BUSHINGS

A. The LV bushings will be connected to the generator circuit breaker by means of a cable bus duct to be designed by W2W Supplier and installed by Contractor. Bolts and nuts for these terminals shall be provided by the contractor.

B. LV bushings for the secondary side and the neutral point shall be of solid type. The LV bushings shall be mounted on the opposite side of the HV connection.

C. The neutral terminals of the transformer shall be grounded at the ground terminal of the transformer or connected directly to the powerhouse grounding mesh with either stranded copper conductor or copper bar. Cross section of these bars or conductors shall not be less than 0.186 inch2 (120 mm²). A grounding current transformer shall be installed for control and protection purposes.

D. The neutral grounding, formation of the star point and connection to ground shall be furnished by the contractor.

E. The HV side of the GSU transformer shall be connected to a new 230 kV SF6 circuit breaker via a 230 kV air insulated wire or bar system connection. Therefore, suitable HV oil-air bushings shall be installed.

F. The design features including type, insulation class, current rating shall conform to the specified standards. Design shall ensure that there will be no corona formation during operation and testing.

G. The HV bushing shall be mounted on the tank cover.

2.09 TRANSFORMER OIL SYSTEM

A. All transformers supplied under this contract shall use the same make and type of oil.

B. Oil used in the filling of the transformer will be pure mineral oil, unmixed with any other substance, refined especially for use in transformers, free from moisture, acid, alkali and sulfur components. It shall be suitable for the ambient conditions prevailing at site.

C. The transformer will be delivered with the necessary oil for filling and additionally a 5% quantity of spare. The transformer oil will comply with the corresponding IEEE recommendations and standards.

D. The transformer shall be fitted with the required number of valves for filling, draining and oil treatment. The valves shall be able to be sealed against transformer oil above 212°F (100°C).

E. A conservator vessel complete with sump and drain valve shall be provided for the transformer in such a position as not to obstruct the electrical connections to the transformer and shall have sufficient capacity to allow oil expansion from 50°F to 212°F (10°C to 100°C). The conservator vessel shall be designed in such a way that it could be completely drained by means of the drain valve mounted when in service. A rod type oil level gauge showing the full oil level ranges shall be provided. Each conservator shall be filled with one breather of normal size filled with silica-gel as a dehydrating agent. The breather shall be provided with a separate isolating valve.

2.10 PROTECTION DEVICES

A. Pressure Relief Device or Explosion Vent

1. The transformer tanks shall be fitted with a pressure relief device or explosion vent. It will be built on the covers to protect against high pressures inside the oil tanks. It shall be provided with closed cover used as diaphragm which ruptures at a gauge pressure of 7.98 to 10.15 psi (0.55 to 0.7 bar) (preferably, the sealing of the explosion vent may be accomplished by a spring closed cover, having the same pressure gauge as before).

B. Buchholz Relays

1. The transformers shall be equipped with a Buchholz relay of earthquake proof design. These relays shall be mounted in the pipe connecting the conservator to the transformer tank.
2. The Buchholz relays shall be of the double float type with two sets of independent mercury contacts (one float actuated by a build-up of gas and the other by a sudden oil surge giving respectively signalization and tripping).
3. Adequate isolating valves shall permit the removal of the Buchholz relays, the conservator being still connected to the tank by a pipe shunting the relay.
4. The relays shall be provided with a window having a scale for reading the gas level. It must be possible to take at any time a gas sample from the

device through a vent screw. It must also be possible to test the Buchholz relays when the transformers are in service.

2.11 TEMPERATURE DETECTORS AND TEMPERATURE INDICATORS

A. The transformers shall be equipped with:

1. Resistance temperature detectors
2. Resistance temperature detectors of the Pt 100 type (100 ohms at 32°F (0°C)) shall be installed in an appropriate and approved manner in the following places:
   a. Two (2) in the hottest spots of the core for remote temperature indication
   b. Two (2) at the location of the hottest oil for remote temperature indication, provided the contractor would prefer to have this device combined with the temperature indicator as given in paragraph hereafter.

B. Temperature analog output signals (i.e., 4 to 20 mA) shall be provide for remote indication in the plant control system.

C. For measuring the temperature of hot oil locally, each transformer will be provided with a dial thermometer complete with two electrical alarm contacts. The mercury bulb will be placed in an oil-filled pocket screwed into the transformer cover. The thermometer housing will be of hose-proof, metal clad ventilated design. Contacts must be available for starting the cooling fans.

D. The indicating instrument shall be of stainless steel. The casing must be spring-suspended on the tank at eye-level. The dial will be scaled from -4°F to 302°F (-2°C to 150°C). A maximum pointer shall be provided which may be reset at any time by means of a push button.

E. Two or more additional pockets for the insertion of thermometers to check oil temperature shall be provided on the cover of the transformer.

2.12 TRANSFORMER OIL MONITORING

A. The transformer shall be equipped with oil sampling ports located throughout various locations for oil sampling at regular intervals.

2.13 CONTROL AND TERMINAL CABINETS, WIRING

A. All necessary automatic control, motor starters, protective devices, switches etc. for cooling equipment of each transformer shall be assembled in a dust proof and weatherproof metal cabinet arranged for mounting on the respective transformer units.

B. This cabinet shall be accessible from ground level and be provided with a door for front access, handles locking facilities (key locks), heaters, internal lighting and electrical outlet on separate conduits.

C. All secondary wiring used on each transformer shall be carried out in suitably supported galvanized steel conduits or metal protective channels (bows and

branches must be open) and brought to an adequately dimensioned terminal cabinet with sealed cover or equivalent design.

D. All power and control cabling or wiring shall terminate in terminal blocks located in the cabinets described above. Two rows of terminal blocks shall be available arranged opposite each other, one for the external cables and one for the transformer cables. The wiring and terminal blocks shall be neatly grouped and arranged to permit connection with minimum number of external cables.

E. The control and terminal cabinets may be combined in a suitably dimensioned common cabinet.

PART 3 - EXECUTION

3.01 GENERAL

A. The Contractor shall install and test all the required Generator Step-Up Transformer, specified in Part 2 above, to tie in the new Unit 4 HV transmission line to the grid.

B. Prior to GSU transformer installation Contractor shall confirm if existing transformer bay oil containment is adequately sized to accommodate new and existing transformer oil volumes.

C. Contractor shall evaluate existing switchyard grounding to account for step and touch potentials prior to GSU transformer installation.

D. Transformer manufacturer should match the anchoring points to the existing concrete pads in the switchyard, to the extent possible.

3.02 INSTALLATION

A. The transformer tanks will be shipped filled with nitrogen gas or dry air. Means for indicating and maintaining the gas pressure inside the tanks during transportation shall be provided. The transformers having the transport weight over the transportation limitations shall be shipped without oil.

B. The oil filling shall be performed at site. The putting into service of the transformers may be done without further drying out. (Transformer oil must be treated)

C. All openings for transformer components e.g. bushings which have been removed from the transformers during transport shall be covered by means of blanking-off plates and spare gates, specially provided for this purpose.

3.03 TESTING

A. Factory Tests. The transformers and their related equipment shall be subjected to acceptance tests, to be performed at the suppliers' workshop in order to prove conformity with the guaranteed and other key design data. These tests shall be

performed according to applicable IEEE standards but shall include as a minimum the following measurements and evaluations:

1. Measurement of ohmic resistances
2. Measurement of zero sequence reactance
3. Measurement of winding capacitances
4. Measurement of voltage ratio in all steps and check on polarity and vector group
5. Measurement of no-load current and losses
6. Measurement of impedance voltage and short-circuit losses
7. Determination of efficiencies
8. Induced and separate source high voltage withstand tests
9. Full wave impulse voltage withstand test
10. Partial discharge test
11. Heat run test (type test on a similar sized transformer)
12. Noise level measurements (this test may be waived, if type test certificates of similar transformers can be submitted).
13. Determination of errors and accuracy of built-in current transformers (test sheets to be provided)
14. Functional test of all electrical control and supervisory equipment
15. Visual inspection

B. Field tests. After final installation at site, the transformer shall undergo a test program according to IEEE recommendations. At least the following test shall be performed and included in the offer:

1. Visual check for transportation defects and tightness
2. Visual check of the erection according to approved drawings
3. Insulation resistance measurement of the electrical installations
4. Measurement of winding resistances,
5. Turns ratio and vector group test,
6. Measurement of no-load losses and no-load current,
7. Insulating oil sample test,
8. Function test of protection and monitoring systems
9. Function test of cooling system, valves, gauges

C. The transformer oil shall be tested by an independent testing organization during erection, 1 year after hand-over of the equipment and 1 month before end of the guaranteed time.

D. One compressed air cylinder with rubber hose and pressure gauge for testing the Buchholz relays shall be delivered.

3.04 SPARE PARTS, TOOLS, AND CONSUMABLES

A. All special tools and consumables shall be provided by the Contractor. Recommended spare parts shall be provided.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

A. There will be no additional measurement for payment for the contract items according to the following table.

4.02 PAYMENT

A. The contract prices will be paid for GSU Transformer which shall include full compensation for all costs incurred under this section.

B. Such payment will be considered full compensation for all costs incurred for the performance of the work necessary to complete the requirements of this Section.

Item No.	Item	Description	Unit
16400-1	Furnish, install, and commission one (1) 10MVA, 3-phase, 230kV-6.9kV, ONAN/ ONAF-cooled GSU transformer.	NA	LS

END OF SECTION

SECTION 16475
LOCAL CONTROL PANELS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This Section describes the design, manufacture, and installation of miscellaneous control panels, and cabinets as specified herein.

1.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Testing and characteristics shall be in accordance with the following:

1. NFPA 70 National Electrical Code (NEC)
2. UL-508 Electric Industrial Equipment
3. NEMA ICS 2 Industrial Control and Systems Controllers

1.03 SUBMITTALS

A. Submittals for this section shall be submitted in accordance with Section 01300.

B. Submit the following:

1. Contractor's Drawings, product data, and descriptive literature for materials, equipment, and other items as specified. Include the Supplier’s name, product designation, and catalogue numbers. Indicate enclosure type, and mounting provisions.
2. Control panel Drawings including interior and exterior elevations, panel layout, terminal block rail assemblies, and internal wiring.
3. Schematic diagrams for component interconnections for the control, monitoring, and protective circuits.
4. Installation Drawings including anchoring details. As a minimum the following information shall be included:
5. Certified production test reports
6. Installation information
7. Operation and maintenance instructions for the control panel.

PART 2 - PRODUCTS

2.01 ENCLOSURES

A. Provide NEMA 12, or NEMA 4X enclosures according to location. Unless otherwise indicated, if the enclosure is to be mounted in a conditioned air space above grade, use an NEMA 12. Enclosures mounted in a damp location are to be NEMA 4X. Suitable size cabinet heater(s) shall be provided for damp locations or as required. Refer to the Drawings for enclosure size and details.

B. Construct cabinets from formed 12 gauge steel. Grind all exposed edges and welds on the enclosure smooth. Paint the exterior of the enclosure with a rust inhibiting primer and two coats of epoxy paint. Provide formed 12 gauge steel

subpanels for attaching surface mounted components inside the cabinet. Attach all components with screws and include threaded connectors on the subpanel. Do not use rivets or back of panel nuts.

C. Control panel cabinets shall be as manufactured by Hoffman Corporation, or Equivalent.

D. In installations where the equipment and wiring to be mounted occupies more than 60% of the mounting space, provide a larger cabinet.

E. Wiring inside cabinets shall be placed inside plastic wiring ducts, such as those manufactured by Panduit, or Equivalent. Wiring densities inside plastic ducts shall not exceed 50% fill.

2.02 CIRCUIT DEVICES AND COMPONENTS

A. General

1. Mount all components, except those on the doors, on fixed or swing out panels. Mount terminal blocks for field connections per the installation details and provide clearance for conduit entry. Locate fixed panels so as not to prevent access within the cabinets to other components, wiring, and terminal blocks on fixed panels or front panels.

B. Surface Mount Wiring Duct

1. Provide slotted wall wiring duct with snap in surface mount and solid snap on cover. Provide wiring duct sized to allow 50% free space in duct. Provide Panduit Type, or Equivalent.

2.03 DIN RAIL

A. All DIN rail shall be slotted aluminum, 35 mm x 10 mm.

2.04 HEATER

A. The panel heater shall be manufactured by Hoffman Corporation, or Equivalent, with the following features:

1. 110V AC power at 100 W.
2. Integral thermostat, adjustable from 0 to 40°C.
3. Integral fan, continuous operation.

B. Mount the heater with standoffs. Secure standoffs to the removable back plane.

2.05 NAMEPLATES

A. Engraved nameplates shall be furnished to identify the panel function and all door mounted devices, and/or as indicated on the Drawings. Nameplates shall be laminated plastic, white characters on black background, and secured with screws. Characters shall be 3/16” high, minimum.

B. Furnish master nameplate giving panel designation, voltage ampere rating, short circuit rating, and manufacturer's name.

C. Control components mounted within the assembly, such as fuse blocks, relays, pushbuttons, switches, etc., shall be suitably marked for identification corresponding to appropriate designations on manufacturer's drawings.

D. Identify all electrical devices within the panel by tag number, machine printed on a label visible from the panel interior.

2.06 CONTROL WIRING

A. The control panel assembly shall be completely wired, and wires for connections to remote equipment shall be brought to terminal blocks. All wiring shall be neat and workmanlike, without splices and with a uniform arrangement of circuits. Wire bundles or single wires shall run in straight lines with 90-degree corners, where change of direction is required.

B. All control wire, inside the panel, shall be #18 AWG or larger. Wiring shall be UL type, SIS or MTW; flexible stranded copper, control wire.

C. Where possible wiring shall be run in plastic wire duct with covers. Where it is not possible to contain the wiring in the duct, wrap the wiring with plastic spiral binding. The plastic wire duct and spiral binding shall be as manufactured by the Panduit Company, Hoffman or equal.

D. Securely clamp wire bundles crossing hinges to both the door and the panel, and run parallel to the hinge for at least half the door length to prevent chafing. No splicing shall be permitted in the wire duct or spiral wrapped wire bundles.

E. Label the wires connecting the various devices to each other and terminal blocks at both ends with identification marks. Wire labels shall be hot-stamped sleeve type.

2.07 TERMINAL BLOCKS

A. Terminal blocks shall be DIN Rail mounted Phoenix Contact, or equal. Terminal block type shall be as follows:

1. Power and general terminations: UK 5 N.
2. Digital I/O terminations: UKK 5-TG.
3. Analog I/O terminations: DOKD 1,5-TG.
4. Fuse plug with indicator: ST-SILED 24-UK 4.
5. Ground terminations: USLKG 5.

2.08 CIRCUIT BREAKERS

A. Circuit breakers shall be DIN Rail mounted, Allen-Bradley Type 1492-GH, or equal.

2.09 RELAYS

A. Auxiliary relays shall be Phoenix Contact Type PR2, or equal with the following features:

1. DIN Rail mounting;
2. Plug-in relay and base with locking lever;

3. Industrial "ice-cube" style;
4. LED indication; and
5. Screw cage connections.

2.10 PUSHBUTTONS AND SWITCHES

A. Pushbuttons and switches shall be 30.5 mm round watertight/oil tight heavy duty type units. Pushbuttons and switches shall be Cutler-Hammer 10250T Series, or equal.

B. Provide pushbuttons and switches with engraved legend plates.

2.11 INDICATING LIGHTS

A. Indicating lights shall be 30.5 mm round watertight/oil tight heavy duty type units with LED type lamps. Indicating lights shall be press-to-test type. Indicating lights shall be Cutler-Hammer 10250T Series, or equal.

2.12 DIGITAL DISPLAYS

A. Displays shall have a 3-1/2 or 5 digit, 7-segment, 0.56-inch red LED digital display unless otherwise specified. Instrument cases shall be dust tight with antiglare faceplates. Indicating instruments shall be Red Lion Controls IMP, or equal.

B. Provide displays with 4-20mA input.

2.13 POWER SUPPLIES

A. The power supplies shall be rated for 105V to 145V AC input and 24V DC output with +/ 1% load regulation. The power supplies shall be Phoenix Contact Type QUINT PS, or Equivalent.

B. Redundant 24V DC power supplies shall be furnished. Failure of one power supply shall not interrupt 24V DC power to the system controls. A power supply redundancy module shall be provided for control of the two power supplies. The power supply redundancy module shall be Phoenix Contact Type QUINT ORING, or Equivalent.

2.14 MOTOR

A. Control panels containing motor control starter circuits shall be provided with an exterior power disconnect operating handle. The panel operating handle shall be close coupled to the starter disconnect circuit breaker so that positive indication of the position of the disconnect is visible with the unit door closed. Operation of the disconnect handle shall be mechanically interlocked so that with the door closed the interlock must be defeated to either open the door while the unit is energized, or with the door open, to energize the starter disconnect circuit breaker. The handle shall have padlocking provisions in the OFF position.

B. Motor starters shall be circuit breaker combination starter type. Combination motor controller units shall be equipped with individual control power transformers with two primary fuses and one secondary lead furnished with a control fuse and the other secondary lead grounded. Control power transformer must be adequately sized to supply the 120VAC for the motorized damper, as required.

C. Circuit breaker disconnects for combination motor starters shall be magnetic trip only type. Circuit breakers shall be Cutler Hammer Type H MCP, or Equivalent.

D. The starter contactors shall be NEMA sized as required by the manufacturer or as indicated on the Drawings. All contactor coils shall be rated 120V AC. Starter contactors shall be Cutler Hammer Type Advantage W201, W211, or Equivalent.

E. Overload relays shall be solid state and provide motor protection accuracy to 2%. The relays shall be provided with the following features:

1. Phase loss protection
2. Phase unbalance protection
3. Adjustable full load current settings
4. Selection for Class 10, 20, or 30 protection
5. Manual reset
6. Trip indication

F. Starter contactors shall contain the auxiliary devices required for proper control panel operation.

PART 3 - EXECUTION

3.01 FABRICATION

A. Complete, assemble, wire, and test each control and panel at the factory. Test in accordance with the latest NEMA ICS 2, Industrial Control and Systems Controllers. Provide UL label as applicable on all cabinets.

B. Standard factory tests shall be performed on the control cabinet equipment provided under this Section. All tests shall be in accordance with the latest version of NEMA ICS 2. As a minimum, the following standard factory tests and procedures shall be performed:

1. The control cabinet shall be completely assembled, wired, adjusted and tested at the factory. After assembly, the complete cabinet shall be visually checked and circuit continuity testing performed to ensure the accuracy of the wiring and the functioning of all equipment.
2. Full function tests shall be performed on the control and/or monitoring systems. System operation shall be simulated in all modes of operation.
3. The manufacturer shall provide three certified copies of factory test reports.

3.02 INSTALLATION

A. Installation shall be per the accepted Contractor's Drawings and the control panel manufacturer's installation instructions.

B. Surface cabinets and apparatus shall be securely mounted. Unless otherwise specified, all wall mounted panels and apparatus enclosures shall be spaced out from the wall. All NEMA 4X enclosure and any enclosure located in a wet location shall be equipped with an automatic drain, Crouse Hinds ECD or Equivalent.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

A. There will be no additional measurement for payment for the contract items according to the following table.

4.02 PAYMENT

A. The contract prices will be paid for Local Control Panels which shall include full compensation for all costs incurred under this section.

B. Such payment will be considered full compensation for all costs incurred for the performance of the work necessary to complete the requirements of this Section.

Item No.	Item	Description	Unit
16475	Furnish, install, and commission complete set of Local Control Panels	NA	LS

END OF SECTION

SECTION 16490
ENCLOSED POWER DISCONNECT SWITCHES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This Section describes the supply, testing, and installation of enclosed power disconnect switches and enclosed circuit breakers.

1.02 REFERENCES, SPECIFICATION, CODES AND STANDARDS

A. Testing and characteristics shall be in accordance with the following:

1. ATS Acceptance Testing Specifications for Electrical Power Equipment & Systems
2. NEMA KS 1 Enclosed Switches
3. NFPA 70 National Electrical Code (NEC)
4. UL 98 Enclosed Switches

1.03 SUBMITTALS

A. Submittals for this section shall be submitted in accordance with Section 01300.

B. Submit the following:

1. Drawings, product data, and descriptive literature for all enclosed disconnect switches and other items as specified. Include manufacturer's name, product designation, and catalog numbers. Mark all drawings and data submitted so that drawings and manuals clearly indicate the items applicable to the work being performed.
2. Complete operation and maintenance (O & M) manuals for all enclosed disconnect switches furnished under this section. Include all required cuts, drawings, equipment lists, and complete spare parts lists.
3. A list of all nameplates and identification tags to be installed on all disconnect switch enclosures.

PART 2 - PRODUCTS

2.01 GENERAL

A. Provide the products specified herein where required and as shown on the drawings. Products shall be furnished complete with all fasteners, accessories, and appurtenances necessary for a complete installation.

2.02 INDIVIDUAL ENCLOSED POWER DISCONNECT SWITCHES

A. General: Disconnect switches shall be heavy duty (HD) meeting NEMA Standard KS1 for Type HD and UL Listed. The switches shall be equipped with full cover interlocks and quick-make, quick-break operating mechanisms. The switches shall be rated 480-volt ac with neutral and/or grounding kits, and with current rating as indicated on the Drawings. Switches shall be located as shown on the Drawings. Enclosures shall be NEMA 12 for indoor installations and NEMA 4X

stainless steel for outdoor and wet installations. Where indicated on the Drawings the switches shall be equipped with fuses. Switches shall be Square D, Cutler Hammer, General Electric, or Owner approved equal.

B. Switch operating handles shall be furnished with provisions for padlocking in the "On" or "Off" position.

C. Identification: Each disconnect switch shall be identified with an engraved nameplate.

2.03 INDIVIDUAL ENCLOSED CIRCUIT BREAKERS

A. General: Enclosed circuit breakers (ECB) shall be heavy duty meeting NEMA Standard 250 for electrical equipment enclosures and UL 489 for molded-case circuit breakers. The ECBs shall be equipped with full cover interlocks to prevent the door from opening when the breaker is in the "On" position. The ECBs shall be rated 600-volt ac with neutral and/or grounding kits and with current rating as indicated on the Drawings. ECBs shall be located as shown on the Drawings. Enclosures shall be NEMA 12 for indoor installations and NEMA 4X for outdoor and wet installations. ECBs shall be Eaton, or Owner approved equal.

B. ECB operating handles shall be furnished with provisions for padlocking in the "On" or "Off" position.

C. Identification: Each ECB shall be identified with an engraved nameplate.

PART 3 - EXECUTION

3.01 GENERAL

A. Use self-drilling anchors or expansion anchors on concrete surfaces. Do not use powder-actuated anchors.

B. Do not fasten supports to piping, ductwork, mechanical equipment, or conduit.

C. Do not drill or cut structural steel members.

3.02 BOXES AND CABINETS

A. Surface boxes, cabinets and apparatus shall be securely mounted. Unless otherwise specified, all wall-mounted boxes, cabinets and apparatus enclosures shall be spaced out from the wall a minimum of 1/2 inch.

B. All NEMA 4X boxes and any box located in a wet location shall be equipped with an automatic drain, Crouse-Hinds ECD, or Owner approved equal.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

A. There will be no additional measurement for payment for the contract items according to the following table.

4.02 PAYMENT

A. The contract prices will be paid for enclosed power disconnect switches and enclosed circuit breakers. which shall include full compensation for all costs incurred under this section.

B. Such payment will be considered full compensation for all costs incurred for the performance of the work necessary to complete the requirements of this Section.

Item No.	Item	Description	Unit
16490-1	Furnish, install, and commission complete set of enclosed power disconnect switches.	NA	LS
16490-2	Furnish, install, and commission complete set of enclosed circuit breakers.		

END OF SECTION

SECTION 16500
LIGHTING

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section addresses the Pine Flat Hydroelectric Unit 4 Powerhouse lighting and receptacle installation requirements.

B. The lighting system shall include furnishing all material, labor, tools, and equipment required for installation and verified operation. The lighting system design shall include outlet boxes, conduit and fittings, wire, cable, grounding connections, wiring devices and plates, fixtures, lamps, lighting transformers, lighting panels, and accessories required for a complete lighting system installation.

C. Contractor shall provide design drawings and calculations for each area. The minimum lighting levels required shall be 30-foot candles.

1.02 REFERENCES, SPECIFICATIONS, CODES AND STANDARDS

A. All designs by the Contractor shall be carried out to national recognized standards. The latest version or edition of the following codes, standards and references are preferred. Alternatives may be used if proposed by the Contractor and accepted by the Owner's Engineer:

1. Illuminating Engineering Society (IES) Lighting Handbook
2. National Fire Protection Association (NFPA).

NFPA 70	National Electric Code.

3. Section 16050 Basic Electrical Materials and Methods.

1.03 SUBMITTAL REQUIREMENTS

A. Submittals for this section shall be submitted in accordance with Section 01300.

B. Submit the following:

1. Lighting calculations.
2. Manufacture data sheets.
3. Lighting plans including fixture, cable, and conduit schedules.

PART 2 - PRODUCTS

2.01 LIGHTING FIXTURES

A. General: The Contractor shall purchase and install all the required lighting fixtures and lamps as required per lighting calculations. Fixtures shall be as specified and installed as specified herein.

B. Materials

1. Exit Lights:
    a. The exit light shall be of rugged steel construction with a white baked enamel finish. Fixtures shall be of stencil face design with green fiberglass panels. The letters shall be six inches high. Universal knockout arrows shall also be furnished. A down light shall be included in each fixture.
    b. A 120V emergency power pack shall be furnished.
    c. The fixture shall be furnished with two long life 20T6 ½. 120 volt incandescent lamps.
    d. Fixtures shall be Underwriters' Laboratories, Inc listed.
2. Emergency Lights:
    a. All emergency lighting units shall be fully automatic with 90-minute operation. Each unit shall contain a rechargeable battery and battery charger. The lighting heads shall be glare free sealed beam.
    b. Each unit shall meet NEC, NFPA life safety and OSHA standards.
3. Powerhouse Indoor Lighting
    a. Powerhouse indoor lighting fixtures shall be JCBL Industrial Light Emitting Diode (LED) Damp Rated High Bay by Lithonia Lighting.
    b. The fixtures shall be as specified or equal.
    c. The fixtures shall be DLC listed.
    d. The fixtures shall be ceiling mounted.
4. Powerhouse Outdoor Lighting
    a. Powerhouse outdoor lighting fixtures shall be TWX2 LED Glass Wall Pack by Lithonia Lighting.
    b. The fixtures shall be as specified or equal.
    c. The fixtures shall be DLC listed.
    d. The fixtures shall be wall mounted.

C. Construction

1. Installation:
    a. Lighting fixtures shall be carefully and neatly installed complete with all necessary connectors, mounting brackets and trim as required for wall and ceiling conditions.
    b. Suspended powerhouse LED fixtures shall be mounted to uni-strut channels or junction boxes anchored to concrete ceiling.
    c. All labels and marks on reflecting surfaces, trim, lens, or diffusers shall be removed from fixtures.
    d. Fixtures shall be cleaned and lamped prior to final inspection.
2. Inspection and Testing: Fixtures and installation shall be tested for proper operation.
3. Each fixture shall have a weatherproof permanent marker indicating the power source and circuit.

2.02 WIRING DEVICES

A. General: Wiring devices shall be UL listed for current and voltage indicated and shall comply with NEMA Standard Publication WD-1. They shall be industrial specification grade with provisions for back wiring and side wiring with captive binding screws. All receptacles shall be grounding type.

B. Materials

1. Switches: General duty switches for 120–277-volt service shall be toggle type, totally enclosed in a melamine or melamine and urea plastic face and body, with ivory toggle handle and screw terminals. Switch shall be rated 20 amperes at 120-277 volts AC. The switches shall conform to Fed. Spec. W-S-896d, Type III, Class 1, 2 or 3 as applicable. Switches shall be Hubbell 1221-I series or approved equal.
2. Receptacles: Unless otherwise noted, receptacles shall be parallel blade grounding type for general duty 20 ampere, 125-volt applications. Receptacles shall be Specification Grade, grounding type, with NEMA contact 5-20R configuration, and shall be UL listed for the circuit application. Receptacles shall be Hubbell 5362-I series or approved equal.
3. Device Plates and Covers: Stainless steel only device plates shall be installed on all switch and receptacle boxes.

C. Construction

1. Installation: All wiring devices shall be installed in boxes providing adequate space for the device, wiring and splices. All devices shall be grounded.
2. Inspection and Testing: Inspection and testing shall be performed to verify that each receptacle is operable with the terminals and ground wired correctly, by using a Hubble or equal receptacle tester.
3. Each fixture receptacle shall have a weatherproof permanent tag attached indicating the power source and circuit number.

PART 3 - EXECUTION

3.01 INSTALLATION OF LIGHTING FIXTURES AND LAMPS

A. Align fixtures in rows both vertically and horizontally. Install fixtures clear of pipes, mechanical equipment, structural openings, indicated future equipment, and other obstructions.

B. Suspend pendant fixtures by means of outlet box with cover-type aligners, each having flexible joint permitting unit to hang plumb. Install stems of 1/2-inch galvanized steel conduits.

C. Install accessories such as, straps, mounting plates, nipples, or brackets necessary for required installation. Mounting heights are measured to bottom of fixture for ceiling mounted fixtures and to center of fixture for wall mounted fixtures.

D. Provide outdoor type lighting fixtures as specified in Part 2 around Powerhouse building especially near access doors.

3.02 FIXTURE CLEAN UP

A. Leave all fixtures in a clean condition, free of dirt and defects, before acceptance by the Owner.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

A. Measurement for payment for the contract items will be according to the following table.

4.02 PAYMENT

A. The contract prices will be paid for Lighting which shall include full compensation for all costs incurred under this section.

B. Such payment will be considered full compensation for all costs incurred for the performance of the work necessary to complete the requirements of this Section.

Item No.	Item	Description	Unit
16500-1	Outlet boxes, pull boxes, conduit and fittings, switches, receptacles, outlets, plugs, lighting fixtures, lighting transformers, and lighting panelboards.	NA	LS

END OF SECTION

SECTION 16600
BATTERY SYSTEM

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This section includes the design, manufacturer, and installation of one lead-acid storage battery complete with battery charger.

1.02 REFERENCES, SPECIFICATIONS, CODES AND STANDARDS

A. Rating tests and characteristics shall be in accordance with the following:

1.	IEEE 484	Recommended Practice for Installation Design and Installation of Vented Lead-Acid Batteries for Stationary Applications.
2.	IEEE 485	Recommended Practice for Sizing Lead-Acid Batteries for Stationary Applications.
3.	NEMA PE 5	Utility Type Battery Chargers.
4.	NFPA 70-2020	National Electric Code.
5.	Section 16050	Basic Electrical Materials and Methods.

1.03 SUBMITTALS

A. Submittals for this section shall be submitted in accordance with Section 01300.

B. Submit the following:

1. Manufacturer data sheets:
   a. Battery.
   b. Battery charger.
2. Sizing calculations:
   a. Battery.
   b. Battery charger.
3. Battery performance data:
   a. Cell manufacturer and type.
   b. Cell ampere-hour capacity.
   c. Cell weight.
   d. Cell dimensions.
4. Schematic and wiring diagrams for the battery charger.
5. Battery rack overall dimensions and construction details.
6. Operation and maintenance manuals.

PART 2 - PRODUCTS

2.01 BATTERY

A. The 48V DC battery system shall consist of 24 cells. Each cell shall have the following characteristics:

1. Acid type.
2. Lead-calcium plate material.
3. 1.210 specific gravity at 25°C.
4. Clear thermoplastic jar material.
5. 8-hour discharge rate to 1.75 volts per cell at 25°C.
6. 2 volt nominal cell voltage.

B. Inter-cell and intertie connections shall be by lead plated copper straps at each post. Fastening hardware shall be stainless steel bolts, flat washers, and nuts. No-Ox-Id terminal grease shall be provided as required.

C. Battery Rack

1. The battery rack shall be of the two-tier type. Bracing, side and end rails and floor fastening provisions are required for installation and service conforming to the requirements of IEEE 484 in a UBC Seismic Risk Zone 4.
2. Rack material shall be zinc-coated steel with two shop coats of acid resistant ANSI 61 gray. Cell rails shall be covered with plastic channels.

D. The following accessories shall be furnished:

1. One portable electrolyte hydrometer syringe.
2. One portable electrolyte thermometer.
3. One lifting device for the cells.
4. One set of cell number labels.
5. One wall-mounted hydrometer holder.
6. One wall-mounted thermometer holder.

2.02 BATTERY CHARGER

A. The battery charge shall be of the constant voltage type and rated 480 volt, 60Hz, three phase input with 48 volt dc (nominal), 35 amp output. The battery charger shall utilize Silicone Control Rectifiers (SCR) circuit for voltage and current control. Output voltage shall be maintained within ±1% from no load to full load with ac input variations of ±10%. The battery charger shall be capable of operating continuously at the rated output current in an ambient temperature of 40°C. The battery charger shall meet the requirements as stated under NEMA PE 5.

B. The battery charger shall be furnished with the following:

1. Separate float and equalize voltage adjustments.
2. Output voltmeter and ammeter.
3. AC input circuit breaker.
4. DC output circuit breaker.

5. Automatic output current limiting.
6. Battery charger fail alarm light and relay.
7. Ground detection indicating lights, with test switch, and relay.
8. 0-24 hour timer for controlling the equalize charge.

C. The battery charger shall be furnished with a NEMA 1 enclosure.

D. The dc output voltage shall be adjustable over the following ranges:

1. Float: 2.1 to 2.25 volts per cell.
2. Equalize: 2.2 to 2.45 volts per cell.

2.03 SPARE PARTS

A. All spare parts shall be of the same material, workmanship and manufacturer as the corresponding original parts, completely interchangeable and packaged for long term storage. The spare parts shall include the following:

1. One gallon of acid resistant paint for the battery rack.
2. Ten indicating lamps of each type used.
3. Ten fuses of each type used.

PART 3 - EXECUTION

3.01 SHOP INSPECTION AND TESTING

A. Each item shall be given the manufacturer's routine factory tests. The factory test equipment and test methods shall conform to the latest applicable requirements of ANSI, IEEE, and NEMA standards.

3.02 SHIPMENT

A. The battery shall be shipped dry-charged. The required electrolyte for the initial filling of the battery to a specific gravity of 1.215 at 25°C shall be shipped in suitable containers.

B. Battery Racks

1. The rack shall be fastened to the floor with expansion anchors and SAE Grade 5 bolts, as required to meet Seismic Zone 4 requirements.
2. Racks shall be touched-up with acid resistant paint before installation of rail covers or cells.

C. Cells

1. Cells shall be connected with inter-cell and inter-tier connectors using No-OX-Id grease according to the manufacturer's instructions.
2. Rubber blankets and insulated tools shall be used when making connections.
3. The cells shall be filled with sulfuric acid electrolyte at the exact specific gravity recommended by the cell manufacturer. The cell manufacturer's written instructions and hazard warnings concerning electrical, fire, and chemical burn hazards shall be observed during diluting and filling operations.

D. Initial Charge

1. Initial charge shall be applied according to the cell manufacturer's instructions. Electrolyte temperature shall not exceed 120°F.
2. Initial charge shall be continued until the specific gravity of the lower cell is at or above the low limit specified by the cell manufacturer.

E. Formation Charge

1. The formation charge shall be applied according to the cell manufacturer's instructions.
2. Individual cell potentials shall be monitored and shall not exceed 2.72 volts per cell. Electrolyte temperature shall not exceed 120°F.
3. The formation charge shall be terminated when all cells have been on charge 12 to 16 hours and all cells are within manufacturer's recommended range of potential for the formation charge.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

A. There will be no additional measurement for payment for the contract items according to the following table.

4.02 PAYMENT

A. The contract prices will be paid for Battery System which shall include full compensation for all costs incurred under this section.

B. Such payment will be considered full compensation for all costs incurred for the performance of the work necessary to complete the requirements of this Section.

Item No.	Item	Description	Unit
16600-1	Furnish, install, and commission lead acid storage battery and charging system.	NA	LS

END OF SECTION

SECTION 16670
FIELD INSTRUMENTATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This section describes the requirements for the supply and installation of miscellaneous powerhouse monitoring instrumentation systems. Instrumentation includes penstock pressure transmitter, and powerhouse piping instrumentation. Refer to 15060 - Piping for piping requirements.

1.02 REFERENCES, SPECIFICATIONS, CODES AND STANDARDS

A. Rating tests and characteristics shall be in accordance with the following:

NFPA 70 National Electric Code.

1.03 SUBMITTALS

A. Submittals for this section shall be submitted in accordance with Section 01300, Contractor Submittals.

B. Submit the following:

1. Manufacturer data sheets for the following equipment:
   a. Pressure transmitters.
   b. Pressure switches.
   c. Flow switches.
   d. Flow indicators.
2. Operation, maintenance, and installation manuals.
3. Field testing and calibrating procedures.
4. Field testing, calibration data sheets, and calibration certificates for each instrument.

PART 2 - PRODUCTS

2.01 PRESSURE GAUGES

A. Pressure gauges shall be provided on suction and discharge connections of pumps; on discharge connections from compressors; at each side of pressure reducing valves and differential pressure transducers; and where shown on the Drawings.

B. Manufacturer: Ashcroft or approved equal.

C. Type: Pressure gauge for water or air service.

D. Construction:

1. 2-1/2-in. diameter dial, unless otherwise shown on the Drawings, and black Alumalife case. Dial engraved with the units in which the gauge is calibrated. Select scales so that the normal operating pressure falls between 25% and 75% of full scale.

2. Pressure range: As shown on the Drawings. Dial engraved with the units in which the gauge is calibrated.
3. Accuracy: ½ of 1% of full scale.

E. Isolate gauges by an elastomeric diaphragm isolator. Factory-charge the pressure gauge diaphragm isolation unit with glycerine, or other liquid recommended by the manufacturer for the service intended. Diaphragm material: as recommended by the manufacturer for the service intended.

F. Provide pulsation dampener, pin-type, on gauges not provided with a diaphragm isolator.

2.02 PRESSURE TRANSMITTERS

A. Provide electronic gauge transmitters consisting of:

1. Transmitter shall be provided with a block and bleed manifold, Oliver model Y24S, or equal
2. Transmitter shall provide a sealed NEMA-4 enclosure with field termination section fully isolated from electronics section of transmitter housing.
3. Transmitter shall be corrosion-resistant construction with stainless steel measurement cell. All exterior hardware shall be stainless steel of the same type as the measurement cell.
4. Transmitter shall provide a conduit entry into the electronic termination section of enclosure.
5. Transmitter shall include an integral display. Displayed information shall be user selectable via programming interface.
6. Transmitter shall store all programmable information in nonvolatile EEPROM memory and maintain sensor characterization data as an integral part of the sensor.
7. Transmitter shall continuously perform self-diagnostics and respond to internal malfunctions via the user programmable failsafe mode, allowing user selection of upscale, downscale, and hold last output failsafe modes.
8. Transmitter shall offer HART communication mode as a standard feature.
9. Manufacturer shall equip the transmitter with the latest software and firmware available as of the delivery date of the transmitter.
10. Manufacturer shall provide a Windows based software interface that allows access to all programmable features of the transmitter from a PC type laptop computer. Provide all hardware necessary to connect the PC to the transmitter.

B. Performance Requirements

1. The amplifier unit shall convert the change in pressure to a 4 to 20 mA DC signal, 2-wire type, with an allowable loop load of not less than 600 ohms.
2. Provide a static pressure rating of at least 500 psig.
3. Prove a maximum over range pressure limit of at least 150% of the range.
4. Provide a span that is adjustable over a minimum 5:1 range.
5. External adjustments shall include zero and span.
6. Provide output signal damping as an internal adjustment.
7. Calibrate the integral indicator in process units.
8. Provide a power supply of 24 VDC.

9. Provide an accuracy, including linearity and repeatability, of plus or minus 0.2% of span.
10. Construct wetted parts, including block and bleed valve parts, of Type 316 stainless steel.

C. Electronic Gauge Pressure Transmitter Manufacturer shall be Rosemount 1151GP, or Equal.

2.03 PRESSURE SWITCHES

A. Unless otherwise noted, pressure switches shall be of the diaphragm type with an adjustable set point. The pressure range on pump discharges shall be as recommended by the pump manufacturer of the pump it is connected to. Wetted parts within the switch shall be corrosion resistant to the applicable fluid. Electrical rating for the switch shall be 120VAC at 3A, single phase. Contact rating shall be 24VDC at 1A. 20% spare contacts shall be provided at a minimum. All pressure switches used for alarm and/or shutdown shall have manual reset. The diaphragm type pressure switch shall be as supplied by Ashcroft, Harwil, or approved equal.

2.04 FLOW SWITCHES

A. Flow switches shall be of the vane type. The switches shall be of the sizes and pressure ratings of adjacent piping and shall be installed where shown on the Drawings. Wetted parts within the switch shall be corrosion resistant to the applicable fluid. There shall be an adjustment for flow sensitivity. Electrical rating for the switches shall be 120VAC at 3A, single phase. Contact rating shall be 24VDC at 1A. 20% spare contacts shall be provided at a minimum. The flow switches shall be as supplied by W. E. Anderson or approved equal.

2.05 FLOW INDICATORS

A. Flow indicators shall provide sight viewing to show flow/no-flow of piped fluids with an internal ball for flow indication. The indicators shall be of the sizes and pressure ratings of adjacent piping and shall be installed where shown on the Drawings. Corrosion resistant materials for the applicable fluid shall be used. The indicators shall be as supplied by Ametek or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION

A. The transmitters shall be installed as recommended by the manufacturer.

3.02 TESTING/CALIBRATION

A. The transmitters shall be calibrated after installation to confirm proper output range. Testing and calibration shall be per the Contractor’s approved testing and calibration procedure document.

B. Provide testing and calibration data sheets for the transmitter and level sensor.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

A. There will be no additional measurement for payment for the contract items according to the following table.

4.02 PAYMENT

A. The contract prices will be paid for Field Instrumentation (as covered in this section). which shall include full compensation for all costs incurred under this section.

B. Such payment will be considered full compensation for all costs incurred for the performance of the work necessary to complete the requirements of this Section.

Item No.	Item	Description	Unit
16670	C. Furnish, install, and commission complete set of ~~Local Control Panels~~ Field Instrumentation covered by this section.	NA	LS

END OF SECTION

SECTION 16720
FIRE DETECTION AND ALARM SYSTEM

PART 1 - GENERAL

1.01 WORK INCLUDED

A. The Contractor shall design, furnish, install, and test Unit 4 Powerhouse building fire detection and alarm system.

B. The design shall include a main Unit 4 Powerhouse building fire alarm control panel (FACP) located inside the existing Powerhouse Control Room and a local fire control panel inside Unit 4 Powerhouse building for monitoring of the system and communication with the main FACP via ethernet or fiber.

1.02 Submittals

A. Manufacturer's product data and catalog sheets for each item included in the fire and smoke detection and alarm system shall be submitted for review by the Owner's Engineer in accordance with Section 01300.

B. Complete system schematic diagram showing all equipment, devices, terminals, and connections.

C. Calculations showing battery capacity life at quiescent and alarm conditions.

D. Operating and maintenance data shall be submitted in accordance with Section 01730.

E. Warranties covering all products shall be submitted in accordance with Section 01720.

F. A certificate of compliance, witnessed by the Owner's Engineer, which certifies proper system installation and proper system operation. This certificate shall conform to the requirements of NFPA 72.

1.03 REFERENCES, SPECIFICATIONS, CODES AND STANDARDS

A. Contractor design, installation and testing shall be carried out in accordance with the requirements stipulated under the latest version or edition of the following codes, standards, and references herein:

1. National Fire Protection Association (NFPA)

NFPA 72	National Fire Alarm and Signaling Code

2. Section 16050 Basic Electrical Material and Methods

1.04 PRODUCT HANDLING

A. Detection and alarm system components and accessories shall be stored in a heated building in their original containers. Storage will be at the site. At the option of the Owner,

equipment shall be stored in the powerhouse or in a separate enclosure provided by the Owner. All handling, protection, and transporting of equipment shall be done by the Contractor.

PART 2 - PRODUCTS

2.01 GENERAL

A. Unit 4 Powerhouse building Fire Alarm Control Panel (FACP), detectors and equipment shall be UL listed.

2.02 CONTROL PANEL

A. Capacity: The fire alarm control panel shall provide the necessary circuitry for 3 supervised alarm initiating zones, expandable to 8 zones, and for once (1) supervised and one (1) unsupervised alarm output circuits.

B. Fire alarm control panel shall be equipped with a dedicated, adequately sized rechargeable battery system to provide back-up power in the event the main 120Vac power source is unavailable.

C. Power: The control panel shall operate from 120V, 60 Hz power. The battery capacity shall be adequate for 60 hours of standby (quiescent) operation with the detectors and equipment specified herein.

D. Features:

1. Power indicator.
2. Alarm indicator.
3. Trouble indicator.
4. Supervised circuit diagnostic indicators.
5. Supervised battery charging circuit.
6. Common alarm contact, Form C, 1 A, 30 VDC.
7. Common trouble contact, Form C, 1 A, 30 VDC.
8. Meters:
9. Voltage
10. System current
11. Battery current
12. Provisions for future external notification circuits.
13. Class A or B operation of initiating devices.

14. Circuit trouble indicator.

15. Field wiring supervised for open and ground fault conditions.

16. Circuit alarm indicator.

17. Auxiliary relays 120V AC 3A as required for control of HVAC system.

2.03 ADRESSABLE MANUAL PULL STATIONS

A. Addressable pull boxes shall, on command from the FACP, send data to the panel representing the state of the manual switch and the addressable communication module status. They shall use a key operated test/reset lock and shall be designed so that after actual emergency operation, they cannot be restored to normal use except by the use of a key.

B. Stations shall be of all-metal construction suitable for wet locations and operate with or without glass rod. Once activated, the pull station handle shall remain at a 90º angle from the front of the station to provide visual indication as to which pull station was activated. All operated stations shall have a positive, and visual indication of operation.

C. Manual stations shall have clearly visible operating instructions provided on the cover. The word ‘FIRE’ shall appear on the front of the stations in raised letters, 1.75 inches (44 mm) or larger.

D. Manual stations shall be suitable for semi-flush or surface mounting.

E. Manual pull stations shall be located near Unit 4 Powerhouse Building egress doors and as required based on the size of the building.

2.04 SMOKE DETECTOR

A. The detectors shall use the photoelectric (light-scattering) principal to measure smoke density and shall, on command from the control panel, send data to the panel representing the analog level of the smoke density.

B. All smoke detectors shall be UL listed to Standard 268 for the control equipment to which is connected.

C. Smoke detector bases shall communicate with the FACP over a twisted shield pair of wires.

D. The detectors shall be equipped with self-compensating circuitry to provide for maximum stability against effects of aging, dust, and film accumulation.

E. The photoelectric light source shall be an LED. ach detector shall contain a red LED which shall pulse to indicate power on, and which shall glow continuously to indicate alarm.

F. A magnetically operated test feature shall be provided capable of simulating the maximum amount of smoke necessary for alarm without having to generate actual smoke.

2.05 INTELLIGENT MULTI-CRITERIA ACCLIMATE DETECTOR

A. The intelligent multi criteria acclimate detector shall be an addressable device that is designed to monitor a minimum of photoelectric and thermal technologies in a single sensing device. The design shall include the ability to adapt to its environment by utilizing a built-in microprocessor to determine its environment and choose the appropriate sensing settings. The detector design shall allow a wide sensitivity window, no less than 1 to 4% per foot obscuration.

B. This detector shall utilize advanced electronics that react to slow smoldering fires and thermal properties.

C. The microprocessor design shall be capable of selecting the appropriate sensitivity levels based on the environment type it is in and then have the ability to automatically change the setting as the environment changes (as walls are moved or as the occupancy changes).

D. The intelligent multi criteria detection device shall include the ability to combine the signal of the thermal sensor with the signal of the photoelectric signal in an effort to react hastily in the event of a fire situation. It shall also include the inherent ability to distinguish between a fire condition and a false alarm condition by examining the characteristics of the thermal and smoke sensing chambers and comparing them to a database of actual fire and deceptive phenomena.

2.06 INTELLIGENT HEAT DETECTOR

A. Heat detectors shall be dual element rate of rise and fixed temperature type. The unit shall activate when the temperature exceeds 135°F or upon 15°F/min. rate of temperature rise.

B. Heat detector bases shall communicate with FACP over twisted shielded pair wires.

2.07 ALARM DEVICES

A. Alarm-device types to match piping and equipment connections.

B. Electrically Operated Alarm Notification Appliances:

1. Strobe/Horn:

a. Standard: UL 464.

b. Tone: Selectable, steady, Temporal-3 (T-3) in accordance with ISO 8201 and ANSI/ASA S3.41, 2400 Hz, electromechanical, broadband.

c. Voltage: 120 V ac, 60 Hz.

d. Effective Intensity: 110 cd.

e. Finish: Red, suitable for outdoor use with approved and listed weatherproof backbox. White letters on housing identifying device as for "Fire".

2.08 MANUFACTURER

A. All products shall be of the same manufacturer wherever possible. Manufacturer shall maintain an authorized service representative within 2 hours travel time of the installation.

B. Manufacturer shall be Kiddie or Owner's Engineer-approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION

A. System components and accessories shall be installed in accordance with the requirements of NFPA 72, and the manufacturer's instructions.

3.02 ADJUSTMENTS AND CLEANING

A. The system shall be adjusted and cleaned in accordance with manufacturer's instructions. Leave sensors, accessories, and control enclosures clean.

3.03 TESTING

A. A functional test shall be performed at each smoke detector or other detector or system switch to confirm system operation. Tests shall conform to the requirements of NFPA 72. The beam type detector shall be tested with a filter which simulates smoke content of 25%.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

A. There will be no additional measurement for payment for the contract items according to the following table.

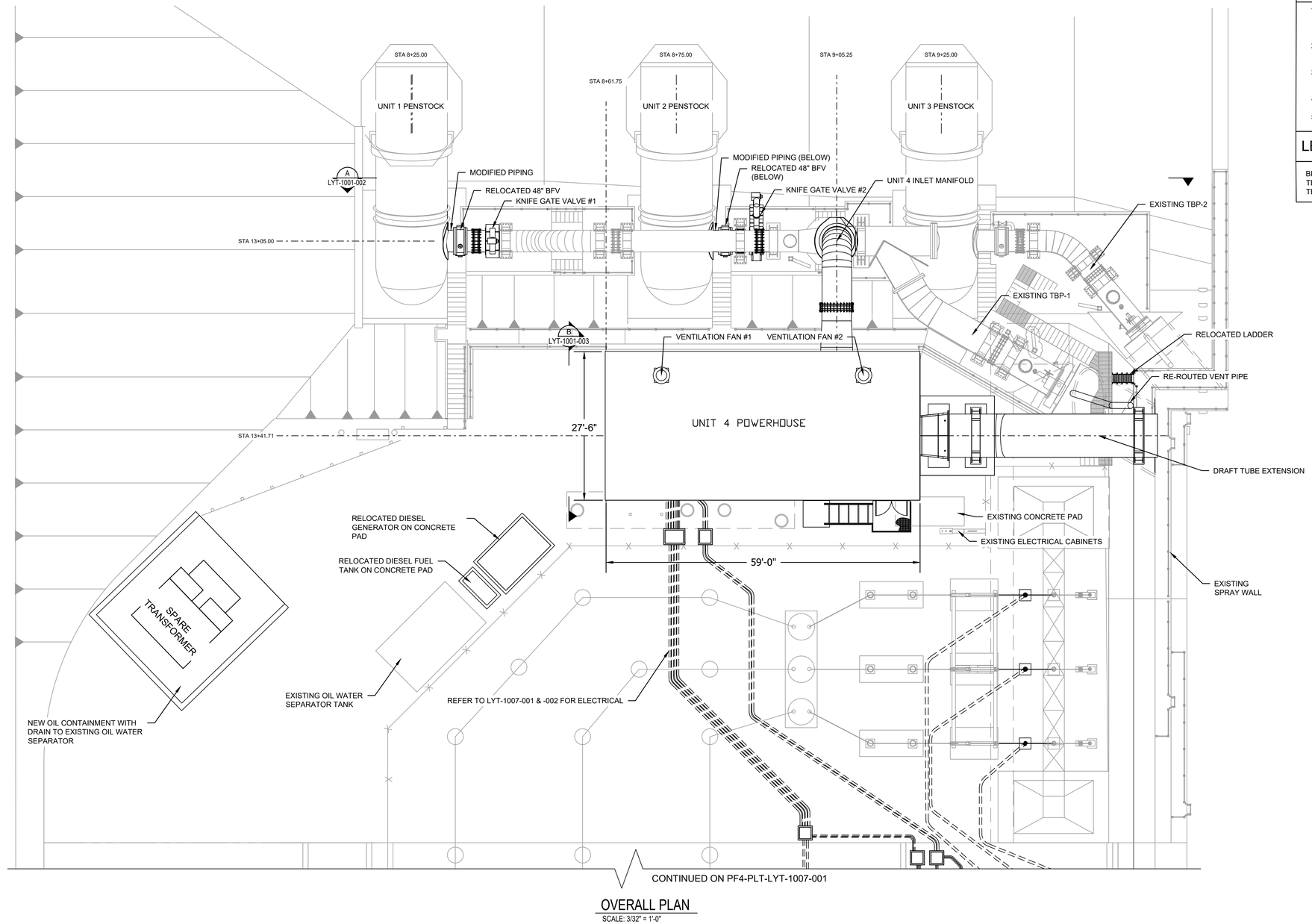
4.02 PAYMENT

A. The contract prices will be paid for Fire Detection and Alarm System which shall include full compensation for all costs incurred under this section.

B. Such payment will be considered full compensation for all costs incurred for the performance of the work necessary to complete the requirements of this Section.

Item No.	Item	Description	Unit
16720-1	Fire Detection and Alarm System	Fire alarm devices and equipment not covered by section 16050.	LS

END OF SECTION



OVERALL PLAN
SCALE: 3/32" = 1'-0"

GENERAL SHEET NOTES

1. LAYOUT AND DIMENSIONS AS SHOWN ON THE DRAWINGS ARE PRELIMINARY. DRAWINGS SHALL BE FINALIZED DURING DETAILED DESIGN BY THE CONTRACTOR. SEE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
2. STATIONING AND DIMENSIONS ARE BASED ON HORIZONTAL PLANE AS ESTABLISHED FOR EXISTING POWERHOUSE UNITS 1-3 AND EXISTING TURBINE BYPASS.
3. REFER TO PINE FLAT DAM - TURBINE BYPASS PROJECT DESIGN DRAWINGS FOR DETAILS ON EXISTING FACILITIES.
4. REFER TO SHEET PF4-PLT-LYT-1007-001 FOR SWITCHYARD LAYOUT.
5. EXISTING FACILITIES AND EQUIPMENT ARE SHOWN AS SCREENED (LIGHTER COLOR).

LEGEND

BFV	BUTTERFLY VALVE
TBP-1	TURBINE BYPASS #1
TBP-2	TURBINE BYPASS #2

PRELIMINARY DESIGN FOR EPC PRICING

Revision	By	Appd.	DD.MM.YY

Issued	By	Appd.	DD.MM.YY

Permit-Seal

Consultants

Stantec
1340 TREAT BLVD #525
WALNUT CREEK, CA 94597
www.stantec.com

Client/Project
KINGS RIVER CONSERVATION DISTRICT
FRESNO, CALIFORNIA
PINE FLAT UNIT 4

KRCD Kings River Conservation District

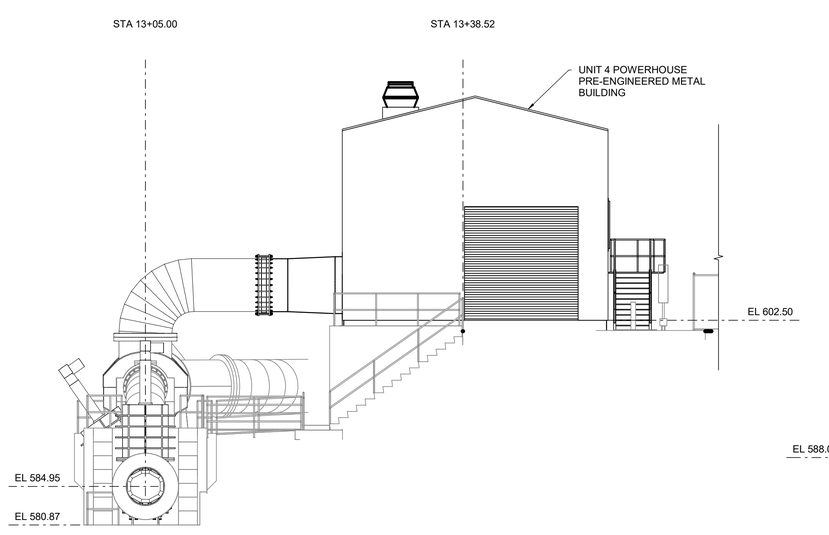
File Name: PL4-PLT-LYT-1001_001 | Dwn. CFE | Chkd. KG | Dsgn. KG | DD.MM.YYYY 04/19/2024

Title
SITE LAYOUT PLAN VIEW

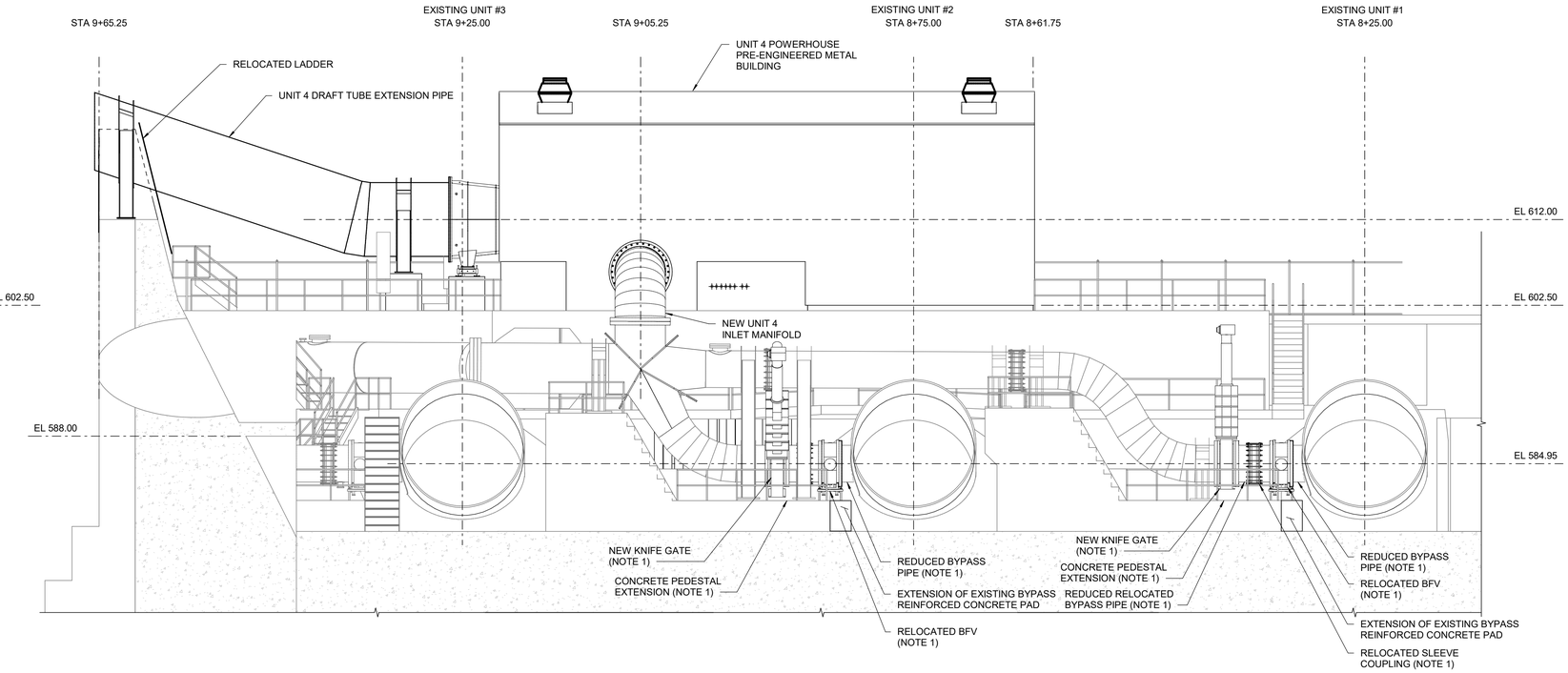
Project No. 224202811
Scale AS SHOWN
Drawing No. PF4-PLT-LYT-1001
Sheet - 001
Revision 00

GENERAL SHEET NOTES

1. FOR INFORMATION SEE CLP-1003-001 TO -003 AND LYT-1006-001 AND -002 LAYOUT, AND DIMENSIONS AS SHOWN ON DRAWINGS ARE PRELIMINARY AND SHALL BE CONFIRMED IN DETAIL DESIGN BY THE CONTRACTOR. SEE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
2. STATIONING AND DIMENSIONS ARE BASED ON HORISONTAL PLANE AS ESTABLISHED FOR EXISITING POWERHOUSE UNIT1-3 AND EXISTING TURBINE BYPASS.
3. SEE PINE FLAT DAM - TURBINE BYPASS PROJECT DESIGN DRAWINGS FOR DETAIL ON EXISTING FACILITIES.
4. SEE SHEET LYT-1007-001 FOR SWITCHYARD LAYOUT.
5. EXISTING FACILITATES AND EQUIPMENT SHOWN IN LIGHTER LINE. CURENT CONTRACT SCOPE DARK LINES.



A NORTH ELEVATION
CPL-1004-001 SCALE: 1/8" = 1'-0"



B EAST ELEVATION
CPL-1004-001 SCALE: 1/8" = 1'-0"

PRELIMINARY DESIGN FOR EPC PRICING

Revision	By	Appd	DD.MM.YY

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WALNUT CREEK, CA 94597
www.stantec.com

Client/Project
KINGS RIVER CONSERVATION DISTRICT
FRESNO, CALIFORNIA
PINE FLAT UNIT 4

KRCD Kings River Conservation District

File Name: PF4-PLT-LYT-1001-002

DNB	KMG	FAA	19.04.2024
Dwn.	Chkd.	Dsgn.	DD.MM.YYYY

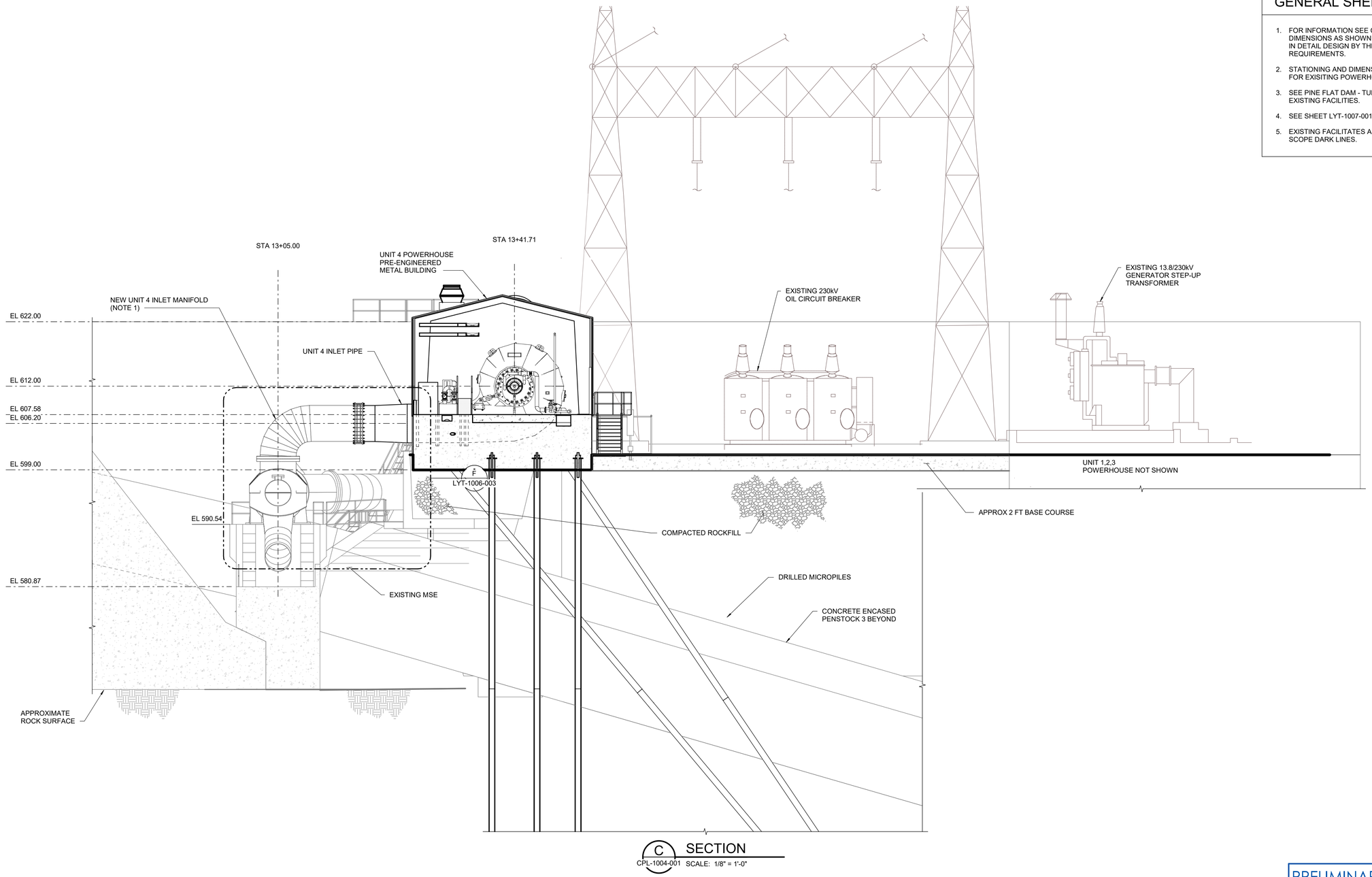
Title
SITE LAYOUT
ELEVATION

Project No.	Scale
224202811	AS SHOWN

Drawing No.	Sheet	Revision
PF4-PLT-LYT-1001 -	002	00

GENERAL SHEET NOTES

1. FOR INFORMATION SEE CLP-1003-001 TO -003 AND LYT-1006-001 AND -002 LAYOUT, AND DIMENSIONS AS SHOWN ON DRAWINGS ARE PRELIMINARY AND SHALL BE CONFIRMED IN DETAIL DESIGN BY THE CONTRACTOR. SEE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
2. STATIONING AND DIMENSIONS ARE BASED ON HORISONTAL PLANE AS ESTABLISHED FOR EXISITING POWERHOUSE UNIT1-3 AND EXISTING TURBINE BYPASS.
3. SEE PINE FLAT DAM - TURBINE BYPASS PROJECT DESIGN DRAWINGS FOR DETAIL ON EXISTING FACILITIES.
4. SEE SHEET LYT-1007-001 FOR SWITCHYARD LAYOUT.
5. EXISTING FACILITATES AND EQUIPMENT SHOWN IN LIGHTER LINE. CURENT CONTRACT SCOPE DARK LINES.



C CPL-1004-001 **SECTION**
SCALE: 1/8" = 1'-0"

PRELIMINARY DESIGN FOR EPC PRICING

Revision	By	Appd	DD.MM.YY

A Issued	By	Appd	DD.MM.YY

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Consultants

Stantec
1340 TREAT BLVD #525
WALNUT CREEK, CA 94597
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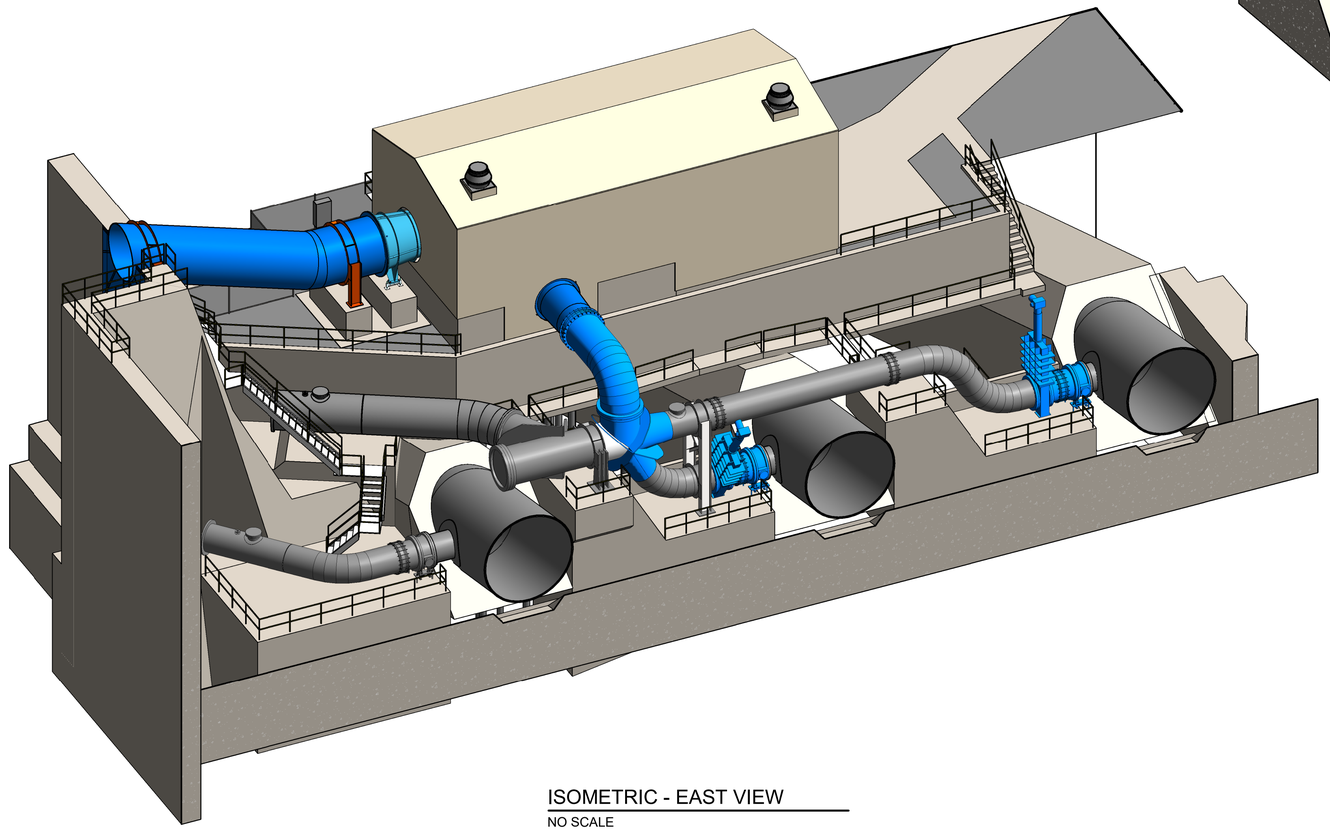
Client/Project
KINGS RIVER CONSERVATION DISTRICT
FRESNO, CALIFORNIA
PINE FLAT UNIT 4

File Name: PF4-PLT-LYT-1001-003	DNB Dwn.	KMG Chkd.	FAA Dsgn.	19.04.2024 DD.MM.YYYY

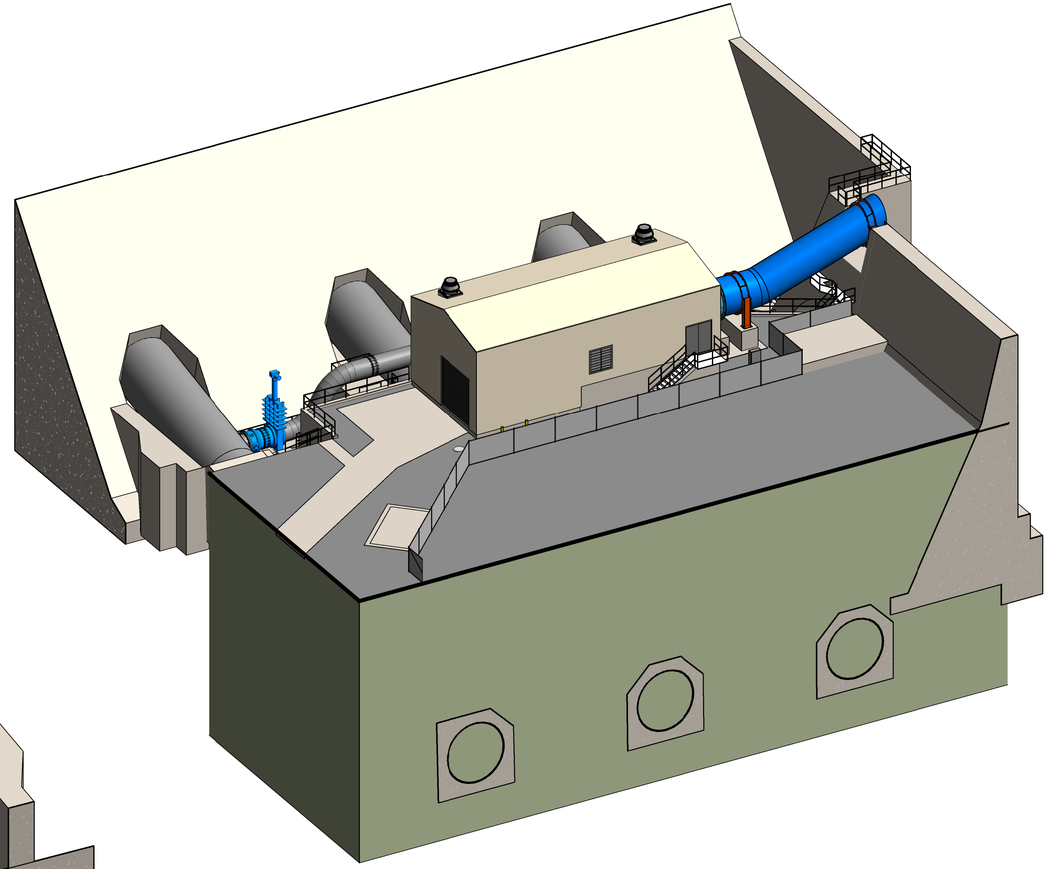
Title
SITE LAYOUT
TRANSVERSE SECTION

Project No.	Scale		
224202811	AS SHOWN		
Drawing No.		Sheet	Revision
PF4-PLT-LYT-1001 -		003	00



ISOMETRIC - EAST VIEW

NO SCALE



ISOMETRIC - WEST VIEW

SCALE:

PRELIMINARY DESIGN FOR EPC PRICING

Revision	By	Appd	DD.MM.YY

Issued	By	Appd	DD.MM.YY
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Client/Project

KINGS RIVER CONSERVATION DISTRICT

FRESNO, CALIFORNIA

PINE FLAT UNIT 4

KRCD Kings River Conservation District

File Name: PF4-PLT-3DL-1002-001

DNB	KMG	FAA	19.04.2024
Dwn.	Chkd.	Dsgn.	DD.MM.YYYY

Title

POWERHOUSE AND BYPASS PIPING
ISOMETRIC

Project No. 224202811

Scale AS SHOWN

Drawing No. PF4-PLT-3DL-1002 - 001

Sheet

Revision 00

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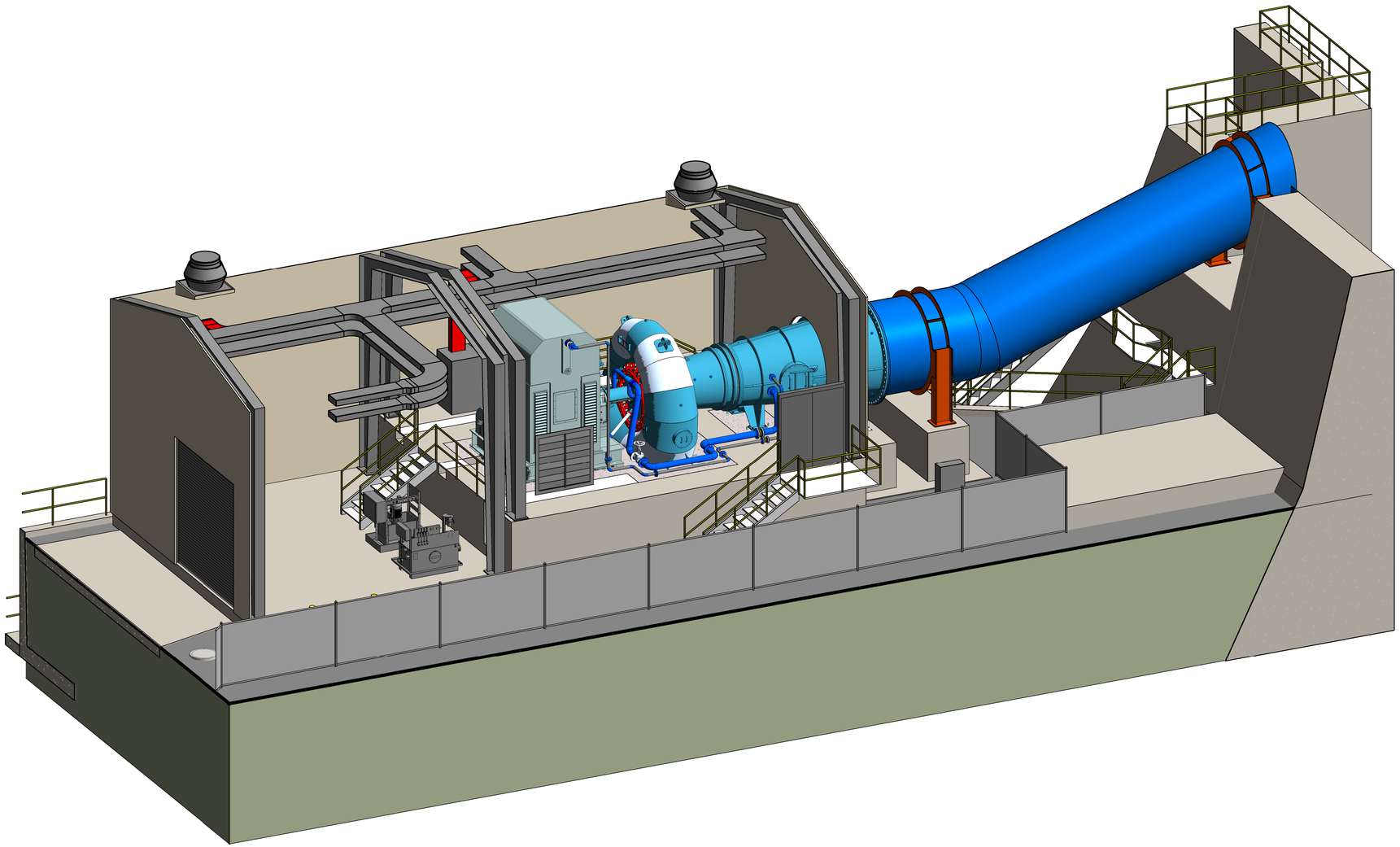
ORIGINAL SHEET - ANSI D



ISOMETRIC - U4 POWERHOUSE

NO SCALE

PRELIMINARY DESIGN FOR EPC PRICING

Revision	By	Appd	DD.MM.YY

Issued	By	Appd	DD.MM.YY
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Consultants

Stantec

1340 TREAT BLVD #525
WALNUT CREEK, CA 94597
www.stantec.com

Client/Project
KINGS RIVER CONSERVATION DISTRICT

FRESNO, CALIFORNIA

PINE FLAT UNIT 4

File Name: PF4-PLT-3DL-1002-002

DNB	KMG	FAA	19.04.2024
Dwn.	Chkd.	Dsgn.	DD.MM.YYYY

Title
POWERHOUSE AND BYPASS PIPING ISOMETRIC

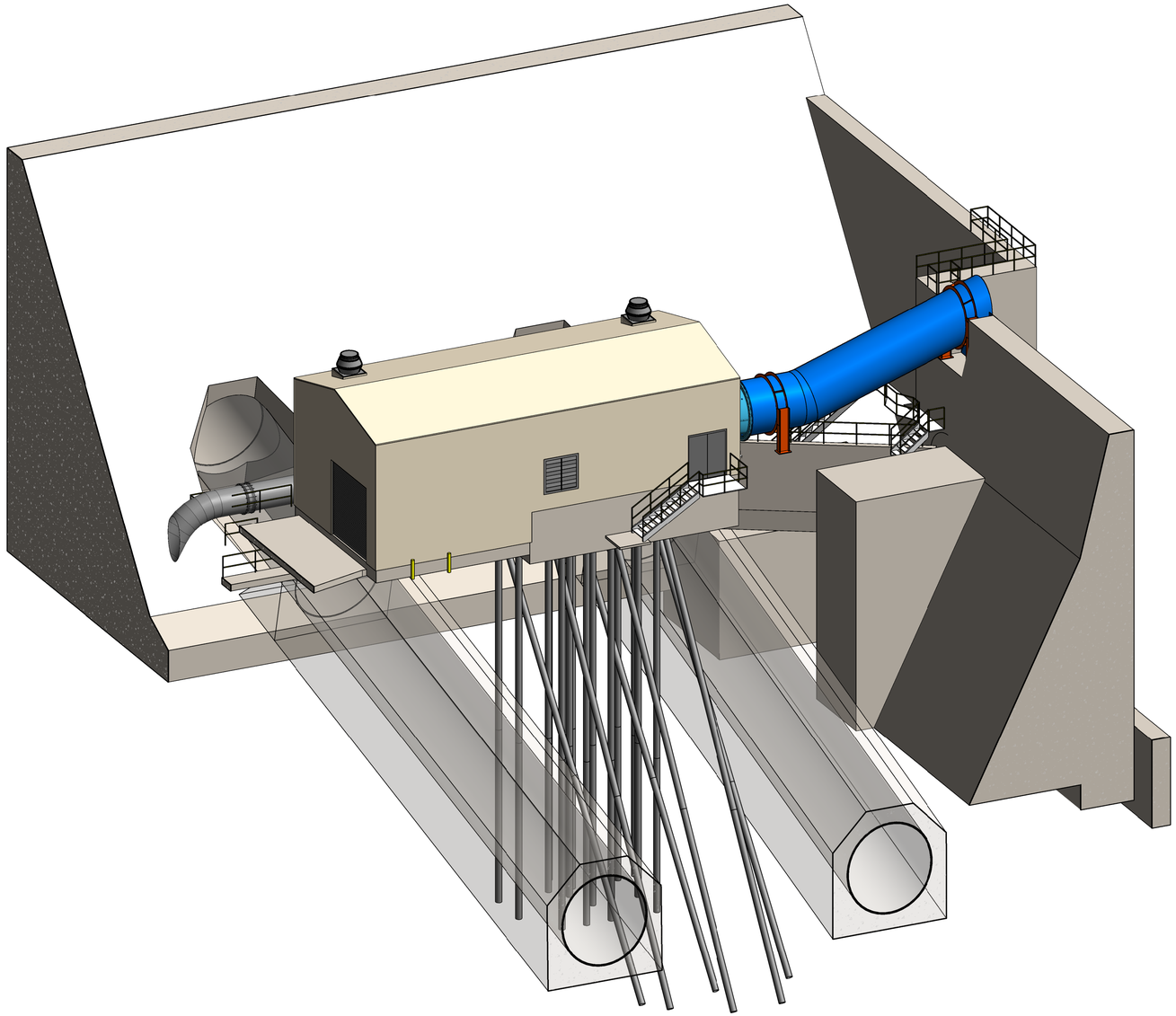
Project No. 224202811

Scale AS SHOWN

Drawing No. PF4-PLT-3DL-1002 -

Sheet 002

Revision 00



ISOMETRIC - U4 POWERHOUSE

NO SCALE

PRELIMINARY DESIGN FOR EPC PRICING

Revision	By	Appd	DD.MM.YY

Issued	By	Appd	DD.MM.YY
A			

Permit/Seal

Consultants

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1340 TREAT BLVD #525
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Client/Project

KINGS RIVER CONSERVATION DISTRICT

FRESNO, CALIFORNIA

PINE FLAT UNIT 4

KRCD Kings River Conservation District

File Name: PF4-PLT-1002-003

DNB	KMG	FAA	19.04.2024
Dwn.	Chkd.	Dsgn.	DD.MM.YYYY

Title

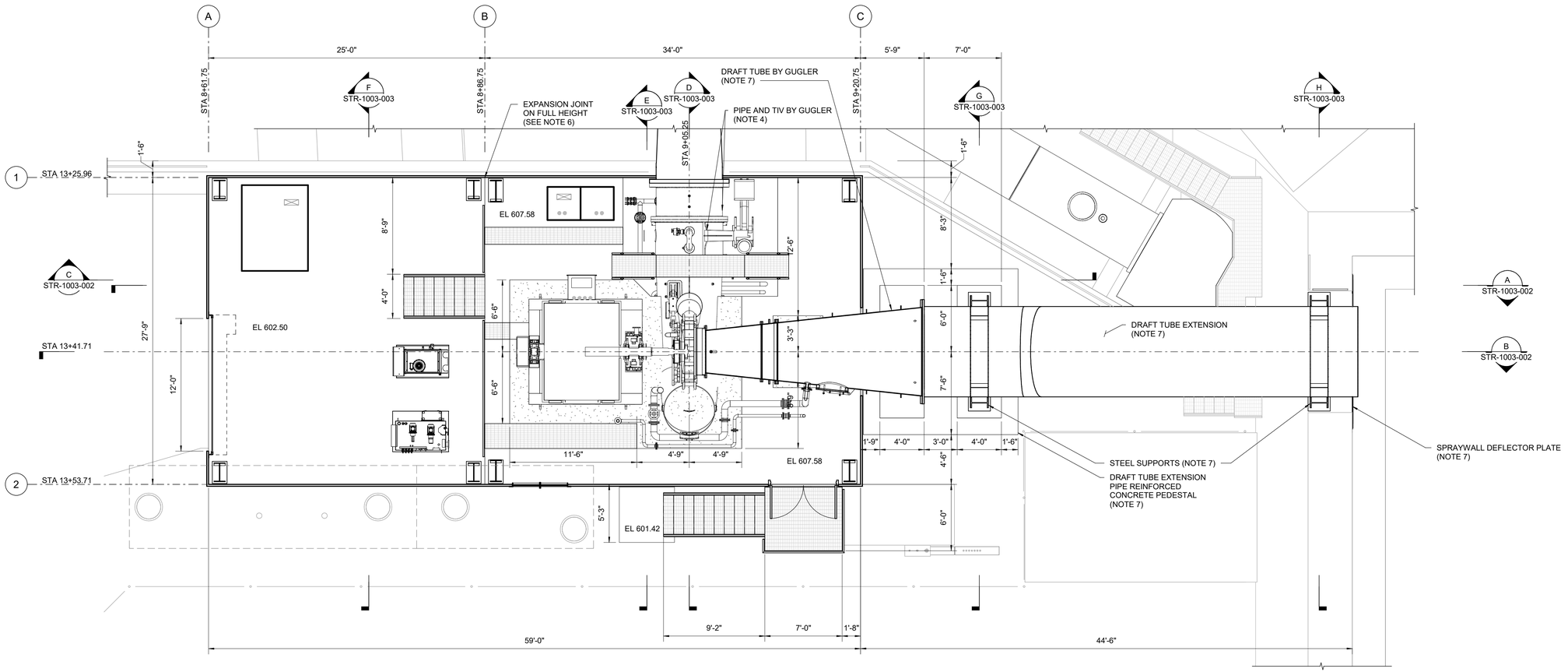
POWERHOUSE AND BYPASS PIPING ISOMETRIC

Project No.	Scale		
224202811	AS SHOWN		
Drawing No.		Sheet	Revision
PF4-PLT-3DL-1002 -		003	00

ORIGINAL SHEET - ANSI D

GENERAL SHEET NOTES

1. LAYOUT, AND DIMENSIONS AS SHOWN ON DRAWINGS ARE PRELIMINARY AND SHALL BE CONFIRMED IN DETAIL DESIGN BY THE CONTRACTOR. SEE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
2. STATIONING AND DIMENSIONS ARE BASED ON HORISONTAL PLANE AS ESTABLISHED FOR EXISITING POWERHOUSE UNIT 1-3 AND EXISTING TURBINE BYPASS.
3. SEE SHEET LYT-1006-003 TO 006 FOR INFORMATION ON MAJOR EQUIPMENT LAYOUT AND SCOPE OF WATER TO WIRE CONTRACTOR (GUGLER).
4. SEE WATER TO WIRE CONTRACT DRAWINGS FOR DETAILS AND MAJOR EQUIPMENT.
5. SEE SHEET STR-1003-004 TO 007 FOR POWERHOUSE DRILLED MICROPILE FOUNDATION SYSTEM PLAN, SECTIONS AND DETAILS.
6. UNIT 4 POWERHOUSE FOUNDATION SLAB CONSIST OF TWO SEPARATE FOUNDATION SYSTEMS: TWO INDEPENDENT SECTION BETWEEN A-B AND B-C. CONTRACTOR TO ACCOMMODATE THE STRUCTURAL SYSTEM BY DETAILING EXPANSION JOINT AND CORRESPONDING DESIGN OF THE PREFABRICATED METAL BUILDING (POWEHOUSE ENVELOPE).
7. SEE SHEET STR-1003-008 FOR DETAILS OF DRAFT TUBE EXTENSION AND SPRAY WALL PENETRATION.



UNIT 4 POWERHOUSE PLAN

SCALE: 3/16" = 1'-0"

PRELIMINARY DESIGN FOR EPC PRICING

Revision	By	Appd	DD.MM.YY

A Issued	By	Appd	DD.MM.YY

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Client/Project
KINGS RIVER
CONSERVATION DISTRICT

FRESNO, CALIFORNIA

PINE FLAT UNIT 4

KRCD Kings River Conservation District

File Name: PF4-PLT-STR-1003-001

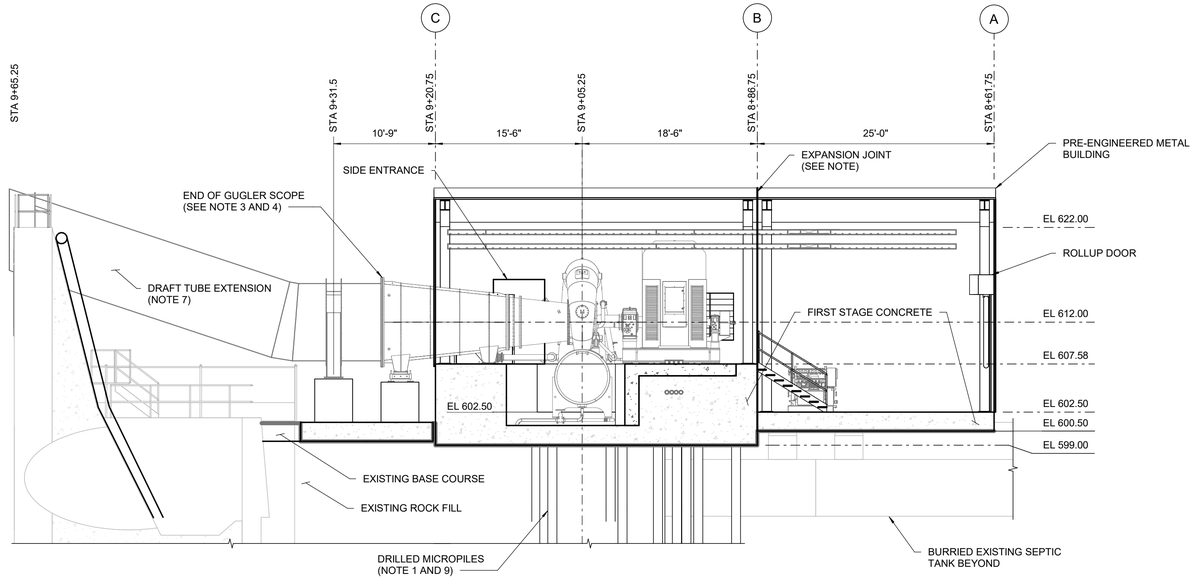
DNB	KMG	FAA	19.04.2024
Dwn.	Chkd.	Dsgn.	DD.MM.YYYY

Title
POWERHOUSE
STRUCTURAL
OVERALL PLAN

Project No. 224202811

Scale AS SHOWN

Drawing No. PF4-PLT-STR-1003 - Sheet 001 Revision 00



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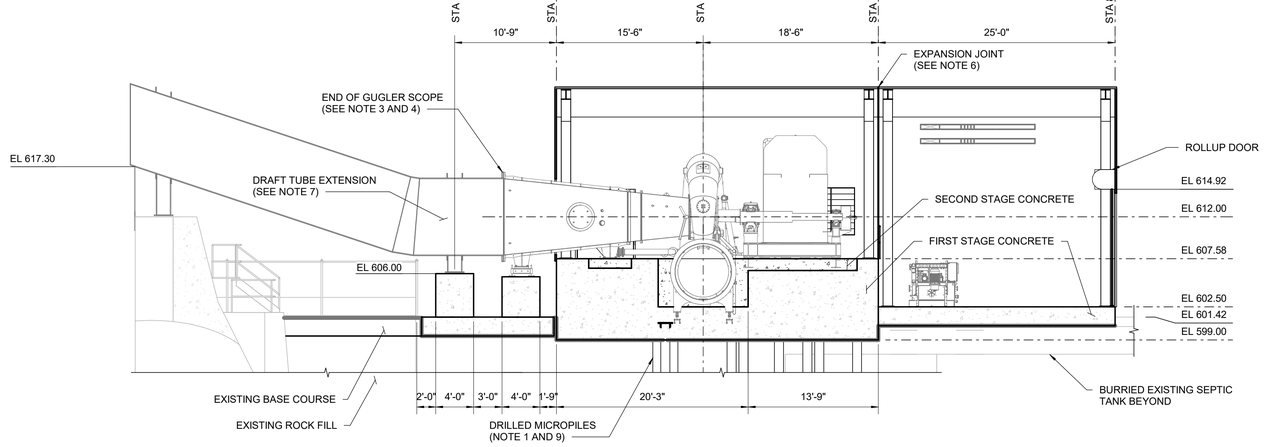
STR-1003-001 SCALE: 1/8" = 1'-0"



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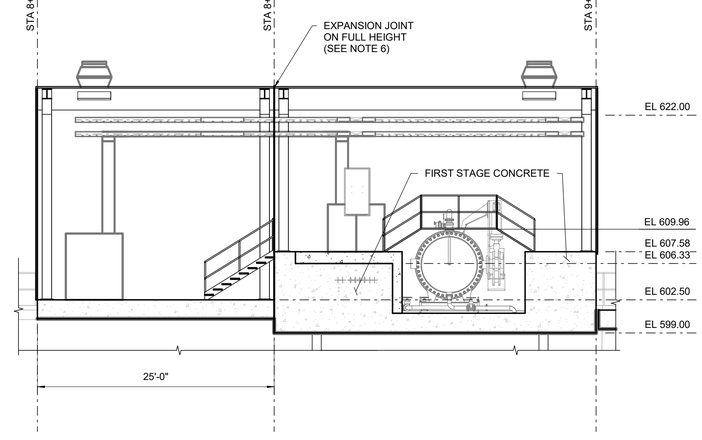

C SECTION
STR-1003-001 SCALE: 1/8" = 1'-0"

GENERAL SHEET NOTES

1. LAYOUT, AND DIMENSIONS AS SHOWN ON DRAWINGS ARE PRELIMINARY AND SHALL BE CONFIRMED IN DETAIL DESIGN BY THE CONTRACTOR. SEE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
2. STATIONING AND DIMENSIONS ARE BASED ON HORISONTAL PLANE AS ESTABLISHED FOR EXISITING POWERHOUSE UNIT 1-3 AND EXISTING TURBINE BYPASS.
3. SEE SHEET LYT-1006-003 TO 006 FOR INFORMATION ON MAJOR EQUIPMENT LAYOUT AND SCOPE OF WATER TO WIRE CONTRACTOR (GUGLER).
4. SEE WATER TO WIRE CONTRACT DRAWINGS FOR DETAILS AND MAJOR EQUIPMENT.
5. SEE SHEET STR-1003-004 TO 007 FOR POWERHOUSE DRILLED MICROPILE FOUNDATION SYSTEM PLAN, SECTIONS AND DETAILS.
6. UNIT 4 POWERHOUSE FOUNDATION SLAB CONSIST OF TWO SEPARATE FOUNDATION SYSTEMS: TWO INDEPENDENT SECTION BETWEEN A-B AND B-C. CONTRACTOR TO ACCOMMODATE THE STRUCTURAL SYSTEM BY DETAILING EXPANSION JOINT AND CORRESPONDING DESIGN OF THE PREFABRICATED METAL BUILDING (POWEHOUSE ENVELOPE).
7. SEE SHEET STR-1003-008 FOR DETAILS OF DRAFT TUBE EXTENSION AND SPRAY WALL PENETRATION.
8. SEE PINE FLAT DAM - TURBINE BYPASS PROJECT SHEET PF-C3 FOR SWITCHYARD EMBANKMENT AND MSE DETAILS.
9. MICROPILE CAP ANCHORAGE NOT SHOWN FOR CLARITY.

PRELIMINARY DESIGN FOR EPC PRICING

Revision	By	Appd	DD.MM.YY

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Client/Project
KINGS RIVER
CONSERVATION DISTRICT

FRESNO, CALIFORNIA

PINE FLAT UNIT 4

KRCD Kings River Conservation District

File Name: PF4-PLT-STR-1003-002

DNB	KMG	FAA	19.04.2024
Dwn.	Chkd.	Dsgn.	DD.MM.YYYY

Title
POWERHOUSE
STRUCTURAL
SECTION

Project No. 224202811

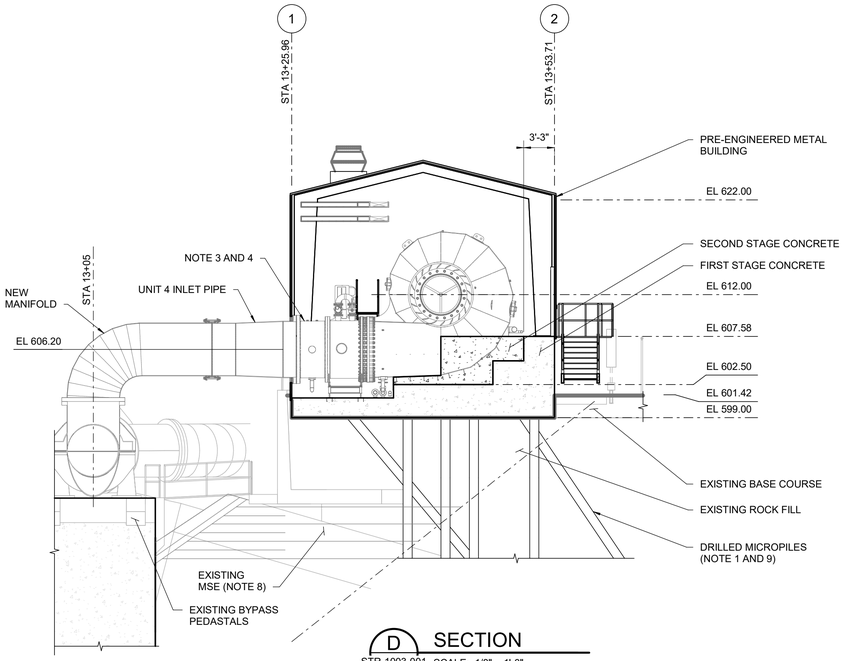
Scale AS SHOWN

Drawing No. PF4-PLT-STR-1003 -

Sheet 002

Revision 00

ORIGINAL SHEET - ANSI D



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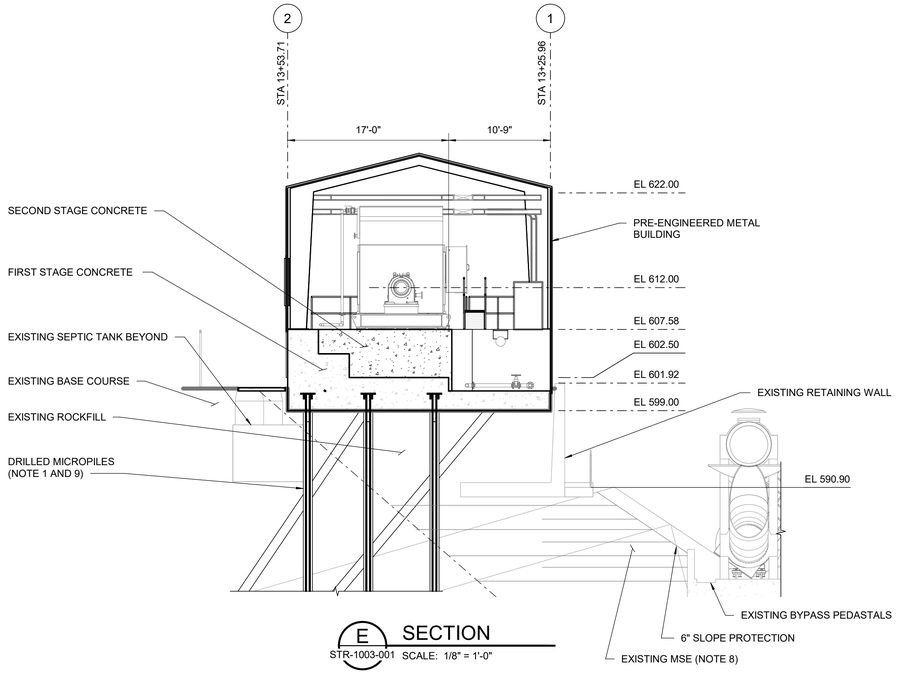
STR-1003-001 SCALE: 1/8" = 1'-0"



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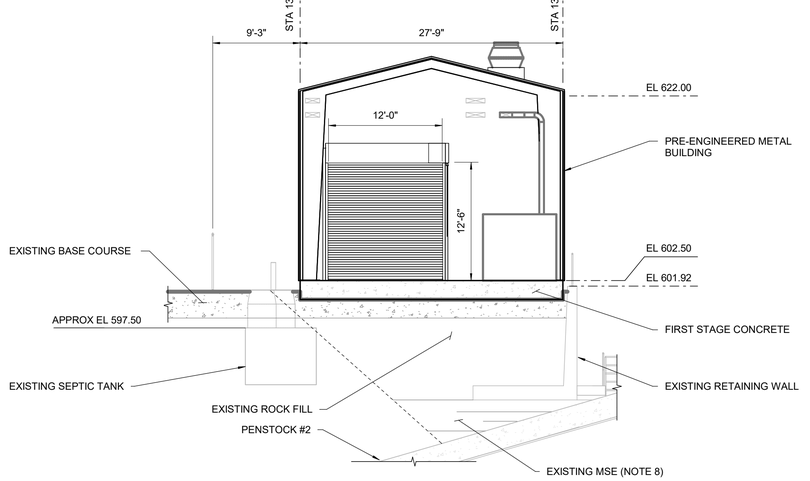

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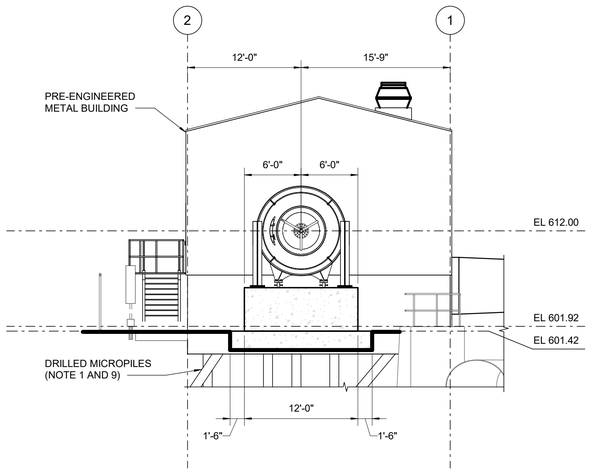

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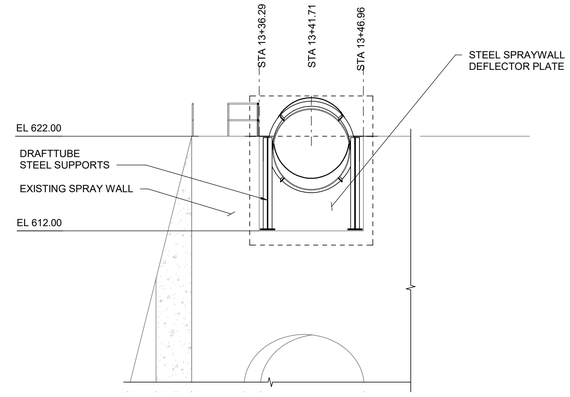

H SECTION
STR-1003-001 SCALE: 1/8" = 1'-0"

GENERAL SHEET NOTES

1. LAYOUT, AND DIMENSIONS AS SHOWN ON DRAWINGS ARE PRELIMINARY AND SHALL BE CONFIRMED IN DETAIL DESIGN BY THE CONTRACTOR. SEE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
2. STATIONING AND DIMENSIONS ARE BASED ON HORISONTAL PLANE AS ESTABLISHED FOR EXISITING POWERHOUSE UNIT 1-3 AND EXISTING TURBINE BYPASS.
3. SEE SHEET LYT-1006-003 TO 006 FOR INFORMATION ON MAJOR EQUIPMENT LAYOUT AND SCOPE OF WATER TO WIRE CONTRACTOR (GUGLER).
4. SEE WATER TO WIRE CONTRACT DRAWINGS FOR DETAILS AND MAJOR EQUIPMENT.
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6. UNIT 4 POWERHOUSE FOUNDATION SLAB CONSIST OF TWO SEPARATE FOUNDATION SYSTEMS: TWO INDEPENDENT SECTION BETWEEN A-B AND B-C. CONTRACTOR TO ACCOMMODATE THE STRUCTURAL SYSTEM BY DETAILING EXPANSION JOINT AND CORRESPONDING DESIGN OF THE PREFABRICATED METAL BUILDING (POWEHOUSE ENVELOPE).
7. SEE SHEET STR-1003-008 FOR DETAILS OF DRAFT TUBE EXTENSION AND SPRAY WALL PENETRATION.
8. SEE PINE FLAT DAM - TURBINE BYPASS PROJECT SHEET PF-C3 FOR SWITCHYARD EMBANKMENT AND MSE DETAILS.
9. MICROPILE CAP ANCHORAGE NOT SHOWN FOR CLARITY.

PRELIMINARY DESIGN FOR EPC PRICING

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Issued	By	Appd	DD.MM.YY
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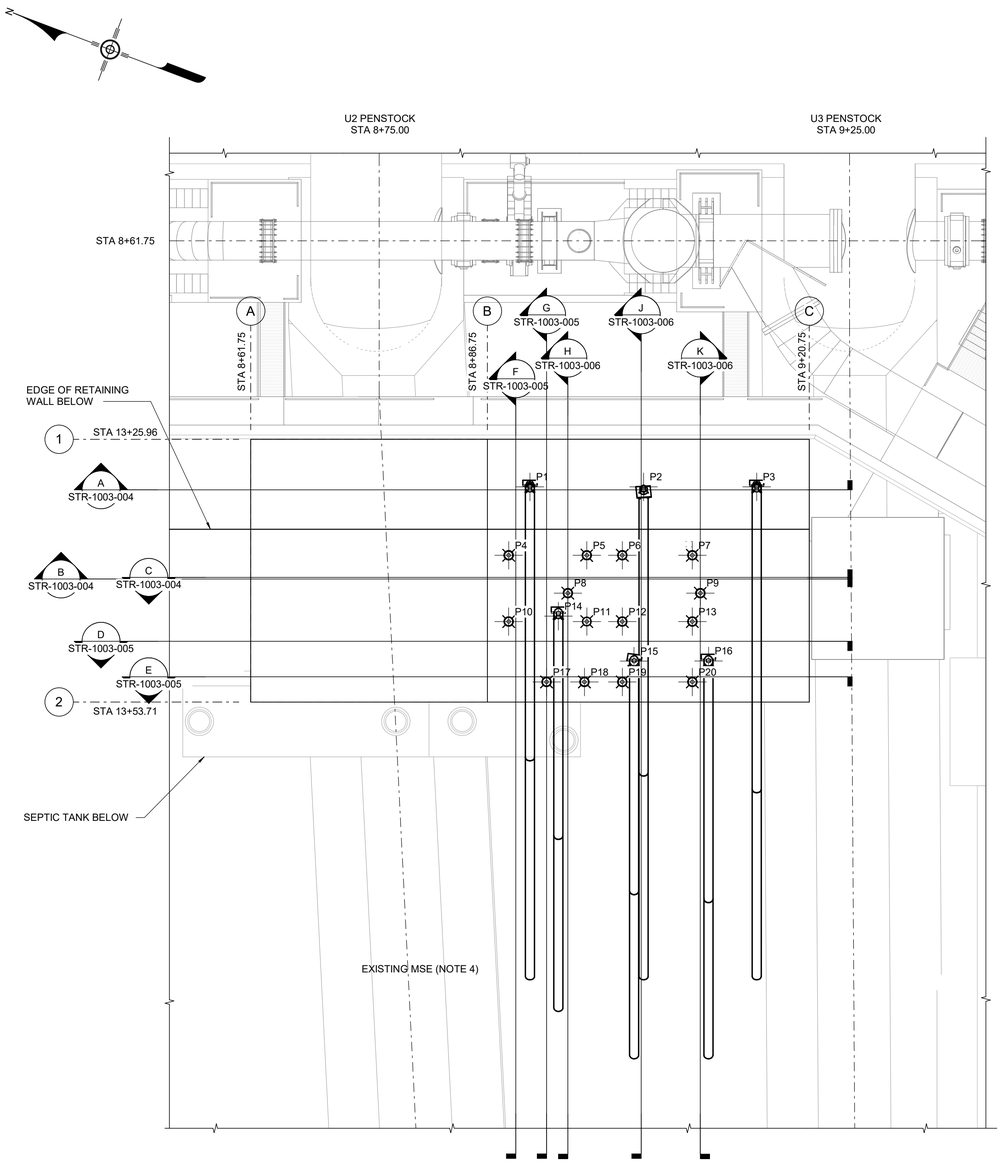
Client/Project
KINGS RIVER CONSERVATION DISTRICT
FRESNO, CALIFORNIA
PINE FLAT UNIT 4

File Name: PF4-PLT-STR-1003-003 | DNB Dwn. | KMG Chkd. | FAA Dsgn. | 19.04.2024 DD.MM.YYYY

Title
POWERHOUSE STRUCTURAL TRANSVERSE SECTION

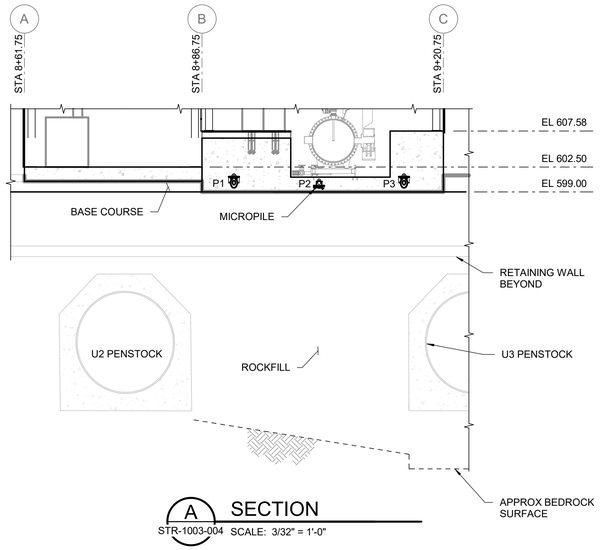
Project No. 224202811
Scale AS SHOWN
Drawing No. PF4-PLT-STR-1003 - 003
Sheet
Revision 00

ORIGINAL SHEET - ANSI D



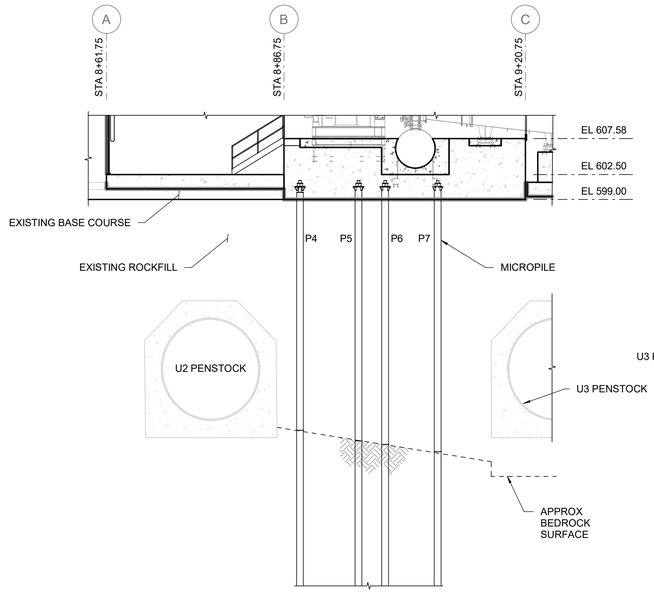
MICROPILE OVERALL PLAN EL 599.00

SCALE: 1/8" = 1'-0"



A SECTION

STR-1003-004 SCALE: 3/32" = 1'-0"



B SECTION

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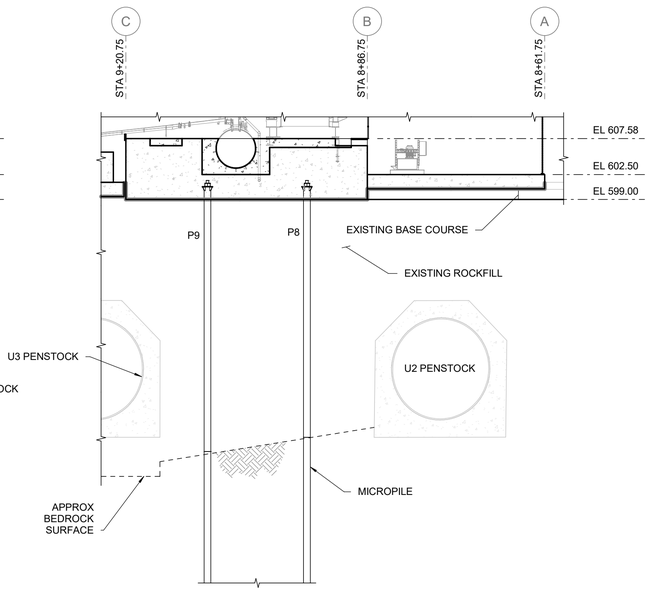

C SECTION

STR-1003-004 SCALE: 3/32" = 1'-0"

GENERAL SHEET NOTES

1. MICROPILE LAYOUT, CASING DIAMETER, WALL THICKNESS, LENGTH AND DIAMETER OF BOND ZONE, AND BAR SIZE AS SHOWN ON DRAWINGS ARE PRELIMINARY DESIGN AND SHALL BE CONFIRMED IN DETAIL DESIGN BY THE CONTRACTOR. SEE SPECIFICATION 02450 FOR ADDITIONAL REQUIREMENT.
2. SEE SHEET STR-1003-007 FOR DETAILS AND MICROPILE INSTALLATION SCHEDULE.
3. STATIONING AND DIMENSIONS ARE BASED ON HORISONTAL PLANE AS ESTABLISHED FOR EXISITING POWERHOUSE UNIT1-3 AND EXISTING TURBINE BYPASS.
4. SEE SHEETS STR-1003-001 TO 003 FOR CONCRETE DIMENSION AND OTHER DETAILS.
5. UNIT 4 POWERHOUSE FOUNDATION SLAB CONSIST OF TWO SEPARATE FOUNDATION SYSTEMS: TWO INDEPENDENT SECTIONS BETWEEN A-B AND B-C. CONTRACTOR TO ACCOMMODATE THE STRUCTURAL SYSTEM BY DETAILING EXPANSION JOINT AND CORRESPONDING DESIGN OF THE PREFABRICATED METAL BUILDING (POWEHOUSE ENVELOPE).
6. SEE PINE FLAT DAM - TURBINE BYPASS PROJECT SHEET - PF-C3 FOR SWITCHYARD EMBANKMENT AND MSE DETAILS.

PRELIMINARY DESIGN FOR EPC PRICING

Revision	By	Appd	DD.MM.YY

A Issued	By	Appd	DD.MM.YY

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Client/Project
KINGS RIVER CONSERVATION DISTRICT
FRESNO, CALIFORNIA
PINE FLAT UNIT 4

KRCD Kings River Conservation District

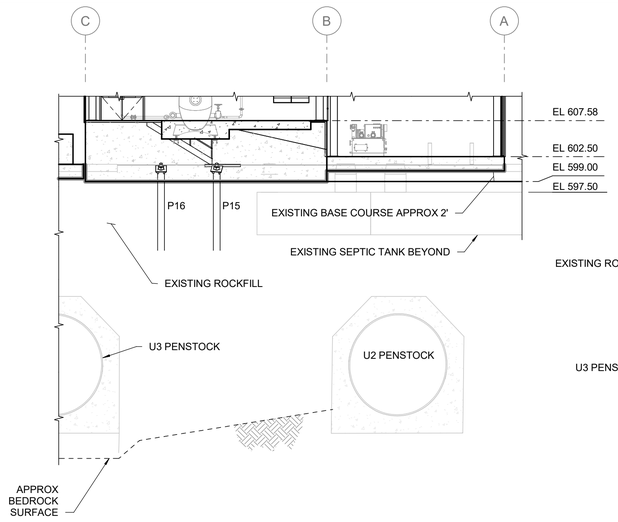
Title
POWERHOUSE SUBSTRUCTURE MICROPILE LAYOUT

Project No.	Scale
224202811	AS SHOWN

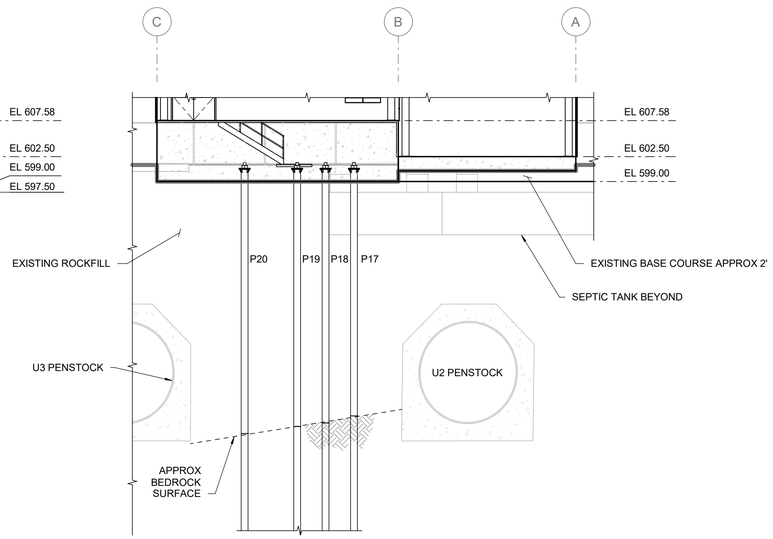
Drawing No.	Sheet	Revision
PF4-PLT-STR-1003 -	004	00

File Name: PF4-PLT-STR-1003-004

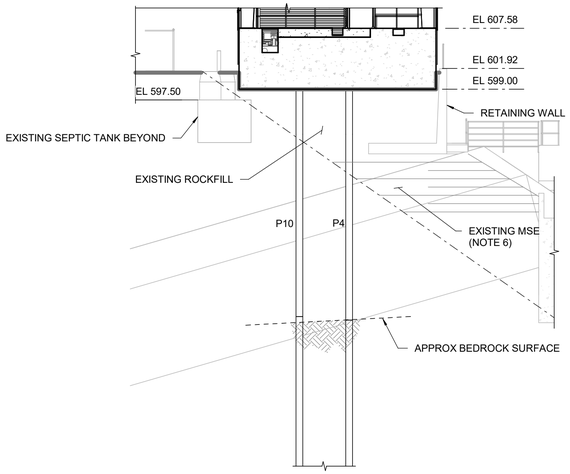
DNB	KMG	FAA	19.04.2024
Dwn.	Chkd.	Dsgn.	DD.MM.YYYY



D SECTION
STR-1003-004 SCALE: 3/32" = 1'-0"



E SECTION
STR-1003-004 SCALE: 3/32" = 1'-0"



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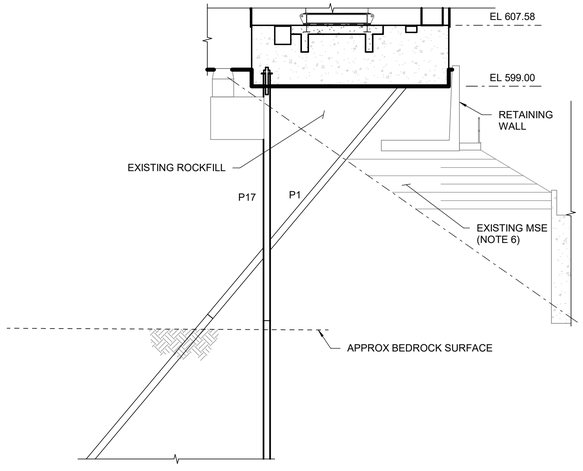

G SECTION
STR-1003-004 SCALE: 3/32" = 1'-0"

GENERAL SHEET NOTES

1. MICROPILE LAYOUT, CASING DIAMETER, WALL THICKNESS, LENGTH AND DIAMETER OF BOND ZONE, AND BAR SIZE AS SHOWN ON DRAWINGS ARE PRELIMINARY DESIGN AND SHALL BE CONFIRMED IN DETAIL DESIGN BY THE CONTRACTOR. SEE SPECIFICATION 02450 FOR ADDITIONAL REQUIREMENT.
2. SEE SHEET STR-1003-007 FOR DETAILS AND MICROPILE INSTALLATION SCHEDULE.
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4. SEE SHEETS STR-1003-001 TO 003 FOR CONCRETE DIMENSION AND OTHER DETAILS.
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6. SEE PINE FLAT DAM - TURBINE BYPASS PROJECT SHEET - PF-C3 FOR SWITCHYARD EMBANKMENT AND MSE DETAILS.

PRELIMINARY DESIGN FOR EPC PRICING

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Client/Project
KINGS RIVER
CONSERVATION DISTRICT

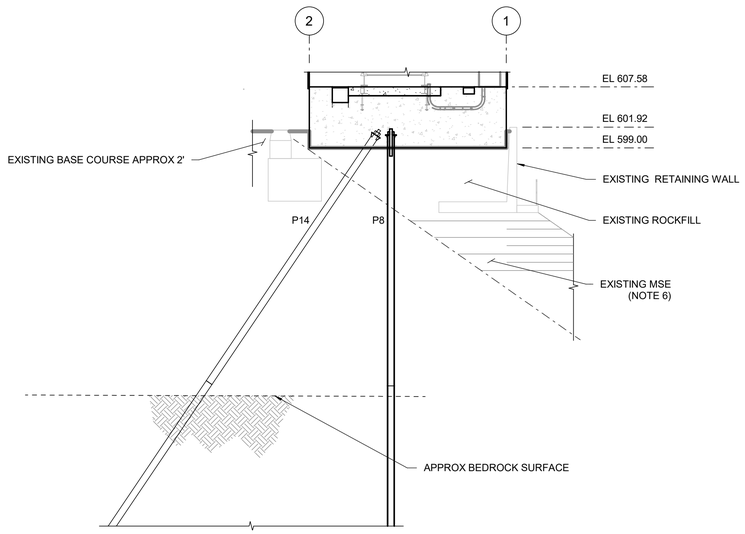
FRESNO, CALIFORNIA

PINE FLAT UNIT 4

File Name: PF4-PLT-STR-1003-005	DNB	KMG	FAA	19.04.2024
	Dwn.	Chkd.	Dsgn.	DD.MM.YYYY

Title
POWERHOUSE
SUBSTRUCTURE
MICROPILE SECTIONS

Project No.	Scale		
224202811	AS SHOWN		
Drawing No.		Sheet	Revision
PF4-PLT-STR-1003 -		005	00



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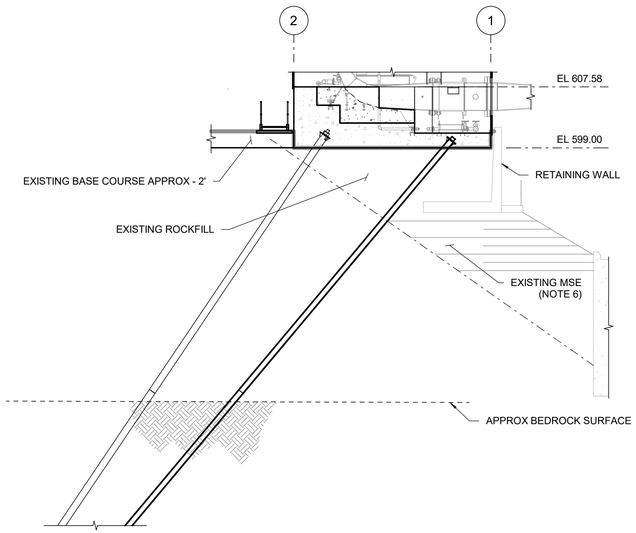
STR-1003-004 SCALE: 3/32" = 1'-0"



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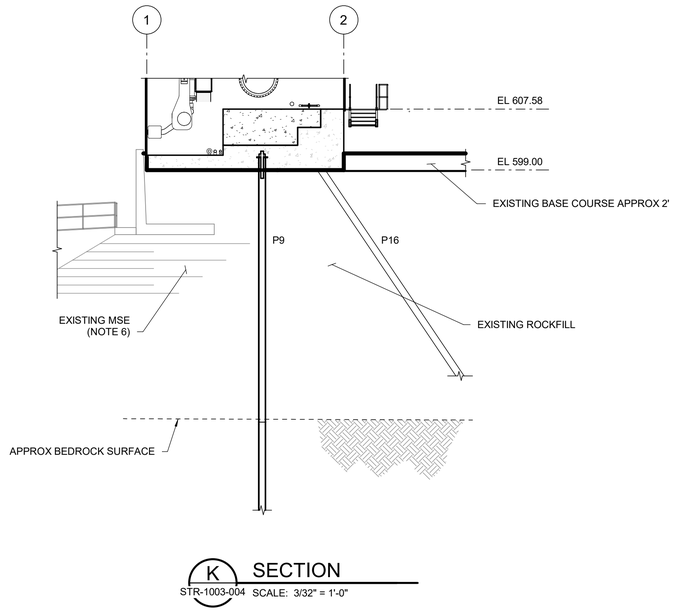

K SECTION
STR-1003-004 SCALE: 3/32" = 1'-0"

GENERAL SHEET NOTES

1. MICROPILE LAYOUT, CASING DIAMETER, WALL THICKNESS, LENGTH AND DIAMETER OF BOND ZONE, AND BAR SIZE AS SHOWN ON DRAWINGS ARE PRELIMINARY DESIGN AND SHALL BE CONFIRMED IN DETAIL DESIGN BY THE CONTRACTOR. SEE SPECIFICATION 02450 FOR ADDITIONAL REQUIREMENT.
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4. SEE SHEETS STR-1003-001 TO 003 FOR CONCRETE DIMENSION AND OTHER DETAILS.
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6. SEE PINE FLAT DAM - TURBINE BYPASS PROJECT SHEET - PF-C3 FOR SWITCHYARD EMBANKMENT AND MSE DETAILS.

PRELIMINARY DESIGN FOR EPC PRICING

Revision	By	Appd	DD.MM.YY

Issued	By	Appd	DD.MM.YY
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Client/Project
KINGS RIVER
CONSERVATION DISTRICT

FRESNO, CALIFORNIA

PINE FLAT UNIT 4

File Name: PF4-PLT-STR-1003-006

DNB	KMG	FAA	19.04.2024
Dwn.	Chkd.	Dsgn.	DD.MM.YYYY

Title
POWERHOUSE
SUBSTRUCTURE
MICROPILE SECTIONS

Project No. 224202811

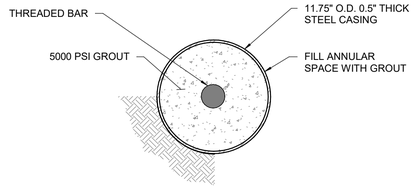
Scale AS SHOWN

Drawing No. PF4-PLT-STR-1003 -

Sheet 006

Revision 00

ORIGINAL SHEET - ANSI D



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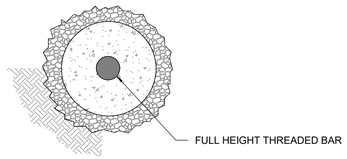
SCALE: 1 1/2" = 1'-0"



2 DETAIL
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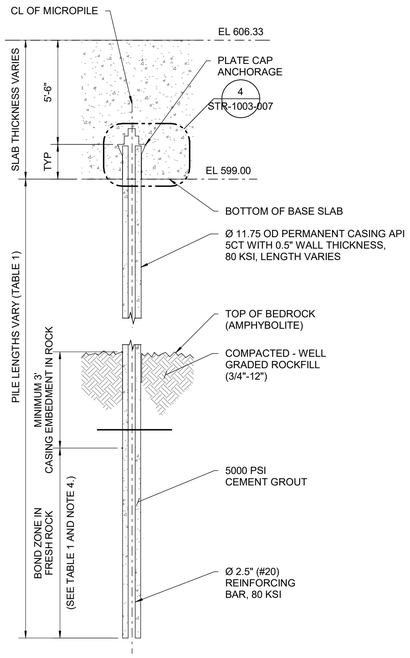

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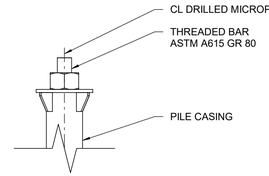
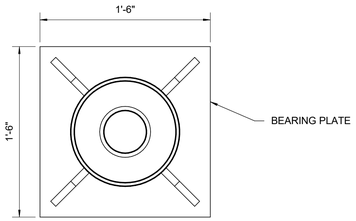
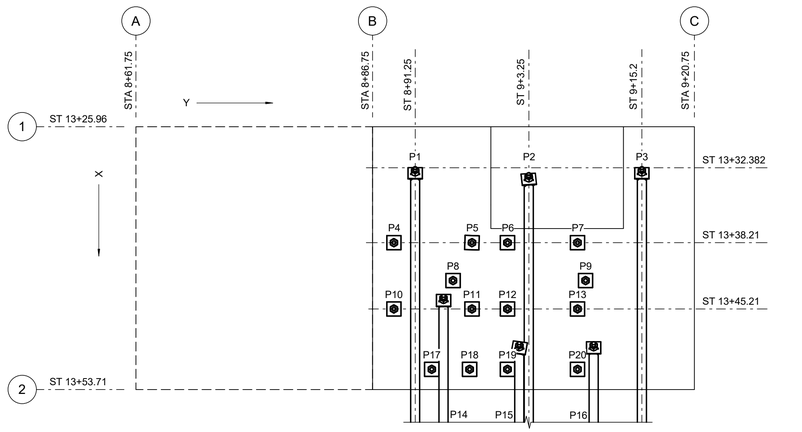


4 DETAIL
STR-1003-007 SCALE: 1/2" = 1'-0"



5 SECTION
SCALE: 1 1/2" = 1'-0"



MICROPILE OVERALL PLAN EL 599.00
SCALE: 1/8" = 1'-0"

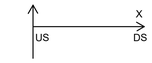
GENERAL SHEET NOTES

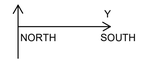
1. GROUT - A NEAT MIX OF PORTLAND CEMENT (TYPEI/II) CONFORMING TO ASTM C150 WITH WATER CEMENT RATIO NO MORE THAN 0.45. THE MINIMUM 28 COMPRESSIVE STRENGTH OF THE GROUT SHALL BE 5000 PSI.
2. MICROPILE CASING - THE STEEL CASING SHALL BE MINIMUM Ø 11.75", 0.5" WALL THICKNESS. (MIN) CONFORMING TO API (FY = 80 KSI)
3. LAYOUT, CASING DIAMETER, WALL THICKNESS, LENGTH AND DIAMETER OF BOND ZONE, AND BAR SIZE AS SHOWN ON DRAWINGS ARE PRELIMINARY AND SHALL BE CONFIRMED IN DETAIL DESIGN BY THE CONTRACTOR. SEE SPECIFICATION 02450 FOR ADDITIONAL REQUIREMENT.

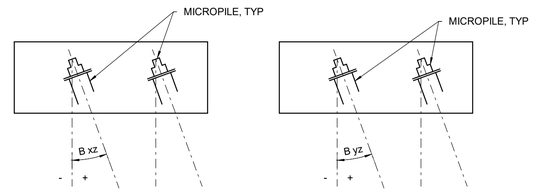
TABLE 1. PILE CENTERER COORDINATES AT DRILLING PLANE EL 599.00

NO.	LOCATION			B XZ	B YZ	MIN. LENGTH	CASING	ROCK
	US-DS (X)	N-S (Y)	ELEVATION (Z)	(DEG)	(DEG)	(FT)	LENGTH (FT)	EMBEDMENT (FT)
P1	ST 13+32.382	ST 8+91.25	599.00	39.97	0.00	64.2	52.2	15.0
P2	ST 13+32.382	ST 9+3.25	599.00	39.97	0.00	64.2	52.2	15.0
P3	ST 13+32.382	ST 9+15.2	599.00	39.97	0.00	64.2	52.2	15.0
P4	ST 13+38.21	ST 8+89	599.00	0.00	0.00	52.0	40.0	15.0
P5	ST 13+38.21	ST 8+97.25	599.00	0.00	0.00	52.0	40.0	15.0
P6	ST 13+38.21	ST 9+1	599.00	0.00	0.00	52.0	40.0	15.0
P7	ST 13+38.21	ST 9+8.4	599.00	0.00	0.00	52.0	40.0	15.0
P8	ST 13+42.21	ST 8+95.25	599.00	0.00	0.00	52.0	40.0	15.0
P9	ST 13+42.21	ST 9+9.25	599.00	0.00	0.00	52.0	40.0	15.0
P10	ST 13+45.21	ST 8+89	599.00	0.00	0.00	52.0	40.0	15.0
P11	ST 13+45.21	ST 8+97.25	599.00	0.00	0.00	50.2	40.0	15.0
P12	ST 13+45.21	ST 9+1	599.00	0.00	0.00	50.2	40.0	15.0
P13	ST 13+45.21	ST 9+8.4	599.00	0.00	0.00	50.2	40.0	15.0
P14	ST 13+45.523	ST 8+94.25	599.00	34.00	0.00	60.2	48.2	15.0
P15	ST 13+50.523	ST 9+2.25	599.00	34.00	0.00	60.2	48.2	15.0
P16	ST 13+50.523	ST 9+10.1	599.00	34.00	0.00	60.2	48.2	15.0
P17	ST 13+51.085	ST 8+93	599.00	0.00	0.00	52.0	40.0	15.0
P18	ST 13+51.085	ST 8+97	599.00	0.00	0.00	52.0	40.0	15.0
P19	ST 13+51.085	ST 9+1	599.00	0.00	0.00	52.0	40.0	15.0
P20	ST 13+51.085	ST 9+8.4	599.00	0.00	0.00	52.0	40.0	15.0

(*) LENGHT DOES NOT INCLUDE PILE CAP EMBEDMENT LENGTH
(- NEGATIVE) ANGLE CORESPONDS TO UPSTREAM INCLINATION OF PILE OR NORTH







PRELIMINARY DESIGN FOR EPC PRICING

Revision	By	Appd	DD.MM.YY

A Issued	By	Appd	DD.MM.YY

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1340 TREAT BLVD #525
WALNUT CREEK, CA 94597
www.stantec.com

Client/Project
KINGS RIVER
CONSERVATION DISTRICT

FRESNO, CALIFORNIA

PINE FLAT UNIT 4

File Name: PF4-PLT-STR-1003-007 | DNB Dwn. | KMG Chkd. | FAA Dsgn. | 19.04.2024 DD.MM.YYYY

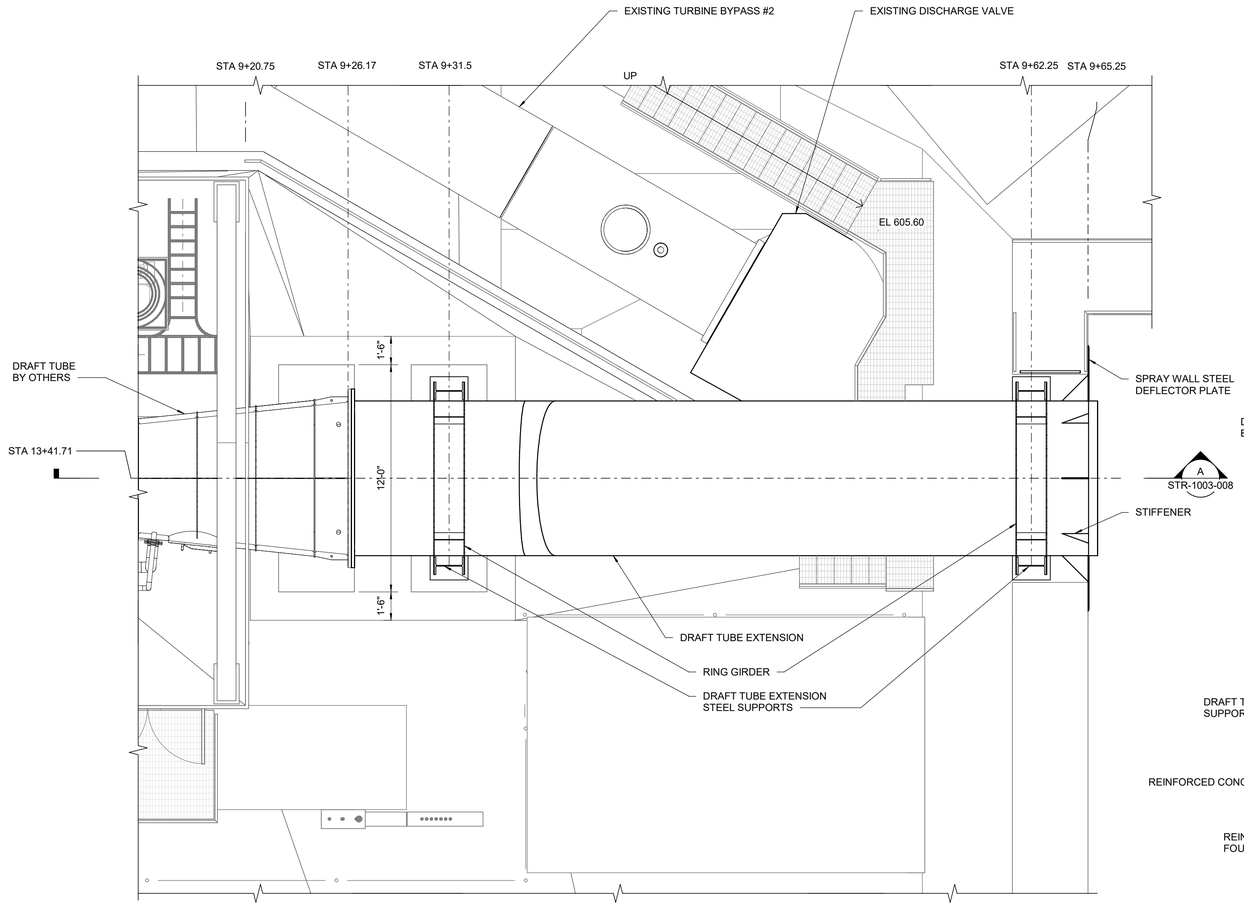
Title
POWERHOUSE
SUBSTRUCTURE
MICROPILE DETAILS

Project No. 224202811
Scale AS SHOWN
Drawing No. PF4-PLT-STR-1003 -
Sheet 007
Revision 00

ORIGINAL SHEET - ANSI D

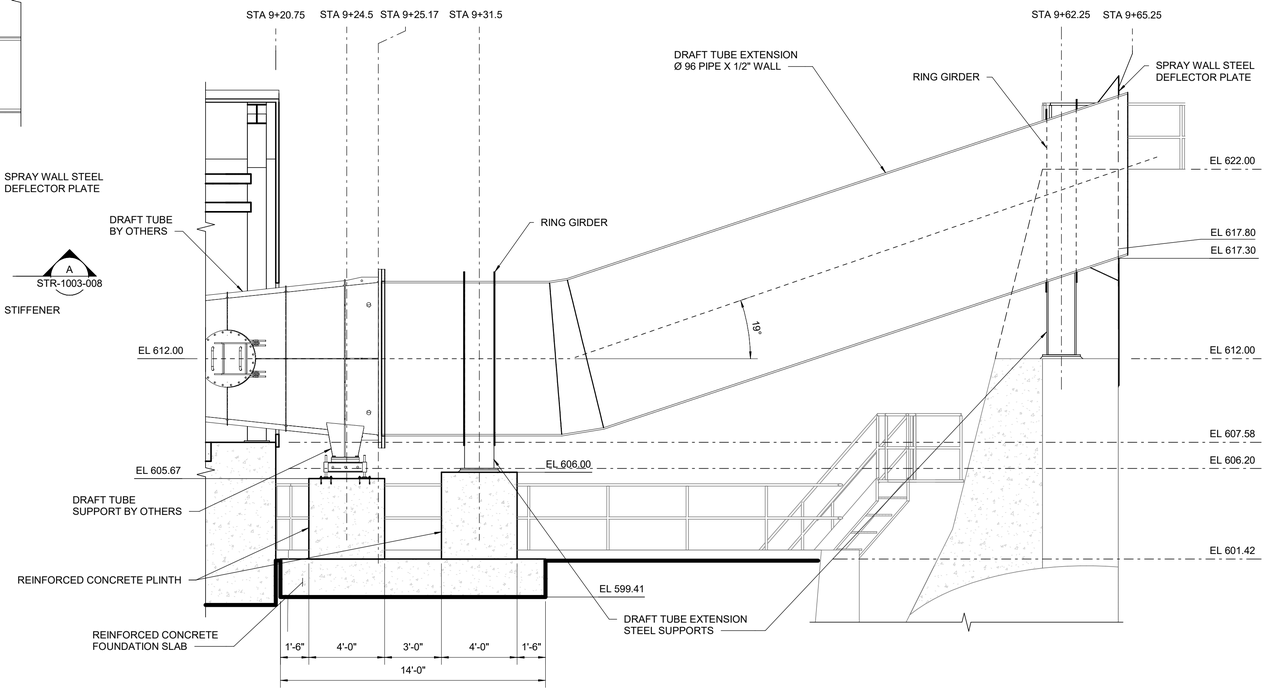
GENERAL SHEET NOTES

1. LAYOUT, AND DIMENSIONS AS SHOWN ON DRAWINGS ARE PRELIMINARY AND SHALL BE CONFIRMED IN DETAIL DESIGN BY THE CONTRACTOR. SEE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
2. STATIONING AND DIMENSIONS ARE BASED ON HORISONTAL PLANE AS ESTABLISHED FOR EXISITING POWERHOUSE UNIT 1-3 AND EXISTING TURBINE BYPASS.
3. SEE SHEET LYT-1006-003 TO 006 FOR INFORMATION ON MAJOR EQUIPMENT LAYOUT AND SCOPE OF WATER TO WIRE CONTRACTOR (GUGLER).



SPRAY WALL PENETRATION PLAN

SCALE: 1/4" = 1'-0"



A SECTION
STR-1003-008 SCALE: 1/4" = 1'-0"

PRELIMINARY DESIGN FOR EPC PRICING

Revision	By	Appd	DD.MM.YY

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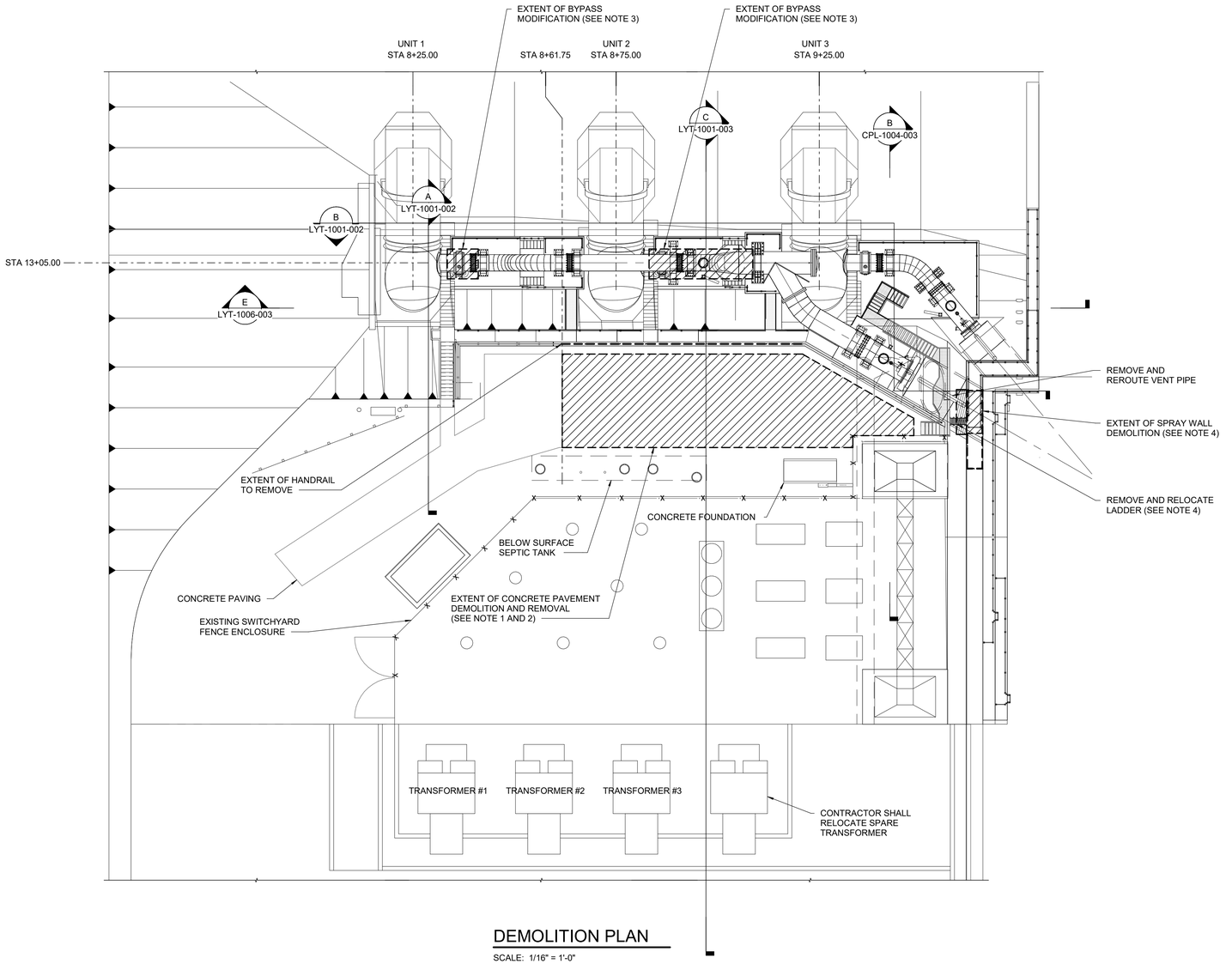
File Name: PF4-PLT-STR-1003-008

DNB	KMG	FAA	19.04.2024
Dwn.	Chkd.	Dsgn.	DD.MM.YYYY

Title
DRAFT TUBE
SPRAY WALL PENETRATION
PLAN AND SECTION

Project No. 224202811
Scale AS SHOWN
Drawing No. PF4-PLT-STR-1003 -
Sheet 008
Revision 00



DEMOLITION PLAN

SCALE: 1/16" = 1'-0"

GENERAL SHEET NOTES

1. DEMOLISH EXISTING CONCRETE PAVING AND BASE COURSE TO BOTTOM ELEVATION OF UNIT 4 BASE SLAB PER SHEET STR-1003-002.
2. RELOCATE ELECTRICAL CABLES WITHIN FOOTPRINT OF THE POWERHOUSE SEE DRAWINGS PINE FLAT DAM TURBINE BYPASS PF-E-04 AND PF-E-08.
3. SEE SHEET CPL-1004-002 FOR DETAILS.
4. SEE SHEET CPL-1004-003 FOR DETAILS.
5. LAYOUT, AND DIMENSIONS AS SHOWN ON DRAWINGS ARE PRELIMINARY AND SHALL BE CONFIRMED IN DETAIL DESIGN BY THE CONTRACTOR. SEE SPECIFICATIONS SECTION 01010 AND 02220 FOR ADDITIONAL REQUIREMENTS.
6. STATIONING AND DIMENSIONS ARE BASED ON HORIZONTAL PLANE AS ESTABLISHED FOR EXISITING POWERHOUSE UNIT 1-3 AND EXISTING TURBINE BYPASS.

PRELIMINARY DESIGN FOR EPC PRICING

Revision	By	Appd	DD.MM.YY

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FRESNO, CALIFORNIA
PINE FLAT UNIT 4

KRCD Kings River Conservation District

File Name: PF4-PLT-CPL-1004-001

DNB	KMG	FAA	19.04.2024
Dwn.	Chkd.	Dsgn.	DD.MM.YYYY

Title
DEMOLITION
EXISTING BYPASS PIPING
PLAN

Project No. 224202811

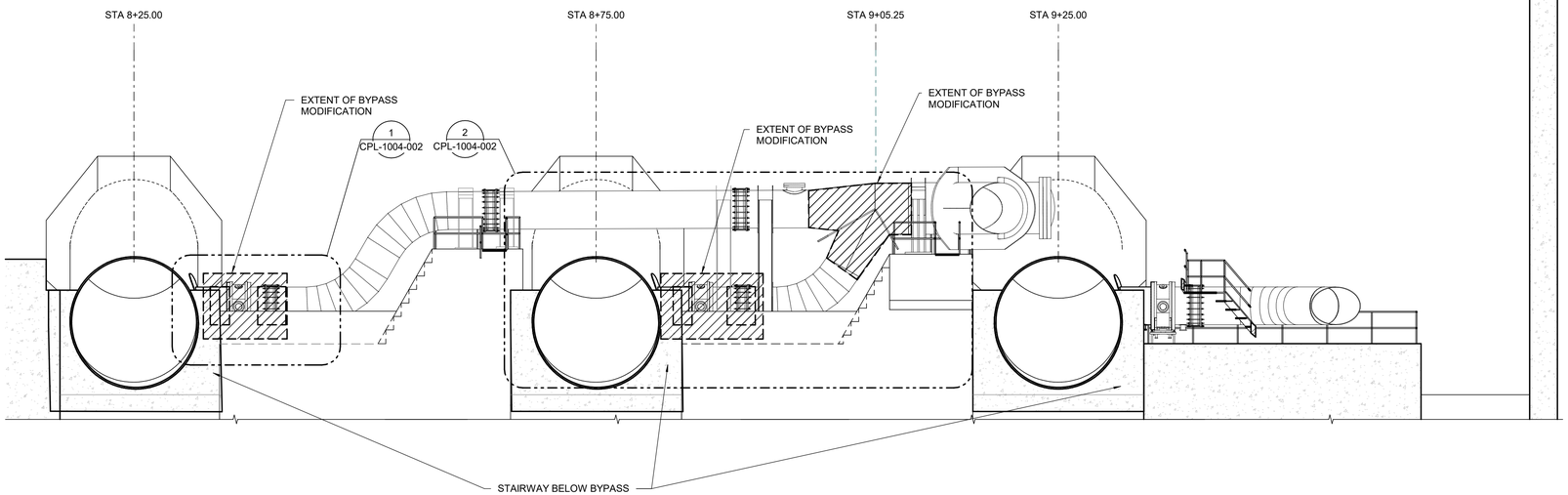
Scale AS SHOWN

Drawing No. PF4-PLT-CPL-1004 - 001

Sheet

Revision 00

ORIGINAL SHEET - ANSI D

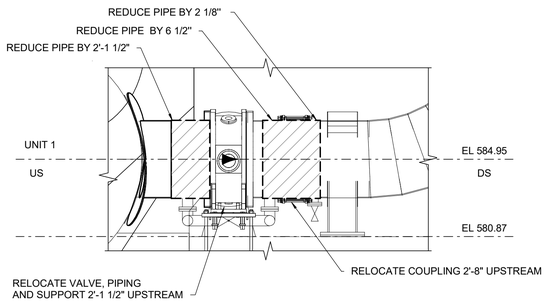


A DEMOLITION ELEVATION

SCALE: 1/8" = 1'-0"

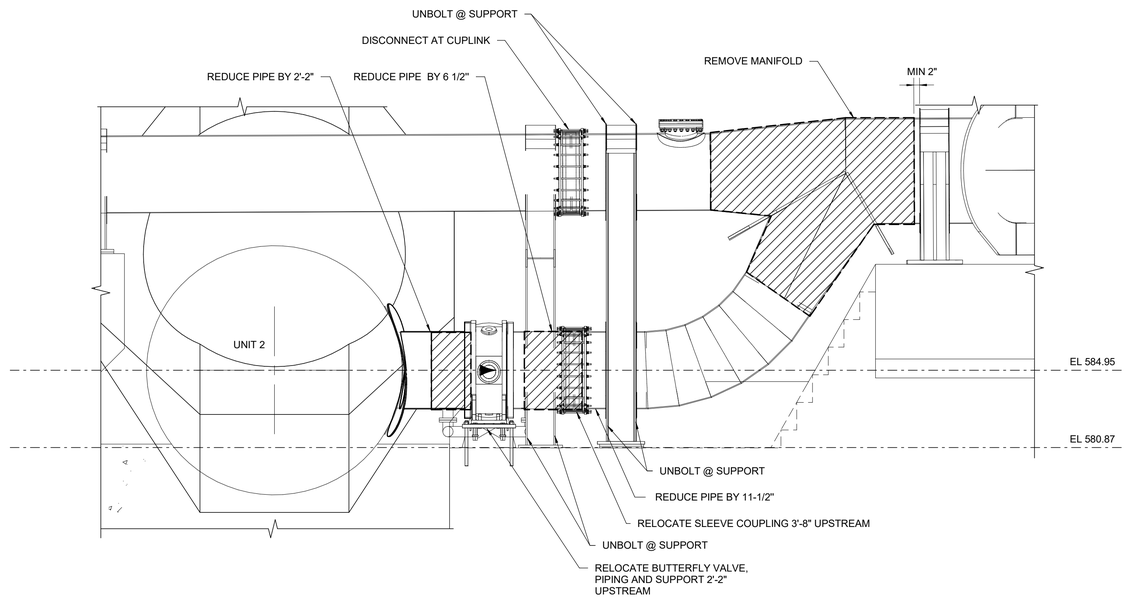
GENERAL SHEET NOTES

1. LAYOUT, AND DIMENSIONS AS SHOWN ON DRAWINGS ARE PRELIMINARY AND SHALL BE CONFIRMED IN DETAIL DESIGN BY THE CONTRACTOR. SEE SPECIFICATIONS 01010 AND 02220 FOR ADDITIOANL REQUIREMNTS.
2. STATIONING AND DIMENSIONS ARE BASED ON HORISONTAL PLANE AS ESTABLISHED FOR EXISITING POWERHOUSE UNIT 1-3 AND EXISTING TURBINE BYPASS.
3. SALVAGE ALL EXISTING VALVES, SPOOLS, COUPLINGS REMOVED FROM THE BYPASS PIPING FOR REINSTALLATION. AS SHOWN ON OPF4-PLT-LYT-1006 - 001 AND -002. THE EXISTING BUTTERFLY VALVES ARE TO BE RELOCATED TO MAKE ROOM FOR NEW KNIFE GATE VALVES.
4. TRIM EXISTING SPOOLS AS NOTED ON THE DRAWINGS.



1 DETAIL

CPL-1004-002 SCALE: 1/4" = 1'-0"



2 DETAIL

CPL-1004-002 SCALE: 1/4" = 1'-0"

PRELIMINARY DESIGN FOR EPC PRICING

Revision	By	Appd	DD.MM.YY

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KINGS RIVER CONSERVATION DISTRICT
FRESNO, CALIFORNIA
PINE FLAT UNIT 4

KRCD Kings River Conservation District

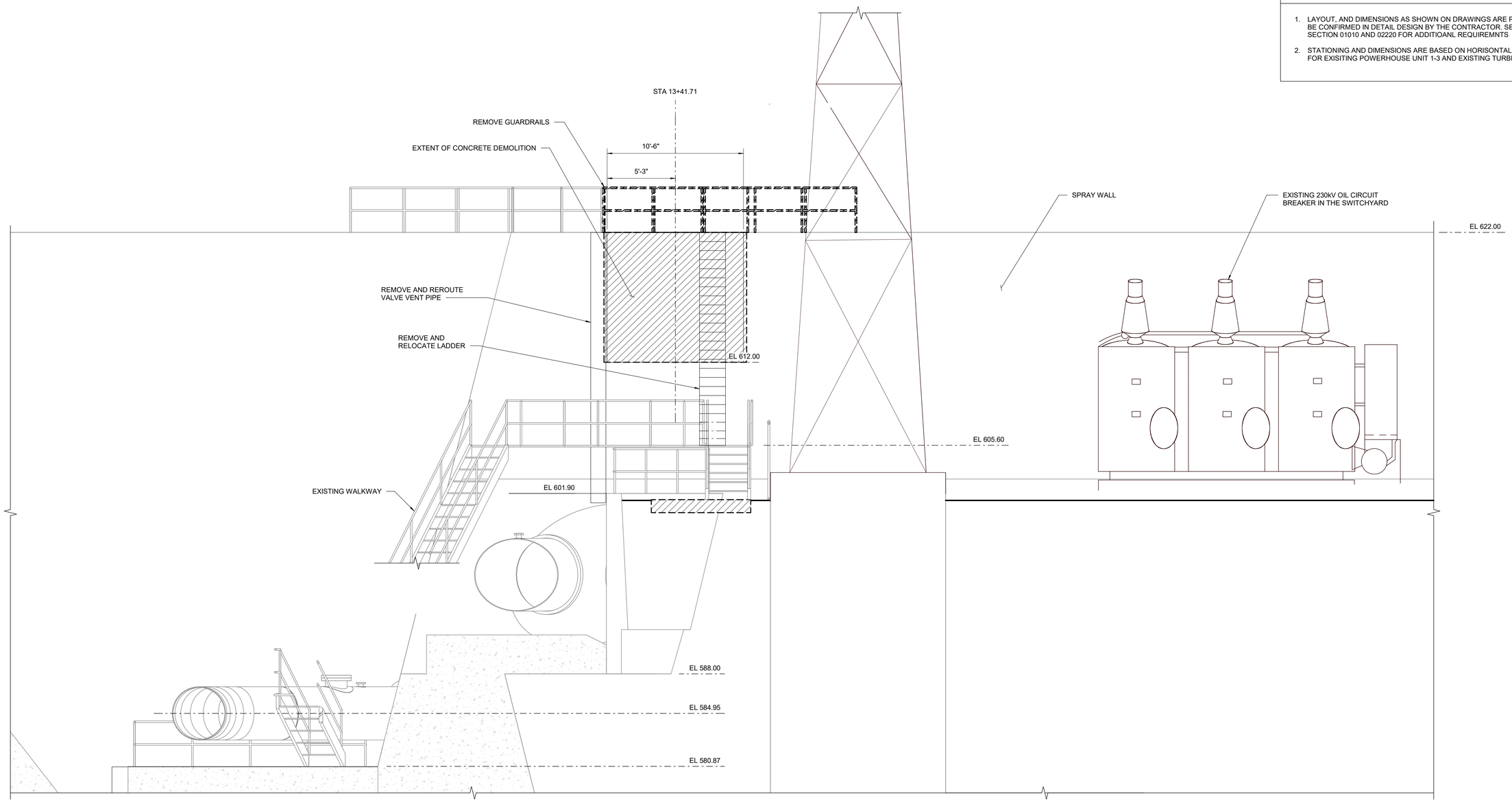
File Name: PF4-PLT-CPL-1004-002 | DNB Dwn. | KMG Chkd. | FAA Dsgn. | 19.04.2024 DD.MM.YYYY

Title
DEMOLITION
EXISTING BYPASS PIPING
ELEVATION

Project No. 224202811
Scale AS SHOWN
Drawing No. PF4-PLT-CPL-1004 - 002
Sheet
Revision 00

GENERAL SHEET NOTES

1. LAYOUT, AND DIMENSIONS AS SHOWN ON DRAWINGS ARE PRELIMINARY AND SHALL BE CONFIRMED IN DETAIL DESIGN BY THE CONTRACTOR. SEE SPECIFICATIONS SECTION 01010 AND 02220 FOR ADDITIOANL REQUIREMNTS
2. STATIONING AND DIMENSIONS ARE BASED ON HORISONTAL PLANE AS ESTABLISHED FOR EXISITING POWERHOUSE UNIT 1-3 AND EXISTING TURBINE BYPASS.



B CPL-1004-001 ELEVATION
SCALE: 1/4" = 1'-0"

PRELIMINARY DESIGN FOR EPC PRICING

Revision	By	Appd	DD.MM.YY

A Issued	By	Appd	DD.MM.YY

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File Name: PF4-PLT-CPL-1004-003

DNB	KMG	FAA	19.04.2024
Dwn.	Chkd.	Dsgn.	DD.MM.YYYY

Title
DEMOLITION
EXISTING BYPASS PIPING
SECTIONS

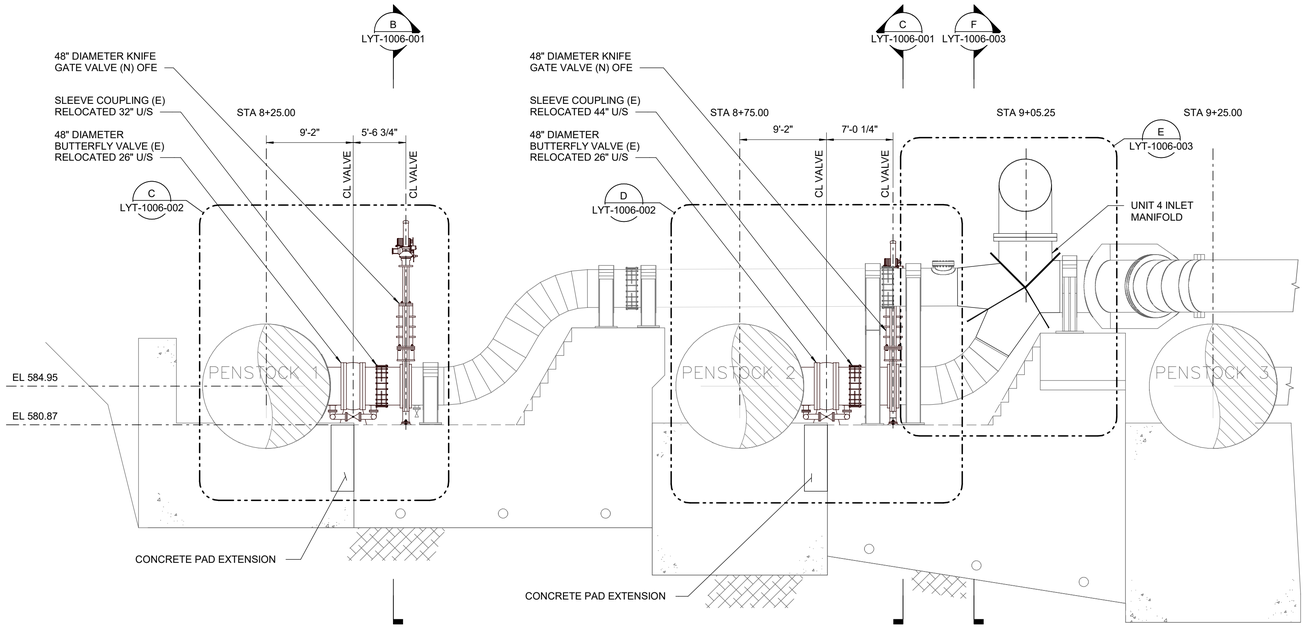
Project No. 224202811
Scale AS SHOWN
Drawing No. PF4-PLT-CPL-1004 - 003
Sheet
Revision 00

GENERAL SHEET NOTES

1. LAYOUT, AND DIMENSIONS AS SHOWN ON DRAWINGS ARE PRELIMINARY AND SHALL BE CONFIRMED IN DETAIL DESIGN BY THE CONTRACTOR. SEE SPECIFICATIONS 01010 AND 02220 FOR ADDITIOANL REQUIREMNTS.
2. STATIONING AND DIMENSIONS ARE BASED ON HORISONTAL PLANE AS ESTABLISHED FOR EXISITING POWERHOUSE UNIT 1-3 AND EXISTING TURBINE BYPASS.
3. INFORMATION IN THIS SHEET SHOULD BE CONSIDERED IN CONJUNCTION WITH CPL-1004-002.

LEGEND

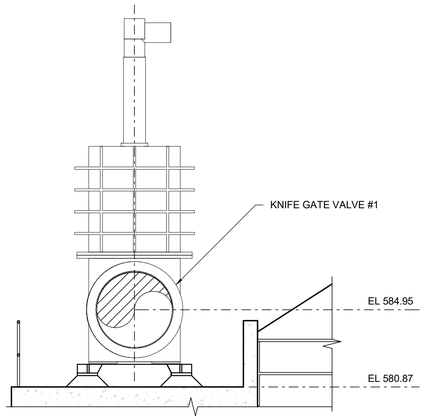
(N) - NEW EQUIPMENT
(E) - EXISTING EQUIPMENT
OFE - OWNER FURNISHED EQUIPMENT



LOOKING UPSTREAM

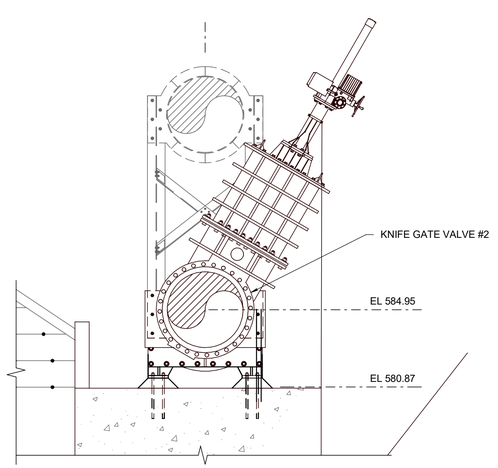
A BYPASS ELEVATION

SCALE: 1/8" = 1'-0"



B BYPASS SECTION

LYT-1006-001 SCALE: 1/4" = 1'-0"



C BYPASS SECTION

LYT-1006-001 SCALE: 1/4" = 1'-0"

PRELIMINARY DESIGN FOR EPC PRICING

Revision	By	Appd	DD.MM.YY

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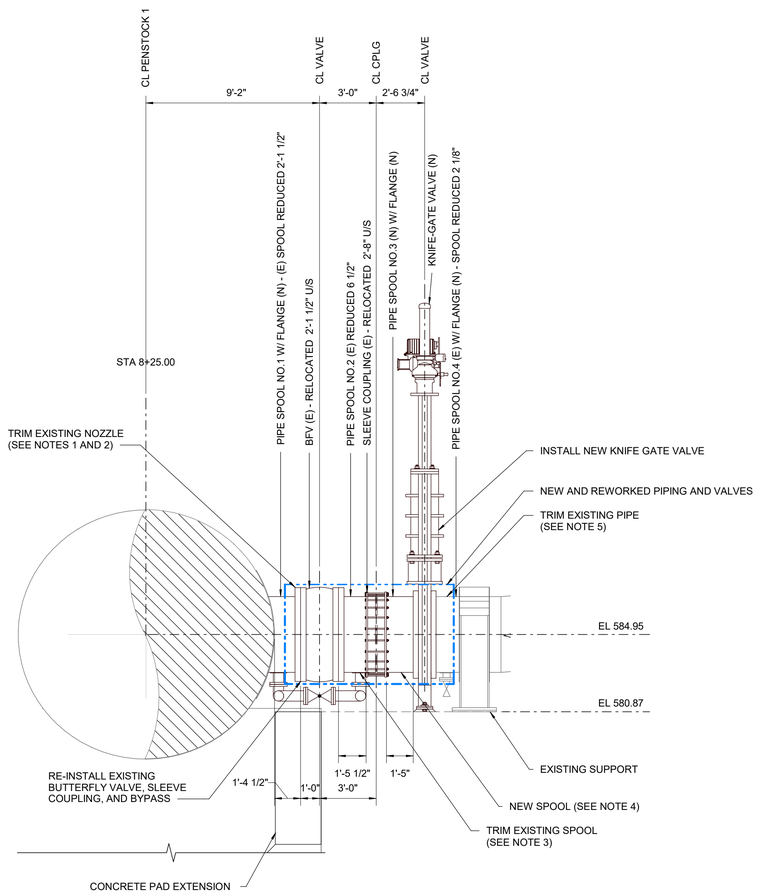
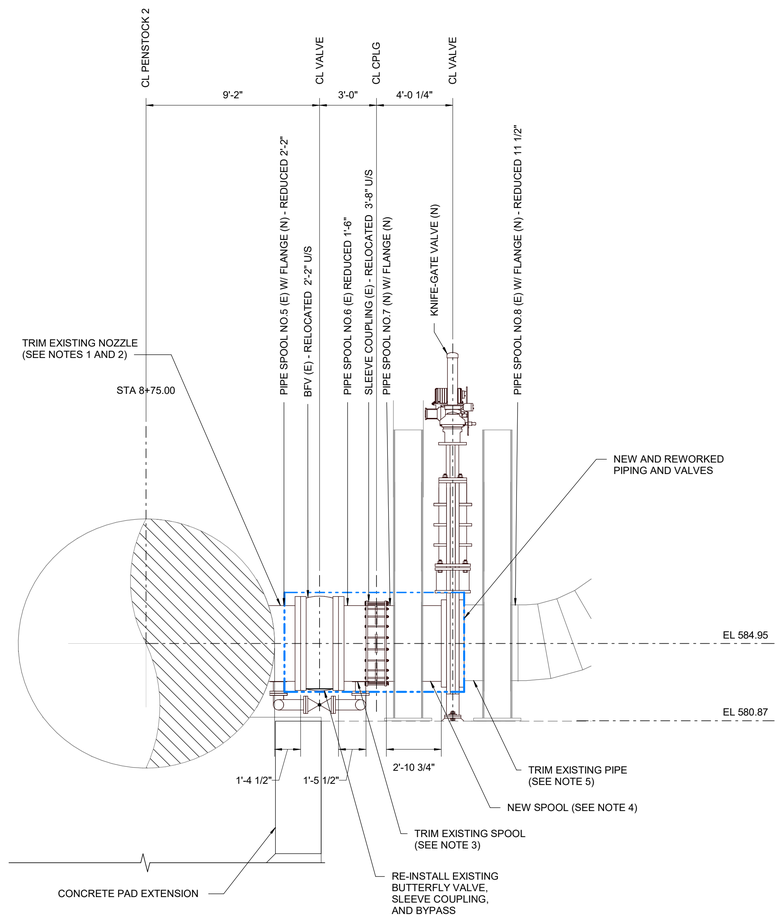
File Name: PF4-PLT-LYT-1006-001 | DNB Dwn. | KMG Chkd. | FAA Dsgn. | 19.04.2024 DD.MM.YYYY

Title

Project No. 224202811
Scale AS SHOWN
Drawing No. PF4-PLT-LYT-1006 - 001
Sheet
Revision 00



C PIPE SECTION
LYT-1006-001 SCALE: 1/4" = 1'-0"



D PIPE SECTION
LYT-1006-001 SCALE: 1/4" = 1'-0"

GENERAL SHEET NOTES

1. FOR ALL PIPE BUTT WELDS USE ASME BOILER AND PRESSURE VESSEL CODE, SECTION VII I DIV, 1 PART UW.
2. ALL FLANGES TO BE AWWA C207 CLASS E.
3. LENGTH OF PIPE SPOOL NO.2 AND NO.6 VARIES AS NECESSARY FOR PROPER FITUP.
4. 6" BFV BYPASS LINES (N) SHALL BE INSTALLED AT THE RELOCATED BFV LOCATIONS. ANY NECESSARY PIPING REINFORCEMENT SHALL BE PROVIDED. (E) BYPASS VALVES MAY BE RE-USED.
5. INFORMATION IN THIS SHEET SHOULD BE CONSIDERED IN CONJUNCTION WITH CPL-1004-002.

LEGEND

(N) - NEW EQUIPMENT
(E) - EXISTING EQUIPMENT
OFE - OWNER FURNISHED EQUIPMENT

PRELIMINARY DESIGN FOR EPC PRICING

Revision	By	Appd	DD.MM.YY

A Issued	By	Appd	DD.MM.YY

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PINE FLAT UNIT 4

KRCD Kings River Conservation District

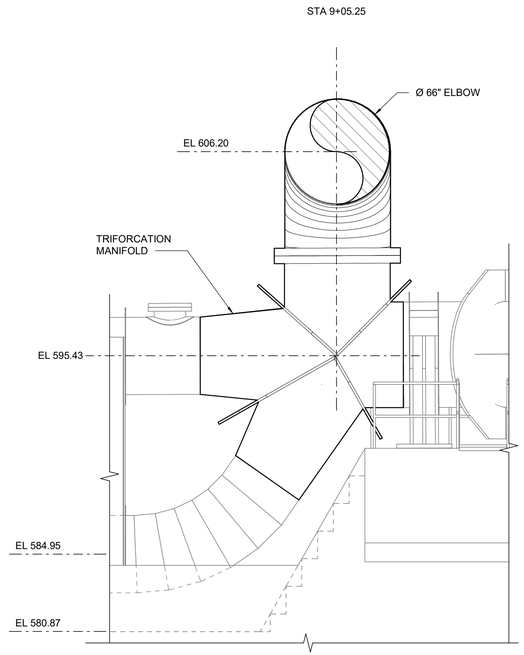
File Name: PF4-PLT-LYT-1006-002

DNB	KMG	FAA	19.04.2024
Dwn.	Chkd.	Dsgn.	DD.MM.YYYY

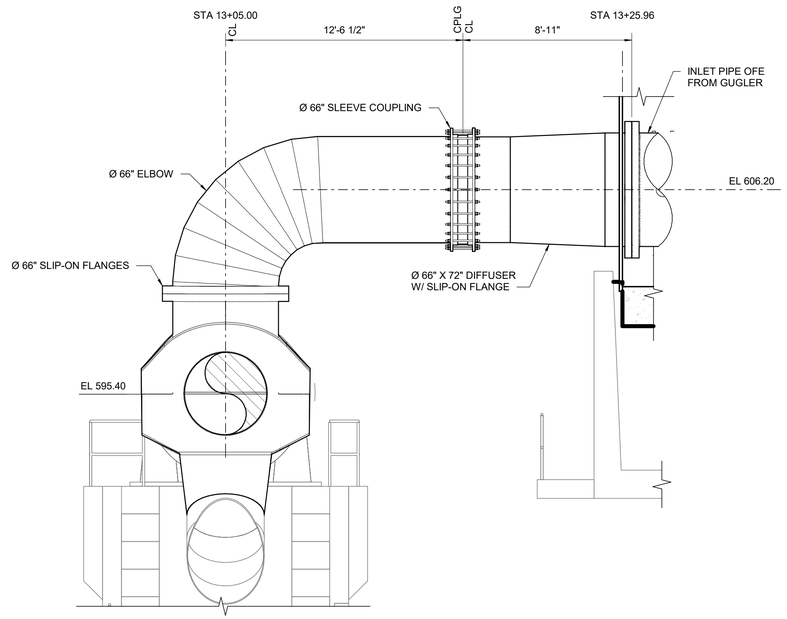
Title
SITE LAYOUT
BYPASS PIPING
PROFILES

Project No.	Scale		
224202811	AS SHOWN		
Drawing No.		Sheet	Revision
PF4-PLT-LYT-1006 -		002	00

ORIGINAL SHEET - ANSI D



E MANIFOLD SECTION
LYT-1006-001 SCALE: 1/4" = 1'-0"



F MANIFOLD SECTION
LYT-1006-001 SCALE: 1/4" = 1'-0"

PRELIMINARY DESIGN FOR EPC PRICING

Revision	By	Appd	DD.MM.YY

Issued	By	Appd	DD.MM.YY
A			

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FRESNO, CALIFORNIA

PINE FLAT UNIT 4

File Name: PF4-PLT-LYT-1006-003

MIS	KMG	FAA	19.04.2024
Dwn.	Chkd.	Dsgn.	DD.MM.YYYY

Title
SITE LAYOUT
MANIFOLD
CONFIGURATION

Project No. 224202811

Scale

Drawing No. PF4-PLT-LYT-1006 -

Sheet 003

Revision 00

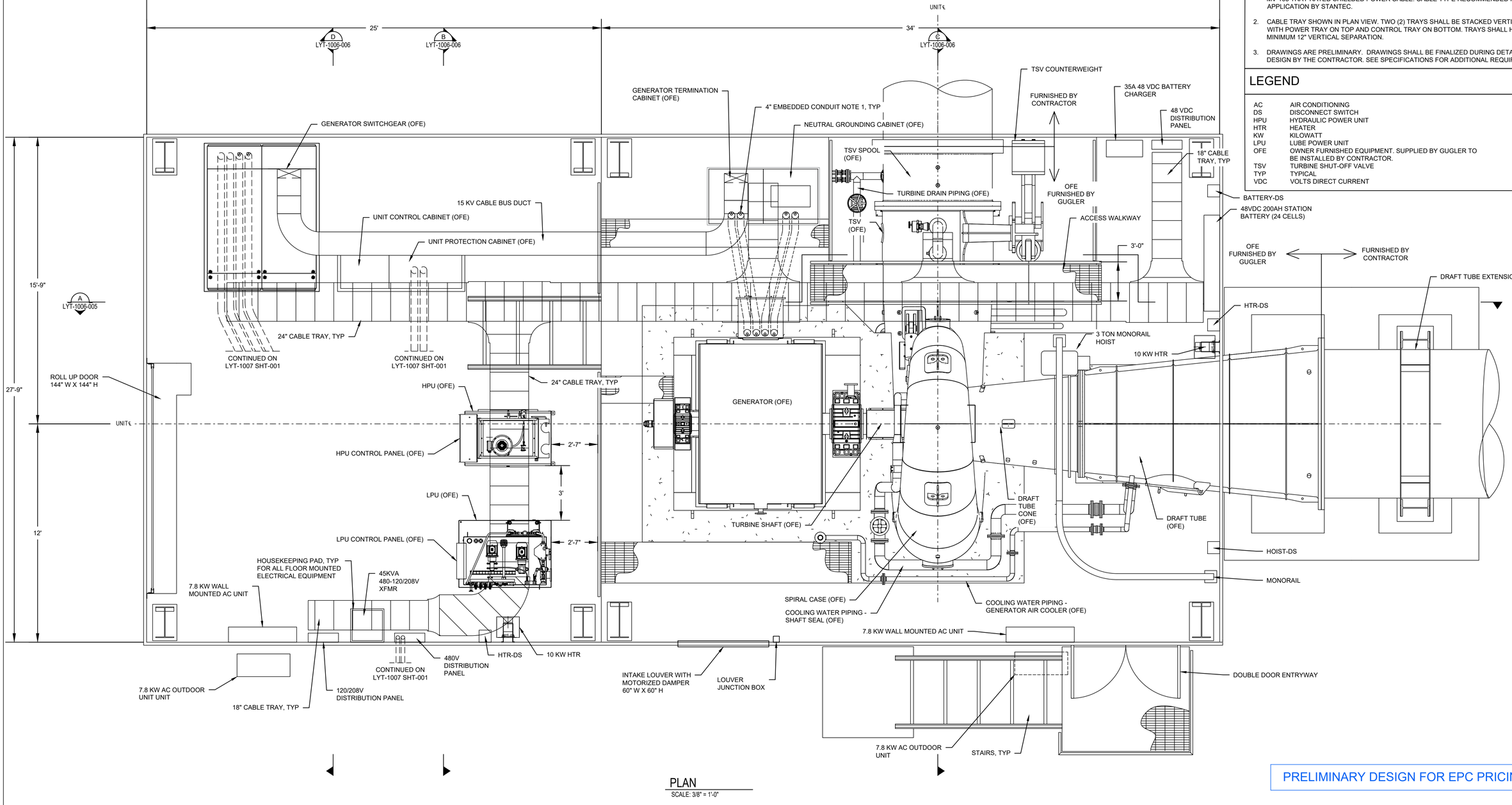
ORIGINAL SHEET - ANSI D

GENERAL SHEET NOTES

1. 2-4" RGS CONDUIT EMBEDDED IN CONCRETE FLOOR WITH 3-1/C 250 KCMIL CABLES/PHASE (TRIPLEXED) PER CONDUIT (ABC-ABC). CABLES SIZED BASED ON 15KV MV-105 TRAY RATED SHIELDED POWER CABLE. CABLE TYPE RECOMMENDED FOR THIS APPLICATION BY STANTEC.
2. CABLE TRAY SHOWN IN PLAN VIEW. TWO (2) TRAYS SHALL BE STACKED VERTICALLY WITH POWER TRAY ON TOP AND CONTROL TRAY ON BOTTOM. TRAYS SHALL HAVE MINIMUM 12" VERTICAL SEPARATION.
3. DRAWINGS ARE PRELIMINARY. DRAWINGS SHALL BE FINALIZED DURING DETAILED DESIGN BY THE CONTRACTOR. SEE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.

LEGEND

AC	AIR CONDITIONING
DS	DISCONNECT SWITCH
HPU	HYDRAULIC POWER UNIT
HTR	HEATER
KW	KILOWATT
LPU	LUBE POWER UNIT
OFE	OWNER FURNISHED EQUIPMENT. SUPPLIED BY GUGLER TO BE INSTALLED BY CONTRACTOR.
TSV	TURBINE SHUT-OFF VALVE
TYP	TYPICAL
VDC	VOLTS DIRECT CURRENT



PLAN
SCALE: 3/8" = 1'-0"

PRELIMINARY DESIGN FOR EPC PRICING

Revision	By	Appd.	DD.MM.YY

Issued	By	Appd.	DD.MM.YY

Permit-Seal

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PINE FLAT UNIT 4

KRCD Kings River Conservation District

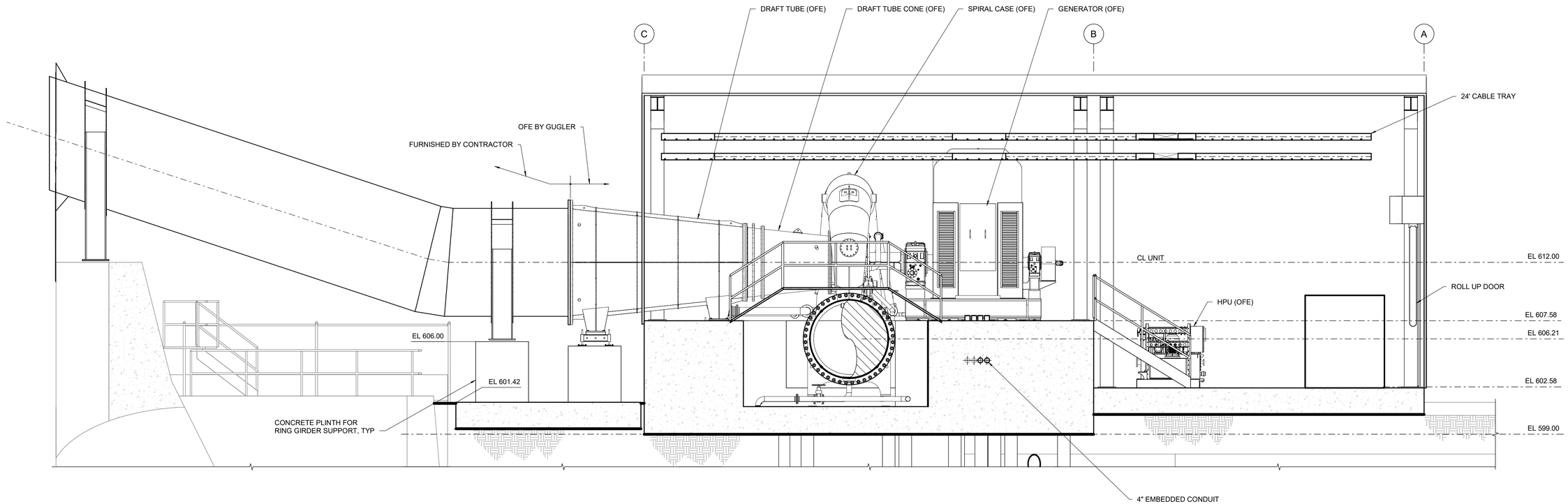
File Name: PF4-PLT-LYT-1006-004 | Dwn. PNG | Chkd. MAH | Dsgn. CFE | 04/19/2024 DD.MM.YYYY

Title
POWERHOUSE
MAJOR EQUIPMENT LAYOUT PLAN

Project No. 224202811
Scale AS SHOWN
Drawing No. PF4-PLT-LYT-1006
Sheet - 004
Revision 00

GENERAL SHEET NOTES

1. MISCELLANEOUS EQUIPMENT ON WALLS OMITTED FOR CLARITY. SEE PF4-PLT-LYT-1006-003 FOR MORE INFORMATION.
2. SEE PRELIMINARY ARRANGEMENT DRAWINGS PREPARED BY GUGLER FOR DETAILS REGARDING BLOCKOUTS FOR SECOND, THIRD, AND FOURTH STAGE CONCRETE WORK AND OTHER ASPECTS OF OWNER FURNISHED EQUIPMENT TO BE INSTALLED BY CONTRACTOR.
3. SEE LIFTING DIAGRAM PREPARED BY GUGLER FOR DETAILS REGARDING LIFTING AND HANDLING TURBINE AND GENERATOR COMPONENTS DURING UNIT ASSEMBLY.
4. SEE SPECIFICATION SECTION 13120 FOR REQUIREMENTS PERTAINING TO THE PRE-ENGINEERED METAL BUILDING AND RELATED SECTIONS 15800 AND 16500 PERTAINING TO HVAC AND LIGHTING.



A LYT-1006-004 SECTION
SCALE: 1/4" = 1'-0"

PRELIMINARY DESIGN FOR EPC PRICING

Revision	By	Appd	DD.MM.YY

Issued	By	Appd	DD.MM.YY
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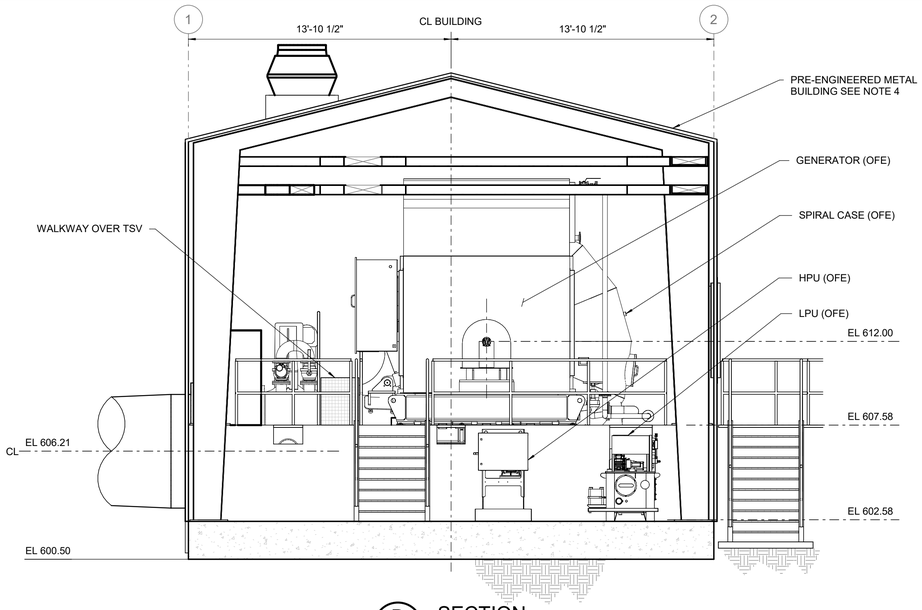
File Name: PF4-PLT-LYT-1006-005

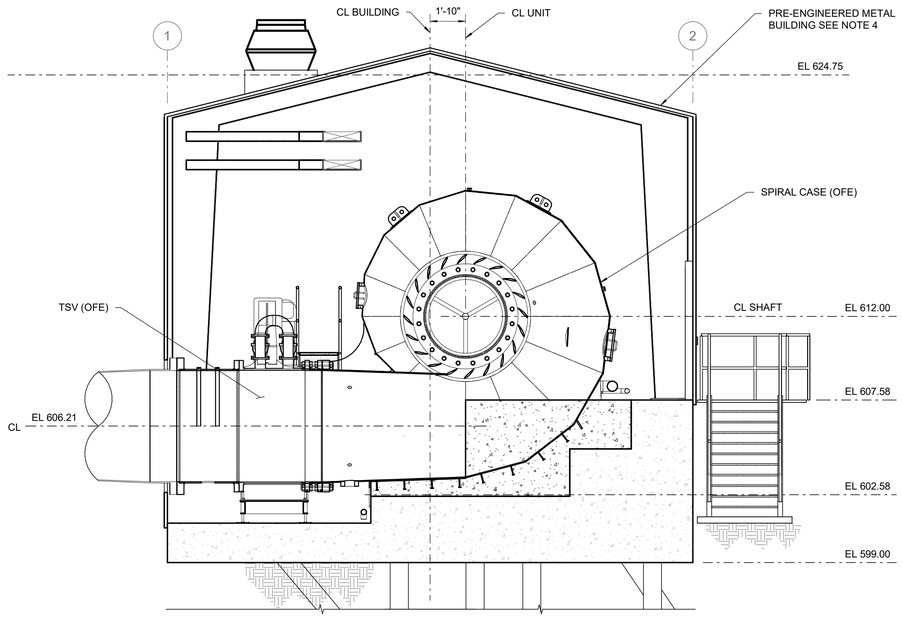
DNB	MAH	CFE	Issue Date
Dwn.	Chkd.	Dsgn.	DD.MM.YYYY

Title
POWERHOUSE
MAJOR EQUIPMENT
TRANSVERSE SECTION

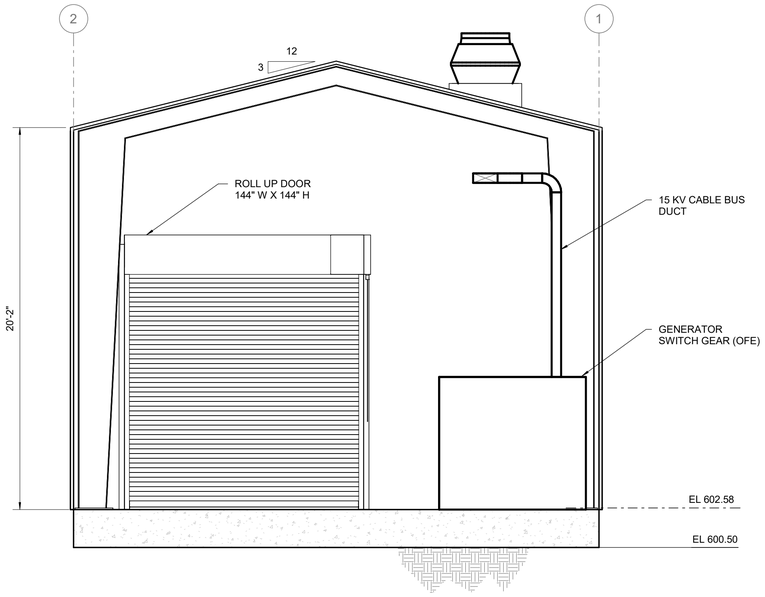
Project No. 224202811
Scale AS SHOWN
Drawing No. PF4-PLT-LYT-1006 -
Sheet 005
Revision 00



B SECTION
LYT-1006-004 SCALE: 1/4" = 1'-0"



C SECTION
LYT-1006-004 SCALE: 1/4" = 1'-0"



D SECTION
LYT-1006-004 SCALE: 1/4" = 1'-0"

GENERAL SHEET NOTES

1. MISCELLANEOUS EQUIPMENT ON WALL OMITTED FOR CLARITY. SEE PF4-PLT LYT-1006-003 FOR MORE INFORMATION.
2. SEE PRELIMINARY ARRANGEMENT DRAWINGS PREPARED BY GUGLER FOR DETAILS REGARDING BLOCKOUTS FOR SECOND, THIRD, AND FOURTH STAGE CONCRETE WORK AND OTHER ASPECTS OF OWNER FURNISHED EQUIPMENT TO BE INSTALLED BY CONTRACTOR.
3. SEE LIFTING DIAGRAM PREPRAED BY GUGLER FOR DETAILS REGARDING LIFTING AND HANDLING TURBINE AND GENERATOR COMPONENTS DURING UNIT ASSEMBLY.

PRELIMINARY DESIGN FOR EPC PRICING

Revision	By	Appd	DD.MM.YY

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KRCD Kings River Conservation District

File Name: PF4-PLT-LYT-1006-006

DNB	MAH	CFE	Issue Date
Dwn.	Chkd.	Dsgn.	DD.MM.YYYY

Title
POWERHOUSE
MAJOR EQUIPMENT
SECTIONS

Project No.	Scale
224202811	AS SHOWN

Drawing No.	Sheet	Revision
PF4-PLT-LYT-1006 -	006	00

ORIGINAL SHEET - ANSI D

EQUIPMENT LIST					
NO.	DESCRIPTION	QTY	SUPPLIED BY	INSTALLED BY	REMARKS
MAJOR EQUIPMENT					
1	TURBINE AND SPIRAL CASE	1	OWNER/GUGLER	CONTRACTOR	
2	DRAFT TUBE CONE	1	OWNER/GUGLER	CONTRACTOR	
3	DRAFT TUBE WITH STEEL SUPPORTS	1	OWNER/GUGLER	CONTRACTOR	
4	GENERATOR	1	OWNER/GAMESA	CONTRACTOR	
5	TSV	1	OWNER/GUGLER	CONTRACTOR	
6	TSV INLET PIPE SPOOL	1	OWNER/GUGLER	CONTRACTOR	
7	GENERATOR MAIN LEAD TERMINATION BOX	1	OWNER/GAMESA	CONTRACTOR	
8	GENERATOR TERMINATION CABINET	1	OWNER/GAMESA	CONTRACTOR	
9	NEUTRAL GROUNDING CABINET	1	OWNER/GAMESA	CONTRACTOR	
POWER DISTRIBUTION					
10	MEDIUM VOLTAGE SWITCHGEAR	1	OWNER/GAMESA	CONTRACTOR	
11	6.9 KV - 230 KV GSU TRANSFORMER	1	CONTRACTOR	CONTRACTOR	
12	480 VAC DISTRIBUTION PANEL	1	CONTRACTOR	CONTRACTOR	
13	480-120/208 VAC DRY TYPE TRANSFORMER (45 KVA)	1	CONTRACTOR	CONTRACTOR	
14	120/208 VAC DISTRIBUTION PANELS	1	CONTRACTOR	CONTRACTOR	
15	48 VDC DISTRIBUTION PANEL	1	CONTRACTOR	CONTRACTOR	
16	48 VDC 200 AH BATTERY	1	CONTRACTOR	CONTRACTOR	
17	48 VDC 35A BATTERY CHARGER	1	CONTRACTOR	CONTRACTOR	
18	BACKUP DIESEL GENERATOR AND FUEL TANK	1	CONTRACTOR	CONTRACTOR	EXISTING EQUIPMENT TO BE RELOCATED
19	SPARE TRANSFORMER	1	CONTRACTOR	CONTRACTOR	EXISTING EQUIPMENT TO BE RELOCATED
CONTROLS AND PROTECTION					
20	GOVERNOR	1	OWNER/GUGLER	CONTRACTOR	
21	ACCUMULATOR	1	OWNER/GUGLER	CONTRACTOR	
22	GOVERNOR CONTROL CABINET	1	OWNER/GUGLER	CONTRACTOR	
23	TSV CONTROLLER	1	OWNER/GUGLER	CONTRACTOR	
24	GENERATOR PROTECTION PANEL	1	OWNER/GUGLER	CONTRACTOR	
25	UNIT CONTROL CABINET	1	OWNER/GUGLER	CONTRACTOR	
26	RIO CABINET	1	CONTRACTOR	CONTRACTOR	
AUXILIARY EQUIPMENT AND SYSTEMS					
27	HPU	1	OWNER/GUGLER	CONTRACTOR	
28	LPU	1	OWNER/GUGLER	CONTRACTOR	
29	COOLING WATER HEADER	1	OWNER/GUGLER	CONTRACTOR	SUPPLY: 4", RETURN: 4"
30	COOLING WATER PIPING - GENERATOR AIR COOLER	1	OWNER/GUGLER	CONTRACTOR	SUPPLY: 2 1/2", RETURN: 2 1/2"
31	COOLING WATER PIPING - LPU OIL COOLER	1	OWNER/GUGLER	CONTRACTOR	SUPPLY: 1 1/4", RETURN: 1 1/4"
32	COOLING WATER PIPING - SHAFT SEAL	1	OWNER/GUGLER	CONTRACTOR	SUPPLY: X", RETURN: X"
33	HYDRAULIC PIPING - WICKET GATE SERVOMOTOR	1	OWNER/GUGLER	CONTRACTOR	SUPPLY: 1/2", RETURN: 3/4"
34	HYDRAULIC PIPING - TSV SERVOMOTOR	1	OWNER/GUGLER	CONTRACTOR	SUPPLY: 5/8", RETURN: 1"
35	LUBE OIL PIPING - INBOARD GENERATOR BEARING	1	OWNER/GUGLER	CONTRACTOR	SUPPLY: 3 X 3/4", RETURN: 4"
36	LUBE OIL PIPING - OUTBOARD GENERATOR BEARING	1	OWNER/GUGLER	CONTRACTOR	SUPPLY: 5/8", RETURN: 1 1/4"
37	LUBE OIL RETURN HEADER	1	OWNER/GUGLER	CONTRACTOR	RETURN: 6"
38	GENERATOR BRAKE OIL PIPING	1	OWNER/GUGLER	CONTRACTOR	SUPPLY: 1 1/4", RETURN: 1 1/4"
39	HEADCOVER PRESSURE RELIEF PIPING	1	OWNER/GUGLER	CONTRACTOR	
40	SHAFT SEAL DRAIN PIPING	1	OWNER/GUGLER	CONTRACTOR	
41	TURBINE DRAIN PIPING	1	OWNER/GUGLER	CONTRACTOR	
SAFETY AND MONITORING					
42	FIRE DETECTION/ALARM PANEL	1	CONTRACTOR	CONTRACTOR	
ADDITIONAL COMPONENTS					
43	KNIFE GATE VALVES	1	CONTRACTOR	CONTRACTOR	
44	ROLL-UP DOOR	1	CONTRACTOR	CONTRACTOR	
45	INTAKE LOUVER AND DAMPER	1	CONTRACTOR	CONTRACTOR	60"X60"
46	EXHAUST FAN AND DAMPER	2	CONTRACTOR	CONTRACTOR	
47	MONORAIL HOIST AND BEAM	1	CONTRACTOR	CONTRACTOR	3 TON
48	UNIT HEATERS	2	CONTRACTOR	CONTRACTOR	10KW EACH
49	AC UNITS	2	CONTRACTOR	CONTRACTOR	7.8KW EACH
50	ELECTRICAL RACEWAYS	1	CONTRACTOR	CONTRACTOR	
51	GROUNDING	1	CONTRACTOR	CONTRACTOR	

GENERAL SHEET NOTES

1. DRAWINGS ARE PRELIMINARY. DRAWINGS SHALL BE FINALIZED DURING DETAILED DESIGN BY THE CONTRACTOR. SEE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.

LEGEND

AH	AMP-HOUR
GSU	GENERATOR STEP-UP
HPU	HYDRAULIC POWER UNIT
KV	KILOVOLT
LPU	LUBE POWER UNIT
NTS	NOT TO SCALE
RIO	REMOTE INPUT/OUTPUT
TSV	TURBINE SHUTOFF VALVE
VAC	VOLTS ALTERNATING CURRENT

PRELIMINARY DESIGN FOR EPC PRICING

Revision	By	Appd.	DD.MM.YY

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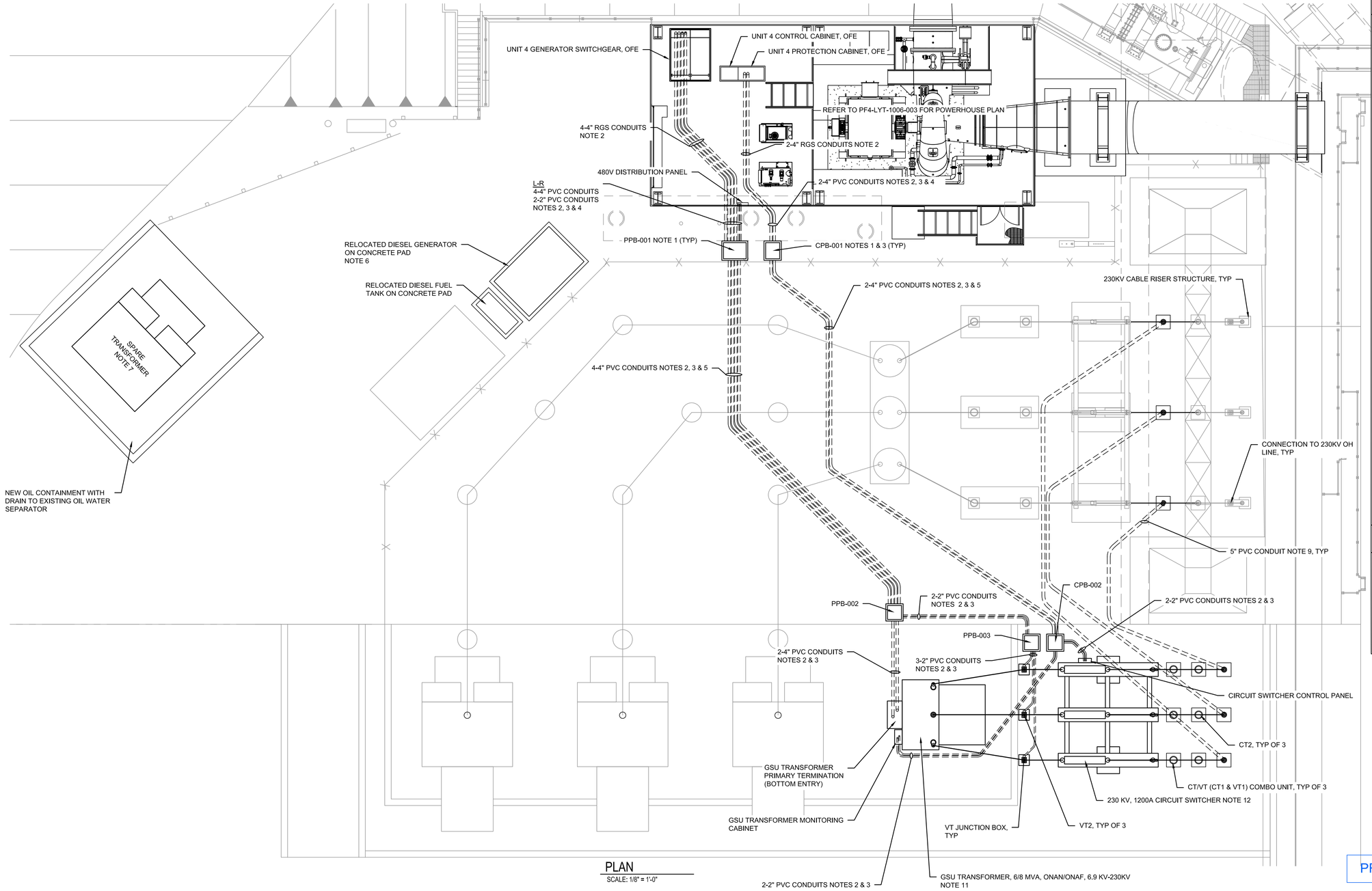
PINE FLAT UNIT 4

File Name: PF4-PLT-LYT-1006-007	CFE Dwn.	MAH Chkd.	MAH Dsgn.	04/19/2024 DD.MM.YYYY

Title
POWERHOUSE
MAJOR EQUIPMENT LIST

Project No.	Scale		
224202811	NTS		
Drawing No.		Sheet	Revision
PF4-PLT-LYT-1006	- 007		00



PLAN
SCALE: 1/8" = 1'-0"

GENERAL SHEET NOTES

1. PPB AND CPB SIZES:
   a. PPB-001 - 48"W X 32"L X 24"D
   b. PPB-002 - 32"W X 32"L X 24"D
   c. PPB-003 - 32"W X 32"L X 24"D
   d. CPB-001 - 32"W X 32"L X 24"D
   e. CPB-002 - 32"W X 32"L X 24"D
2. CONDUITS EMBEDDED IN POWERHOUSE SLAB AND EXTERNALLY MOUNTED SHALL BE RGS. UNDERGRDUND CONDUITS EXTERNAL TO UNIT 4 POWERHOUSE FOUNDATION SHALL BE CONCRETE ENCASED PVC WITH MINIMUM OF 3 INCHES OF CONCRETE ENCASEMENT. CONDUIT SHALL TRANSITION FROM RGS TO PVC AT GRADE FOR VERTICAL TRANSITIONS AND AT TRANSITION FROM FOUNDATION TO BACKFILL.
3. CONCRETE ENCASED CONDUITS SHALL BE AT A MINIMUM DEPTH OF 30 IN. CONDUITS SHALL BE SLOPED TO DRAIN TO THE PULL BOXES. PULL BOXES SHALL BE PROVIDED WITH ABILITY TO DRAIN INTO BACKFILL.
4. CONDUITS SHALL BE ROUTED BETWEEN OIL WATER SEPARATOR MANHOLE THROATS.
5. CONTRACTOR SHALL COORDINATE CONDUIT ROUTING INSTALLATION WITH EXISTING SWITCHYARD UNDERGROUND SERVICES.
6. DIESEL GENERATOR LOCATION IS PRELIMINARY. RACEWAYS AND CABLE SHALL BE DESIGNED, FURNISHED AND INSTALLED FOR POWER, CONTROL, AND MONITORING WHEN FINAL LOCATION HAS BEEN DETERMINED AND APPROVED BY OWNER. FUEL TANK REFURBISHMENT / REPLACEMENT, INCLUDING EXTENSION / MODIFICATION OF THE FUEL SUPPLY PIPING, SHALL BE DESIGNED, FURNISHED AND INSTALLED FOR POWER, CONTROL, AND MONITORING WHEN FINAL LOCATION HAS BEEN DETERMINED AND APPROVED BY OWNER.
7. SPARE TRANSFORMER SHALL BE RELOCATED TO OWNER APPROVED LOCATION BY CONTRACTOR.
8. EXISTING FACILITIES AND EQUIPMENT ARE SHOWN AS SCREENED (LIGHTER COLOR).
9. CONDUITS FOR 230KV CABLES SHALL BE DIRECT BURIED AT A MINIMUM DEPTH OF 42 IN. COORDINATE DEPTH OF CONDUITS WITH CONCRETE FOUNDATIONS. CONDUITS SIZED TO ACCOMODATE 170 KV XLPE/CWS/LAT/PE 90°C COPPER CABLE (240 MM²).
10. SUBSTATION EQUIPMENT IS SHOWN CONCEPTUALLY AND NOT FOR CONSTRUCTION. CLEARANCES AND ENGINEERING DESIGN SHALL BE PROVIDED TO VERIFY SPACING REQUIREMENTS FOR ALL EQUIPMENT BASED ON SUPPLIED EQUIPMENT DIMENSIONS.
11. CONTRACTOR SHALL COORDINATE INSTALLATION OF UNIT 4 GSU TRANSFORMER WITH EXISTING TRANFORMER FOUNDATION. DESIGN SHALL BE PROVIDED FOR MODIFICATIONS REQUIRED FOR INSTALLATION.
12. CIRCUIT SWITCHER CONCRETE FOUNDATION DESIGN SHALL BE PROVIDED BASED ON SUPPLIED EQUIPMENT REQUIREMENTS.
13. DRAWINGS ARE PRELIMINARY. DRAWINGS SHALL BE FINALIZED DURING DETAILED DESIGN BY THE CONTRACTOR. SEE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.

LEGEND

CPB	CONTROL PULL BOX
CT	CURRENT TRANSFORMER
GSU	GENERATOR STEP-UP
KV	KILOVOLT
MVA	MEGA VOLT AMPERE
OFE	OWNER FURNISHED EQUIPMENT. SUPPLIED BY GUGLER TO BE INSTALLED BY CONTRACTOR.
PPB	POWER PULL BOX
PVC	POLYVINYL CHLORIDE
RGS	RIGID GALVANIZED STEEL
VT	VOLTAGE TRANSFORMER

PRELIMINARY DESIGN FOR EPC PRICING

Revision	By	Appd.	DD.MM.YY

Issued	By	Appd.	DD.MM.YY

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FRESNO, CALIFORNIA
PINE FLAT UNIT 4

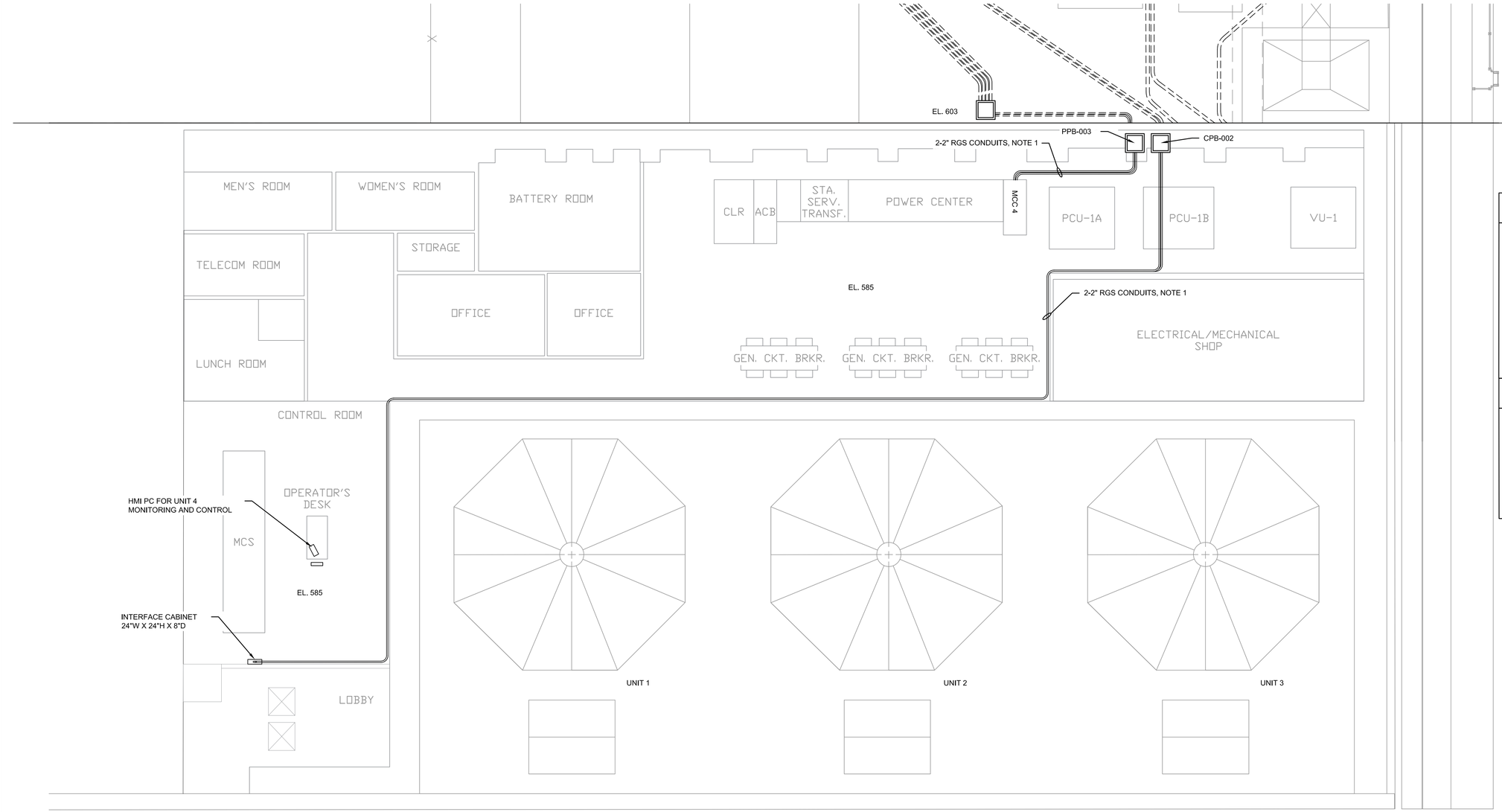
KRCD Kings River Conservation District

File Name: PF4-PLT-LYT-1007_001	PNG Dwn.	CFE Chkd.	CFE Dsgn.	04/19/2024 DD.MM.YYYY

Title
230 KV SWITCHYARD LAYOUT
PLAN VIEW

Project No.	Scale		
224202811	AS SHOWN		
Drawing No.	Sheet		Revision
PF4-PLT-LYT-1007	- 001		00

ORIGINAL SHEET - ANSI D



PLAN
SCALE: 1/8" = 1'-0"

GENERAL SHEET NOTES

1. CONDUITS ROUTED FROM CPB-002 TO THE EXISTING MAIN POWERHOUSE CONTROL ROOM INTERFACE CABINET FOR FIBER OPTIC COMMUNICATION CABLE SHALL BE EXTERNALLY MOUNTED RGS CONDUITS, OR AS DIRECTED BY OWNER.
2. CONDUITS ROUTED FROM PPB-003 TO MCC 4 FOR 480V 200A SUPPLY TO UNIT 4 POWERHOUSE (250 KCMIL + #2 AWG GND) SHALL BE EXTERNALLY MOUNTED RGS CONDUITS, OR AS DIRECTED BY OWNER.
3. EXISTING FACILITIES AND EQUIPMENT ARE SHOWN AS SCREENED (LIGHTER COLOR).
4. DRAWINGS ARE PRELIMINARY. DRAWINGS SHALL BE FINALIZED DURING DETAILED DESIGN BY THE CONTRACTOR. SEE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.

LEGEND

CPB	CONTROL PULL BOX
EL	ELEVATION
GND	GROUND
HMI	HUMAN MACHINE INTERFACE
MCC	MOTOR CONTROL CENTER
OFE	OWNER FURNISHED EQUIPMENT. SUPPLIED BY GUGLER TO BE INSTALLED BY CONTRACTOR.
PC	PERSONAL COMPUTER
PPB	POWER PULL BOX
RGS	RIGID GALVANIZED STEEL

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File Name:	PF4-PLT-LYT-1007_002	PNG Dwn.	CFE Chkd.	CFE Dsgn.	04/19/2024 DD.MM.YYYY

Title
230 KV SWITCHYARD LAYOUT & MAIN POWERHOUSE PLAN VIEW

Project No.	Scale		
224202811	AS SHOWN		
Drawing No.	Sheet		Revision
PF4-PLT-LYT-1007	- 002		00

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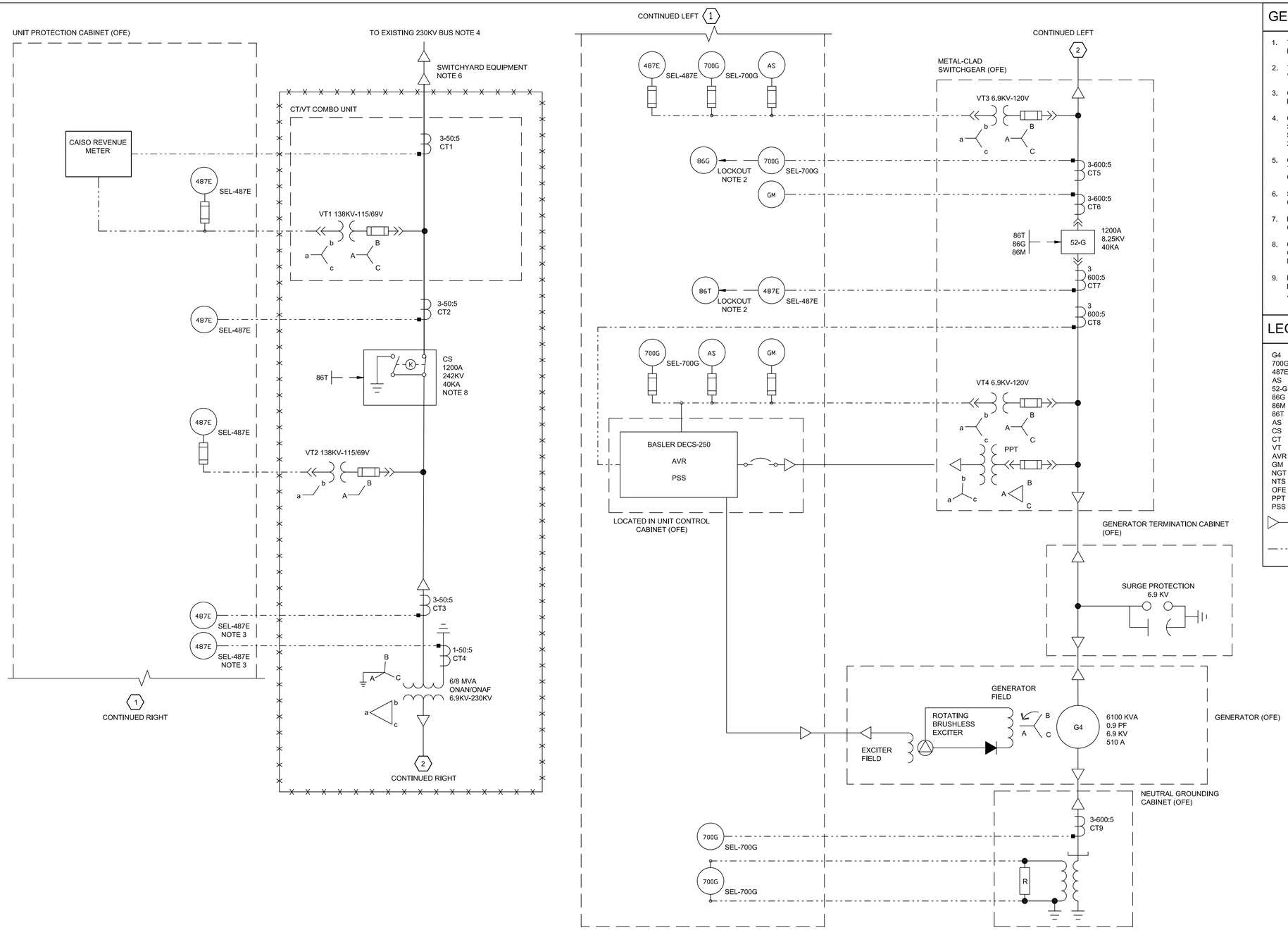

GENERAL SHEET NOTES

1. THE SYNCHRONISM CHECK FUNCTION FOR AUTO SYNCHRONIZING SHALL BE PROVIDED WITH SEL-700G RELAY.
2. 700G AND 487E RELAY OUTPUTS FOR CLOSURE AND SHUTDOWN SHALL BE VIA THE 86G AND 86T LOCKOUT RELAYS, RESPECTIVELY.
3. CTS FOR 50N/51N NEUTRAL OVERCURRENT; 87N RESTRICTED EARTH FAULT PROTECTION.
4. CONTRACTOR SHALL VERIFY, WITH OWNER SUPPORT, THAT THERE IS SUFFICIENT CAPACITY IN THE EXISTING 230KV BUS FOR THE ADDITIONAL SUPPLY FROM UNIT #4. CONNECTION SHALL BE MADE TO THE EXISTING 230KV TAKE-OFF TOWER.
5. OWNER-FURNISHED EQUIPMENT (0FE) FURNISHED BY TURBINE-GENERATOR SUPPLIER (GUGLER) SHALL BE INSTALLED BY CONTRACTOR.
6. SWITCHYARD EQUIPMENT TO BE FURNISHED AND INSTALLED BY CONTRACTOR.
7. FIELD INTERCONNECTION CABLES TO BE FURNISHED AND INSTALLED BY CONTRACTOR.
8. CIRCUIT SWITCH SHALL BE PROVIDED WITH KIRK-KEY INTERLOCK FOR GROUND SWITCH WHEN EQUIPMENT IS DISCONNECTED FOR MAINTENANCE.
9. DRAWINGS ARE PRELIMINARY. DRAWINGS SHALL BE FINALIZED DURING DETAILED DESIGN BY THE CONTRACTOR. SEE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.

LEGEND

G4	UNIT 4 GENERATOR
700G	MULTIFUNCTION GENERATOR RELAY
487E	MULTIFUNCTION TRANSFORMER RELAY
AS	AUTOMATIC SYNCHRONIZER
52-G	GENERATOR CIRCUIT BREAKER (GCB)
86G	GENERATOR LOCKOUT RELAY (ELECTRICAL)
86M	GENERATOR LOCKOUT RELAY (MECHANICAL)
86T	TRANSFORMER LOCKOUT RELAY
AS	AUTOMATIC SYNCHRONIZER
CS	CIRCUIT SWITCH
CT	CURRENT TRANSFORMER
VT	VOLTAGE TRANSFORMER
AVR	AUTOMATIC VOLTAGE REGULATOR
GM	GENERATOR METER
NGT	NEUTRAL GROUNDING TRANSFORMER
NTS	NOT TO SCALE
OFE	OWNER FURNISHED EQUIPMENT
PPT	POWER POTENTIAL TRANSFORMER
PSS	POWER SYSTEM STABILIZER

POWER CABLE, NOTE 7

CT INSTRUMENTATION & PT POWER CABLE, NOTE 7

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Revision	By	Appd.	DD.MM.YY

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PINE FLAT UNIT 4

File Name: PF4-PLT-DIA-1008-001	PNG Dwn.	CFE Chkd.	CFE Dsgn.	04/19/2024 DD.MM.YYYY

Title
PINE FLAT UNIT 4
ONE LINE DIAGRAM

Project No.	Scale	
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Drawing No.	Sheet	Revision
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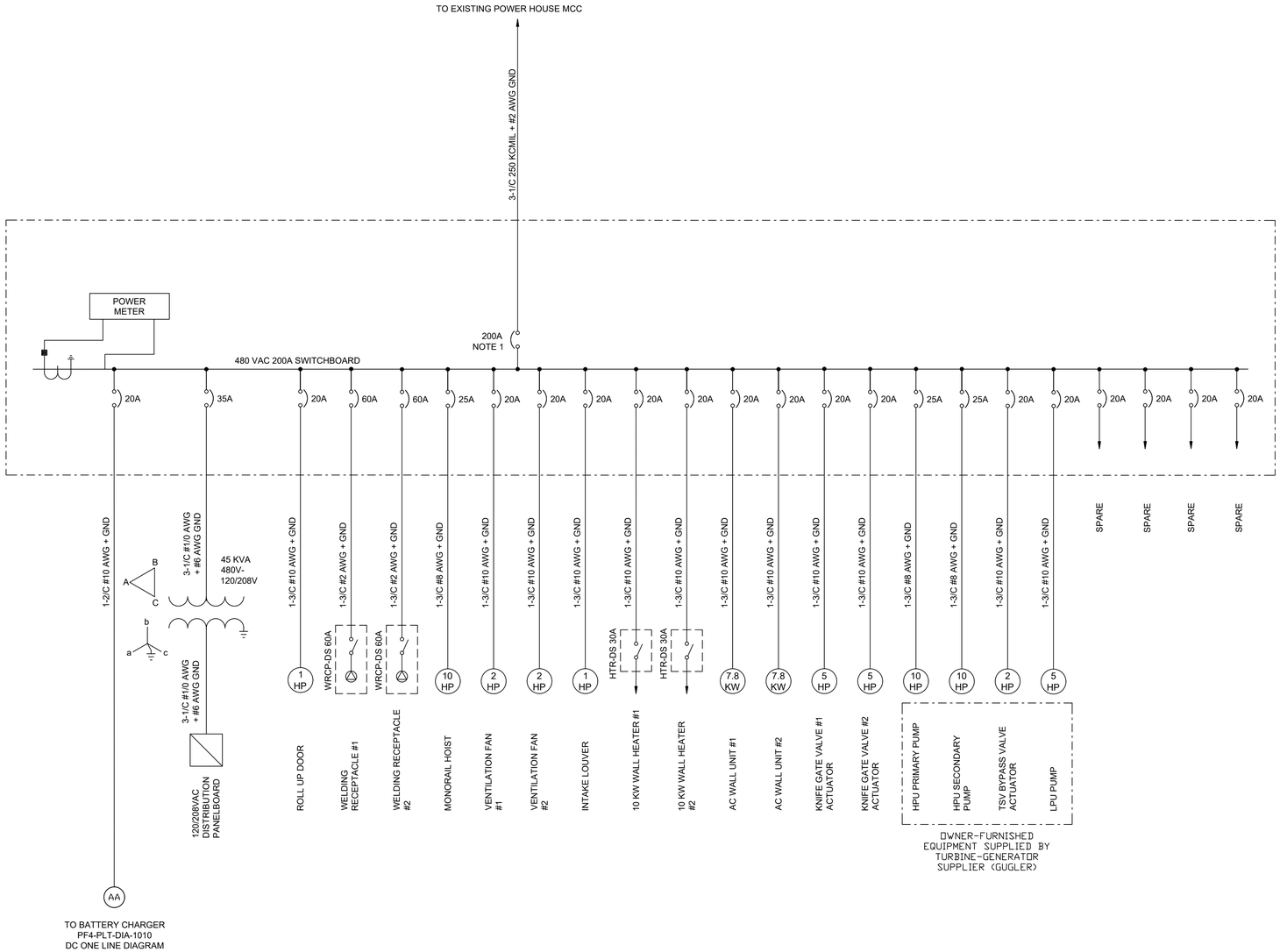

GENERAL SHEET NOTES

1. PANEL SIZING AND ANTICIPATED LOADS HAVE BEEN ESTIMATED. CABLE SIZE, BREAKER TRIP RATINGS, AND ESTIMATED LOADS SHALL BE UPDATED ONCE FINAL EQUIPMENT HAS BEEN SELECTED AND VENDOR DATA HAS BEEN PROVIDED FOR SUPPLIED EQUIPMENT.
2. DRAWINGS ARE PRELIMINARY. DRAWINGS SHALL BE FINALIZED DURING DETAILED DESIGN BY THE CONTRACTOR. SEE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.

LEGEND

DS	DISCONNECT SWITCH
HP	HORSE POWER
HPU	HYDRAULIC POWER UNIT
HTR	HEATER
KVA	KILO VOLT-AMPERE
KW	KILOWATT
LPU	LUBE POWER UNIT
MCC	MOTOR CONTROL CENTER
NTS	NOT TO SCALE
TSV	TURBINE SHUTOFF VALVE
VAC	VOLTS ALTERNATING CURRENT
WRCP	WELDING RECEPTACLE

PRELIMINARY DESIGN FOR EPC PRICING

Revision	By	Appd.	DD.MM.YY
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Issued	By	Appd.	DD.MM.YY

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File Name: PF4-PLT-DIA-1009-001	PNG Dwn.	CFE Chkd.	CFE Dsgn.	04/19/2024 DD.MM.YYYY

Title
STATION SERVICE ONE LINE DIAGRAM

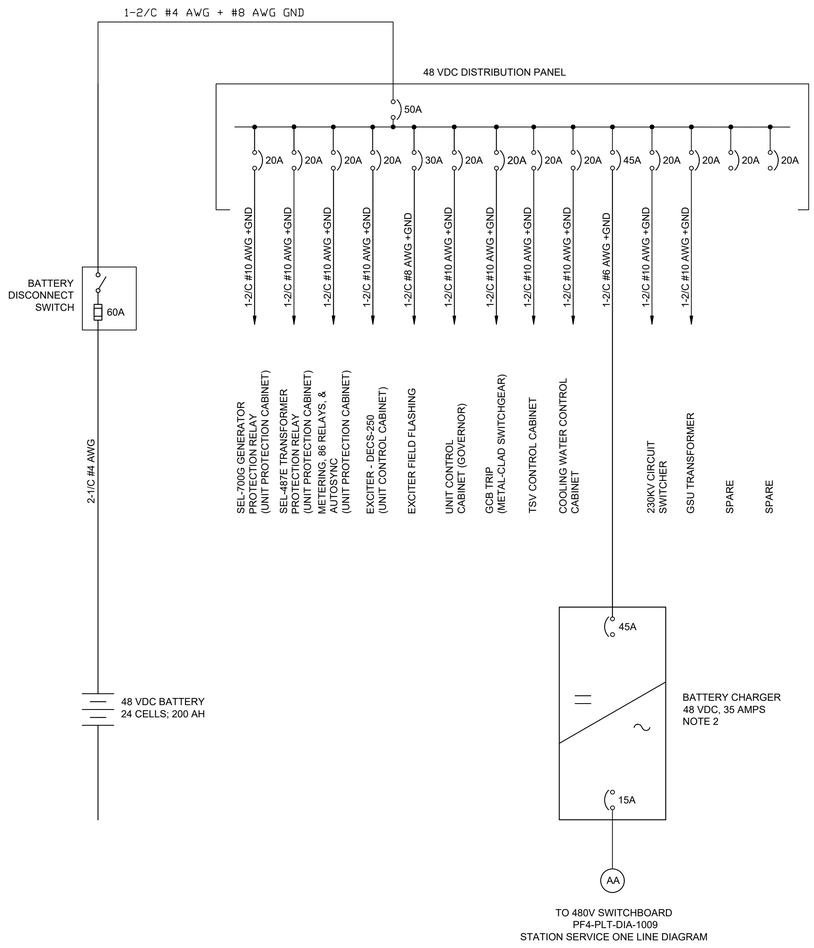
Project No.	Scale	
224202811	NTS	
Drawing No.	Sheet	Revision
PF4-PLT-DIA-1009	- 001	00

GENERAL SHEET NOTES

1. PANEL SIZING AND ANTICIPATED LOADS HAVE BEEN ESTIMATED. CABLE SIZE, BREAKER TRIP RATINGS, AND ESTIMATED LOADS SHALL BE UPDATED ONCE FINAL EQUIPMENT HAS BEEN SELECTED AND VENDOR DATA HAS BEEN PROVIDED FOR SUPPLIED EQUIPMENT.
2. 35 AMP BATTERY CHARGER SIZED FOR 12 HOUR CHARGE TIME FOR 200 AH BATTERY.
3. DRAWINGS ARE PRELIMINARY. DRAWINGS SHALL BE FINALIZED DURING DETAILED DESIGN BY THE CONTRACTOR. SEE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.

LEGEND

AH	AMP-HOUR
CW	COOLING WATER
GCB	GENERATOR CIRCUIT BREAKER
NTS	NOT TO SCALE
RIO	REMOTE INPUT/OUTPUT
TSV	TURBINE SHUTOFF VALVE
VDC	VOLT DIRECT CURRENT



PRELIMINARY DESIGN FOR EPC PRICING

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2024/04/19 2:31 PM By: Eden, Christopher

Revision	By	Appd.	DD.MM.YY

Issued	By	Appd.	DD.MM.YY

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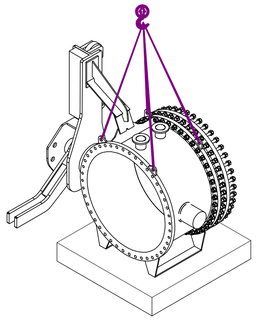
FRESNO, CALIFORNIA
PINE FLAT UNIT 4

File Name:	PNG	CFE	CFE	04/19/2024
PF4-PLT-DIA-1010-001	Dwn.	Chkd.	Dsgn.	DD.MM.YYYY

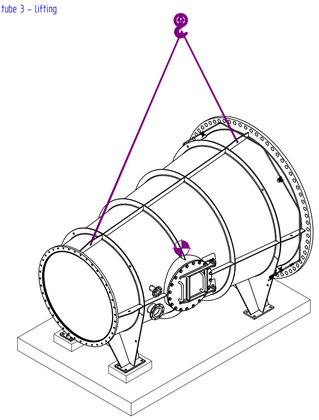
Title
48 VDC SYSTEM
ONE LINE DIAGRAM

Project No.	Scale		
224202811	NTS		
Drawing No.		Sheet	Revision
PF4-PLT-DIA-1010	- 001		00

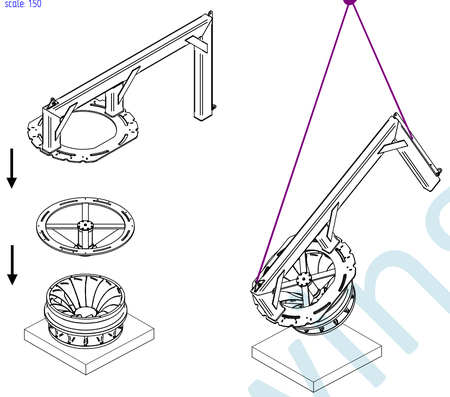
description butterfly valve – lifting
weight: 10.000 kg
scale: 150



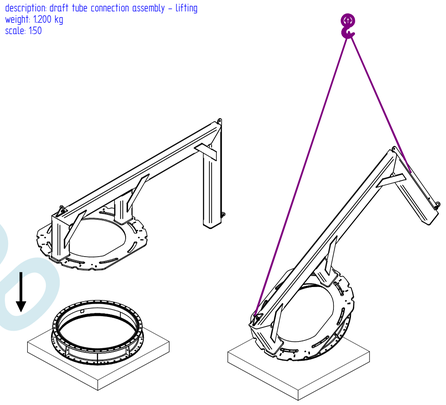
description draft tube 3 – lifting
weight: 4.000 kg
scale: 150



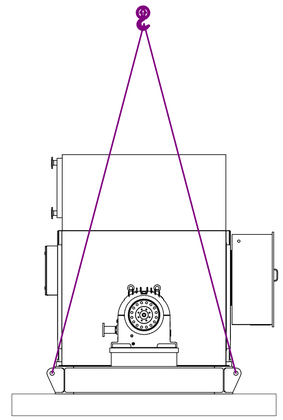
description runner lifting – assembly
weight: 2.900 kg
scale: 150



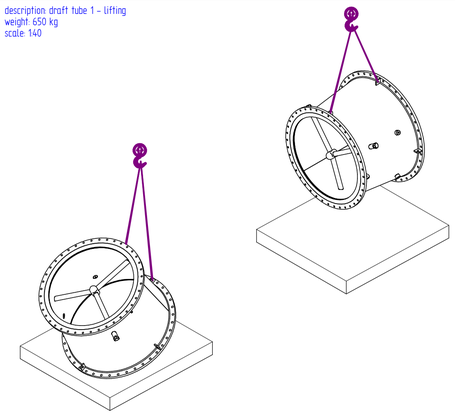
description draft tube connection assembly – lifting
weight: 1.200 kg
scale: 150



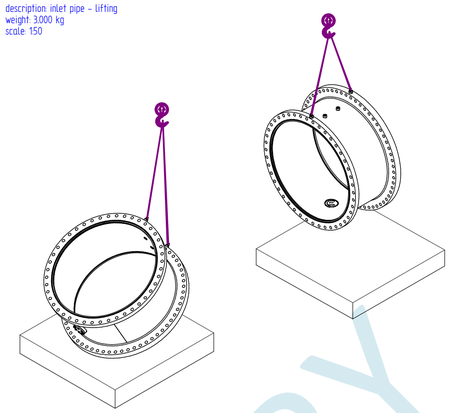
description generator – lifting
weight: 40.000 kg
scale: 150



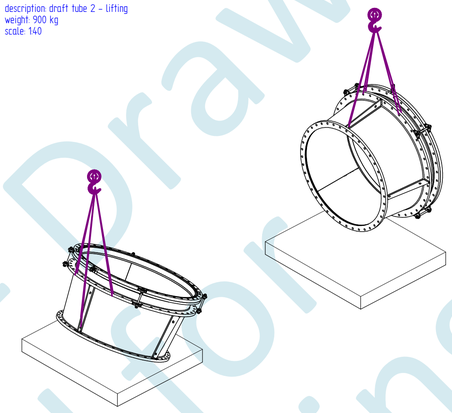
description draft tube 1 – lifting
weight: 650 kg
scale: 140



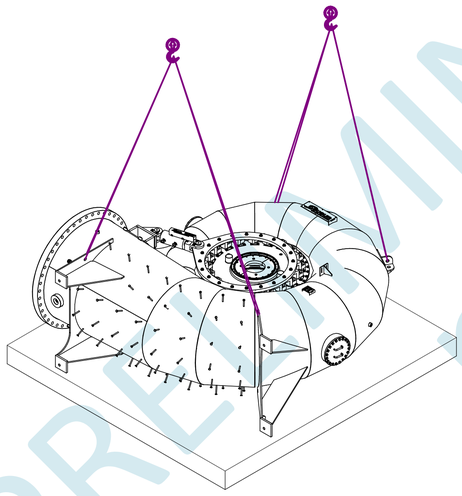
description inlet pipe – lifting
weight: 3.000 kg
scale: 150

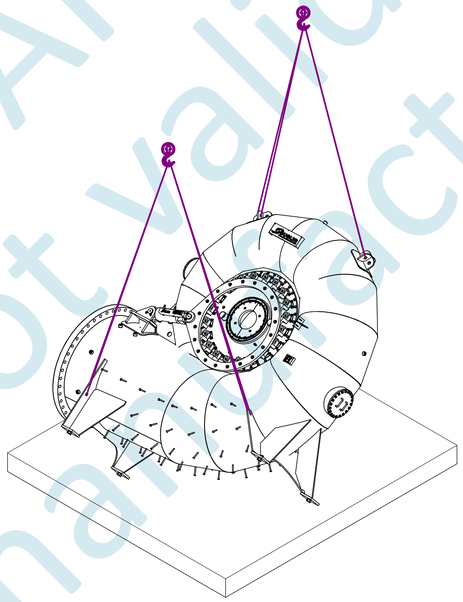


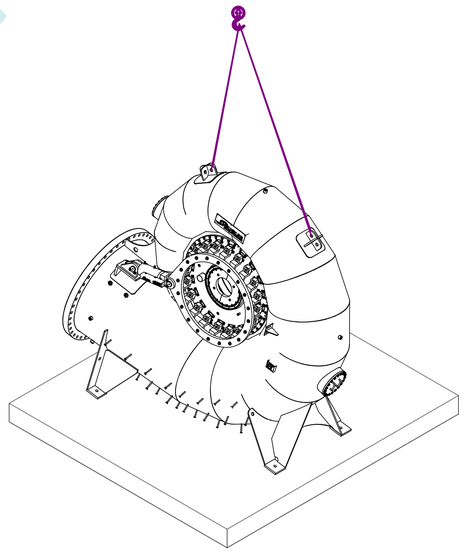
description draft tube 2 – lifting
weight: 900 kg
scale: 140

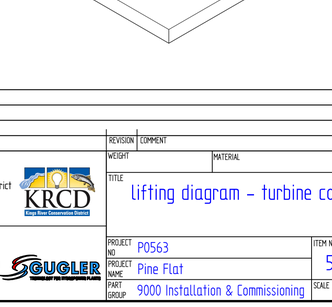


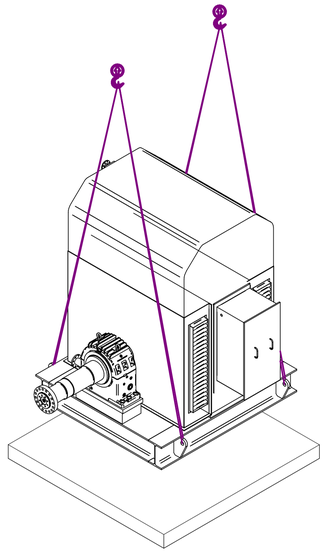
description spiral case – lifting
weight: 12.000 kg
scale: 150











dimensions without indication of tolerances according to ISO 2768-mK
weld preparation according to ISO 9692-1
welding tolerances according to ISO 13920-B
welding class according to ISO 5817-C

DRAWING UNIT [mm]

RELEASED ON | BY

CREATED ON 15.04.2024 | BY Wurzinger Oliver

PERMIT-SEAL

CONSULTANTS

Stantec
Street Address
City Prov/State Country Code/Zip
www.stantec.com

REVISED ON | BY

REVISION	COMMENT

CLIENT
Kings River Conservation District
4886 E. Jensen Avenue
Fresno, California 93725

SUPPLIER
GUGLER Water Turbines GmbH
Gewerbepark 41, 4101 Feldkirchen

WEIGHT | MATERIAL | SHEET SIZE A1

TITLE
lifting diagram – turbine components

PROJECT NO	P0563	ITEM NO 50093029	REV NO 00
PROJECT NAME	Pine Flat		
PART GROUP	9000 Installation & Commissioning	SCALE 150	SHEET 1 OF 1

End of Existing Penstocks Sta. 12 + 72.52
Existing Spillway Spray Wall
Spillway Spray Wall Extension
End of Existing Flip Bucket Sta. 13 +33.06
Existing Walkway
Contraction jt. Sta. 13+72.52
Contraction jt. Sta. 14 +11.52
A
1.0'
UNITS Sta. 14+79.52
End of Training Wall Sta. 15 +58.02
R = 210'
550
550
Sta. 9+25.00 Penstock No. 3
Sta. 8+75.00 Penstock No. 2
Sta. 8 +25.00 Penstock No. 1
DN
Existing Concrete Dam
1.5H : 1.0V
0.78 H : 1.00V
1.25 H : 1.00V
Diesel generator
Reserve metering Pot. transf. & Current transf.
Diesel fuel tank
230KV disconnect & ground switch
230KV O.C.B.
Transmission tower footer foundation
pull box See Dwg. LG-11-149
EL. 603.00 Transformer Deck
Coupling
Septic & holding tank
New Ductile Iron switch-yard drainage pipe
Guard rail See Dwg. LG-11-141
10' High chain Link fence See Dwg. LG-11-141
R=50.0'
Emergency oil separator
EL. 603.0
EL. 601.4
2%
Entry
UNIT 3
EL. 585.00
Contraction jt. Generator Deck
UNIT 2
Contraction jt.
Gantry Crane
UNIT 1
Erection and Service Area
EL. 603.00
Erection Pedestal
Crane rail
Drainage structure no.2 See Dwg. LG-11-150
EL. 603.0
Sta. 9 +36.75
Sta. 8 +91.75
Sta. 8 +46.75
EL. 526.05
Tailrace channel
4H : 1V
10H : 1V
R = 350'
EL. 560.0
575
1H:4V
Handrail See Dwg. LG-11-142
Walkway
PARKING AREA
Guard rail See Dwg. LG-11-141
600
Shotcrete with wire mesh and anchor bolts. See Dwg. LG-11-107
Shoulder
EL. 609.0
6 %
EL. 611.0
EL. 613.0
36" R.C. pipe culvert See Dwg. LG-11-107
Drainage structure no.1 See Dwg. LG-11-107
EL. 603.0
2%
Access Road
12.5 %
1H : 3V
Shoulder
Drainage Channel
625
4'x4'x6' deep Precast Catch Basin See Dwg. LG-11-107
Catch Basin
EL. 638.30
4 %
EL. 633.36
8%
Berm
Drainage Channel
650
1H:4V
Existing Septic Tank
Existing Leaching Field EL. 640.00
10' High Permanent Chain Link Fence See Dwg. LG-11-141
675
Sta. 14 +18.52
B.V.C. Sta. 15+42.00
E.V.C. Sta. 17+42.00
B.V.C. Sta. 17+75.33
Sta. 18+11.00
POWERHOUSE
ACCESS ROAD
700
725
PLAN

SCALE 0 20 40 60 80 100 FT.

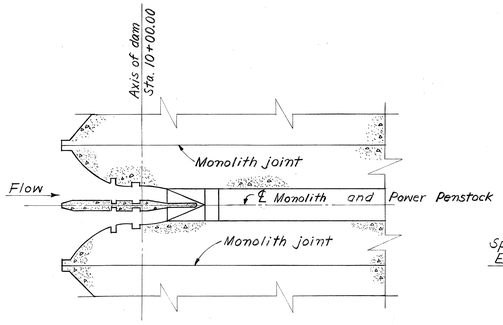
KINGS RIVER CONSERVATION DISTRICT

KINGS RIVER HYDROELECTRIC PROJECT
UNIT 1 - PINE FLAT POWER PLANT

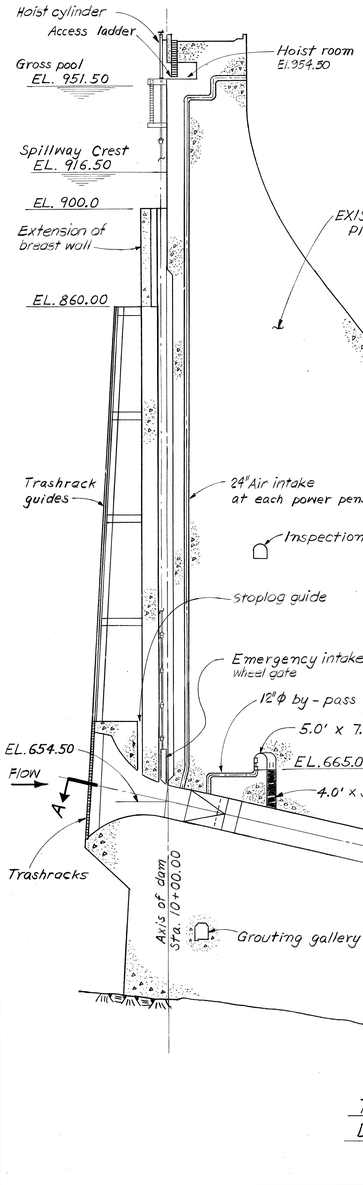
SITE PLAN

CONSULTING ENGINEERS
INTERNATIONAL ENGINEERING COMPANY, INC.
A MORRISON-KNUDSEN COMPANY
180 HOWARD STREET, SAN FRANCISCO, CALIFORNIA 94105

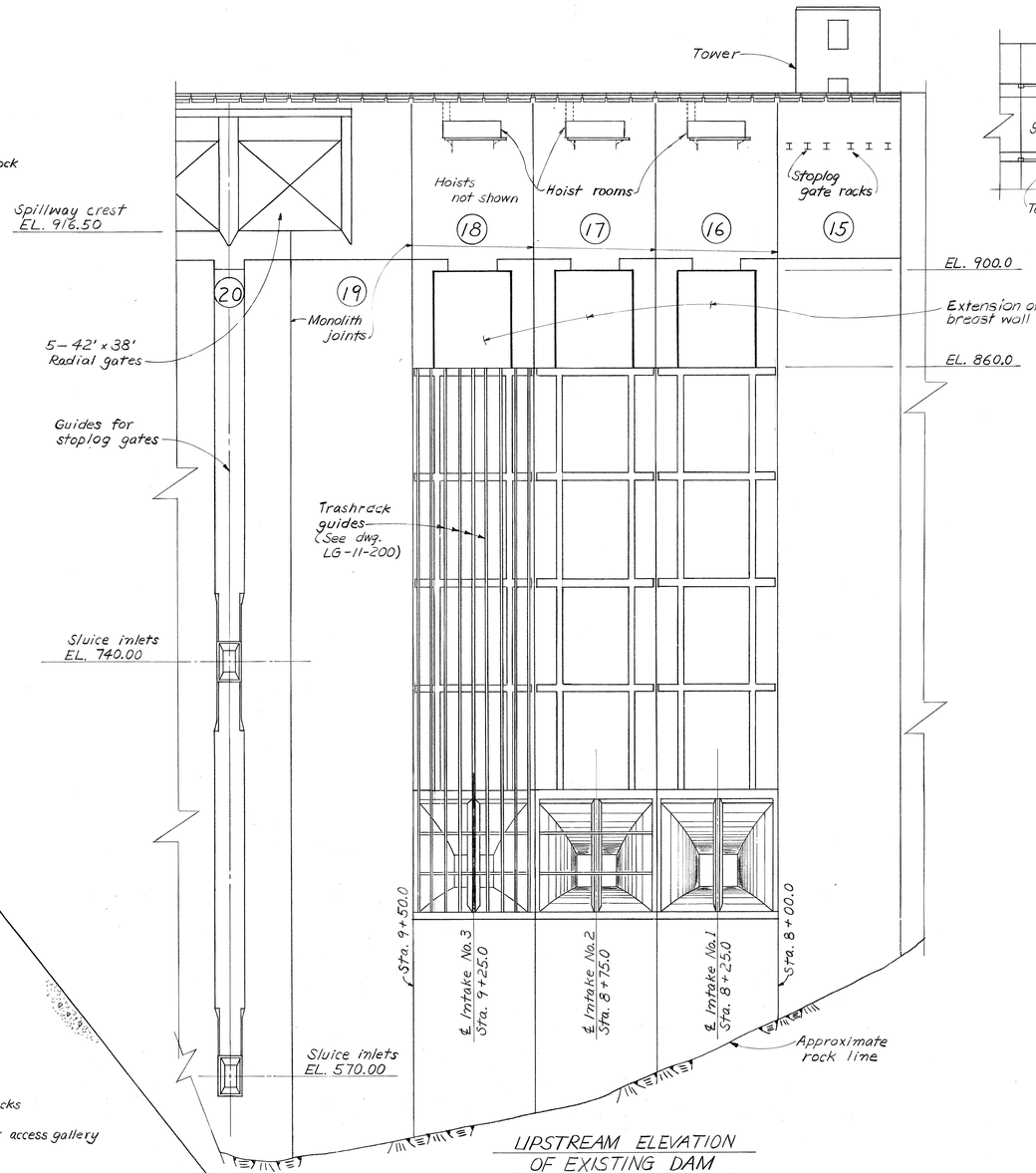
DESIGNED IECO INSPECTED MCC
DRAWN PK RECOMMENDED
CHECKED KH APPROVED
DATE JUNE 4, 1980
DRAWING NO. LG-11-100



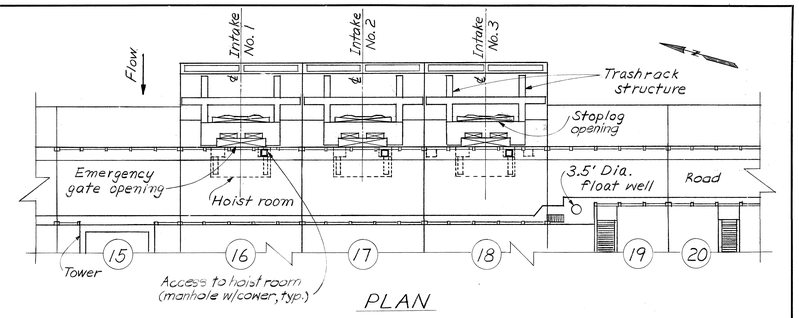
SECTION A-A



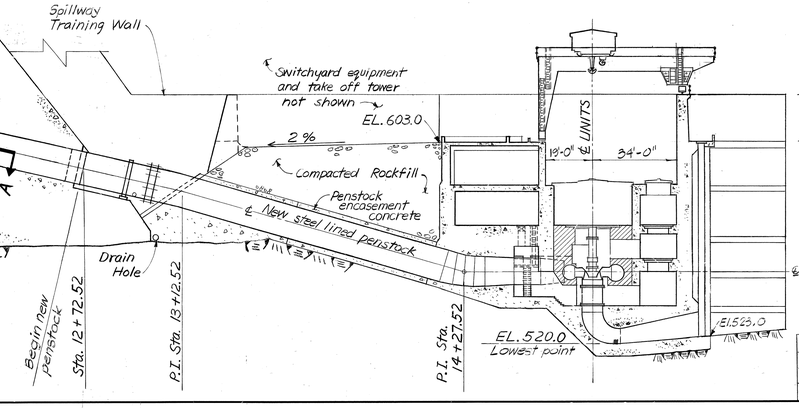
TRANSVERSE SECTION
DAM AND POWER PLANT



UPSTREAM ELEVATION
OF EXISTING DAM



PLAN



AS BUILT

Scale 0 25 50 75 100 Ft.

NO	DATE	DESCRIPTION	BY	CH.	APPD.
1	12-6-34	As built	EG		

REVISIONS

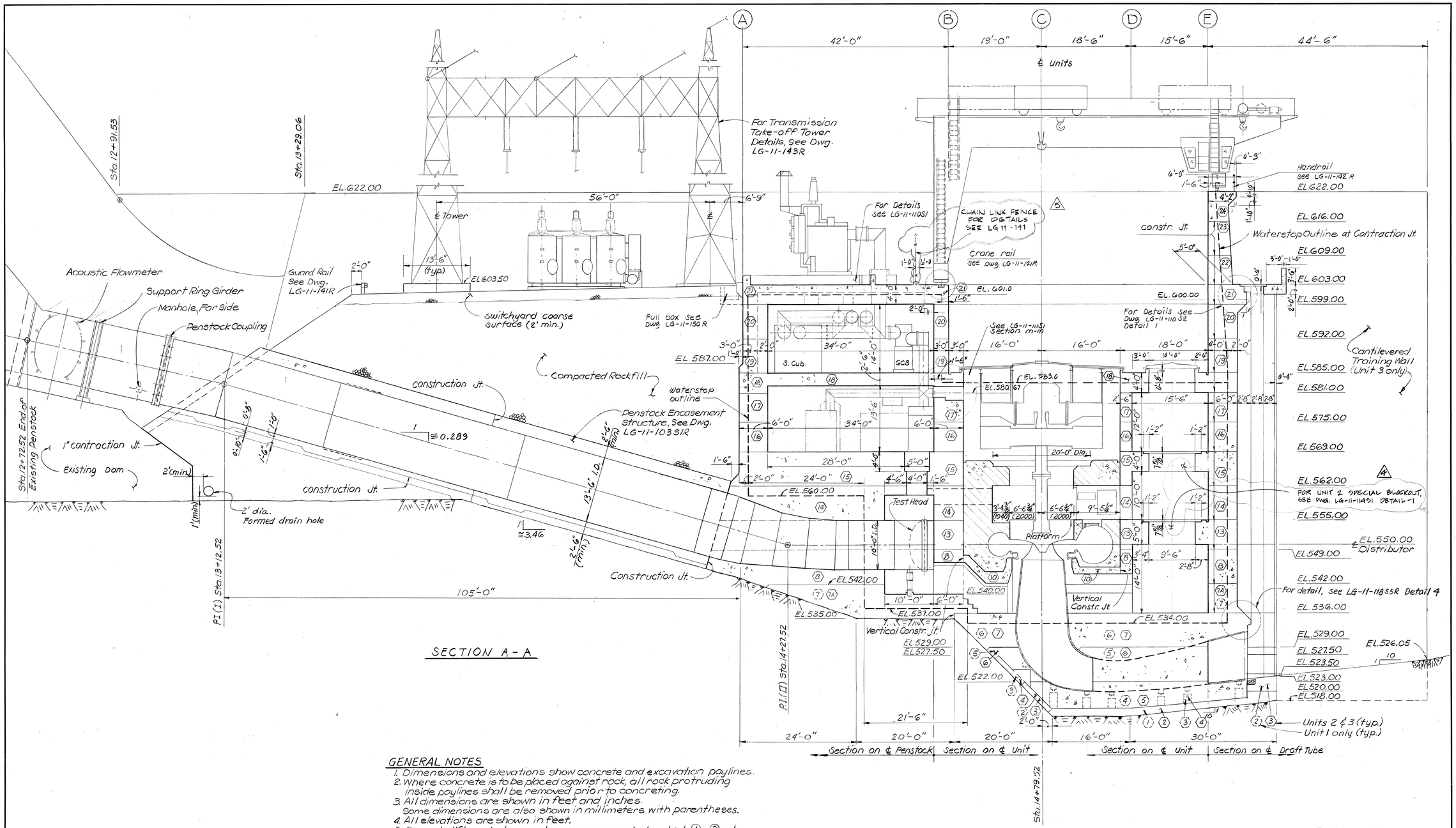
KINGS RIVER CONSERVATION DISTRICT

KINGS RIVER HYDROELECTRIC PROJECT
UNIT I - PINE FLAT POWER PLANT
DAM AND POWER PLANT

SECTION & ELEVATION

CONSULTING ENGINEERS
INTERNATIONAL ENGINEERING COMPANY, INC.
A MORRISON-KNUDSEN COMPANY
180 HOWARD STREET, SAN FRANCISCO, CALIFORNIA 94105

DESIGNED IECO INSPECTED K H
DRAWN PK RECOMMENDED A. D. Foye
CHECKED IECO APPROVED
DATE JUNE 4, 1980
DRAWING NO. LG-11-101 R1



SECTION A-A

GENERAL NOTES

1. Dimensions and elevations show concrete and excavation paylines.
2. Where concrete is to be placed against rock, all rock protruding inside paylines shall be removed prior to concreting.
3. All dimensions are shown in feet and inches. Some dimensions are also shown in millimeters with parentheses.
4. All elevations are shown in feet.
5. Concrete lifts and placement sequence are designated ①, ② etc.
6. For excavation, concrete outline, concrete reinforcement, misc. metal, embedded piping, electrical conduit, mechanical and electrical equipment see IECO drawings "Released for construction."
7. For steel penstock liner details see "U.S. Steel-American Bridge" drawings.
8. For turbine, generator, 13.8 KV switchgear and bus duct see "Hitachi" drawings.
9. For draft tube gate and gate guide details see "Mitsubishi" drawings.
10. For gantry crane details see "Crane Manufacturing and Service Corp." drawings.
11. For Main Power Transformers details see "Fuji" drawings.
12. For Station Service Low Voltage Equipment details see "Control electric" drawings.
13. For Main Control Switchboard details see "Warco Control Centres" drawings.
14. In general exposed and embedded piping and conduits smaller than 24-inches are not shown. See mechanical and electrical drawings.

LEGEND

- First stage concrete
- Second stage concrete
- concrete in blockout

Scale 0 8 16 24 32 Feet
Except as Noted

AS BUILT

RELEASED FOR CONSTRUCTION

NO	DATE	DESCRIPTION	BY	CH	APPD
R5	12-2-85	REVISED TO "AS BUILT"	WRL		Mgr
R4	10-4-82	REVISED AS NOTED	EC/WC	HCC	Mgr Check
R3	8-17-82	REVISED AS NOTED	EC/WC	HCC	Mgr Check
R2	12-10-81	REMOVED PORTIONS ON HOLD	EC/WC	KH	Asst Chief
R1	8-21-81	Redrawn & released for constr	RV/WC	KH	Asst Chief

REVISIONS

KINGS RIVER CONSERVATION DISTRICT

KINGS RIVER HYDROELECTRIC PROJECT
UNIT 1 - PINE FLAT POWER PLANT
POWERHOUSE – GENERAL ARRANGEMENT

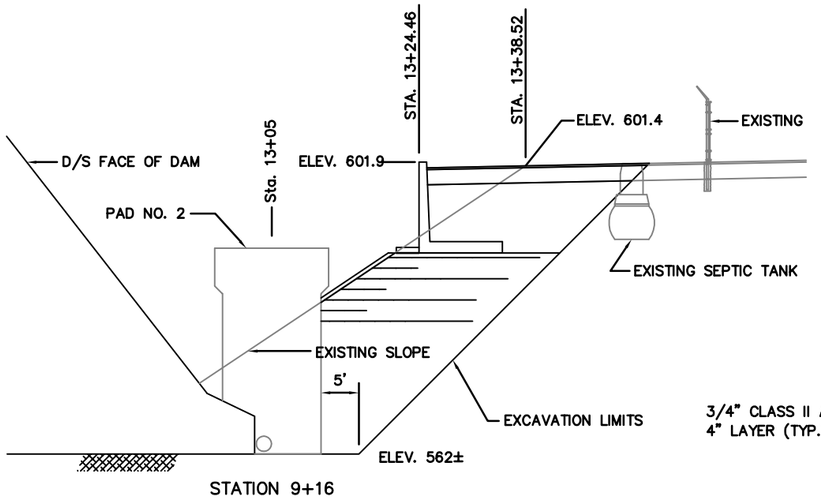
TRANSVERSE SECTION

CONSULTING ENGINEERS
INTERNATIONAL ENGINEERING COMPANY, INC.
A MORRISON-KNUDSEN COMPANY
180 HOWARD STREET, SAN FRANCISCO, CALIFORNIA 94105

DESIGNED IECO INSPECTED HCC
DRAWN RV RECOMMENDED
CHECKED WC/KH APPROVED

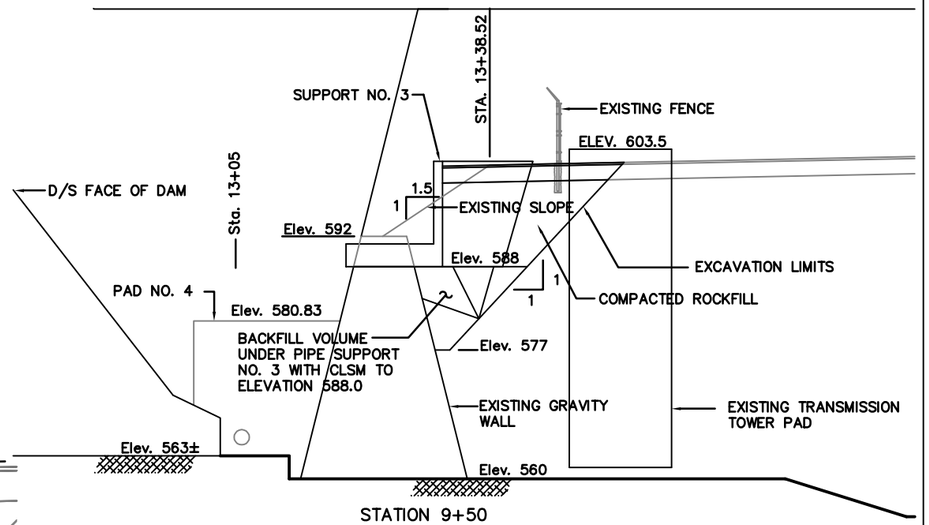
DATE JULY 21, 1981

DRAWING NO. LG-11-112R5



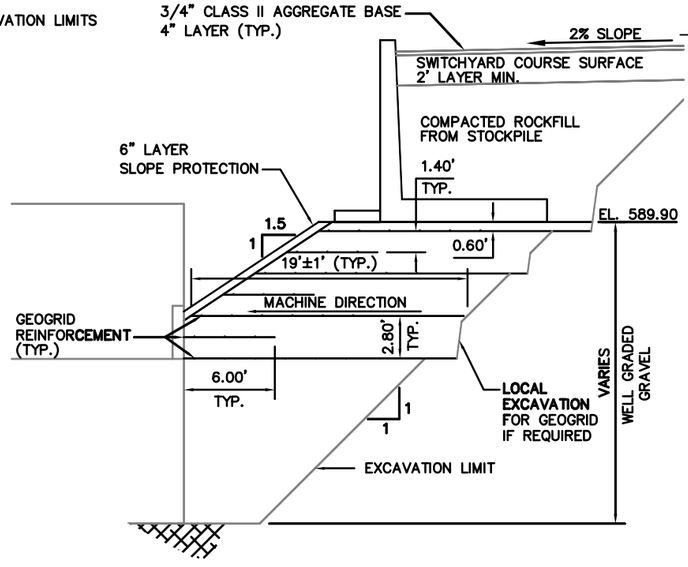
STATION 9+16

⚠ **SECTION** C
SCALE: 1"=10'
C-2 | C-3

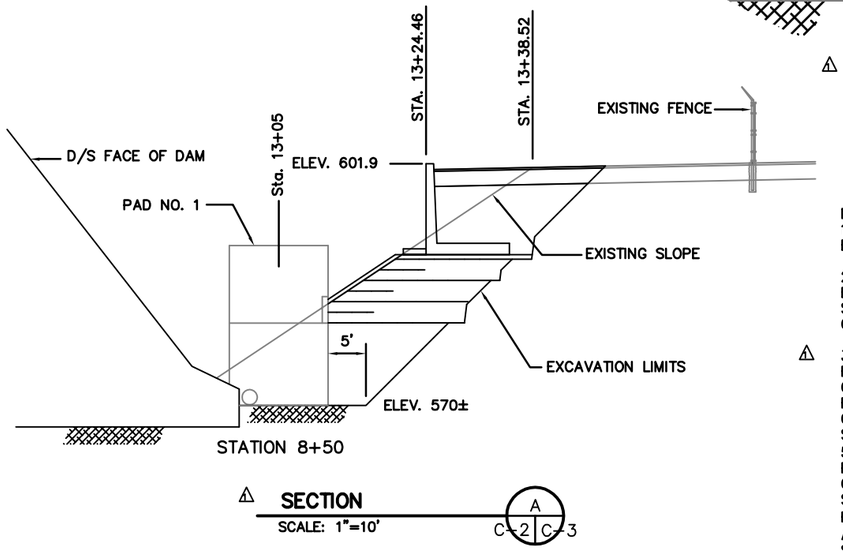


STATION 9+50

SECTION D
SCALE: 1"=10'
C-2 | C-3



⚠ **FOUNDATION REINFORCEMENT DETAIL**
SCALE: 1"=5'



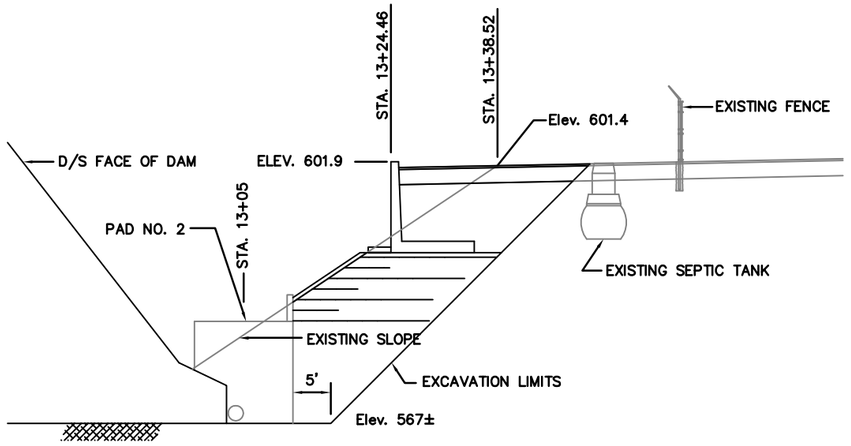
STATION 8+50

⚠ **SECTION** A
SCALE: 1"=10'
C-2 | C-3

NOTES:
1. ELEVATIONS OF EXISTING ROCK FOUNDATIONS TO BE FIELD VERIFIED.

2. ROCKFILL AND SWITCHYARD COARSE SURFACE EXCAVATED MATERIAL TYPES TO BE STOCKPILED SEPARATELY FOR BACKFILL PURPOSES. SEE NOTE ON SHEET G-3.

⚠ 3. AFTER CONSTRUCTION OF CONCRETE PADS REPLACE EXCAVATED BACKFILL WITH WELL GRADED GRAVEL TO ELEVATION 580.90. CONSTRUCT REINFORCED FOUNDATION USING IMPORTED WELL GRADED GRAVEL AND GEOGRID REINFORCEMENT AS SHOWN IN DETAIL ON THIS SHEET, TO ELEVATION 589.90. PLACE 6" THICK LAYER OF SLOPE PROTECTION MATERIAL ON EXPOSED SLOPE. CONSTRUCT L-WALL AND WALKWAY AS SHOWN ON SHEET S-21. BACKFILL WALL WITH STOCKPILED ROCKFILL. PLACE NEW 4" THICK CLASS II AGGREGATE BASE ON TOP OF 2' THICK BACKFILLED SWITCHYARD COARSE SURFACE.



STATION 8+84

⚠ **SECTION** B
SCALE: 1"=10'
C-2 | C-3

GRAPHIC SCALE
1" = 10'-0"
0 5' 10' 20' 30' 40' 50'

US Army Corps of Engineers
Sacramento District

Symbol	Description	Date	Approved
⚠	ADDED DETAIL, REVISED SECTIONS AND NOTE. 84 #W01-0042-VH001	9-17-84	

Date:
Designed by: K. Tate
Drawn by: G. Bucknell
Reviewed by:
Submitted by: /s/ Rick Poeppelman Chief, Structural Des. Sec.
Rev.
Design file no: K12-25-715
Spec No.: 1156
Drawing Code:
File name: PF_C_03.dwg
Plot date: 11/01/00
Plot scale: 1"=1" (1:1)

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS
SACRAMENTO, CALIFORNIA

SACRAMENTO DISTRICT
HOUSE DESIGN
1325 J STREET
SACRAMENTO, CA 95814-2922

KINGS RIVER
PINE FLAT DAM
TURBINE BYPASS PROJECT
CALIFORNIA

EXCAVATION SECTIONS

Sheet reference number:
C-3

Border Revised 11/10/88, CCESHTM1.DWG TRISERVICE REVISION

GENERAL NOTES:

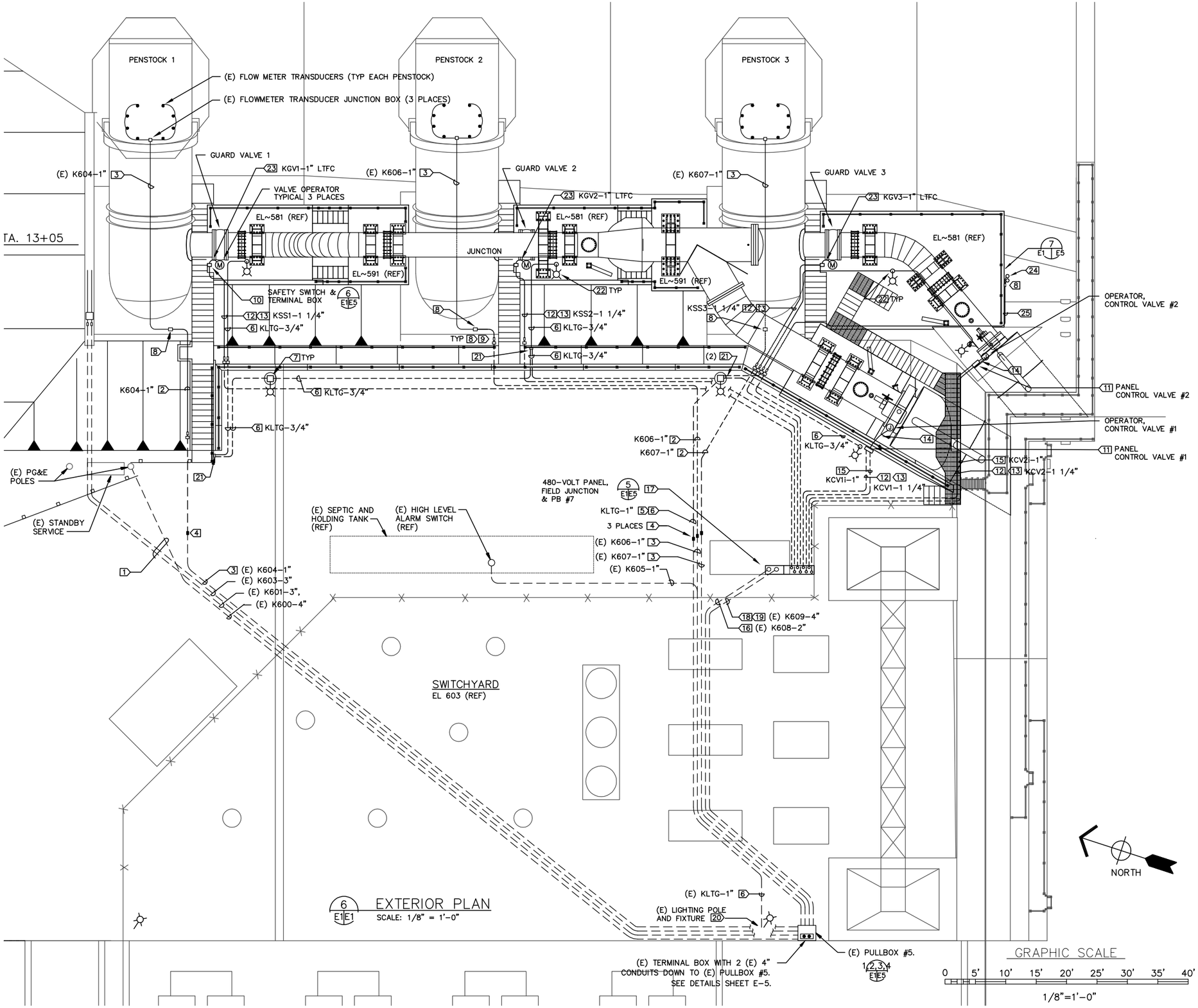
1. WORK SHOWN DIAGRAMMATICALLY. COORDINATE EQUIPMENT AND CONDUIT LOCATIONS WITH CONTRACTING OFFICER.
2. ALL ELECTRICAL WORK IS NEW, UNLESS OTHERWISE INDICATED.
3. EXISTING LIGHTING PANEL "LA" LOCATED IN CONTROL ROOM. SEE SHEET E-2.

KEYED NOTES: (#)

1. THESE CONDUITS CRITICAL TO OPERATION OF OF DAM. DO NOT DISTURB UNDER ANY CIRCUMSTANCE !
2. CONDUIT FROM STUB-OUT TO PULLBOX ON END OF EXISTING PENSTOCK FLOWMETER CONDUIT. SEE KEYED NOTES 4 & 8.
3. ONE 12-PAIR #20 OVERALL SHIELDED TYPE TC INSTRUMENTATION CABLE FROM FLOWMETER TRANSDUCER JUNCTION BOX TO FLOWMETER PANELS. SEE E-2 AND E-3.
4. THREADED & CAPPED UNDERGROUND STUBOUT. SEE DEMOLITION PLAN, E-9.
5. CONDUITS FROM UNDERGROUND STUB-OUT TO LIGHTING POLE. MATCH SIZE OF EXISTING,
6. 2 #8, 1 #10-G TYPE THHN/THWN, CKT LA10.
7. 250W HPS FIXTURE "B" ON 30' HINGED POLE. POLE SHALL LOWER PARALLEL TO BARRIER. SEE BASE DETAIL, S-20.
8. WATER-TIGHT MALLEABLE IRON PULL BOX.
9. DEFLECTION/EXPANSION FITTINGS & BONDING JUMPER AT TRANSITIONS FROM ENCASED OR UNDERGROUND TO ABOVE-GROUND CONDUIT.
10. 3 POLE 30A SAFETY SWITCH, TERMINAL BOX. MOUNT ON GALVANIZED STEEL SUPPORT. SEE S-20 FOR SUPPORT DETAIL.
11. GOVERNMENT-FURNISHED CONTROL PANEL. MOUNT ON GALVANIZED STEEL SUPPORT. SEE S-20 FOR SUPPORT DETAIL.
12. ONE 3/C #12 + #12G TYPE TC POWER CABLE FROM SAFETY SWITCH OR VALVE CONTROL PANEL TO 480-VOLT PANELBOARD.
13. ONE 7/C #14 TYPE TC CONTROL CABLE FROM SAFETY SWITCH OR VALVE CONTROL PANEL TO CONTROL ROOM PANEL. SEE E-2, E-3.
14. 3 #12 + #12G POWER AND 11 #14 CONTROL, TYPE THHN/THWN, FROM VALVE CONTROL TO OPERATOR. CONNECT PER DETAIL 2, E-6.
15. #20 SHIELDED PAIR TYPE TC INSTRUMENTATION CABLE FROM VALVE OPERATOR, TO CONTROL PANEL, AND ON TO CONTROL ROOM PANEL. CONNECT PER DETAIL 2, E-6. SEE E-2, E-3.
16. (NOT USED)
17. 480 VOLT PANELBOARD, WIRE TROUGH (PB #7) & FIELD JUNCTION BOX. MOUNT ON GALVANIZED STEEL SUPPORT. SEE S-20 FOR SIMILAR DETAIL.
18. 3/C #2, 1 #6G TYPE TC POWER CABLE FROM PANELBOARD TO FEEDER BREAKER IN MCC 4. SEE E-2, E-3.
19. 5 7/C #14 TYPE TC CONTROL CABLES FROM SAFETY SWITCH, VALVE CONTROL PANEL TO CONTROL ROOM PANEL. SEE KN 12, E-2, E-3.
20. CONNECT NEW WIRING TO (E) CKT LA-10.
21. WEATHERPROOF SWITCH. MOUNT ON POLE/RAIL.
22. 100W HPS FIXTURE "A" ON 1-1/4" GALVANIZED STEEL PIPE STANCHION ATTACHED TO SIDE OF CONCRETE STRUCTURE. LOCATE FIXTURE 12 FT ABOVE SLAB. ORIENT TO ILLUMINATE VALVE.
23. 3 #12 + #12G POWER AND 3 #14 CONTROL, TYPE THHN/THWN, FROM TERMINAL BOX TO OPERATOR. CONNECT PER DETAIL 1, E-6.
24. FLOAT SWITCHES. MOUNT ON FACE OF CONCRETE PAD. CONFIRM HEIGHT & DETAILS WITH CONTRACTING OFFICER.
25. 7/C #14 TYPE TC CONTROL CABLE FROM FLOAT JUNCTION BOX TO PB #7 & FIELD JUNCTION BOX. CONNECT PER DETAIL 3, E-6.

LEGEND:

———	EXPOSED CONDUIT
— — — —	CONCEALED/BURIED CONDUIT
#/C	QUANTITY OF CONDUCTORS IN CABLE



6 E1E1 EXTERIOR PLAN
SCALE: 1/8" = 1'-0"

US Army Corps of Engineers
Sacramento District

Rev.	Date:	Description	Date Approved	Symbol

Designed by: W. WADSWORTH, P.E.
Dwn by: MAD/JF/WW
Spec No.: 1156
Reviewed by: C. BEACH
Submitted by: /s/ Thomas Nissen, P.E. Chief, Mech/Elec Des. Sec.
Design file no: K12-25-715
Drawing Code:
File name: PF_E_01.dwg
Plot date: 20 Jan 01
Plot scale: 1"=1' (1:1)

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS
SACRAMENTO, CALIFORNIA

SACRAMENTO DISTRICT
MILHOUSE DESIGN
1325 J STREET
SACRAMENTO, CA 95814-2922

KINGS RIVER
CALIFORNIA
PINE FLAT DAM
TURBINE BYPASS PROJECT
ELECTRICAL PLAN
SWITCHYARD, PENSTOCKS & BYPASSES

Sheet reference number:
E-1

Border Revised 11/10/98, CDS:H12.DWG TRSERVICE REVISION

GENERAL NOTES:

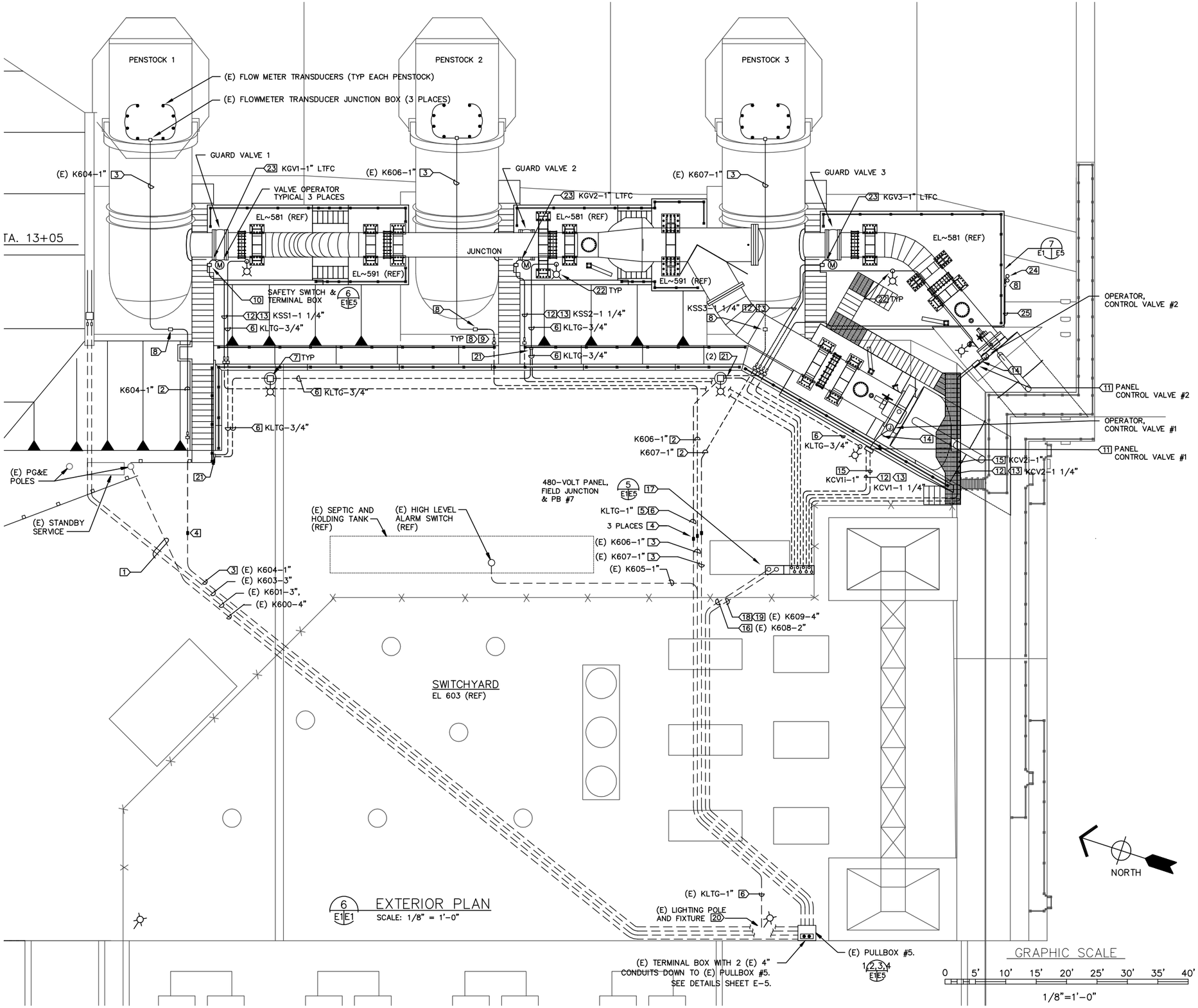
1. WORK SHOWN DIAGRAMMATICALLY. COORDINATE EQUIPMENT AND CONDUIT LOCATIONS WITH CONTRACTING OFFICER.
2. ALL ELECTRICAL WORK IS NEW, UNLESS OTHERWISE INDICATED.
3. EXISTING LIGHTING PANEL "LA" LOCATED IN CONTROL ROOM. SEE SHEET E-2.

KEYED NOTES: (#)

1. THESE CONDUITS CRITICAL TO OPERATION OF OF DAM. DO NOT DISTURB UNDER ANY CIRCUMSTANCE !
2. CONDUIT FROM STUB-OUT TO PULLBOX ON END OF EXISTING PENSTOCK FLOWMETER CONDUIT. SEE KEYED NOTES 4 & 8.
3. ONE 12-PAIR #20 OVERALL SHIELDED TYPE TC INSTRUMENTATION CABLE FROM FLOWMETER TRANSDUCER JUNCTION BOX TO FLOWMETER PANELS. SEE E-2 AND E-3.
4. THREADED & CAPPED UNDERGROUND STUBOUT. SEE DEMOLITION PLAN, E-9.
5. CONDUITS FROM UNDERGROUND STUB-OUT TO LIGHTING POLE. MATCH SIZE OF EXISTING,
6. 2 #8, 1 #10-G TYPE THHN/THWN, CKT LA10.
7. 250W HPS FIXTURE "B" ON 30' HINGED POLE. POLE SHALL LOWER PARALLEL TO BARRIER. SEE BASE DETAIL, S-20.
8. WATER-TIGHT MALLEABLE IRON PULL BOX.
9. DEFLECTION/EXPANSION FITTINGS & BONDING JUMPER AT TRANSITIONS FROM ENCASED OR UNDERGROUND TO ABOVE-GROUND CONDUIT.
10. 3 POLE 30A SAFETY SWITCH, TERMINAL BOX. MOUNT ON GALVANIZED STEEL SUPPORT. SEE S-20 FOR SUPPORT DETAIL.
11. GOVERNMENT-FURNISHED CONTROL PANEL. MOUNT ON GALVANIZED STEEL SUPPORT. SEE S-20 FOR SUPPORT DETAIL.
12. ONE 3/C #12 + #12G TYPE TC POWER CABLE FROM SAFETY SWITCH OR VALVE CONTROL PANEL TO 480-VOLT PANELBOARD.
13. ONE 7/C #14 TYPE TC CONTROL CABLE FROM SAFETY SWITCH OR VALVE CONTROL PANEL TO CONTROL ROOM PANEL. SEE E-2, E-3.
14. 3 #12 + #12G POWER AND 11 #14 CONTROL, TYPE THHN/THWN, FROM VALVE CONTROL TO OPERATOR. CONNECT PER DETAIL 2, E-6.
15. #20 SHIELDED PAIR TYPE TC INSTRUMENTATION CABLE FROM VALVE OPERATOR, TO CONTROL PANEL, AND ON TO CONTROL ROOM PANEL. CONNECT PER DETAIL 2, E-6. SEE E-2, E-3.
16. (NOT USED)
17. 480 VOLT PANELBOARD, WIRE TROUGH (PB #7) & FIELD JUNCTION BOX. MOUNT ON GALVANIZED STEEL SUPPORT. SEE S-20 FOR SIMILAR DETAIL.
18. 3/C #2, 1 #6G TYPE TC POWER CABLE FROM PANELBOARD TO FEEDER BREAKER IN MCC 4. SEE E-2, E-3.
19. 5 7/C #14 TYPE TC CONTROL CABLES FROM SAFETY SWITCH, VALVE CONTROL PANEL TO CONTROL ROOM PANEL. SEE KN 12, E-2, E-3.
20. CONNECT NEW WIRING TO (E) CKT LA-10.
21. WEATHERPROOF SWITCH. MOUNT ON POLE/RAIL.
22. 100W HPS FIXTURE "A" ON 1-1/4" GALVANIZED STEEL PIPE STANCHION ATTACHED TO SIDE OF CONCRETE STRUCTURE. LOCATE FIXTURE 12 FT ABOVE SLAB. ORIENT TO ILLUMINATE VALVE.
23. 3 #12 + #12G POWER AND 3 #14 CONTROL, TYPE THHN/THWN, FROM TERMINAL BOX TO OPERATOR. CONNECT PER DETAIL 1, E-6.
24. FLOAT SWITCHES. MOUNT ON FACE OF CONCRETE PAD. CONFIRM HEIGHT & DETAILS WITH CONTRACTING OFFICER.
25. 7/C #14 TYPE TC CONTROL CABLE FROM FLOAT JUNCTION BOX TO PB #7 & FIELD JUNCTION BOX. CONNECT PER DETAIL 3, E-6.

LEGEND:

———	EXPOSED CONDUIT
— — — —	CONCEALED/BURIED CONDUIT
#/C	QUANTITY OF CONDUCTORS IN CABLE



6 E1E1 EXTERIOR PLAN
SCALE: 1/8" = 1'-0"

US Army Corps of Engineers
Sacramento District

Rev.	Date:	Description	Date Approved	Symbol

Designed by: W. WADSWORTH, P.E.
Dwn by: MAD/JF/WW
Spec No.: 1156
Reviewed by: C. BEACH
Submitted by: /s/ Thomas Nissen, P.E. Chief, Mech/Elec Des. Sec.
Design file no: K12-25-715
Drawing Code:
File name: PF_E_01.dwg
Plot date: 20 Jan 01
Plot scale: 1"=1' (1:1)

DEPARTMENT OF THE ARMY
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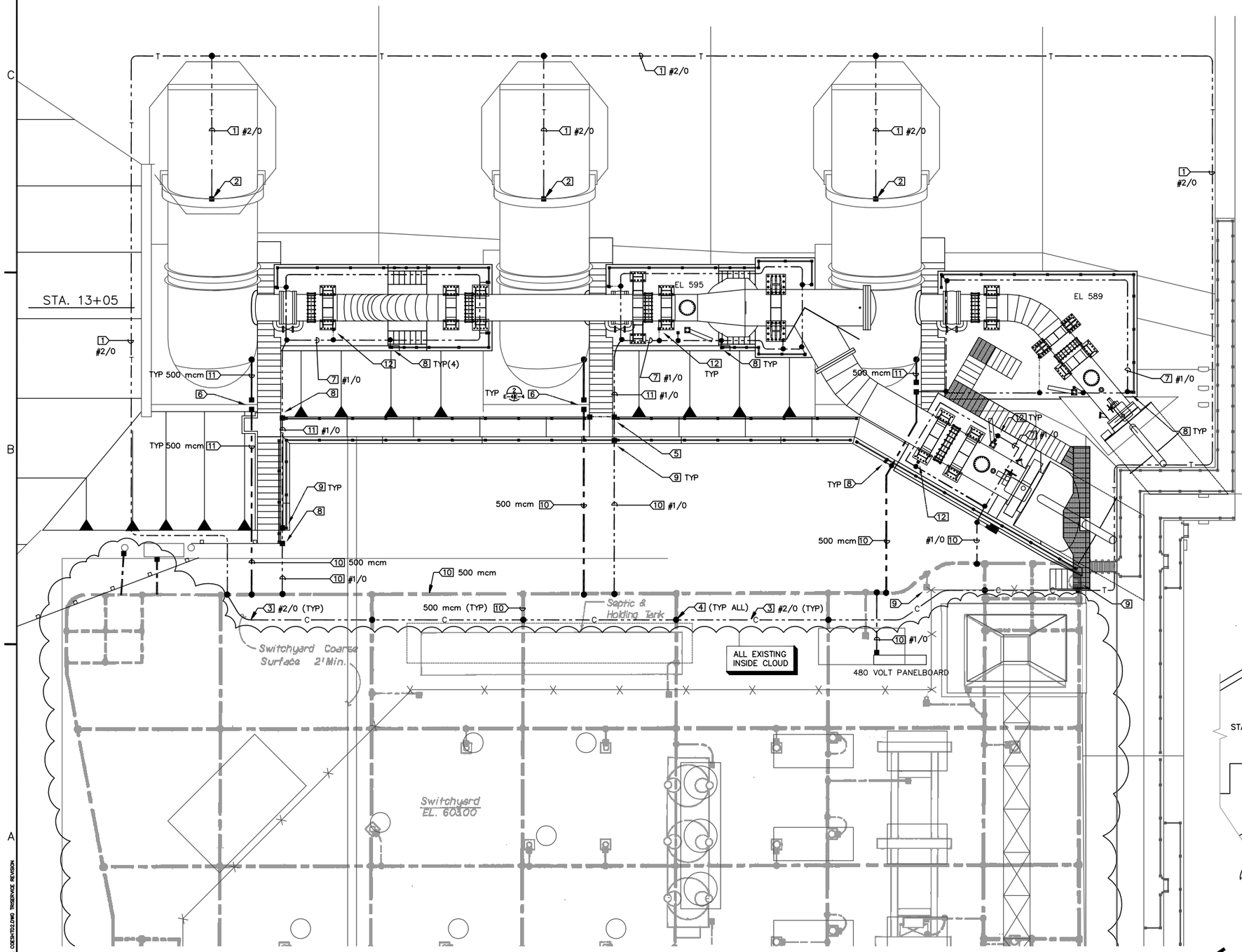
SACRAMENTO, CALIFORNIA

SACRAMENTO DISTRICT
MILHOUSE DESIGN
1325 J STREET
SACRAMENTO, CA 95814-2922

KINGS RIVER
CALIFORNIA
PINE FLAT DAM
TURBINE BYPASS PROJECT
ELECTRICAL PLAN
SWITCHYARD, PENSTOCKS & BYPASSES

Sheet reference number:
E-1

Border Revised 11/10/98, CDS:H12.DWG TRSERVICE REVISION



1 E-4 E-4 GROUNDING PLAN
SCALE: 1/8" = 1'-0"

GENERAL NOTES:

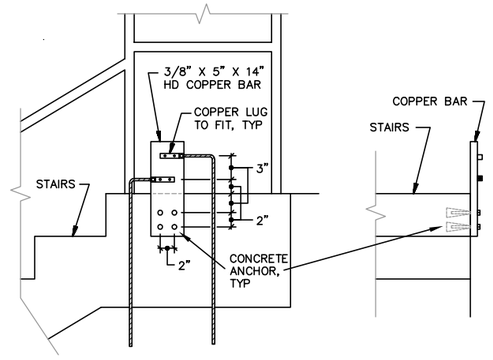
1. SEE SHEET E-9 FOR EXTENT OF CABLE REMOVAL PRECEEDING THIS WORK.

KEYED NOTES: #

1. TEMPORARY PENSTOCK GROUNDING SYSTEM, FOR GROUNDING CONTINUITY DURING CONSTRUCTION. #2/0 2kV RHH/RHW COPPER CABLE, SURFACE MOUNTED. INSTALL BEFORE BEGINNING DEMOLITION (SEE SHEET E-9) AND REMOVE AFTER PROJECT COMPLETION.
2. TEMPORARY PENSTOCK GROUND. 1/4" X 1", 2-HOLE, 1/2" BOLT-SIZE LUG. DRILL PENSTOCK SUPPORT COLLAR AND BOLT LUG WITH 1/2-13 SILICONE-BRONZE BOLTS, NUTS, WASHERS AND INTERNAL TOOTH LOCKWASHERS.
3. CONSTRUCTION CONTINUITY GROUND. #2/0 BARE COPPER GROUND CABLE AT 36" BELOW FINISHED GRADE. INSTALL AFTER DEMOLITION TO TIE REMAINING GRID ENDS TOGETHER AND MAINTAIN GROUND GRID CONTINUITY DURING PERIOD THAT SLOPE IS "PULLED BACK".
4. UNLESS OTHERWISE NOTED, CONNECT GROUND CABLES AND LUGS IN ACCORDANCE WITH THE SPECIFICATIONS.
5. HANDRAIL / GUARD GROUND. 3/16" X 1", 2-HOLE, 3/8" BOLT-SIZE LUG. DRILL STRUCTURE AND BOLT LUG WITH 3/8-16 SILICON-BRONZE BOLTS, NUTS, WASHERS AND INTERNAL TOOTH LOCKWASHERS.
6. GROUND CONTINUITY TEST STATION. REUSE PLATE FROM SHEET E-9, KEYED NOTE 11.
7. CONCRETE EMBEDDED CABLE. LOCATE ABOVE REBAR AND NO LESS THAN 1 1/2" FROM FINISHED SURFACE. CONFIRM LOCATIONS OF HANDRAILS, ETC FOR GROUNDING STUBOUTS.
8. HANDRAIL & STAIR GROUNDING BOND. 3/16"x1", 1-HOLE, 3/8" BOLT-SIZE LUG. DRILL STRUCTURE AND BOLT LUG WITH 3/8-16 SILICON-BRONZE BOLTS, NUTS, WASHERS AND INTERNAL TOOTH LOCKWASHERS.
9. RESTORE FENCE, BARRIER, AND OTHER MISCELLANEOUS GROUNDS TO BE THE SAME AS BEFORE DEMOLITION.
10. BURY CABLE 36" BELOW FINISHED GRADE.
11. SURFACE-MOUNT GROUND CABLES ON SIDES OF CONCRETE STRUCTURES USING CONCRETE ANCHORS AND APPROVED CLAMPS.
12. STRUCTURE GROUND. 1/4" X 1", 1-HOLE, LUG FOR BOLT-SIZE OF STRUCTURAL ANCHOR BOLT. BOLT LUG UNDER STRUCTURAL ANCHOR NUT, USING SILICONE-BRONZE WASHERS AND INTERNAL TOOTH LOCKWASHERS.

LEGEND:

- T — TEMPORARY EXPOSED CABLE
- EXPOSED CABLE
- C — CONSTRUCTION CONTINUITY GROUND CABLE
- BURIED CABLE
- CONCRETE EMBEDDED CABLE



2 E4 E4 REINSTALLED GROUND TEST STATION
NOT TO SCALE

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Rev.	Description	Date Approved	Symbol

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Designed by: W. WADSWORTH, P.E.
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Submitted by: /s/ Thomas Nissen, P.E. Chief, Mech/Elec Des. Sec.
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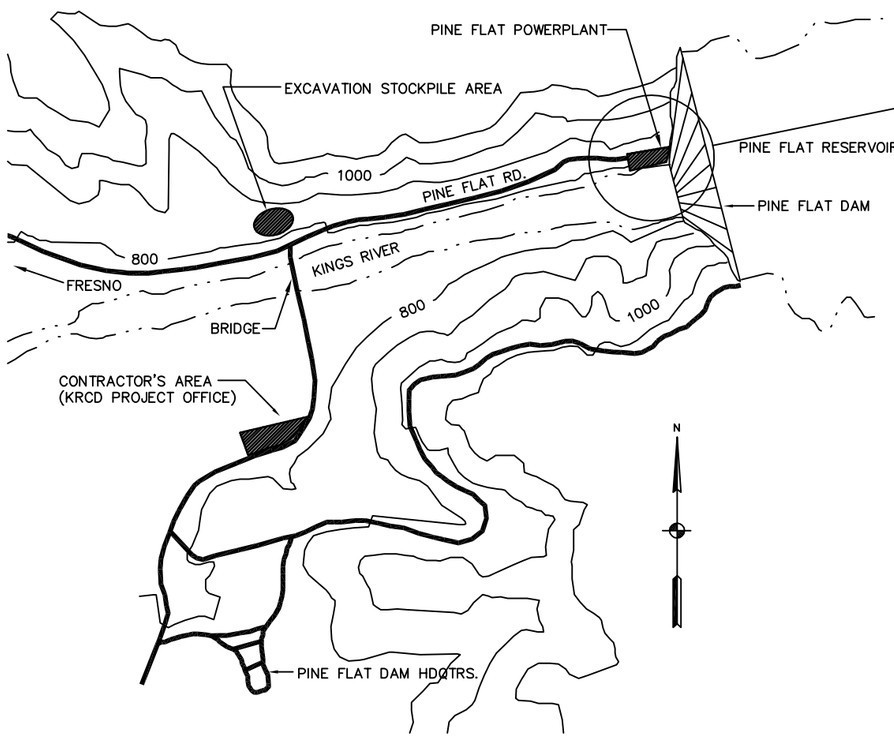
KINGS RIVER
CALIFORNIA
PINE FLAT DAM
TURBINE BYPASS PROJECT
GROUNDING PLAN
SWITCHYARD, PENSTOCKS & BYPASSES

Sheet reference number:
E-4

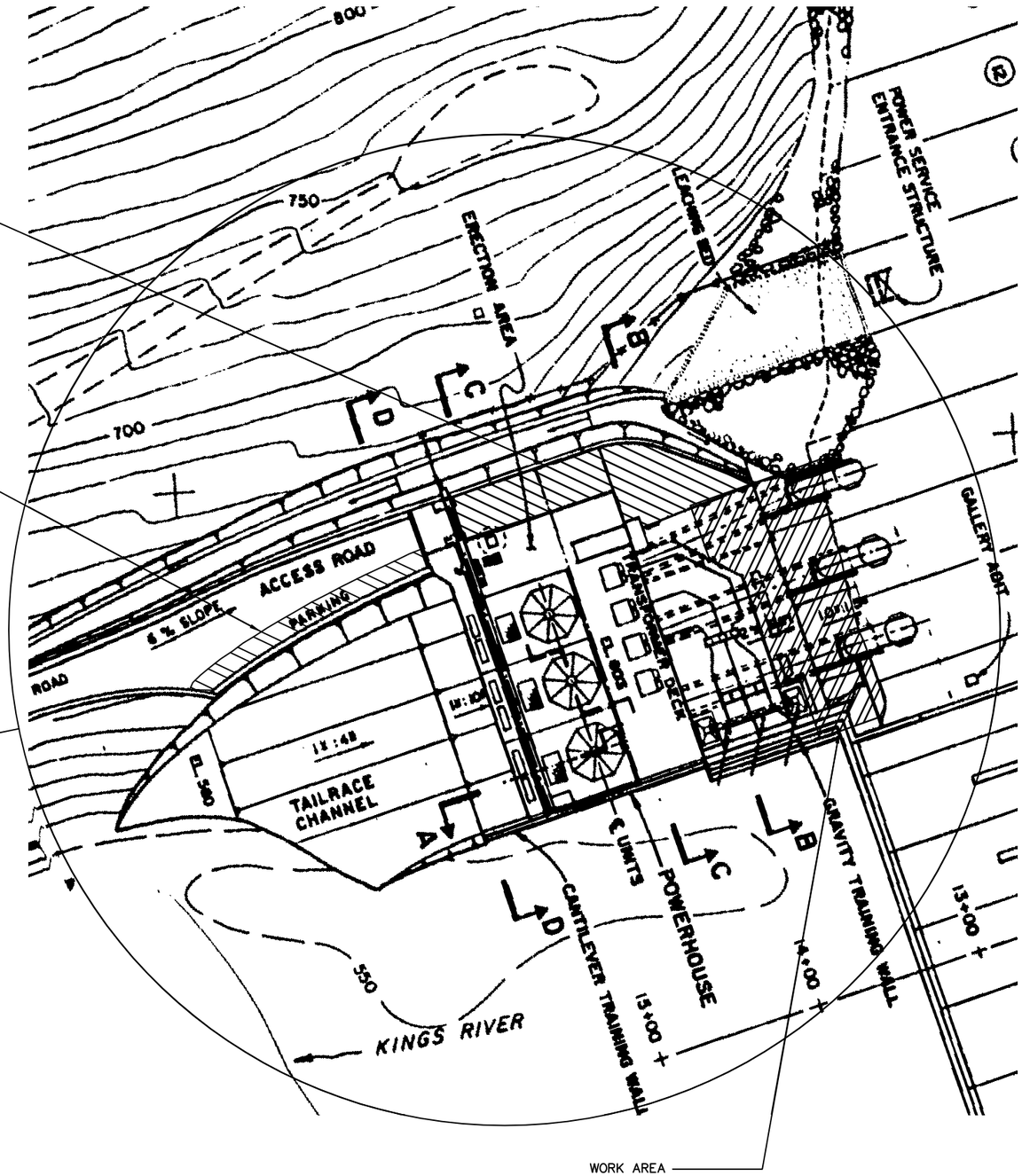
Border Revised 11/10/98, CDESHTD2.DWG TRISERVICE REVISION

NOTE: EXCAVATION FROM SWITCHYARD EMBANKMENT AREA TO BE TEMPORARILY STOCKPILED AT LOCATION SHOWN, AS NOTED ON SHEET C–3. ANY MATERIAL NOT REQUIRED FOR BACKFILL SHALL BE PERMANENTLY DISPOSED OF AT THE SAME LOCATION.



CONTRACTOR'S AREA

RESERVED FOR KRCD



WORK AREA

Border Revised 11/10/95, CDESIGN/DWG TRISERVICE REVISION

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Rev.	Description	Date	Approved

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Spec No: K12–1156
Dwn by: G. Bucknell
Reviewed by:
Submitted by: /s/ Rick Poppoleman
Chief, Standard Des. Sec.

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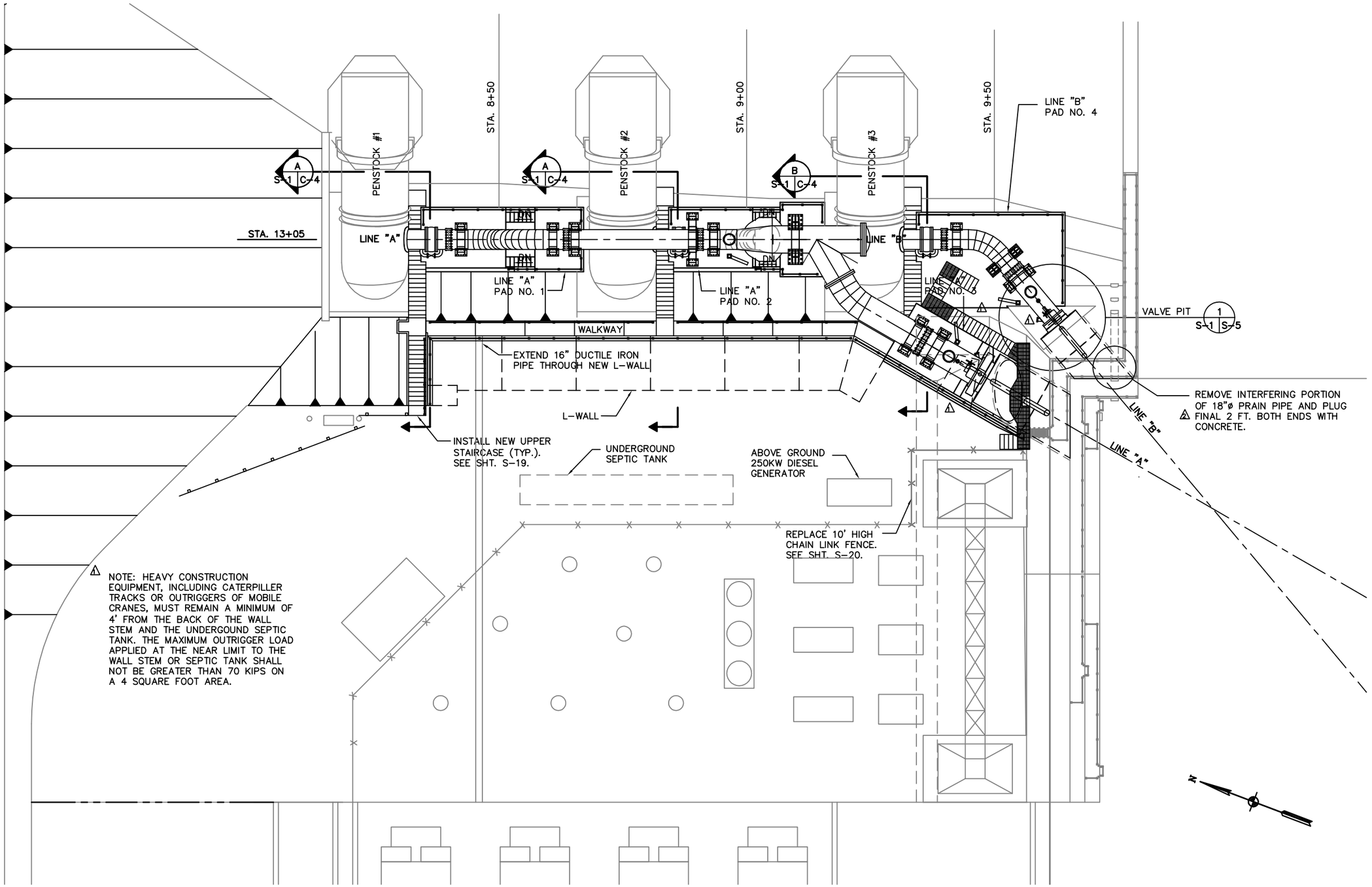
CALIFORNIA

CONTRACTOR MOBILIZATION AREAS AND EXCAVATION STOCKPILE/DISPOSAL AREA

Sheet reference number:
G–3



PLAN
SCALE: 1" = 10'

GRAPHIC SCALE
1" = 10'-0"
0 5' 10' 20' 30' 40' 50'

Border Revised 11/10/99, CDESHTDZ.DWG TRISERVICE REVISION

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Symbol	Description	Date Approved
1	ADDED NOTE. 84 #WO1-0042-VH002	11-2-01
2	VALVE DETAILS, PLATFORMS, STAIRS AND NOTES 84 #WO1-0042-VH001	11-2-01

Date:
Rev. 2
Design file no: KI2-25-715
Drawing Code:
File name: PF_S_01_1
Plot date: 10/10/01
Plot scale: 1:1
Spec No.: 1156
Designed by: K. Tate
Dwn by: G. Bucknell
Reviewed by:
Submitted by: Chief, Structural Des. Sec.

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HYDROLOGIC DESIGN
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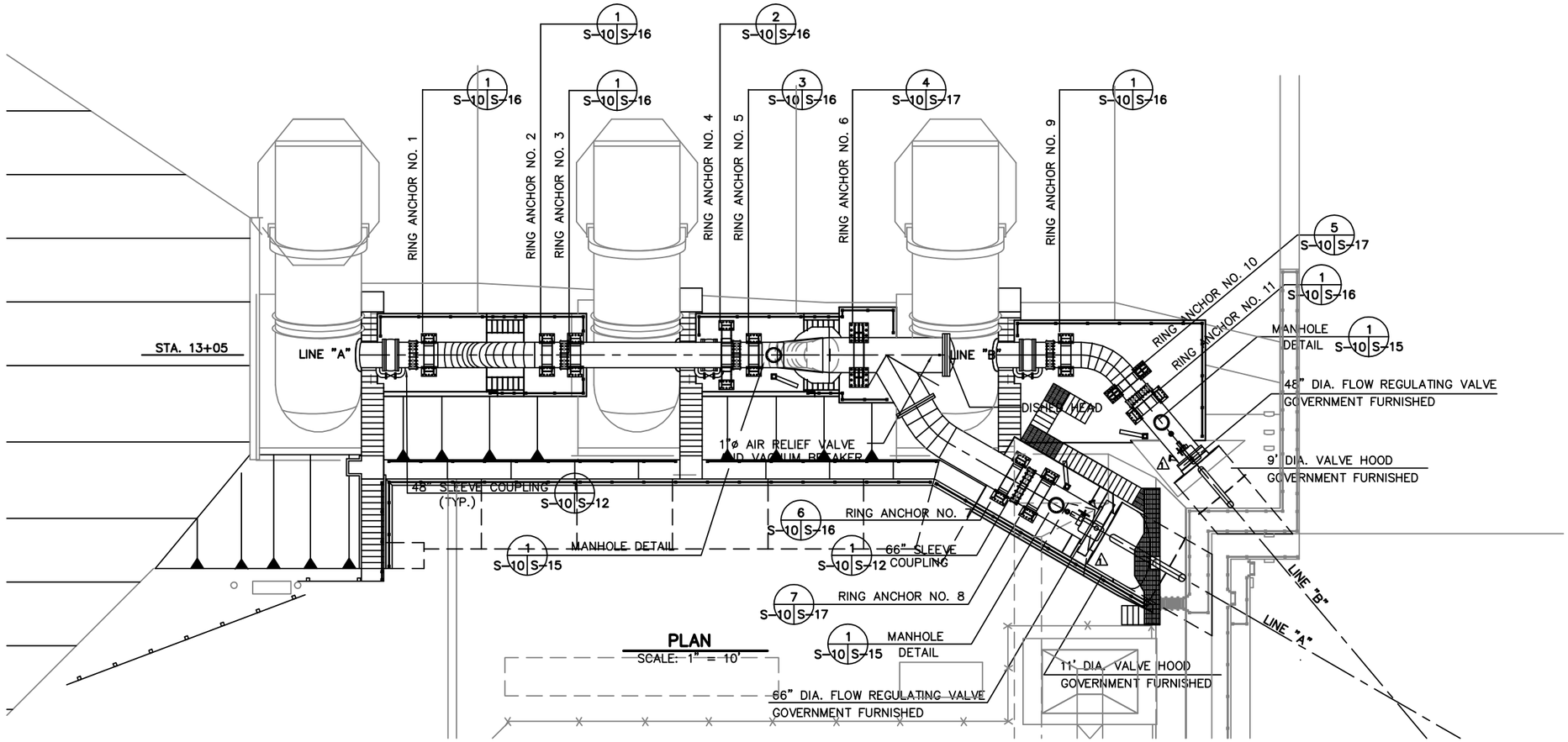
KINGS RIVER
CALIFORNIA
PINE FLAT DAM
TURBINE BYPASS PROJECT
NEW PIPELINES AND CONCRETE PADS
PLAN LAYOUT

Sheet reference number:
S-1



Border Revised 11/10/98, CDE/MTD/LDWD TRISERVICE REVISION

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Sacramento District

MONOVAR VALVE CONTROL, 84 #W01-0042-VH001
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Date | Approved
Symbol

Designed by: K. Tate
Dwn by: G. Bucknell
Reviewed by:
Submitted by:
Chief, Structural Des. Sec.
Date: 10-2-01
Spec No.: 1156
Design file no: K12-25-715
Drawing Code:
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Plot date: 09/25/02, 15:17:53
Plot scale:
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KINGS RIVER CALIFORNIA
PINE FLAT DAM
TURBINE BYPASS PROJECT
NEW PIPELINES
PLAN AND ELEVATION

Sheet reference number:
S-10

Floor Live Load information at the Existing Plant

Below is the list of live load ratings for each of the locations at the powerhouse. For Unit-4 construction, the construction will most likely occur around “Unloading Platform and Erection Area” and “Transformer Deck”. Other locations in the table below are for references.

The data is taken from the “Technical Record of Design and Construction” submitted by the original Pine Flat Power Plant Engineering Consultant, in 1985, upon completion of the project.

Table: Minimum uniformly distributed live loads-

	Location	***Floor Live Loads***
1	*Unloading Platform and Erection Area (El. 603’)*	*1000 psf*
2	*Transformer Deck (El. 603’)*	*1000 psf*
3	*Draft Tube Deck (El. 603’)*	*500 psf*
4	*Galleries*	*200 psf*
5	*Pump Room (El. 555’)*	*500 psf*
6	*Turbine Floor (El. 569’)*	*500 psf*
7	*Generator Floor (El. 585’)*	*500 psf*
8	*Floor Hatches*	*500 psf*
9	*Stairways*	*100 psf*