EAST BAY MUNICIPAL UTILITY DISTRICT

REQUEST FOR QUOTATION (RFQ) NO. 2617
for
ELECTRICAL EQUIPMENT FOR MOKELUMNE FISH HATCHERY

Contact Person: Mel Go
Phone Number: 510-287-2017
E-mail Address: mel.go@ebmud.com
For complete information regarding this project, see RFQ posted at https://www.ebmud.com/business-center/materials-and-supplies-bids/current-requests-quotation-rfqs/ or contact the EBMUD representative listed above. Please note that prospective bidders are responsible for reviewing this site during the RFQ process, for any published addenda regarding this RFQ.

Bids Due
by
2:00 p.m.
on
April 22, 2026

All bid submissions hand delivered or mailed (USPS, FedEx, UPS, etc.) to the address or PO Box noted below and must be received no later than 2:00 p.m. on the bid due date.

RESPONSE DELIVERED BY SERVICE (UPS, FedEx, DHL, etc., during business hours: 8:00 AM – 3:30 PM only) to:	RESPONSE DELIVERED BY MAIL (U.S. Postal Service) to:	RESPONSE HAND-DELIVERED (during business hours: 8:00 AM – 4:00 PM only)
EBMUD–Purchasing Division RFQ 2617 - Electrical Equipment for Mokelumne Fish Hatchery 375 11th Street Oakland, CA 94607	EBMUD–Purchasing Division RFQ 2617- Electrical Equipment for Mokelumne Fish Hatchery P.O. Box 24055 Oakland, CA 94623	EBMUD–Purchasing Division RFQ 2617 - Electrical Equipment for Mokelumne Fish Hatchery Purchasing Office 375-11TH Street, 1st Floor Oakland, CA 94607

EAST BAY MUNICIPAL UTILITY DISTRICT

RFQ No. 2617

for

Electrical Equipment for Mokelumne Fish Hatchery

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I. STATEMENT OF WORK

A. SCOPE

It is the intent of these specifications, terms, and conditions to describe the purchase and delivery of electrical equipment for the East Bay Municipal Utility District (District) Mokelumne Fish Hatchery. The District is seeking to replace existing and outdated electrical equipment at the Mokelumne Fish Hatchery to ensure reliable and robust emergency backup power for critical hatchery operations.

The project includes installation of a new Tier 4 Final diesel-powered generator, automatic transfer switch, 480 Volt switchboard, and control panel to provide emergency power and associated controls for all electrical loads serving the hatchery facility.

The new system will also integrate with the existing contingency backup 250 KW diesel-powered generator that serves the Yolk chiller. The new 500 kW diesel generator will replace the existing 125 kW diesel generator, which is nearing the end of its service life, and will be installed at the same location.

The District intends to award a contract to the lowest responsive and responsible bidder whose proposal meets the requirements of the District.

The District intends to assign the contract that is awarded pursuant to this RFQ to a District construction contractor. By submitting a response to this RFQ, the bidder acknowledges the intent and agrees to such an assignment on terms set forth in the attached Assignment Acceptance & Consent form, or other similar terms.

Following assignment, the District construction contractor shall assume the rights and obligations of the District under the assigned contract for the purposes of equipment coordination, delivery, and installation. The Supplier shall cooperate and coordinate with the District and the assigned construction contractor as necessary to support the project schedule.

Assignment of the contract shall not relieve the Supplier of any obligations under the contract, including but not limited to equipment pricing, delivery schedule, warranty obligations, submittal requirements, factory testing, and technical support.

The Supplier shall honor all pricing, warranties, guarantees, and delivery commitments contained in the contract following assignment.

For the purposes of this specification, the term Supplier shall refer to the entity responsible for procuring, manufacturing, furnishing, and delivering the equipment specified herein under a pre-purchase agreement with the District. Installation of the equipment will be performed By Others under a separate construction contract.

B. BIDDER QUALIFICATIONS

1. Bidder Minimum Qualifications

   a. The Bidder, bidder's principal, or bidder's staff shall have been regularly engaged in the business of providing electrical equipment similar in type and complexity to that specified in this RFQ for a minimum of ten (10) years.

   b. The Bidder shall possess all permits, licenses, and professional credentials necessary to supply the products and perform services as specified under this RFQ.

   c. The Bidder shall be an authorized manufacturer or authorized distributor of the equipment proposed and shall have the capability to provide technical support, coordination of submittals, and factory testing associated with the equipment supplied.

   d. The Bidder shall demonstrate experience providing equipment of similar size and complexity by submitting at least three (3) references for comparable projects completed within the past ten (10) years.

   e. The District reserves the right to request additional information to verify the Bidder's qualifications and ability to successfully supply the equipment specified in this RFQ.

   f. Documentation demonstrating current NSF/ANSI Standard 61 certification, where applicable to the equipment provided, shall be submitted by the Bidder as part of the bid package.

   g. If awarded, the Supplier shall notify the District in writing within five (5) days if any required certification lapses or expires during the term of the contract. Failure to notify the District within the specified time may constitute grounds for termination of the contract.

C. SPECIFIC REQUIREMENTS

1. Bid Items

   The equipment procurement under this RFQ shall consist of two (2) bid items:

   - Bid Item 1 – Emergency Generator System
     500 kW Emergency Diesel Generator with 50% rated load bank
   - Bid Item 2 - Switchboard / Automatic Transfer Switch (ATS) / Control Panel Lineup

Bidders shall provide pricing for each bid item using the Bid Form included in the RFQ Response Packet.

The District intends to procure the following electrical equipment. Additional details are provided in the Contract Drawings (Exhibit G)

Bid Item 1 – Emergency Generator System

Provide a Caterpillar 500 kW, 480/277V, Tier 4 Final emergency diesel generator, Model C18 T4F, or approved equal, including the following:

- 660-gallon sub-base fuel tank
- Control panel input expansion module
- Control panel output expansion module
- Remote annunciator module

The generator shall be provided with a Caterpillar C18 Tier 4 Final sound-attenuated, outdoor-rated enclosure.

Provide a Trystar radiator-mounted load bank rated 250 kW (50% of generator capacity), 480V, with the following features:

- Automatic load control
- Remote operator panel
- Integral control power transformer

Load bank shall be Trystar LD-RT Series or approved equal. The load bank shall be supplied and coordinated by Caterpillar for the selected generator unit.

Bid Item 2 – Switchboard / ATS / Control Panel Assembly

Provide the following equipment as a fully assembled lineup, arrangement as shown in the Contract Drawings:

<u>Switchboard</u>

- Eaton UL 891 Pow-R-Line Xpert switchboard, or approved equal
- Front access, front and rear aligned
- Type 3R (non-walk-in) enclosure with flat roof
- 480Y/277V, 3-phase, 4-wire
- Minimum main bus rating: 1200A
- Silver-plated copper bus

- Minimum interrupting rating: 65 kA RMS symmetrical
- Bus bracing rating: 65 kA

Automatic Transfer Switch

- ASCO UL 1008 listed Automatic Transfer Switch, or approved equal
- Rated 480V, 3-phase, 4-wire
- 1000 A continuous rating
- Minimum interrupting rating: 65 kA RMS symmetrical
- Integral controls with dead-front construction
- NEMA 3R enclosure
- Controller with adjustable transfer delays, built-in test functions, and remote status/alarm contacts
- Factory tested

Control Panel – CPNL-01 (per Contract Drawings)

Provide control panel including the following components:

- PLC
- Ethernet switch
- Fans and thermostat
- Receptacle
- Power supplies
- Air conditioning unit
- Control relays
- Terminal blocks / DIN rail / wireway
- Other supporting hardware as required

2. Equipment Configuration Requirements

a. General Equipment Requirements

All products supplied under this RFQ shall be new, unused, and of the most current production model available at the time of manufacture.

b. Equipment Supply Configuration

The switchboard, automatic transfer switch (ATS), and control panel shall be supplied and assembled by a single Supplier.

Individual components may be manufactured by separate manufacturers; however, the Supplier shall be responsible for:

- Final assembly
- Complete coordination and integration of all equipment
- Interconnecting wiring between components
- Delivery of the assembled equipment lineup to the project site

The switchboard and control panel shall be delivered as a fully assembled lineup, with all internal wiring, control wiring, and interconnections completed.

c. Generator Interface Requirements

The 500 kW emergency diesel generator shall be supplied under a separate bid item.

The switchboard, automatic transfer switch (ATS), and control panel provided under this RFQ shall be:

- Fully compatible with the specified generator
- Suitable for integration into the overall emergency power system shown on the Contract Drawings and Specifications.

The Supplier shall ensure that the equipment provided is fully compatible with the specified generator and capable of proper operation within the complete emergency power system without requiring modification to the generator equipment.

d. Codes, Standards, and Certifications

Electrical materials shall be UL listed and shall bear a UL label where a UL listing has been established for the materials or devices in question.

Where no UL product category exists, materials shall comply with applicable:

- IEEE standards
- NEMA standards
- PG&E standards

3. Project Schedule and Construction Constraints

The construction window for installation is limited to the period between June 1 and August 14 due to sensitive hatchery operations that could compromise the health of the fish housed at the facility.

Therefore, all equipment procured under this RFQ shall be manufactured, factory acceptance testing completed, and delivered to the project site no later than **May 14, 2027**. This delivery date is required to allow sufficient time for receipt, District inspection, and staging prior to the start of construction.

4. Procurement and Delivery Requirements

To meet this delivery requirement:

- The Supplier shall coordinate with equipment manufacturers to determine expected manufacturing lead times, including the time required for preparation and review of shop drawings, product data, and other required submittal documentation.
- The Supplier shall develop and include a detailed procurement schedule as part of the submittal package demonstrating how the equipment delivery date will be achieved.
- The Supplier shall be responsible for ensuring that manufacturing and delivery of equipment meet the required project schedule regardless of manufacturer lead times.

5. Equipment Storage and Delivery

Following completion and District approval of Factory Acceptance Testing (FAT), the Supplier shall provide secure and appropriate storage for all equipment until delivery to the project site.

The Supplier shall arrange for proper storage of the equipment in accordance with manufacturer recommendations and industry best practices to prevent damage or deterioration. At a minimum, equipment shall be:

- Protected from weather and environmental exposure
- Stored wrapped or otherwise enclosed to prevent moisture intrusion and contamination
- Elevated above ground to prevent contact with standing water or ground moisture
- Provided with space heaters or other moisture control measures where required by the manufacturer

- Maintained in a secure location to prevent damage or unauthorized access

The Supplier shall store the equipment until May 14, 2027, unless an alternate delivery date is directed by the District or the District's construction contractor.

The Supplier shall provide a daily storage cost for equipment retained after FAT approval. Storage costs shall be provided as separate line items for the following equipment:

- 500 kW Emergency Generator with 50% rated load bank
- Switchboard / Automatic Transfer Switch / Control Panel lineup

The District reserves the right to direct delivery of the equipment at any time prior to May 14, 2027. The District shall notify the Supplier of the delivery schedule at least ten (10) working days prior to shipment of the equipment.

The Supplier shall be responsible for delivery of the equipment to the project site.

The Supplier shall remain responsible for the condition of the equipment while in storage and shall repair or replace any equipment damaged prior to delivery at no additional cost to the District.

6. Submittals and District Review

The procurement schedule shall incorporate two (2) weeks of District review time for submittals. Submittals shall be prepared and submitted in a timely manner to support expedited review and maintain the overall project schedule.

The District shall review and approve factory inspection reports and Factory Acceptance Test (FAT) reports prior to shipment of the equipment to the project site. Equipment shall not be delivered until written approval of the inspection and test documentation has been issued by the District.

Submittals returned with comments shall be revised and resubmitted by the Supplier within a reasonable timeframe acceptable to the District in order to maintain the project schedule.

7. Air District Permitting

Following District approval of the 500 kW diesel-powered emergency generator shop drawings, the Supplier shall coordinate with the local air quality management district to obtain the required permit or authorization for installation and operation of the generator.

The Supplier shall allow a minimum of sixty (60) days for air district review and approval.

Manufacturing of the generator shall not commence until the required air district approval has been obtained and written authorization to proceed has been issued by the District.

D. DELIVERABLES / REPORTS

Contractor shall supply all documentation, O&M manuals, submittals, and all other requirements as detailed in sections:

1. 01 33 00 – Submittal Procedures
2. 01 43 11 – Seismic Qualification and Certification
3. 01 61 01 – Electrical Requirements for Mechanical Package Systems
4. 01 81 02 – Seismic Design Criteria
5. 16 70 00 – Control Panels
6. 16 80 00 – Programmable Logic Controllers and Associated Equipment
7. 26 05 19 – Low Voltage Electrical Power Conductors and Cables
8. 26 05 26 – Grounding and Bonding for Electrical Systems
9. 26 05 53 – Identification for Electrical Systems
10. 26 22 13 – Low Voltage Distribution Transformers
11. 26 24 13 – Switchboards
12. 26 24 16 – Panelboards
13. 26 27 26 – Wiring Devices
14. 26 28 16 – Circuit Breakers
15. 26 32 13.13 – Diesel Engine Driven Generator Set
16. 26 36 23 – Automatic Transfer Switches

All other specifications listed in Exhibit G Drawings and Specifications. All equipment shall be delivered to the following location:

Mokelumne River Fish Hatchery
25800 North McIntire Rd
Clements, CA 95227

E. INSPECTION

The District will inspect equipment upon arrival at the designated delivery point. The Supplier is solely responsible for ensuring the equipment arrives at the District's ship-to location free of defects, damage, and in full conformance with the requirements of this specification.

Inspection by the District shall not relieve the Supplier of responsibility for providing equipment that meets all requirements of the contract and specifications.

In the event that an item or lot is rejected, District Inspectors will provide the Supplier and the EBMUD Purchasing Division with an Inspector's Job Report identifying the product deficiencies and required corrective actions. Correction, repair, or replacement of rejected equipment shall be at the Supplier's sole expense, including any costs associated with return shipping, replacement, or re-delivery.

The District reserves the right of access to the Supplier's or manufacturer's facilities, at the District's expense, for the purpose of verifying compliance with this specification, witnessing testing, or reviewing manufacturing processes.

F. FAILURE TO MEET SPECIFICATIONS

If any shipment of equipment supplied under this contract fails to meet the requirements of these specifications or the delivery requirements of the contract, the District may reject the shipment in whole or in part.

At the District's option, the District may require the Supplier to promptly repair or replace the nonconforming equipment, or the District may procure the required equipment from another source capable of meeting the District's specifications.

Any additional costs incurred by the District to procure conforming equipment from another source shall be charged to the Supplier, including costs exceeding the original contract price.

The Supplier shall also bear all costs associated with removal, return, replacement, and disposal of nonconforming equipment, including transportation and handling.

The District's acceptance or inspection of equipment shall not relieve the Supplier of responsibility for providing equipment that conforms to all contract requirements.

II. CALENDAR OF EVENTS

EVENT	DATE/LOCATION
RFQ Issued	March 25, 2026
Deadline For Submission of Questions	March 30, 2026
Response Due	April 22, 2026 by 2:00 p.m. At this time all bids will be opened publicly in the EBMUD Board Room at 375 Eleventh St., Oakland, CA 94607*
Anticipated Contract Start Date	May 26, 2026

*** Note**: All dates are subject to change **by District**.
Bidders are responsible for reviewing **https://www.ebmud.com/business-center/materials-and-supplies-bids/current-requests-quotation-rfqs/** for any published addenda. Hard copies of addenda will not be mailed out.

III. DISTRICT PROCEDURES, TERMS, AND CONDITIONS

A. RFQ ACCEPTANCE AND AWARD

1. RFQ responses will be evaluated to determine that they are responsive, responsible, and that they meet the specifications as stated in this RFQ.

2. The District reserves the right to award to a single or to multiple Contractors, dependent upon what provides the lowest overall cost to the District.

3. The District has the right to decline to award this contract or any part of it for any reason.

4. Any specifications, terms, or conditions, issued by the District, or those included in the bidder's submission, in relation to this RFQ, may be incorporated into any purchase order or contract that may be awarded as a result of this RFQ.

5. Award of contract. The District reserves the right to reject any or all proposals, to accept one part of a proposal and reject the other, unless the bidder stipulates to the contrary, and to waive minor technical defects and administrative errors, as the interest of the District may require. Award will be made, or proposals rejected by the District as soon as possible after bids have been opened.

B. BRAND NAMES, APPROVED EQUIVALENTS, DEVIATIONS, AND EXCEPTIONS

Any references to manufacturers, trade names, brand names, and/or catalog numbers are intended to be descriptive, but not restrictive, unless otherwise stated, and are

intended to indicate the quality level desired. Bidders may offer an equivalent product that meets or exceeds the specifications.

The District reserves the right to be the sole judge of what shall be considered equal and/or acceptable and may require the bidder to provide additional information and/or samples. If the bidder does not specify otherwise, it is understood that the brand and/or product referenced in this RFQ will be supplied.

Taking exception to the RFQ, or failure on the part of the bidder to comply with all requirements and conditions of this RFQ, may subject the RFQ response to rejection. If no deviations are shown, the bidder will be required to furnish the material exactly as specified. The burden of proof of compliance with the specifications will be the responsibility of the bidder.

This RFQ is subject to acceptance only on the terms and conditions stated in this RFQ. Any additional or different terms and conditions proposed by the bidder are hereby rejected and shall be of no force or effect unless expressly assented to in writing by the District.

C. PRICING

1. All prices are to be F.O.B. destination. Supplier shall retain title and bear all risk of loss, damage, or degradation (including temperature or handling impacts) until delivery and acceptance by the District. Supplier shall, at no cost to the District, promptly replace any goods that are lost, damaged, defective, or otherwise rendered unusable prior to acceptance.

2. All prices quoted shall be in United States dollars.

3. Price quotes shall include any and all payment incentives available to the District.

4. Bidders are advised that in the evaluation of cost, if applicable, it will be assumed that the unit price quoted is correct in the case of a discrepancy between the unit price and extended price.

D. NOTICE OF INTENT TO AWARD AND PROTESTS

At the conclusion of the RFQ response evaluation process, all entities who submitted a bid package will be notified in writing by e-mail or USPS mail with the name of the Bidder being recommended for contract award. The document providing this notification is the Notice of Intent to Award.

Protests must be in writing and must be received no later than seven (7) workdays after the District issues the Notice of Intent to Award. The District will reject the protest as untimely if it is received after this specified time frame. Protests will be accepted from bidders or potential bidders only.

If the protest is mailed and not received by the District, the protesting party bears the burden of proof to submit evidence (e.g., certified mail receipt) that the protest was sent in a timely manner so that it would be received by the District within the RFQ protest period.

Bid protests must contain a detailed and complete written statement describing the reason(s) for protest. The protest must include the name and/or number of the bid, the name of the firm protesting, and include a name, telephone number, email address and physical address of the protester. If a firm is representing the protester, they shall include their contact information in addition to that of the protesting firm.

Protests must be mailed, hand delivered, or emailed to the Manager of Purchasing, Mailstop 102, East Bay Municipal Utility District, 375 Eleventh Street, Oakland, CA 94607 or P.O. Box 24055, Oakland, California 94623. Facsimile and electronic mail protests must be followed by a mailed or hand delivered identical copy of the protest and must arrive within the seven workday time limit. Any bid protest filed with any other District office shall be forwarded immediately to the Manager of Purchasing.

The bid protester can appeal the determination to the requesting organization's Department Director. The appeal must be submitted to the Department Director no later than five workdays from the date which the protest determination was transmitted by the District, to the protesting party. The appeal shall focus on the points raised in the original protest, and no new points shall be raised in the appeal.

Such an appeal must be made in writing and must include all grounds for the appeal and copies of the original protest and the District's response. The bid protester must also send the Purchasing Division a copy of all materials sent to the Department Director.

The Department Director will make a determination of the appeal and respond to the protester by certified mail in a timely manner. If the appeal is denied, the letter will include the date, time, and location of the Board of Directors meeting at which staff will make a recommendation for award and inform the protester it may request to address the Board of Directors at that meeting.

The District may transmit copies of the protest and any attached documentation to all other parties who may be affected by the outcome of the protest. The decision of the District as to the validity of any protest is final. This District's final decision will be transmitted to all affected parties in a timely manner.

E. METHOD OF ORDERING

1. POs and payments for products and/or services will be issued only in the name of Contractor.

2. Any and all change orders shall be in writing and agreed upon, in advance, by Contractor and the District.

F. TERM / TERMINATION / RENEWAL

1. The term of the contract, which may be awarded pursuant to this RFQ, will be one year.

2. At the sole discretion of the District, any contract which may be awarded pursuant to this RFQ, may be extended for two (2) additional one-year terms at agreed prices with all other terms and conditions remaining the same. In the event that a Contractor does not agree to an extension, the District shall be given a minimum of 90 days' notice to locate a suitable replacement contractor.

3. This Agreement may be terminated for convenience by the District provided the Contractor is given written notice of not less than 30 calendar days. Upon such termination, the District shall pay the Contractor the amount owing for the products ordered and satisfactorily received by the District. This shall be the sole and exclusive remedy to which the Contractor is properly entitled in the event of termination by the District.

4. This Agreement may be terminated for cause at any time, provided that the District notifies Contractor of impending action.

G. WARRANTY

1. For any contract awarded pursuant to this RFQ, Contractor expressly warrants that all goods furnished will conform strictly with the specifications and requirements contained herein and with all approved submittals, samples and/or models and information contained or referenced therein, all affirmations of fact or promises, and will be new, of merchantable quality, free from defects in materials and workmanship, including but not limited to leaks, breaks, penetrations, imperfections, corrosion, deterioration, or other kinds of product deficiencies. Contractor expressly warrants that all goods to be furnished will be fit and sufficient for the purpose(s) intended. Contractor expressly warrants that all goods shall be delivered free from any security interest, lien, or encumbrance of any kind, and free from any claim of infringement, copyright or other intellectual property violation, or other violation of laws, statutes, regulations, ordinances, rules, treaties, import restrictions, embargoes or other legal requirements. Contractor guarantees all products and services against faulty or inadequate design, manufacture, negligent or improper transport, handling, assembly, installation or testing, and further guaranties that there shall be strict compliance with all manufacturer guidelines, recommendations, and requirements, and that Contractor guaranties that it will conform to all requirements necessary to keep all manufacturer warranties and guarantees in

full force and effect. These warranties and guarantees are inclusive of all parts, labor, and equipment necessary to achieve strict conformance, and shall take precedence over any conflicting warranty or guarantee. These warranties and guaranties shall not be affected, limited, discharged, or waived by any examination, inspection, delivery, acceptance, payment, course of dealing, course of performance, usage of trade, or termination for any reason and to any extent. In the absence of any conflicting language as to duration, which conflicting language will take precedence as being more specific, Contractor's aforesaid warranties and guarantees shall be in full force and effect for a period of three years from the date of acceptance by the District but shall continue in full force and effect following notice from District of any warranty or guarantee issue, until such issue has been fully resolved to the satisfaction of District.

H. INVOICING

1. Following the Districts acceptance of product(s) meeting all specified requirements, and/or the complete and satisfactory performance of services, the District will render payment within thirty (30) days of receipt of a correct invoice.

2. The District shall notify Contractor of any invoice adjustments required.

3. Invoices shall contain, at a minimum, District purchase order number, invoice number, remit to address, and itemized products and/or services description.

4. The District will pay Contractor in an amount not to exceed the total amount quoted in the RFQ response.

I. LIQUIDATED DAMAGES

1. A deduction for liquidated damages of $500 per day will be assessed for not meeting District-specified performance requirements as prescribed in this RFQ after June 1, 2027.

2. It being impracticable or extremely difficult to fix the actual damage, the amount set forth above is hereby agreed upon as liquidated damages and will be deducted from any money due under the agreement arising from this RFQ.

3. In the event performance and/or deliverables have been deemed unsatisfactory, the District reserves the right to withhold future payments until the performance and/or deliverables are deemed satisfactory.

J. BONDS

1. The successful bidder will be required to post and maintain the following bonds included in Exhibit E for 100 percent (100%) of the Total Lump Sum Bid Cost

(Exhibit A) in the Bid Form with the District. Bonds must be on District forms attached to this RFQ as Exhibit E – Bond Forms.

a. Payment bond

b. Faithful Performance bond

2. Refer to Article 9 of the General Conditions for additional requirements.

IV. RFQ RESPONSE SUBMITTAL INSTRUCTIONS AND INFORMATION

A. DISTRICT CONTACTS

All contact during the competitive process is to be through the contact listed on the first page of this RFQ. The following persons are to be contacted only for the purposes specified below.

TECHNICAL SPECIFICATIONS:
Attn: I-Pei Hsiu, Associate Engineer
EBMUD-Water Resources Department
E-Mail: ipei.hsiu@ebmud.com
PHONE: 510-287-0979

CONTRACT EQUITY PROGRAM:
Attn: Contract Equity Office
PHONE: (510) 287-0114

AFTER AWARD:
Attn: I-Pei Hsiu, Associate Engineer
EBMUD-Water Resources Department
E-Mail: ipei.hsiu@ebmud.com
PHONE: 510-287-0979

B. SUBMITTAL OF RFQ RESPONSE

1. Responses must be submitted in accordance with Exhibit A – RFQ Response Packet, including all additional documentation stated in the "Required Documentation and Submittals" section of Exhibit A.

2. Late and/or unsealed responses will not be accepted.

3. RFQ responses submitted via electronic transmissions will not be accepted. Electronic transmissions include faxed RFQ responses or those sent by electronic mail ("e-mail").

4. All RFQ responses must be SEALED and received by 2:00 p.m. on the due date specified in the Calendar of Events. Any RFQ response received after that

time/date, or at a place other than the stated addresses, cannot be considered and will be returned to the bidder unopened. The EBMUD mailroom and Purchasing Division timestamp shall be considered the official timepiece for the purpose of establishing the actual receipt of RFQ responses.

5. RFQ responses are to be addressed/delivered as follows:

Mailed (USPS):
East Bay Municipal Utility District
Electrical Equipment for Mokelumne Fish Hatchery
RFQ No. 2617
EBMUD–Purchasing Division
P.O. Box 24055
Oakland, CA 94623

Hand Delivered, delivered by courier or package delivery service (UPS, FedEx, DHL, etc.):

East Bay Municipal Utility District
Electrical Equipment for Mokelumne Fish Hatchery
RFQ No. 2617
EBMUD–Purchasing Division
375 Eleventh Street, First Floor
Oakland, CA 94607

Bidder's name, return address, and the RFQ number and title must also appear on the mailing package.

6. All costs required for the preparation and submission of an RFQ response shall be borne by the bidder.

7. California Government Code Section 4552: In submitting an RFQ response to a public purchasing body, the bidder offers and agrees that if the RFQ response is accepted, it will assign to the purchasing body all rights, title, and interest in and to all causes of action it may have under Section 4 of the Clayton Act (15 U.S.C. Sec. 15) or under the Cartwright Act (Chapter 2, commencing with Section 16700, of Part 2 of Division 7 of the Business and Professions Code), arising from purchases of goods, materials, or services by the bidder for sale to the purchasing body pursuant to the RFQ response. Such assignment shall be made and become effective at the time the purchasing body tenders final payment to the bidder.

8. Bidder expressly acknowledges that it is aware that if a false claim is knowingly submitted (as the terms “claim” and “knowingly” are defined in the California False Claims Act, Cal. Gov. Code, §12650 et seq.), the District will be entitled to civil remedies set forth in the California False Claim Act.

9. The RFQ response shall remain open to acceptance and is irrevocable for a period of one hundred eighty (180) days, unless otherwise specified in the RFQ documents.

10. It is understood that the District reserves the right to reject any or all RFQ responses.

11. RFQ responses, in whole or in part, are NOT to be marked confidential or proprietary. The District may refuse to consider any RFQ response or part thereof so marked. RFQ responses submitted in response to this RFQ may be subject to public disclosure. The District shall not be liable in any way for disclosure of any such records.

EXHIBIT A
RFQ RESPONSE PACKET
RFQ No. 2617 - Electrical Equipment for Mokelumne Fish Hatchery

To: The EAST BAY MUNICIPAL UTILITY District ("District")

From: _____

(Official Name of Bidder)

RFQ RESPONSE PACKET GUIDELINES

- **BIDDERS ARE TO SUBMIT ONE (1) ORIGINAL HARDCOPY RFQ RESPONSE WITH ORIGINAL INK SIGNATURES, CONTAINING THE FOLLOWING IN THEIR ENTIRETY:**
  - **EXHIBIT A – RFQ RESPONSE PACKET**
    - **INCLUDING ALL REQUIRED DOCUMENTATION AS DESCRIBED IN "EXHIBIT A-REQUIRED DOCUMENTATION AND SUBMITTALS"**
  - **EXHIBIT D – IRAN CONTRACTING ACT CERTIFICATION**
  - **EXHIBIT E – BOND FORMS**

- **ALL PRICES AND NOTATIONS MUST BE PRINTED IN INK OR TYPEWRITTEN; NO ERASURES ARE PERMITTED; ERRORS MAY BE CROSSED OUT AND CORRECTIONS PRINTED IN INK OR TYPEWRITTEN ADJACENT AND MUST BE INITIALED IN INK BY PERSON SIGNING THE RFQ RESPONSE.**

- **BIDDERS THAT DO NOT COMPLY WITH THE REQUIREMENTS, AND/OR SUBMIT AN INCOMPLETE RFQ RESPONSE MAY BE SUBJECT TO DISQUALIFICATION AND THEIR RFQ RESPONSE REJECTED IN TOTAL.**

- **IF BIDDERS ARE MAKING ANY CLARIFICATIONS AND/OR AMENDMENTS, OR TAKING EXCEPTION TO ANY PART OF THIS RFQ, THESE MUST BE SUBMITTED IN THE EXCEPTIONS, CLARIFICATIONS, AND AMENDMENTS SECTION OF THIS EXHIBIT A – RFQ RESPONSE PACKET. THE DISTRICT, AT ITS SOLE DISCRETION, MAY ACCEPT AMENDMENTS/EXCEPTIONS, OR MAY DEEM THEM TO BE UNACCEPTABLE, THEREBY RENDERING THE RFQ RESPONSE DISQUALIFIED.**

- **BIDDERS SHALL NOT MODIFY DISTRICT LANGUAGE IN ANY PART OF THIS RFQ OR ITS EXHIBITS, NOR SHALL THEY QUALIFY THEIR RFQ RESPONSE BY INSERTING THEIR OWN LANGUAGE OR FALSE CLAIMS IN THEIR RESPONSE. ANY EXCEPTIONS AND CLARIFICATIONS MUST BE PLACED IN THE "EXCEPTIONS/ CLARIFICATIONS" PAGE, NOT BURIED IN THE PROPOSAL ITSELF."**

BIDDER INFORMATION AND ACCEPTANCE

1. The undersigned declares that all RFQ documents, including, without limitation, the RFQ, Addenda, and Exhibits, have been read and that the terms, conditions, certifications, and requirements are agreed to.

2. The undersigned is authorized to offer, and agrees to furnish, the articles and services specified in accordance with the RFQ documents.

3. The undersigned acknowledges acceptance of all addenda related to this RFQ.

4. The undersigned hereby certifies to the District that all representations, certifications, and statements made by the bidder, as set forth in this RFQ Response Packet and attachments, are true and correct and are made under penalty of perjury pursuant to the laws of California.

5. The undersigned acknowledges that the bidder is, and will be, in good standing in the State of California, with all the necessary licenses, permits, certifications, approvals, and authorizations necessary to perform all obligations in connection with this RFQ and associated RFQ documents.

6. It is the responsibility of each bidder to be familiar with all of the specifications, terms, and conditions and, if applicable, the site condition. By the submission of an RFQ response, the bidder certifies that if awarded a contract it will make no claim against the District based upon ignorance of conditions or misunderstanding of the specifications.

7. Patent indemnity: Contractors who do business with the District shall hold the District, its Directors, officers, agents, and employees, harmless from liability of any nature or kind, including cost and expenses, for infringement or use of any patent, copyright, or other proprietary right, secret process, patented or unpatented invention, article, or appliance furnished or used in connection with the contract or purchase order.

8. Insurance certificates are not required at the time of submission. However, by signing Exhibit A – RFQ Response Packet, the bidder agrees to meet the minimum insurance requirements stated in the RFQ. This documentation must be provided to the District prior to execution of an agreement by the District and shall include an insurance certificate which meets the minimum insurance requirements, as stated in the RFQ.

9. The undersigned acknowledges that RFQ responses, in whole or in part, are NOT to be marked confidential or proprietary. The District may refuse to consider any RFQ response or part thereof so marked. RFQ responses submitted in response to this RFQ may be subject to public disclosure. The District shall not be liable in any way for disclosure of any such records.

10. The undersigned bidder hereby submits this RFQ response and binds itself on award to the District under this RFQ to execute in accordance with such award a contract and to furnish the bond or bonds and insurance required by the RFQ. The RFQ, subsequent Addenda, bidder's Response Packet, and any attachments, shall constitute the Contract, and all provisions thereof are hereby accepted.

11. The undersigned acknowledges ***ONE*** of the following (please check only one box):

☐ Bidder is not an SBE and is ineligible for any bid preference; **OR**

☐ Bidder is an SBE or DVBE as described in the Contract Equity Program (CEP) and Equal Employment Opportunity (EEO) Guidelines, is requesting a 7% bid preference, and has completed the CEP and EEO forms at the hyperlink contained in the CEP and EEO section of this Exhibit A.

For additional information on SBE bid preference, please refer to the Contract Equity Program and Equal Employment Opportunity Guidelines at the above referenced hyperlink.

Official Name of Bidder (exactly as it appears on Bidder's corporate seal and invoice): _____

Street Address Line 1: _____

Street Address Line 2: _____

City: _____ State: _____ Zip Code: _____

Webpage: _____

Type of Entity / Organizational Structure (check one):

☐ Corporation ☐ Joint Venture

☐ Limited Liability Partnership ☐ Partnership

☐ Limited Liability Corporation ☐ Non-Profit / Church

☐ Other: _____

Jurisdiction of Organization Structure: _____

Date of Organization Structure: _____

Federal Tax Identification Number: _____

Department of Industrial Relations (DIR) Registration Number: _____

Primary Contact Information:

Name / Title: _____

Telephone Number: _____ Fax Number: _____

E-mail Address: _____

Street Address Line 1: _____

City: _____ State: _____ Zip Code: _____

SIGNATURE: _____

Name and Title of Signer (printed): _____

Dated this _____ day of _____ 20_____

EBMUD

BID FORM

Cost shall be submitted on this Bid Form as is. The prices quoted shall not include Sales Tax or Use Tax; said tax, wherever applicable, will be paid by the District to the contractor, if licensed to collect, or otherwise directly to the State.

No alterations or changes of any kind to the Bid Form(s) are permitted. RFQ responses that do not comply may be subject to rejection in total. The cost quoted below shall be the cost the District will pay for the term of any contract that is a result of this RFQ process.

Quantities listed herein are annual estimates based on past usage and are not to be construed as a commitment. No minimum or maximum is guaranteed or implied.

Electrical Equipment

Description	Quantity	Unit of Measure	Unit Cost	Extended Cost (Quantity x Unit Cost)
Bid Item 1 - Emergency Generator System 500 kW Emergency Diesel Generator with 50% rated load bank	1	Lump Sum		**$**
Bid Item 2 - Switchboard /Automatic Transfer Switch (ATS) /Control Panel Lineup	1	Lump Sum		**$**
TOTAL COST (Bid Item 1 and Bid Item 2)				**$**

For Information Only

Please quote below the expected shipping/freight costs. These costs will not to be used to evaluate/determine RFQ Bid Amount.

Shipping/Freight Cost: $_____

Additional Storage of Equipment (per day) $_____

REQUIRED DOCUMENTATION AND SUBMITTALS

All of the specific documentation listed below is required to be submitted with the Exhibit A – RFQ Response Packet. Bidders shall submit all documentation, in the order listed below, and clearly label each section of the RFQ response with the appropriate title (i.e. Table of Contents, Letter of Transmittal, Key Personnel, etc.).

1. **Description of the Proposed Equipment**: RFQ response shall include a description of the proposed equipment, as it will be finally configured during the term of the contract. The description shall specify how the proposed equipment will meet or exceed the requirements of the District and shall explain any advantages that this proposed equipment would have over other possible equipment/systems. The description shall include any disadvantages or limitations that the District should be aware of in evaluating the RFQ response. Finally, the description shall describe all product warranties provided by bidder.

2. **Implementation Plan and Schedule**: The RFQ response shall include an implementation plan and schedule. The plan for implementing the proposed equipment/system and services shall include an Acceptance Test Plan. In addition, the plan shall include a detailed schedule indicating how the bidder will ensure adherence to the timetables for the final equipment/system and/or services.

3. **Evidence of Qualification Testing**: RFQ response provides evidence that the proposed equipment/system has successfully completed the qualification test standard requirements defined in this RFQ. Evidence shall include a statement from an Independent Testing Authority (ITA) that both the hardware elements and the software elements of the proposed equipment/system comply with the requirements of the qualification standard. If the equipment/system specified requires the addition of components or features not previously tested by the ITA, the District will determine, in its sole discretion, whether qualification testing of such components or features will be required prior to the award of a contract.

4. **Sustainability Statement:** Contractors shall submit a statement regarding any sustainable or environmental initiatives or practices that they or their suppliers engage in. This information can be in relation to the specific products procured under this RFQ or in relation to the manufacture, delivery, or office practices of your firm.

   If applicable, please also provide any information you have available on the below:

   a. Has your firm taken steps to enhance its ability to assess, track and address issues regarding Greenhouse Gas (GHG) Emissions in answer to recent legislations such as the Buy Clean California Act? If so, please attach any data you can on the embedded greenhouse gas emissions in the production and transport of the products and/or services which will be provided via this RFQ. If this is not available, please describe the approach you plan to take in order to gather and report this information in the future.

For further information in this topic, please see: http://www.ghgprotocol.org/scope-3-technical-calculation-guidance.

5. **References:**

a. Bidders must use the templates in the "References" section of this Exhibit A – RFQ Response Packet to provide references.

b. References should have similar scope, volume, and requirements to those outlined in these specifications, terms, and conditions.

- Bidders must verify the contact information for all references provided is current and valid.
- Bidders are strongly encouraged to notify all references that the District may be contacting them to obtain a reference.

c. The District may contact some or all of the references provided in order to determine Bidder's performance record on work similar to that described in this RFQ. The District reserves the right to contact references other than those provided in the RFQ response.

6. **Exceptions, Clarifications, Amendments:**

a. The RFQ response shall include a separate section calling out all clarifications, exceptions, and amendments, if any, to the RFQ and associated RFQ documents, which shall be submitted with Bidder's RFQ response using the template in the "Exceptions, Clarifications, Amendments" section of this Exhibit A – RFQ Response Packet.

b. **THE DISTRICT IS UNDER NO OBLIGATION TO ACCEPT ANY EXCEPTIONS, AND SUCH EXCEPTIONS MAY BE A BASIS FOR RFQ RESPONSE DISQUALIFICATION.**

7. **Contract Equity Program:**

a. Every bidder must fill out, sign, and submit the appropriate sections of the Contract Equity Program and Equal Employment Opportunity documents located at the hyperlink contained in the last page of this Exhibit A. Special attention should be given to completing Form P-25, "Contractor Employment Data and Certification". Any bidder needing assistance in completing these forms should contact the District's Contract Equity Office at (510) 287-0114 prior to submitting an RFQ response.

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REFERENCES

RFQ No. 2617 – Electrical Equipment for Mokelumne Fish Hatchery

Bidder Name: ___________________________________

Bidder must provide a minimum of 3 references.

Company Name:	Contact Person:
Address:	Telephone Number:
City, State, Zip:	E-mail Address:
Services Provided / Date(s) of Service:	

Company Name:	Contact Person:
Address:	Telephone Number:
City, State, Zip:	E-mail Address:
Services Provided / Date(s) of Service:	

Company Name:	Contact Person:
Address:	Telephone Number:
City, State, Zip:	E-mail Address:
Services Provided / Date(s) of Service:	

Company Name:	Contact Person:
Address:	Telephone Number:
City, State, Zip:	E-mail Address:
Services Provided / Date(s) of Service:	

Company Name:	Contact Person:
Address:	Telephone Number:
City, State, Zip:	E-mail Address:
Services Provided / Date(s) of Service:	

EXCEPTIONS, CLARIFICATIONS, AMENDMENTS
RFQ No. 2617 – Electrical Equipment for Mokelumne Fish Hatchery

Bidder Name: _____

List below requests for clarifications, exceptions, and amendments, if any, to the RFQ and associated RFQ Documents, and submit with bidder's RFQ response. **The District is under no obligation to accept any exceptions and such exceptions may be a basis for RFQ response disqualification.**

Reference to:			**Description**
Page No.	Section	Item No.	
p. 23	**D**	**1.c.**	***Bidder takes exception to…***

*Print additional pages as necessary

CONTRACT EQUITY PROGRAM & EQUAL EMPLOYMENT OPPORTUNITY

The District's Board of Directors adopted the Contract Equity Program (CEP) to enhance equal opportunities for business owners of all races, ethnicities, and genders who are interested in doing business with the District. The program has contracting objectives, serving as the minimum level of expected contract participation for the three availability groups: white-men owned businesses, white-women owned businesses, and ethnic minority owned businesses. The contracting objectives apply to all contracts that are determined to have subcontracting opportunities, and to all contractors regardless of their race, gender, or ethnicity.

All Contractors and their subcontractors performing work for the District must be Equal Employment Opportunity (EEO) employers and shall be bound by all laws prohibiting discrimination in employment. There shall be no discrimination against any person, or group of persons, on account of race, color, religion, creed, national origin, ancestry, gender including gender identity or expression, age, marital or domestic partnership status, mental disability, physical disability (including HIV and AIDS), medical condition (including genetic characteristics or cancer), genetic information, or sexual orientation.

Contractor and its subcontractors shall abide by the requirements of 41 CFR §§ 60-1.4(a), 60-300.5(a) and 60-741.5(a). These regulations prohibit discrimination against qualified individuals based on their status as protected veterans or individuals with disabilities and prohibit discrimination against all individuals based on their race, color, religion, sex, sexual orientation, gender identity, or national origin in the performance of this contract. Moreover, these regulations require that covered prime contractors and subcontractors take affirmative action to employ and advance in employment individuals without regard to race, color, religion, sex, national origin, protected veteran status or disability.

All Contractors shall include the nondiscrimination provisions above in all subcontracts.

Please include the required completed forms with your bid. Non-compliance with the Guidelines may deem a bid non-responsive, and therefore ineligible for contract award.

Your firm is responsible for:

1) Reading and understanding the CEP guidelines.
2) Filling out and submitting with your bid the appropriate forms.

The CEP guidelines and forms can also be downloaded from the District website at the following link: **http://ebmud.com/business-center/contract-equity-program/**

If you have questions regarding the Contract Equity Program, please call (510) 287-0114.

EXHIBIT B
INSURANCE REQUIREMENTS

CONTRACTOR/COMPANY NAME: _____

PROPOSER shall take out and maintain during the life of the Agreement all insurance required and PROPOSER shall not commence work until such insurance has been approved by DISTRICT. The proof of insurance shall be on forms provided by DISTRICT directly following these Insurance Requirements.

PROPOSERS are not required to submit completed insurance verification documents with their bid but will be required to submit them upon notification of award. By signing Exhibit A – RFP Response Packet, the PROPOSER agrees to meet the minimum insurance requirements stated in the RFP.

Provisions Applicable to All Required Insurance

A. Prior to the beginning of and throughout the duration of Services, and for any additional period of time as specified below, CONTRACTOR shall, at its sole cost and expense, maintain insurance in conformance with the requirements set forth below.

B. CONTRACTOR shall provide Verification of Insurance as required by this Agreement by providing the completed Verification of Insurance as requested below by signing and submitting Exhibit B ("Insurance Requirements") to the DISTRICT. The Insurance Requirements may be signed by the insurance broker or the insurance broker's agent (Insurance Broker/Agent) for the CONTRACTOR, or by an officer of the CONTRACTOR (Officer), or by the CONTRACTOR's risk manager (Risk Manager). The Notice to Proceed shall not be issued, and CONTRACTOR shall not commence Services until a signed Verification of Insurance evidencing the specific coverages and limits required by this Agreement has been received by the DISTRICT.

C. CONTRACTOR shall carry and maintain the minimum insurance requirements as defined in this Agreement. CONTRACTOR shall require any contractor/subcontractor to carry and maintain the minimum insurance required in this Agreement to the extent the insurance applies to the scope of the services to be performed by contractor/subcontractor.

D. Receipt of a signed Verification of Insurance by the DISTRICT shall not relieve CONTRACTOR of any of the insurance requirements, nor decrease liability of CONTRACTOR.

E. Insurance must be maintained, and an updated Verification of Insurance must be provided to the DISTRICT before the expiration of insurance by having the Insurance Broker/Agent, Officer, or Risk Manager update, sign and return the Insurance Requirements to the DISTRICT's contract manager. The updated Insurance Requirements shall become a part of the Agreement but shall not require a change order to the Agreement. It is the CONTRACTOR's sole responsibility to provide or to ensure that an updated Verification of Insurance is provided to the DISTRICT. The DISTRICT has no obligation to solicit, remind, prompt, request, seek, or otherwise obtain any updated Verification of Insurance, and any actual or alleged failure on the part of the DISTRICT to obtain any updated Verification of Insurance under this Agreement shall not in any way be construed to be a waiver of any right or remedy of the DISTRICT, in this or any regard.

F. The insurance required hereunder may be obtained by a combination of primary, excess and/or umbrella insurance, and all coverage shall be at least as broad as the requirements listed in this Agreement.

G. Any deductibles, self-insurance, or self-insured retentions (SIRs) applicable to the required insurance coverage must be declared to and accepted by the DISTRICT.

H. At the option and request of the DISTRICT, CONTRACTOR shall provide documentation of its financial ability to pay the deductible, self-insurance, or SIR.

I. CONTRACTOR is responsible for the payment of any deductibles or SIRs pertaining to the policies required under this Agreement. In the event CONTRACTOR is unable to pay the required SIR, CONTRACTOR agrees that such SIR may be satisfied, in whole or in part, by the DISTRICT as the additional insured at the DISTRICT's sole and absolute discretion, unless to do so would terminate or void the policy(ies).

J. Unless otherwise accepted by the DISTRICT, all required insurance must be placed with insurers with a current A.M. Best's rating of no less than A- V.

K. CONTRACTOR shall defend the DISTRICT and pay any damages as a result of failure to provide the waiver of subrogation from the insurance carrier required by this Agreement.

L. For any coverage that is provided on a claims-made coverage form (which type of form is permitted only where specified), the retroactive date must be shown, must be before the date of this Agreement, and must be before the beginning of any Services related to this Agreement.

M. For all claims-made policies the updated Verification of Insurance must be provided to the DISTRICT for at least three (3) years after expiration or termination of this Agreement.

N. If claims-made coverage is canceled or is non-renewed and if the claims-made coverage is not replaced with another claims-made policy form with a retroactive date prior to the effective date of this Agreement and prior to the start of any Services related to this Agreement, CONTRACTOR must purchase an extended reporting period for a minimum of three (3) years after expiration or termination of the Agreement.

O. In the event of a claim or suit, and upon request by the DISTRICT, CONTRACTOR agrees to provide a copy of the pertinent policy(ies) within 10 days of such request to the DISTRICT for review. Any actual or alleged failure on the part of the DISTRICT to request a copy of the pertinent policy(ies) shall not in any way be construed to be a waiver of any right or remedy of the DISTRICT, in this or any regard. Additionally, the DISTRICT may, at any time during CONTRACTOR's performance under this Agreement, request a copy of the Declarations pages and Schedule of Forms and Endorsements of any policy required to be maintained by CONTRACTOR hereunder, whether or not a suit or claim has been filed. Premium details may be redacted from any such documents requested.

P. The defense and indemnification obligations of this Agreement are undertaken in addition to, and shall not in any way be limited by, the insurance obligations contained herein.

Q. Where additional insured coverage is required, the additional insured coverage shall be primary and non-contributory, and will not seek contribution from the DISTRICT's insurance or self-insurance.

R. CONTRACTOR agrees to provide immediate Notice to the DISTRICT of any loss or claim against CONTRACTOR arising out of, pertaining to, or in any way relating to this Agreement or to Services performed under this Agreement. The DISTRICT assumes no obligation or liability by such Notice but

has the right (but not the duty) to monitor the handling of any such claim(s) if the claim(s) is likely to involve the DISTRICT.

S. It is the obligation of the CONTRACTOR to ensure all contractors/subcontractors performing services under this Agreement maintain the necessary coverages and limits. CONTRACTOR shall ensure that all contractors/subcontractors agree to the same indemnity obligation that CONTRACTOR agrees to in this Agreement based on the nature and scope of services being performed by each contractor/subcontractor. CONTRACTOR shall require that each contractor/subcontractor include the DISTRICT, its directors, officers, and employees as additional insureds on its liability policy(ies) (excepting Professional Liability and Workers' Compensation) for all ongoing and completed operations with coverage as broad as required of CONTRACTOR under this Agreement. Failure or inability to secure fully adequate insurance shall in no way relieve the CONTRACTOR or all contractors/subcontractors of the responsibility for its own acts or the acts of any contractors/subcontractors or any employees or agents of either. All contractors/subcontractors are to waive subrogation against the DISTRICT on all policies. CONTRACTOR shall be responsible for maintaining records evidencing contractors'/subcontractors' compliance with the necessary insurance coverages and limits, and such records shall be made available to the DISTRICT within 10 days upon request.

T. It is CONTRACTOR's responsibility to ensure its compliance with the insurance requirements. Any actual or alleged failure on the part of the DISTRICT to obtain proof of insurance required under this Agreement shall not in any way be construed to be a waiver of any right or remedy of the DISTRICT, in this or any regard.

U. Notice of Cancellation/Non-Renewal/Material Reduction**.** The insurance requirements hereunder are mandatory, and the DISTRICT may, at its sole and absolute discretion, terminate the services provided by CONTRACTOR, should CONTRACTOR breach its obligations to maintain the required coverage and limits set forth in this Agreement. No coverage required hereunder shall be cancelled, non-renewed or materially reduced in coverage or limits without the DISTRICT being provided at least thirty (30) days prior written notice, other than cancellation for the non-payment of premiums, in which event the DISTRICT shall be provided ten (10) days prior written notice. Replacement of coverage with another policy or insurer, without any lapse in coverage or any reduction of the stated requirements does not require notice beyond submission to the DISTRICT of an updated Verification of Insurance which shall be met by having the Insurance Broker/ Agent, or Officer, or Risk Manager update, sign and return the Insurance Requirements.

I. Workers' Compensation and Employer's Liability Insurance Coverage

A. Workers' Compensation insurance including Employer's Liability insurance with minimum limits as follows:

Coverage A.	Statutory Benefits Limits	
Coverage B.	Employer's Liability of not less than:	
	Bodily Injury by accident:	$1,000,000 each accident
	Bodily Injury by disease:	$1,000,000 each employee
	Bodily Injury by disease:	$1,000,000 policy limit

B. If there is an onsite exposure of injury to CONTRACTOR, and/or contractor/subcontractor's employees under the U.S. Longshore and Harbor Workers' Compensation Act, the Jones Act, or under laws, regulations or statutes applicable to maritime employees, coverage is required for such injuries or claims.

C. If CONTRACTOR is exempt from carrying Workers' Compensation Insurance, CONTRACTOR must return the completed Verification of Insurance confirming that CONTRACTOR has no employees and is exempt from the State of California Workers' Compensation requirements.

D. If CONTRACTOR is self-insured with respect to Workers' Compensation coverage, CONTRACTOR shall provide to the DISTRICT a Certificate of Consent to Self-Insure from the California Department of Industrial Relations. Such self-insurance shall meet the minimum limit requirements and shall waive subrogation rights in favor of the DISTRICT as stated below in section "E."

E. Waiver of Subrogation. Workers' Compensation policies, including any applicable excess and umbrella insurance, must contain a waiver of subrogation endorsement providing that CONTRACTOR and each insurer waive any and all rights of recovery by subrogation, or otherwise, against the DISTRICT, its directors, board, and committee members, officers, officials, employees, agents, and volunteers. CONTRACTOR shall defend and pay any and all damages, fees, and costs, of any kind arising out of, pertaining to, or in any way relating to CONTRACTOR's failure to provide waiver of subrogation from the insurance carrier.

Verification of Workers' Compensation and Employer's Liability Insurance Coverage

☐ **By checking the box and signing below, I hereby verify that the CONTRACTOR is exempt from the State of California's requirement to carry Workers' Compensation insurance.**

As the CONTRACTOR's Insurance Broker/Agent, Officer, or Risk Manager, I hereby verify that I have reviewed and confirmed that the CONTRACTOR carries Workers' Compensation insurance as required by this Agreement, including the relevant provisions applicable to all required insurance.

Self-Insured Retention: Amount: $_____

Policy Limit: $_____

Policy Number: _____

Policy Period: from _____ **to** _____

Insurance Carrier Name: _____

Insurance Broker/Agent or Officer or Risk Manager - Print Name: _____

Insurance Broker/Agent or Officer or Risk Manager's Signature: _____

II. Commercial General Liability Insurance ("CGL") Coverage

A. CONTRACTOR's insurance shall be primary, and any insurance or self-insurance procured or maintained by the DISTRICT shall not be required to contribute to it.

B. The insurance requirements under this Agreement shall be the greater of (1) the minimum coverage and limits specified in this Agreement; or (2) the broader coverage and maximum limits of coverage of any insurance policies or proceeds available to the Named Insured. It is agreed that these insurance requirements shall not in any way act to reduce coverage that is broader or that includes higher limits than the minimums required herein. No representation is made that the minimum insurance requirements of this Agreement are sufficient to cover the obligations of the CONTRACTOR.

C. Minimum Requirements. CGL insurance with minimum per occurrence and aggregate limits as follows:

Bodily Injury and Property Damage	$2,000,000 per occurrence & aggregate
Personal Injury/Advertising Injury	$2,000,000 per occurrence & aggregate
Products/Completed Operations	$2,000,000 per occurrence & aggregate

D. Coverage must be on an occurrence basis and be as broad as Insurance Services Office (ISO) form CG 00 01.

E. Coverage for Products, and Completed Operations, and Ongoing Operations must be included in the insurance policies and shall not contain any "prior work" coverage limitation or exclusion applicable to any Services performed by CONTRACTOR and/or contractor/subcontractor under this Agreement.

F. There will be no exclusion for explosions, collapse, or underground liability (XCU).

G. Insurance policies and Additional Insured Endorsement(s) shall not exclude liability and damages to work arising out of, pertaining to, or in any way relating to services performed by contractor/subcontractor on CONTRACTOR's behalf.

H. Contractual liability coverage shall be included and shall not limit, by any modification or endorsement, coverage for liabilities assumed by CONTRACTOR under this Agreement as an "insured contract."

I. Waiver of Subrogation. The policy shall be endorsed to include a Waiver of Subrogation ensuring that the CONTRACTOR and its insurer(s) waive any rights of recovery by subrogation, or otherwise, against the DISTRICT, its directors, board, and committee members, officers, officials, agents, volunteers, and employees. CONTRACTOR shall defend and pay any and all damages, fees, and costs, of any kind, arising out of, pertaining to, or in any way resulting from CONTRACTOR's failure to provide the waiver of subrogation from its insurance carrier(s).

J. Independent Contractor's Liability shall not limit coverage for liability and/or damages arising out of, pertaining to, or in any way resulting from Services provided under this Agreement.

K. To the fullest extent permitted by law, the DISTRICT, its directors, board, and committee members, officers, officials, employees, agents, and volunteers must be covered as Additional Insureds on a primary and noncontributory basis on all underlying, excess and umbrella policies that shall be evidenced in each case by an endorsement. Coverage for the Additional Insureds must be as broad as ISO forms CG 20 10 (ongoing operations) and CG 20 37 (completed operations) for liability arising in whole, or in part, from work performed by or on behalf of CONTRACTOR, or in any way related to Services performed under this Agreement.

L. A severability of interest provision must apply for all the Additional Insureds, ensuring that CONTRACTOR's insurance shall apply separately to each insured against whom a claim is made or suit is brought, except with respect to the policies' limit(s).

Verification of Commercial General Liability (CGL) Insurance Coverage

As the CONTRACTOR'S Insurance Broker/Agent, Officer, or Risk Manager, I hereby verify that I have reviewed and confirmed that the CONTRACTOR carries Commercial General Liability insurance, as required by this Agreement, including the relevant provisions applicable to all required insurance:

Self-Insured Retention: Amount: $_____

Policy Limit: $_____

Policy Number: _____

Policy Period: from _____ **to** _____

Insurance Carrier Name: _____

Insurance Broker/Agent or Officer or Risk Manager - Print Name: _____

Insurance Broker/Agent or Officer or Risk Manager's Signature: _____

III. Business Auto Liability Insurance Coverage

A. CONTRACTOR's insurance shall be primary, and any insurance or self-insurance procured or maintained by the DISTRICT shall not be required to contribute to it.

B. The insurance requirements under this Agreement shall be the greater of (1) the minimum coverage and limits specified in this Agreement; or (2) the broader coverage and maximum limits of coverage of any insurance policies or proceeds available to the Named Insured. It is agreed that these insurance requirements shall not in any way act to reduce coverage that is broader or that includes higher limits than the minimums required herein. No representation is made that the minimum insurance requirements of this Agreement are sufficient to cover the obligations of the CONTRACTOR.

C. Minimum Requirements. Auto insurance with minimum coverage and limits as follows:
   a. Each Occurrence Limit (per accident) and in the Aggregate: 2,000,000
   b. Bodily Injury and Property Damage: $2,000,000

D. Coverage must include either "owned, non-owned, and hired" autos or "any" automobile. This provision ensures the policy covers losses arising out of use of company-owned vehicles ("owned autos"), employee's personal autos ("non-owned autos" meaning not owned by company/insured) or autos that are rented or leased ("hired autos").

E. If CONTRACTOR is transporting hazardous materials or contaminants, evidence of the Motor Carrier Act Endorsement-hazardous materials clean-up (MCS-90, or its equivalent) must be provided.

F. If CONTRACTOR's Scope of Services under this Agreement exposes a potential pollution liability risk related to transport of potential pollutants, seepage, release, escape or discharge of any nature (threatened or actual) of pollutants into the environment arising out of, pertaining to, or in any way related to CONTRACTOR's and/or contractor's/subcontractor's performance under this Agreement, then Auto Liability Insurance policies must be endorsed to include Transportation Pollution Liability insurance. Alternatively, coverage may be provided under the CONTRACTOR's Pollution Liability Policies if such policy has no exclusions that would restrict coverage under this Agreement. Coverage

shall also include leakage of fuel or other "pollutants" needed for the normal functioning of covered autos.

G. To the fullest extent permitted by law, the DISTRICT, its directors, board, and committee members, officers, officials, employees, agents, and volunteers must be covered as Additional Insureds on a primary and noncontributory basis on all underlying and excess and umbrella policies.

H. A severability of interest provision must apply for all the Additional Insureds, ensuring that CONTRACTOR's insurance shall apply separately to each insured against whom a claim is made or suit is brought, except with respect to the insurer's limits of liability.

Verification of Business Auto Liability Insurance Coverage

As the CONTRACTOR'S Insurance Broker/Agent, Officer, or Risk Manager, I hereby verify that I have reviewed and confirmed that the CONTRACTOR carries Business Automobile Liability insurance, as required by this Agreement, including the relevant provisions applicable to all required insurance:

Self-Insured Retention: Amount: $_____

Policy Limit: $_____

Policy Number: _____

Policy Period: from _____ **to** _____

Insurance Carrier Name: _____

Insurance Broker/Agent or Officer or Risk Manager – Print Name: _____

Insurance Broker/Agent or Officer or Risk Manager's Signature: _____

EXHIBIT C – GENERAL CONDITIONS

GENERAL CONDITIONS

TABLE OF CONTENTS

GENERAL CONDITIONS

ARTICLE 1 - GENERAL PROVISIONS

1.1 Interpretation

1.1.1 The following interpretative rules apply throughout the Contract Documents.

.1 The provisions of the Contract Documents are complementary and should be interpreted viewing the Contract Documents as a whole.

.2 A concept phrased in the singular should be interpreted in the plural as required.

.3 Masculine includes feminine, and feminine includes masculine.

.4 The words "shall," "will" and "must," in any of their tenses, indicate mandatory requirements.

.5 The use of examples like "such as" or "including" does not limit or exclude examples not specifically mentioned.

.6 The words "provide," "perform," "construct," and "install" mean, unless preceded by the word "only," that the Contractor shall provide, perform, construct, and install and include all services necessary to provide, perform, construct and install.

1.2 Definitions

1.2.1 Throughout the Contract Documents, the terms below will have the following defined meanings:

.1 **Addendum:** A written change, clarification, or correction to the Contract Documents issued by the East Bay Municipal Utility District prior to bid opening.

.2 **Bidder:** Any individual, partnership, joint venture, or corporation submitting a proposal for the work contemplated, acting directly or through a duly authorized representative.

.3 **Board or Board of Directors:** The Board of Directors of the East Bay Municipal Utility District.

.4 **Change Order:** A Change Order is a written instrument used for modifying the contract with regards to the scope of Work, Contract Sum**,** and/or Contract Time. An approved Change Order is a Change Order signed by the District. An

executed Change Order is a Change Order signed by both the District and the Contractor.

.5 Compensable Delay: A period of delay to the Contractor's performance of the Work that meets all of the following criteria:

- **a)** the delay directly prevents the Contractor from performing critical path Work;
- **b)** the delay is caused directly and solely by the District or by causes within the exclusive control of the District;
- **c)** the delay is not concurrent with any other type of delay;
- **d)** the delay could not have been avoided by the Contractor through work-arounds, rescheduling or other mitigation measures; and
- **e)** the Contractor gave timely notice of the delay to the District in compliance with the terms of this contract.

.6 Concurrent Delay: Two or more independent causes of delay to the Contractor's performance of the Work that meet all of the following criteria:

- **a)** the delays occur at the same time during all or a portion of the delay period being considered;
- **b)** the delays directly prevent the Contractor from performing critical path Work;
- **c)** each of the delays would have delayed the Contractor's performance of critical path work even in the absence of any of the other delays;
- **d)** none of the delays could have been avoided by the Contractor through work-arounds, rescheduling or other mitigation measures required under this contract; and
- **e)** the Contractor gave timely notice of the delays to the District in compliance with the terms of this contract.

.7 Contract Completion: The Work has been fully completed in accordance with the Contract Documents as determined by the Engineer and all governmental authorities with jurisdiction over the project have issued acceptance or a certificate of occupancy.

.8 Contract Documents: See Article 1.3.

.9 Contract Sum: The contract price stated in the contract form (Document 00 52 00) plus all Approved Change Orders.

.10 Contract Time: The number of days set forth in the contract to achieve Contract Completion. The required completion date is computed by adding the number of days to the effective date of the Notice to Proceed. If the required completion date falls on a District holiday or non-Work Day, that day is excluded and the following Work Day is counted. The Contract Time may only be adjusted by approved Change Order.

.11 Contractor: The individual, partnership, joint venture, or corporation with whom the contract is made by the District.

.12 Critical Path: The sequence of schedule activities that determines the duration of the Work.

.13 Day: Unless otherwise specified, days are calendar days, measured from midnight to the next midnight.

.14 Deficiency Notice: A written notice issued by the Engineer informing the Contractor of non-conforming Work.

.15 District: The East Bay Municipal Utility District.

.16 Engineer: The Director of Engineering and Construction or the Director of Wastewater of the District acting directly or through authorized agents acting within the duties entrusted to them.

.17 Excusable Delay: A period of delay to the Contractor's performance of the Work that meets all of the following criteria:

- **a)** the delay prevents the Contractor from performing critical path work;
- **b)** the delay is directly caused by events beyond the control of both the District and the Contractor (including, but not limited to, adverse weather);
- **c)** the delay is not concurrent with an Inexcusable Delay as defined in this contract;
- **d)** the delay could not have been avoided by the Contractor through work-arounds, rescheduling or other mitigation measures required under the contract; and
- **e)** the Contractor gave timely notice of the delay to the District in compliance with the terms of this contract.

.18 Fixed Costs (also known as **Fixed Price**)**:** Any necessary labor, material, and equipment costs directly expended which remain constant regardless of the quantity of work done.

.19 Force Account: Method of compensation for Work performed that is billed at actual cost for labor, materials, equipment, taxes and other costs plus a specified percentage of markup for overhead and profit. Compensation rate for certain cost elements may be specified in the contract.

.20 Free Float (also known as **Activity Float**)**:** The amount of time that a scheduled activity can be delayed without delaying the early start of any immediately following schedule activity.

.21 Inexcusable Delay: A period of delay to the Contractor's performance of the Work caused by circumstances within the Contractor's control or within the scope of the Contractor's contract responsibilities. Delays attributable to or

within the control of a Subcontractor of any tier, or a Supplier, shall be deemed to be delays within the control of the Contractor. Inexcusable Delays include, but are not limited to, any of the following:

- **a)** delays caused by the Contractor's failure to perform its cooperation and coordination responsibilities required by this contract;
- **b)** delays caused by the District's enforcement of any government act or regulation, or the provisions of the contract;
- **c)** delays caused by the District's right to sequence the Work in a manner that would avoid disruption to the District's tenants, customers, contiguous property owners, and their contractors or other prime contractors and their respective Subcontractors;
- **d)** any delay that is neither a Compensable Delay nor Excusable Delay as defined in this contract; and
- **e)** delays of any kind that the Contractor fails to give timely notice to the District in compliance with the terms of this contract.

.22 Lump Sum Price: Pricing arrangement where the Contractor agrees to perform the scope of work for a fixed price that cannot be adjusted unless there is a Change Order. For the purpose of this contract, the terms Lump Sum Price and Fixed Price adjustment are used interchangeably.

.23 Notice to Proceed: A written directive, issued by the District, authorizing the Contractor to start performance of the work and establishing date of commencement of the work. The effective date is the date the Contractor acknowledges receipt of the Notice to Proceed or five days from mailing, whichever is earlier.

.24 Shop Drawings: Includes all drawings, specifications, diagrams, calculations, illustrations, product samples, brochures, catalog cuts, schedules, and other data which are prepared by the Contractor, a Subcontractor, tier-subcontractor, manufacturer, Supplier, or distributor, illustrating how specific portions of the Work shall be fabricated or installed.

.25 Shoring: A temporary structural system designed to support any and all loads for the purposes of excavation. Sloping of the soil shall not be considered as shoring.

.26 Subcontractor: The person or persons, co-partnership, firm or entity in direct contract with the Contractor or with any other Subcontractor for the purpose of furnishing materials, equipment, and/or performing a part of the contract Work.

.27 Superintendent: The Contractor's authorized on-site representative in charge of supervising the Work. Instructions and information given by the Engineer to the Superintendent shall be considered to have been given to the Contractor.

.28 Supplier: A manufacturer, fabricator, distributor, or any person or organization who supplies materials or equipment for the contract Work, including that

fabricated to a special design, but who does not ordinarily perform labor at the jobsite.

.29 Total Float: The amount of time that a schedule activity may be delayed from its early start without delaying the Contract Completion date, or violating a schedule constraint.

.30 Underground Utilities: All pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities that are installed underground to furnish any of the following services or materials: water, sewage and drainage removal, electricity, gases, steam, liquid petroleum products, telephone or other communication systems, cable television, traffic, or other control or information systems.

.31 Unit Price: Pricing arrangement in which the total amount of compensation for performance of the work is computed by multiplying the actual quantity of Work performed by the line item unit price except as noted in Article 7.5. Measurement of the quantity of work performed shall be determined by the Engineer.

.32 Work: All labor, material, equipment, submittal, and appurtenances required to be furnished to properly complete construction of the work under the Contract Documents.

.33 Work Day: Unless specified elsewhere, work day includes all days of the year except Saturdays, Sundays, and District Holidays.

1.3 Contract Documents

1.3.1 The Contract Documents comprise the entire agreement between the District and the Contractor concerning the Work. The Contractor shall properly perform all requirements of the Contract Documents.

1.3.2 The Contract Documents include the District's contract form and any exhibits attached thereto, including the Notice to Contractors, Instructions to Bidders, Bidding Form, Proposal, General Conditions, Supplementary General Conditions, Designation of Subcontractors, Contract Equity Program Forms, specifications, addenda, appendices, and approved Change Orders, if any.

1.3.3 The Contract Documents are intended to be complementary and include all items necessary for the Contractor's proper execution and completion of the Work. Anything mentioned in the specifications and not shown on the drawings or shown on the drawings and not mentioned in the specifications shall be as if shown or mentioned in both. Any part of the Work not shown or mentioned on the drawings or in the specifications that is reasonably implied by either, or is necessary or usual

for proper performance of the Work, shall be provided by the Contractor at its expense.

.1 In the case of conflicts, errors, or discrepancies in any of the Contract Documents, the order of precedence is as follows. Within the same order of precedence, specific requirements shall take precedence over general requirements.

1. Change Orders
2. Contract Forms
3. Addenda
4. Contractor's Bid (Bid Form)
5. Supplementary General Conditions
6. General Conditions
7. Specifications (Divisions 01 - 49)
8. Drawings/Plans
9. Referenced Standard Specifications
10. Remainder of Specifications (Division 00)

.2 With reference to the Drawings:

1. Numerical dimensions govern over scaled dimensions
2. Detailed drawings govern over general drawings
3. Addenda/Change Order drawings govern over contract drawings
4. Contract drawings govern over standard drawings
5. Notes apply only to the drawing where the notes appear, unless classified as "typical" or intended to apply elsewhere in which case they apply to all drawings where the conditions or circumstance noted occurs
6. Typical details apply to all drawings unless a specific different detail is shown

1.3.4 "Related Sections" are referenced solely for the convenience of the Contractor and its Subcontractors and Suppliers, but does not, whether by omission or otherwise, lessen the requirements of the specification section where the related section is referenced.

1.3.5 Command type sentences used in the specifications refer to and are directed to the Contractor.

1.3.6 No interest in the contract shall be transferred to any other party without permission of the Board of Directors.

ARTICLE 2 - RIGHTS-OF-WAY AND PROPERTY

2.1 Provided by the District

2.1.1 The District will provide reasonable access to the site for performance of the Work. Upon approval by the Engineer, the Contractor may use a suitable portion of the District's rights-of-way or property for working space and for storage of equipment and materials. The Contractor is responsible for any damage resulting from its use of the District's rights-of-way or property and shall return and restore it to its pre-existing condition. The District will not be responsible for any loss or damage to equipment or materials stored on the work site or on the District's rights-of-way or property.

2.1.2 The Contractor does not have exclusive use of the site or the rights-of-way and must coordinate its use with the District and others.

2.2 Additional Property

2.2.1 If the Contractor's operations cause the contractor to require additional property that is not within the District's rights-of-way or property for its operations, the Contractor shall, at its own expense, arrange with the property owners to use the additional property.

2.2.2 Agreements with property owners for storing materials and equipment, or other purpose related to the Work shall be made in writing with a copy submitted to the Engineer.

ARTICLE 3 - ADMINISTRATION OF THE CONTRACT

3.1 Authority of the Engineer

3.1.1 The decision of the Engineer will be final and binding on both parties with respect to all questions concerning the intent of the Contract Documents, the acceptability of material or equipment, the classification of material, the execution of the Work, and/or conflicting interests of separate contractors performing related work.

3.2 Inspection and Non-Conforming Work

3.2.1 All materials furnished and Work completed under the contract is subject to inspection by the Engineer. The Engineer's inspections are solely for the District's benefit and do not constitute acceptance of any of the Contractor's work or waiver of the requirement that the Contractor's work conform to the requirements of the Contract Documents. The Contractor shall furnish, without extra charge, all necessary test pieces and samples, including facilities and labor for obtaining those pieces, as requested by the Engineer. The Engineer will have safe access to the work site or shop where the work, material or equipment subject to inspection is

being performed or manufactured or where any off-site work is being performed, including shops, sites, and assembly facilities of Subcontractors and Suppliers.

3.2.2 All material, equipment or Work that does not conform to the Contract Documents is non-conforming work and will be rejected regardless of whether it may have been inspected by the Engineer or its representative. Installation of unapproved materials and equipment is non-conforming work until the materials or equipment are approved by the Engineer. Deficiency Notices may be issued by the Engineer to advise the Contractor of non-conforming work. However, lack of a Deficiency Notice shall not waive the Contractor's obligation to correct any and all non-conforming work, patent or latent, through the expiration of the warranty period, or other such longer period as specified in the Contract Documents.

3.2.3 Within 10 Work Days after receipt of a Deficiency Notice, the Contractor shall submit its proposal and schedule for correcting all non-conforming work. The District may withhold 150% of the installed value identified or such reasonable costs as determined by the Engineer until the non-conforming work is completed in accordance with the requirements of the Contract Documents. Additional costs for engineering, observation, administrative, clerical or other work associated with or resulting from the Contractor's failure to perform its work in conformance with the Contract Documents shall be borne solely by the Contractor, and the Engineer may elect to deduct the District's additional costs from any future payments to the Contractor. If the Contractor refuses or neglects to replace the non-conforming work, the District may correct or replace the non-conforming work at the Contractor's expense. The District's expenses in correcting any non-conforming work will be calculated as fully burdened costs for labor, plus actual costs for materials and equipment, plus a 15% markup on materials and equipment.

3.2.4 Work completed without the Engineer's inspection and approval may be required to be reconstructed or replaced upon the Engineer's inspection. Work covered without prior approval of the Engineer may be required to be uncovered to the extent necessary for the Engineer to determine if the covered Work is satisfactory. The entire cost of replacing or uncovering and re-covering the Work, including the cost of materials furnished by the District, shall be borne by the Contractor, whether or not the Work uncovered or replaced is found to be defective.

3.3 Lines, Grades, and Measurements

3.3.1 Lines and grades will be established by the Engineer, unless otherwise noted, and the Contractor shall provide such assistance and materials as may be required. The Contractor shall be responsible for transferring grades from the survey stakes provided by the Engineer. The Contractor shall carefully preserve all stakes and reference points. Should any stakes, points or monuments be removed or destroyed without the approval of the Engineer, the stakes, points or monuments shall be reset, as necessary, at the Contractor's expense.

3.3.2 The Contractor shall inform the Engineer at least four full Work Days in advance of the times and places that the Contractor requires establishment of lines, grades, or quantity surveys.

3.3.3 If the Contractor fails to provide timely notice to the Engineer regarding its survey requirements, no compensation will be made for the impact to the Contractor for resulting delays.

3.4 Disputes and Claims

3.4.1 Disputes

.1 If the Engineer issues an order or decision that requires the Contractor to perform Work that the Contractor believes is not required by the Contract Documents, the Contractor shall, within 48 hours of the order or decision, notify the Engineer in writing that it disputes the order or decision. The Contractor's notice shall include the date and circumstances of the Engineer's order or decision and the detailed basis for disputing the order or decision. Regardless of the basis of the dispute, the Contractor shall immediately perform the disputed Work or conform to the Engineer's order or decision.

.2 Notice of Intent To File a Claim: The Engineer will consider and investigate the dispute and issue a written and final decision regarding the dispute. If the Contractor disagrees with the Engineer's final decision, the Contractor shall, within 10 days of receipt of the decision, send the Engineer a written Notice of Intent To File a Claim.

.3 Waiver: Failure of the Contractor to comply with the notifications of Articles 3.4.1.1 and 3.4.1.2 within the specified time constitutes a waiver of the Contractor's right to assert a Claim concerning such matter.

3.4.2 Claims

.1 Time to Submit Claim: The Contractor shall submit a written Claim within 30 days after submitting a Notice of Intent to File a Claim. The Claim shall relate directly to the circumstances addressed in the Notice of Intent to File a Claim, must identify the date of the Notice of Intent to File a Claim to which the Claim relates, and may not raise new issues or circumstances that were not identified in the Notice of Intent to File a Claim. The Claim shall clearly state that it is a Claim being submitted under this Article. Failure to submit a written Claim within the 30-day period waives any right to recover compensation or obtain an extension of Contract Time due to the issues referenced in the Notice of Intent to File a Claim.

.2 Contents of Written Claim: The written Claim shall provide detailed information sufficient to allow the Engineer to evaluate entitlement and value of the Claim, including:

a) Description of the event or events giving rise to the Claim;
b) Identification of the date or dates of the event, or events giving rise to the Claim;
c) Identification of all statutory or contractual support for the Claim; and
d) Detailed analysis of the asserted effect on the Contract Sum and the Contract Time.

.3 Extensions in Contract Time: The Claim shall provide an analysis of schedule impact that describes how the Contractor will incorporate the alleged changed Work in the schedule and how that Work impacts the current accepted schedule. The analysis of schedule impacts shall contain a written narrative and a schedule diagram per Construction Progress Documentation set forth in Section 01 32 00 of the specifications depicting how the alleged changed Work affects other schedule activities and an analysis of the potential mitigation efforts. The written narrative shall describe the sequence of events surrounding the alleged change, the affect the events had or will have on the progress of the Work, an explanation regarding the cause of delay, the Contractor's mitigation efforts taken to minimize time impacts to the project, and the Contractor's determination whether additional compensation and/or an extension of the Contract Time is sought for delay. If the Contractor is requesting an extension in the Contract Time, the magnitude and cause of the delay shall be demonstrated in the analysis of schedule impacts.

.4 Delay Analysis Diagrams: The same scheduling software used for the project schedule and schedule update shall be used to create the analysis diagram. The analysis diagram shall be provided in an editable, electronic, file format as well as a printed copy. The results of the analysis diagram shall be tied to the affected sequence of schedule activities to enable the Engineer to evaluate the impact to the critical path as a result of the alleged changed work. The schedule diagram shall also show logic relationships and durations of new activities associated with the alleged change and logic and duration revisions to existing schedule activities due to the alleged change and mitigations taken to minimize impacts to the project. The Contractor is responsible for requesting extensions to its Contract Time based on the analysis of schedule impact.

.5 Adjustments to Contract Sum: The Claim shall also provide adequate financial data supporting any request for a change in Contract Sum. The Claim shall include a detailed cost breakdown of all items claimed, including all costs associated with delays, acceleration, overhead and profit, and the computations used in determining such costs. The Contractor's proposal shall include detailed estimates with cost breakdowns for each Subcontractor whose break down will include the following categories: labor, material, equipment, overhead, and profit. Labor shall be broken down into hours and rate per hour. If applicable, the proposal shall include a breakdown for off-site labor (including factory labor, engineering, etc.). If the exact amount of a Claim is not ascertainable at the time the claim is made, the available supporting data

shall be submitted and any supplemental data supporting the exact amount of the Claim shall be submitted as soon as available.

.6 Claim Format:

a) The Contractor shall submit the claim in the following format:

1) Cover letter and certification.

2) Summary of claim including:

(a) Underlying Facts.

(b) Entitlement.

(c) Mitigation Efforts.

(d) Calculations.

(e) Contract Provisions Supporting Relief.

3) List of documents relating to claim:

(a) Specifications.

(b) Drawings.

(c) Clarifications/Requests For Information.

(d) Schedules.

(e) Other.

4) Chronology of Events and Correspondence.

5) Analysis of Claim Merit.

6) Analysis of Claim Cost.

7) Analysis of Schedule Impact.

8) Attachments:

(a) Specifications.

(b) Drawings.

(c) Clarifications/Requests For Information.

(d) Correspondence.

(e) Schedules.

(f) Other.

b) The Contractor, through a corporate officer or general partner, shall certify under penalty of perjury pursuant to the laws of the State of California for any Claim filed on behalf of itself or its Subcontractors or Suppliers, that:

1) The Claim is made in good faith;

2) Supporting data are accurate and complete to the best of the Contractor's knowledge and belief; and

3) The amount requested accurately reflects the contract adjustment for which the Contractor believes the District is liable.

.7 If Contractor does not certify the Claim as required above, the Claim will be denied without any further recourse by, or remedy to, the Contractor.

.8 Condition Precedent (Government Code, Sections 930, et seq.):

a) The Disputes and Claims procedures set forth in Article 3.4 are the exclusive procedures for presenting any Claims exceeding $375,000 and are a condition precedent to filing a Government Code Claim, which, in turn, is a condition precedent to the right to initiating any action against the District related to the Claim. Claims may not be divided into amounts less than $375,000 to avoid the requirements of this Article 3.4 and any claims arising from the same facts or circumstances, or related facts or circumstances, will be deemed a single claim valued as the sum of all related claims. Failure to comply with the Disputes and Claims procedures offset forth in Article 3.4 is a waiver of any Claim arising from or related to the facts and circumstances described in the Claim or the Notice of Intent to File a Claim.

.9 For claims less than or equal to $375,000, the Contractor shall comply with Public Contract Code, Section 20104, et seq., which is set forth below in relevant part (as used therein, the term "local agency" means East Bay Municipal Utility District). This Public Contract Code section on Claim resolution does not supersede the Claim documentation requirements in this Article 3.4 and only becomes operative upon the timely notice and submittal of a Claim under the contract.

“20104. (a) (1) This article applies to all public works claims of three hundred seventy-five thousand dollars ($375,000) or less which arise between a contractor and a local agency.

(2) This article shall not apply to any claims resulting from a contract between a contractor and a public agency when the public agency has elected to resolve any disputes pursuant to Article 7.1 (commencing with Section 10240) of Chapter 1 of Part 2.

(b) (1) "Public work" means “public works contract” as defined in Section 1101 but does not include any work or improvement contracted for by the state or the Regents of the University of California.

(2) "Claim" means a separate demand by the contractor for (A) a time extension, (B) payment of money or damages arising from work done by, or on behalf of, the contractor pursuant to the contract for a public work and payment of which is not otherwise expressly provided for or the claimant is not otherwise entitled to, or (C) an amount the payment of which is disputed by the local agency.

20104.2. For any claim subject to this article, the following requirements apply:

(a) The claim shall be in writing and include the documents necessary to substantiate the claim. Claims must be filed on or before the date of final payment. Nothing in this subdivision is intended to extend the time limit or supersede notice requirements otherwise provided by contract for the filing of claims.

(b) (1) For claims of less than fifty thousand dollars ($50,000), the local agency shall respond in writing to any written claim within 45 days of receipt of the claim, or 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 local agency may have against the claimant.

(2) If additional information is thereafter required, it shall be requested and provided pursuant to this subdivision, upon mutual agreement of the local agency and the claimant.

(3) The local agency’s written response to the claim, as further documented, shall be submitted to the claimant within 15 days after receipt of the further documentation or within a period of time no greater than that taken by the claimant in producing the additional information, whichever is greater.

(c) (1) For claims of over fifty thousand dollars ($50,000) and less than or equal to three hundred seventy-five thousand dollars ($375,000), the local

agency shall respond in writing to all written claims within 60 days of receipt of the claim, or 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 local agency may have against the claimant.

(2) If additional information is thereafter required, it shall be requested and provided pursuant to this subdivision, upon mutual agreement of the local agency and the claimant.

(3) The local agency's written response to the claim, as further documented, shall be submitted to the claimant within 30 days after receipt of the further documentation, or within a period of time no greater than that taken by the claimant in producing the additional information or requested documentation, whichever is greater.

(d) If the claimant disputes the local agency's written response, or the local agency fails to respond within the time prescribed, the claimant may so notify the local agency, in writing, either within 15 days of receipt of the local agency's response or within 15 days of the local agency's failure to respond within the time prescribed, respectively, and demand an informal conference to meet and confer for settlement of the issues in dispute. Upon a demand, the local agency shall schedule a meet and confer conference within 30 days for settlement of the dispute.

(e) Following the meet and confer conference, if the claim or any portion remains in dispute, the claimant may file a claim as provided in Chapter 1 (commencing with Section 900) and Chapter 2 (commencing with Section 910) or Part 3 of Division 3.6 of Title 1 of the Government Code. For purposes of those provisions, the running of the period of time within which a claim must be filed shall be tolled from the time the claimant submits his or her written claim pursuant to subdivision (a) until the time that claim is denied as a result of the meet and confer process, including any period of time utilized by the meet and confer process.

(f) This article does not apply to tort claims and nothing in this article is intended nor shall be construed to change the time periods for filing tort claims or actions specified by Chapter 1 (commencing with Section 900) and Chapter 2 (commencing with Section 910) of Part 3 of Division 3.6 of Title 1 of the Government Code.**"**

All civil actions filed to resolve claims under this Act are subject to the provisions of Public Contract Code Section 20104.4 and 20104.6(b).

.10 The parties specifically and expressly agree that Government Code, Section 12650, et seq., applies. If a false claim is knowingly submitted (as the terms "claim" and "knowingly" are defined in the California False Claims Act, Government Code, Section 12650, et seq.), the District will be entitled to civil

remedies set forth in the California False Claim Act. It may also be considered fraud and the Contractor may be subject to criminal prosecution.

.11 Under no circumstances will the Contractor be entitled to indirect, consequential, special and incidental damages.

ARTICLE 4 - CONTRACTOR'S RESPONSIBILITIES

4.1 Responsibility of the Contractor

4.1.1 Means and Methods. The Contractor shall complete the entire Work to the satisfaction of the Engineer in accordance with the Contract Documents. The Contractor is solely responsible for the means, methods, techniques, sequence, scheduling, workforce, and procedures of construction unless otherwise specified. The Contractor is solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with performance of Work under the contract and shall comply and enforce all Cal/OSHA requirements on this project. The Contractor is the "controlling employer" for this project as defined by Cal/OSHA.

4.1.2 Work. The Contractor shall provide and pay for all labor, materials, equipment, tools, construction equipment and machinery, transportation, utilities, and other facilities and services required for the proper execution and completion of the Work included in this contract.

4.1.3 Permit, Fee and Licenses. Unless otherwise specified**,** the Contractor shall secure and pay for all licenses, royalties, government fees, and permits necessary for proper execution and completion of the Work. The Contractor shall give notices as required by permits prior to commencement of the Work, and provide copies of all permits to the Engineer before starting on the Work.

4.1.4 Contractor's Licensing Requirements. The Contractor shall have all required California State and local licenses and certificates for performance of the Work, and shall furnish satisfactory proof of licensing and certifications to the Engineer upon request. All required licenses and certificates shall be valid throughout construction of the project.

4.1.5 Taxes. The Contractor shall pay all State, Federal, and local taxes applicable to the project, including all sales, use, gross receipts and similar taxes properly assessed against its equipment, materials, or property used or required in connection with the Work.

4.1.6 Compensation for Employees. In accordance with the provisions of Section 3700 of the Labor Code, the Contractor shall secure the payment of compensation to its employees, Subcontractors and Suppliers.

4.2 Supervision of the Work

4.2.1 Superintendent. The Contractor shall provide a qualified, competent superintendent at the project site to supervise and direct all Work being performed by the Contractor, Subcontractors, and their respective agents and employees to ensure that the Work is being carried out in accordance with the Contract Documents. The Contractor shall designate, in writing, the scope and authority of the superintendent before the Work begins. Instructions and information given by the Engineer to the Contractor's superintendent about the Work are binding on the Contractor.

4.2.2 Coordination of the Work. Before starting each portion of the Work, the Contractor shall: (i) review and compare the various Contract Documents relative to that portion of the Work, as well as any additional information furnished by the Engineer and approved Subcontractor submittals that may affect proper installation of the Work; (ii) field measure existing conditions related to that portion of the Work; and (iii) observe any conditions at the site that may directly impact that portion of the Work, promptly reporting any improper or defective Work to the Engineer. Any errors or inconsistencies in the Contract Documents shall be promptly reported to the Engineer in writing as a request for information or clarification.

4.2.3. **Duty of Care.** All Work shall be performed in a workmanlike manner meeting construction industry standards for a similar project located in California, regardless of any omission from the Contract Documents**.**

4.3 Contractor's Employees

4.3.1 The Contractor shall employ competent qualified personnel to construct the Work and shall maintain discipline and order at the project site.

4.3.2 Substitution of Key Personnel. The Contractor cannot substitute key personnel, lessen their level of effort, or reduce the amount of time key personnel are assigned to the project without written consent from the Engineer. If the Contractor proposed specific key personnel during prequalification, or in response to an invitation to bid, the Contractor shall provide the same personnel at the same level of effort and for the same duration and amounts of time per week.

4.3.3 Removal of Personnel. The Contractor shall not remove or replace any key personnel without the prior written consent of the Engineer, which will not be unreasonably withheld. When required by the Engineer, the Contractor shall remove from the project any person who, in the Engineer’s opinion, is unfit, disorderly, dangerous, insubordinate, incompetent, or otherwise objectionable. Removed personnel may not be reemployed on the project without the Engineer’s prior written consent. Such removal shall not be the basis of any claim for compensation or damages against the District or any of its officers, directors or employees. Within one week of removal, the Contractor shall propose a replacement to the Engineer. The replacement person shall hold the same position

or title and have approximately the same number of years of experience or more as the person that was removed from the project.

4.4 Materials and Workmanship

4.4.1 Materials and Workmanship. All materials and equipment incorporated into the Work shall be new, unexpired, of good quality, and of current manufacture unless otherwise specified. All materials shall be of the specified quality and equal to approved samples, if samples were required.

4.4.2 Substitution of Materials or Equipment. Materials, products, services or equipment specified or designated in the Contract Documents are intended to indicate the measure of quality and utility. Unless the Contract Documents specifically state that there are no substitutions, the Contractor may submit other brands of the specified product provided that the submitted product is of equal or better quality, possesses the required characteristics for the purpose intended and shall not involve additional cost to the District. By proposing a substitute, the Contractor warrants that it is equal to that specified and takes complete responsibility for any errors, omissions, conflicts, all modifications to existing piping, ductwork or electrical connections, or inconsistencies caused by using the substitute, including any additional costs of engineering or inspection, or necessary coordination with connections to make the substitute perform as specified. All submittals shall receive written approval from the Engineer prior to installation.

4.4.3 Procurement and Storage. All materials and equipment shall be furnished in ample quantities and procured in a timely manner to ensure uninterrupted progress of the Work. All materials and equipment shall be properly stored and protected and any loss or damage due to improper storage or protection shall be borne by the Contractor.

4.4.4 Site Logistics. The Contractor shall maintain its storage area and shall keep its storage areas clean, safe and secure. Any materials or equipment stored offsite shall be insured. The risk of loss shall remain on the Contractor for all materials and equipment stored off-site.

4.5 District's Right to Perform Separate Work

4.5.1 Separate Work. The District reserves the right to perform separate work at or near the project site at any time by the use of its own forces or other contractors. The Contractor shall coordinate its Work with the District and/or the District's other contractors and shall cooperate with the District to avoid any delay or hindrance to the project schedule and the other's work.

4.5.2 Delays and Defective Construction. The District shall be reimbursed by the Contractor for costs incurred by the District that are payable to its separate contractors as a result of the Contractor caused delays, improperly timed activities, damaged work, or defective construction.

4.6 Patents and Copyrights

4.6.1 The Contractor shall pay all license fees and royalties and all other costs incidental to use in the Work of any patented or copyrighted design, process, or product. The Contractor shall indemnify and hold harmless the District, its officers, agents, and employees against all costs and claims arising from any infringement of patents or copyrights incidental to use in the Work of any design, process, or product not specified in the Contract Documents.

4.7 Contractor's Responsibility for Losses and Liabilities

4.7.1 Risk of Loss. Until acceptance of the Work by the District, the Contractor bears all risk of loss or damage to the Work or to any part of the Work and to any materials or equipment ordered or purchased for the Work whether located at the project, suitably stored off-site or in transit regardless of the cause of loss or damage. However, the Contractor is not responsible for the cost of repair or restoration of damage to the Work caused by an Act of God as that term is defined in Section 7105 of the Public Contract Code.

4.7.2 Protection of Materials and Facilities

.1 The Contractor is responsible for the preservation, protection and care of equipment, materials and facilities whether located on the project site or elsewhere and if it does not do so, the District may, at its option, do so at the Contractor’s expense.

.2 The Contractor is responsible for any District-furnished material upon receipt and for protection of the Work until it is completed and accepted. The Contractor shall at its own expense replace damaged or lost material and repair damaged parts of the Work.

.3 The Contractor shall protect District facilities from damage resulting from its Work. District facilities damaged by or as a result of the Contractor's Work shall be repaired or replaced, at the Contractor's expense.

.4 The Contractor shall maintain the project site in a clean, safe and orderly condition. Upon completion of the Work, the Contractor shall remove all temporary buildings and structures, rubbish, debris, abrasive blast media, unused material, concrete forms, and other materials used during construction that are not part of the completed work.

.5 The Contractor shall provide fire watch and be responsible for all fire prevention in connection with the Work. Open fires will not be permitted on the project site. The Contractor shall notify the Engineer before undertaking any torch cutting and welding operations. The Contractor shall take all necessary safety precautions during torch cutting and welding operations including, but not limited to, fire watch, providing fire extinguishers and fire blankets at the location where the operations are occurring. The Contractor shall be

responsible for any damages caused by the Contractor or Subcontractor during such operations.

4.7.3 Laws and Regulations

.1 The Contractor, its agents and employees shall observe and comply with all Federal, State, Municipal and local laws, ordinances, rules, regulations, building codes and standards, orders, notices and requirements applicable to its Work on this project. Nothing in these Contract Documents may be construed to permit Work not conforming to such laws, ordinances, and regulations. If the Contractor should discover any aspect or portion of the Contract Documents that conflicts with any law, ordinance, regulation, order, or decree, the Contractor shall immediately report the conflict in writing to the Engineer. Where the applicable legal requirements of public authorities differ from those of the Contract Documents, the more stringent requirements shall apply.

.2 If an applicable law requirement was not in effect on the date of submission of bids, the Contract Sum and the Contract Time will be adjusted, if necessary, as provided in Article 7. Under no other circumstance will the Contract Sum or Contract Time be adjusted because of the effect of any applicable law, ordinance, regulation, order, decree or other legal requirement of public authorities in effect on the date of bid submission.

4.7.4 Duty to Defend. Notwithstanding assertions that the District, the Board, any member of the Board, or the District's officers, agents, or employees may have been actively or solely negligent, the Contractor shall assume the defense of the District, the Board, each member of the Board, and the District's officers, agents, and employees from all claims of any kind arising directly or indirectly out of the performance of, or on account of, the Work.

4.7.5 Indemnity

.1 To the fullest extent allowed by law (including, but not limited to, Civil Code Section 2782), the Contractor shall indemnify and save harmless the District, the Board, each member of the Board, and the District's officers, agents, and employees (collectively “Indemnitees”) from all liability, claims, damage and loss, of any kind, including attorneys' fees, subject to the limitations set forth by law, that arise out of, on account of, or in connection with the performance of the Work, including, but not limited to, liability or claims arising out of or resulting from:

a) Any act or omission of the Contractor, its Subcontractors and Suppliers, or anyone directly employed by any of them for whom the Contractor may be liable, during the performance of the Work; in guarding or maintaining the Work; or from any improper materials, implement, or appliances used in construction of the Work;

b) Violation of any law, ordinance, regulation, order, or decree, whether by the Contractor, its Subcontractors, Suppliers or anyone directly employed by any of them for whom the Contractor may be liable;

c) The use or manufacture by the Contractor, its agents, or the District of any copyrighted composition, secret process, patented invention, article, or appliance, unless specifically specified in the Contract Documents;

d) Any breach of warranties, whether express or implied, made to the District by the Contractor, its Subcontractors, Suppliers or anyone directly employed by any of them for whom the Contractor may be liable;

e) The willful misconduct of the Contractor, its Subcontractors, Suppliers or anyone directly employed by any of them for whom the Contractor may be liable;

f) Any breach or default of the obligations assumed by the Contractor under this contract;

g) Injuries, sickness, disease or death of employees of the Contractor or its Subcontractors, Suppliers or anyone directly employed by any of them for whom the Contractor may be liable in connection with performance of the Work; and

h) Destruction of tangible property (other than the Work itself).

.2 The Contractor's duty to indemnify is not affected or in any way diminished because the District, the Board, any member of the Board, or the District's officers, agents, or employees jointly caused or contributed to the liability or claim by their acts, omissions, conduct, or negligence, except that the Contractor is not obligated to indemnify an Indemnitee against its sole or active negligence, willful misconduct, or for defects in designs furnished by the Indemnitee. The Contractor's indemnification obligation is not limited by the Contractor's insurance, if any, or by the amount or type of damages, compensation, or benefits payable by or for the Contractor or any Subcontractor or other person or organization under the Workers' Compensation Act, Disability Benefit Act, or other employee benefit act. Said duty to indemnify shall not apply to the District's active negligence, consistent with Civil Code Section 2782.

4.8 Protection of Property

4.8.1 The Contractor shall take all necessary precautions to provide for the safety and protection of all persons who may come in contact with the Work and for all property within and adjacent to the project site including, but not limited to, adequate precautions to protect existing sidewalks, curbs, pavements, utilities, shrubs, trees, and other adjoining property and structures. Should any facility,

structure, or property be damaged by the operations of the Contractor, the Contractor shall immediately notify the proper owners or authorities and the Engineer. The precautionary measures shall apply continuously and not be limited to normal work hours.

4.8.2 If damage to persons or property occur as a result of the Work, the Contractor shall be responsible for proper investigation, documentation, including video or photography, to adequately memorialize and make a record of what transpired. The Contractor, at its own expense, shall rebuild, repair and restore, to the Engineer's satisfaction, all damage resulting from its operations as a condition of contract acceptance.

4.8.3 Pursuant to Public Contract Code, Section 9201, the District will provide timely notification to the Contractor of the receipt of any third-party claims relating to damaged property.

4.9 Contractor Use of Premises

4.9.1 The Contractor shall confine operations at the project site to areas permitted by the Contract Documents and shall not encumber the site with excessive material or equipment. The Contractor shall not impose load on any structure that will damage or endanger the structure. The Contractor shall take all actions necessary to prevent annoyance to occupants adjacent to or in the vicinity of the Work and shall not hinder access or operations of District personnel or equipment.

4.10 Documents On-site

4.10.1 Contract Documents. The Contractor shall maintain a copy of all Contract Documents at the project site, including but not limited to, subcontracts; Change Orders; requests for information; site, health and safety plan; material safety data sheets; the current construction progress schedule; updated as-built drawings; all approved submittals and samples pertaining to the Work; and any governing authority required documents. The Engineer shall have access to the Contract Documents during the Contractor’s normal business hours.

4.11 Review of Contract Documents and Field Conditions

4.11.1 The Contractor shall carefully study and compare the Contract Documents for any errors, omissions, or discrepancies; and shall take field measurements and carefully compare such field measurements with the Contract Documents. The Contractor shall immediately inform the Engineer in writing of any apparent errors, omissions, or discrepancies and shall await instructions before proceeding with the Work. Instructions given by the Engineer, which are manifestly necessary to carry out the intent of the Contract Documents or which are customarily performed, shall be performed by the Contractor as if fully and correctly set forth in the Contract Documents at no additional cost to the District.

4.11.2 If the Contractor performs any construction activity that it either knows or should have known involves an error, omission, or discrepancy referred to in Article 4.11.1 without notifying and receiving written instructions from the Engineer, the Contractor shall be responsible for resultant losses, including without limitation, the costs and time of correcting the defective Work.

4.11.3 Drawings indicate general and typical details of construction. Where conditions are not specifically indicated but are of similar character to details shown, similar details for construction shall be used, subject to review by the Engineer.

ARTICLE 5 – SUBCONTRACTORS AND SUPPLIERS

5.1.1 The Contractor is fully responsible to the District for the acts and omissions of Subcontractors, Suppliers, and of persons and/or persons or entities employed by the Contractor to the same extent the Contractor is responsible for its own acts and omissions.

5.1.2 All Subcontractors shall posses the appropriate California State contractor's license and certifications at time of bid and during the performance of the Work. The Contractor shall comply with all requirements of the Subletting and Subcontracting Fair Practices Act commencing with Public Contract Code, Section 4100, et seq. Violation of the Subletting and Subcontracting Fair Practice Act are grounds for cancellation of the Contract under Public Contract Code, Section 4110, and disciplinary actions under Section 4111.

5.1.3 The Contractor shall coordinate all Subcontractors and Suppliers engaged in the Work. The Contractor shall ensure that all of its Subcontractors commence their respective work at the proper time and proceed with due diligence to avoid delays and/or damage to the Work. Any property damage caused by Subcontractors or Suppliers during the Work shall be repaired or paid for by the Contractor.

5.1.4 Nothing contained in the Contract Documents shall be construed as creating any contractual relationship between any Subcontractor, or Supplier, and the District. The District will not undertake to settle differences between the Contractor and its Subcontractors or Suppliers.

ARTICLE 6 - SAFETY OF PERSONS AND PROPERTY

6.1 Contractor's Responsibility

6.1.1 Notwithstanding any other provision of the specifications, the Contractor is solely and completely responsible for conditions of the jobsite, including safety of all persons and property, during performance of the Work. This requirement applies continuously and is not limited to normal work hours. Health and safety provisions shall conform to applicable Federal, State, County, and local laws, regulations, ordinances, standards, and codes, including the Federal Occupational Safety and

Health Act of 1970 (29 U.S.C., Section 651, et seq.) and California Code of Regulations, Title 8, Industrial Relations Division 1, Department of Industrial Relations, Chapter 4. Where any of these are in conflict, the more stringent requirement shall be followed.

6.2 Public Safety

6.2.1 During the performance of the Work, the Contractor shall erect and maintain necessary temporary fences, bridges, railings, lights, signals, barriers, or other safeguards as appropriate under the circumstance for the prevention of accidents. In addition, the Contractor shall take other precautions as necessary for public safety including, but not limited to, traffic control.

6.3 Engineer's Responsibility

6.3.1 The Engineer's review of the Contractor's construction performance and submittal documents is not intended to include review of the adequacy of the Contractor's safety measures in, on, or near the construction site.

6.3.2 The Engineer may suspend operations if it determines that an imminent safety hazard exists.

6.4 Emergency Work

6.4.1 During Work Hours. The Contractor shall act, without previous direction from the Engineer in case of an emergency arising from the performance of the Work that threatens loss or injury to property and/or safety of life. The Contractor shall notify the Engineer of the emergency as soon as possible. Any compensation claimed by the Contractor, together with substantiated documents in regard to expense, shall be submitted to the Engineer within 15 calendar days after the emergency. Additional compensation, if allowed, will be paid for through Article 7.

6.4.2 Outside of Work Hours. The Engineer will notify the Contractor of all emergencies for which it is aware that arise outside of regular work hours as a result of the Work. The Contractor shall respond to the emergency immediately without delay and shall, with the least practicable inconvenience, make the necessary repairs, replacements, or perform other necessary work. If the Contractor does not act promptly in accordance with this requirement, or should the circumstances of the case require repairs, replacements, or performance of other necessary work before the Contractor can be notified or can respond, the District may, at its option, make the necessary repairs, replacements, or perform the necessary work and deduct its cost of labor, materials and equipment from the Contractor’s next progress payment. Performance of emergency work by District forces will not relieve the Contractor of any of its responsibilities, obligations, or liabilities under the contract.

ARTICLE 7 - CHANGES

7.1 General

The District reserves the right to make such alterations, deviations, additions to or deletions from the drawings and specifications, including increases or decreases to the quantity of any item or portion of work or omitting any item or portion of the work or any other changes in the Work that the Engineer determines to be necessary or advisable for proper completion or construction of the whole work. No change in the scope of work shall be authorized, and the Contractor shall not be eligible for compensation for any extra work performed, unless the change is ordered by the Engineer in writing.

7.2 Change Orders

7.2.1 Changes in the Work can only be made through a written contract Change Order issued by the Engineer. If the change causes an increase or decrease in the Contractor's Contract Sum, or a change in the Contract Time, an adjustment may be made as determined by the Engineer. The approved Change Order will specify increase or decrease to the Contract Sum and adjustment to the Contract Time, if any.

7.2.2 Prior to issuing an approved Change Order, the Engineer may request that the Contractor submit a proposal covering the changes. The Change Order request will include a description of the work or revised drawings or specifications reflecting the proposed changes. Within 10 Work Days after receiving the request, the Contractor shall submit its proposal to the Engineer of all costs associated with the proposed change and any request for an extension of Contract Time. Contractor's proposal shall include detailed estimates with cost breakdowns for each Subcontractor, including labor, material, equipment, overhead, and profit. Labor shall be broken down into hours and rate per hour. If applicable, the proposal shall include a breakdown for off-site labor (including factory labor, engineering, etc.). The Contractor's proposal shall include an Analysis of Schedule Impact (See Article 3.4.2) when the Contractor is requesting an adjustment in Contract Time. Costs associated with preparation of the proposal, including the Analysis of Schedule Impact, are considered to be covered in the markup allowances in Article 7.3.4. The Contractor shall be responsible for any delay associated with its failure to submit its change proposal within the time specified. If the Engineer decides not to issue an approved Change Order after requesting a proposal from the Contractor, the Contractor will be notified in writing. The Contractor is not entitled to reimbursement for Change Order preparation costs for cancelled Change Order requests.

7.2.3 If the Contractor agrees with the terms and conditions of the approved Change Order, the Contractor shall indicate its acceptance by signing the original copy and returning it to the Engineer within 10 Work Days after receipt or with reasonable promptness and in such sequence as to not delay the Work or activities of the District or of separate contractors, whichever is sooner. If notice of any change is

required to be given to a surety by the provisions of any bond, the Contractor shall provide notice and the amount of each applicable bond shall be adjusted separately. Payment in accordance with the terms and conditions set forth in the executed Change Order shall constitute full compensation for all Work included in the Change Order and the District will be released from any and all claims for direct, indirect, and impact expenses and additional time impact resulting from the Work. If the Contractor disagrees with the terms and conditions of the approved Change Order, the Contractor shall indicate specific areas of disagreement and return the approved Change Order to the Engineer. The Contractor shall submit a written dispute in accordance with Article 3.4. No payment will be made on the disputed work until the approved Change Order is returned to the Engineer. However, whether or not the Contractor agrees with the terms and conditions of an approved Change Order, the Contractor shall immediately revise its sequence of operations as required to facilitate timely completion of the changed work and shall proceed with the revised work sequence.

7.2.4 The Engineer may, after having received a written cost quotation from the Contractor, order the Contractor, in writing, to proceed with the work prior to issuance of an approved Change Order through a change directive. The change directive will authorize the Contractor to proceed with the work subject to the cost quotation submitted by the Contractor. Within five days following receipt of the change directive, the Contractor shall submit a detailed change proposal as described in Article 7.2.2 documenting the amount of compensation. The Engineer will review the change proposal and, at its option, will either issue an approved Change Order for the work or direct the Contractor to perform the work through Force Account. Until the method of compensation is determined and the approved Change Order is received, the Contractor shall keep full and complete time and material records of the cost of the ordered work and shall permit the Engineer to have access to such records. An approved Change Order shall supersede any previously issued written change directive covering the same Work.

7.2.5 Accord and Satisfaction and Reservations of Rights: Every executed Change Order shall constitute a full accord and satisfaction, and release of all Contractor (and, if applicable, Subcontractor) claims for additional time, money or other relief arising from or relating to the subject matter of the change including, without limitation, impacts of all types, cumulative impacts, inefficiency, overtime, delay, and any other type of claim.

7.3 Determination of Costs for Force Account Change Order Work

7.3.1 Labor. The cost of labor used in performing the Change Order work, whether the employer is the Contractor and/or its Subcontractor, shall be the sum of the following:

.1 Actual Wages: Actual wages paid to workers, including foremen devoting their exclusive attention to the work in question. The actual wages shall include payments to, or on behalf of, workers for health and welfare, pension, vacation,

travel, subsistence**,** and similar purposes, and shall be paid at the wage rate demonstrated by submitted certified payrolls or, if the certified payrolls were not available, at the rate set forth in the pertinent prevailing wage determinations issued by the Director of Industrial Relations for the wage class common to the work performed. Superintendent's wages are included under the allowance for overhead and profit and shall not be included as part of these computations.

.2 Labor Surcharge: To the actual wages, as defined in Article 7.3.1.1 above less those for travel and subsistence, will be added 27 percent, which shall constitute full compensation for all payments imposed by State and Federal laws, such as taxes, and for insurance and all other payments made to, or on behalf of, the workers, other than actual wages as defined in Article 7.3.1.1 above.

7.3.2 Materials. Only materials incorporated in the Change Order work will be paid for, the cost of which shall be the cost to the purchaser, including sales tax, if applicable, whether the Contractor and/or its Subcontractor, from the Supplier thereof, except as the following are applicable:

.1 If a cash or trade discount by the actual Supplier is offered or available to the purchaser, it shall be credited to the District notwithstanding the fact that such discount may not have been taken.

.2 If materials are procured by the purchaser by any method which is not a direct purchase from a direct billing by the actual Supplier to such purchaser, the cost of such materials shall be deemed to be the price paid to the actual Supplier as determined by the Engineer. No markup except for actual costs incurred in the handling of such materials will be permitted, and only application of one common markup to cover multiple handling.

.3 If the materials are obtained from a supply or source owned wholly or in part by the purchaser, payment therefor will not exceed the price paid by the purchaser for similar materials furnished from said source on contract items or the current wholesale price for such materials delivered on the job site, whichever price is lower.

.4 If the cost of such materials is excessive in the opinion of the Engineer, then the cost of such materials shall be deemed to be the lowest current wholesale price at which such materials are available in the quantities concerned and timely delivered to the job site, less any discounts as provided in Article 7.3.2.1 above.

7.3.3 Equipment. The Contractor and/or its Subcontractor will be paid for the use of equipment at the rental rates established as provided in Articles 7.3.3.1 and 7.3.3.2 below, which rates shall include the cost of fuel oil, lubrication, supplies, small tools, necessary attachments, repairs and maintenance of any kind, depreciation, storage, insurance, and all incidentals. Operators of rented equipment will be paid for as provided in Article 7.3.1 above.

Unless otherwise specified, manufacturers' ratings shall be used to classify equipment for the determination of applicable rental rates.

.1 Equipment on the Work: For the use of any equipment normally required for the contract regardless of whether the equipment is already on the work or is to be delivered to the project, the Contractor and/or its Subcontractor will be paid for the use of such equipment as follows:

a) If equipment is owned by the Contractor and/or its Subcontractor, payment will be at the rental rates listed for such equipment in the State of California's Department of Transportation publication titled "Labor Surcharge and Equipment Rental Rates" that is in effect on the date that the Work is performed. The rental rates for equipment not listed under the schedules of rental rates set forth by the State of California shall be those agreed upon by the Contractor and/or its Subcontractor, and the Engineer, except that in no case shall the rental rates exceed those of established distributors or equipment rental agencies within the locality of the project. The Contractor and/or its Subcontractor shall provide full documentation to the satisfaction of the Engineer to support any proposed equipment rental rates. Documentation shall include a breakdown of costs per Article 7.3.3, including amortized depreciation versus wear and tear, and maintenance expenses versus operating expenses.
Compensation for idle time of equipment through delays caused by the District will be made by applying the delay factor listed in the Caltrans User's Guide for Labor Surcharge and Equipment Rental Rates (current version), or if unlisted at 50 percent of the rental rates listed in the State of California Department of Transportation publication entitled "Labor Surcharge and Equipment Rental Rates." Compensation for idle time shall not exceed eight (8) hours per day and forty (40) hours per week.

b) If equipment is rented, payment will be the actual rental cost as indicated on the rental invoice.

Individual pieces of equipment or tools not listed and having a replacement value of $1,000 or less, whether or not consumed by use, shall be considered to be small tools and no payment will be made for their use on the Work.

In computing the rental of equipment, the minimum rental time to be paid per day shall be one hour. Rental time shall not be allowed while equipment is inoperative due to breakdowns or non-Work Days. Loading and transporting costs shall be allowed when the equipment is moved by means other than its own power.

.2 Equipment for Change Order Work: For the use of equipment not required under the Contract Documents, moved on the Work and used exclusively for Change Order work, the Contractor will be paid at the rates agreed upon by the

Contractor and/or Subcontractor, and the Engineer through the Change Order process, except that in no case shall the rental rates paid exceed those of established distributors or equipment rental agencies.

The rental period shall begin at the time the equipment is required and unloaded at the site and shall terminate on the day that the Change Order work is completed, except that the minimum total rental time to be paid for shall be not less than four hours.

The Contractor and/or its Subcontractor will be reimbursed for the cost of transporting the equipment to and from the Work. Should the equipment be transported by low bed trailers, hourly rates charged by established haulers will be paid. Also, the District will pay for loading and unloading costs. Should the Contractor and/or its Subcontractor desire the return of the equipment to a location other than its original location, the District will pay the cost of transportation in accordance with the above provisions, provided such cost does not exceed the cost of moving the equipment to the project.

7.3.4 Markup Allowances. The Contractor and/or its Subcontractors or Suppliers that perform on-site work are entitled to compensation for overhead and profit for the performance of Change Order work. This compensation shall be in the form of markup percentages applied to the costs computed as provided for in Articles 7.3.1 through 7.3.3 and is full and complete payment for overhead and profit. Overhead includes, but is not limited to, superintendent costs, bond and insurance premiums, financing costs, project engineer, project manager, scheduler, estimator, drafting, small tools, home office expenses, field office expenses, and utilities (gas, electricity, sewer, water, telephone, fax, copier, etc.). The Contractor shall not receive payment for itemized costs which are considered to be included under the profit and overhead percentage markup.

.1 For work by the Contractor's own organization or by its Subcontractor's own workforce, the Contractor may apply, as a maximum, the following markup percentages as overhead and profit:

1. Labor	20 percent
2. Materials	15 percent
3. Equipment (owned or rented)	15 percent

.2 Under a fixed price adjustment basis, if work is performed by a Subcontractor with its own workforce, the Contractor may apply an additional 5 percent markup to the total which has been computed in accordance with Article 7.3.4.1. The Contractor shall reach agreement with the Subcontractor and any intermediate Subcontractor as to the division of the markup percentages between them.

.3 Under a force account basis, if work is performed by a Subcontractor with its own workforce, the Contractor may not apply an additional 5 percent markup, as provided for under Article 7.3.4.2, to the total which has been computed in accordance with Article 7.3.4.1. The Contractor shall reach agreement with the Subcontractor and any intermediate Subcontractor as to the division of the markup percentages between them.

7.4 Lump Sum or Force Account Adjustments

7.4.1 Change Order work will be paid for by either a Lump Sum adjustment of the Contract Sum or on a Force Account basis, or a combination of both, as determined by the Engineer. Change Order work will not be paid for unless ordered in writing by the Engineer.

7.4.2 In the event the Contractor fails to submit its proposal within 15 days after receipt of a written request for proposal, or the Engineer and the Contractor fail to agree upon a negotiated Lump Sum adjustment, within a reasonable time, or if in the judgement of the Engineer, it is impracticable because of the nature of the Work or for any other reason to fix the price for completion before the work order is issued, the Engineer has the option of authorizing payment on the basis of a Force Account.

7.4.3 The Contractor shall notify the Engineer in writing of the day and time on which Force Account work will commence prior to beginning work. All Force Account work shall be reported daily on daily extra work reports furnished by the Engineer to the Contractor and signed by both parties, which daily reports shall thereafter be considered the true record of Force Account work completed. Completely detailed invoices covering the Force Account work shall be submitted for payment consideration not later than 15 days after the completion of the work. The charges for Work performed by the Contractor or a Subcontractor shall be reported separately. Substantiating invoices from Suppliers and Subcontractors shall be included with the Contractor's invoices. The Contractor shall permit examination of accounts, bills, and vouchers relating to the Force Account work when requested by the Engineer. Payment for the Work done under Force Account will be made after receipt of an executed Change Order issued to cover the increase in the Contract Sum.

7.4.4 Payment for the Work completed under Lump Sum adjustment will be made after receipt of an executed Change Order issued to cover the change in the Contract Sum and/or Contract Time.

7.5 Variation in Quantity in Unit Price Work

7.5.1 **General.** The estimated quantities for Unit Price work listed in the Bid Form are established for the sole purpose of bid comparison and do not constitute a guarantee to the Contractor of the quantities of work to be performed under this contract. The Contractor shall be compensated only for the actual quantities of work performed which were directed by the Engineer. The amount of compensation for each item of

Work shall be computed by multiplying the actual quantity by the appropriate bid Unit Price except as follows:

.1 Increases of more than 20 percent: If the actual quantity of work performed on an item of Work exceeds the estimated quantity by more than 20 percent, the quantity in excess of 120 percent of the estimated quantity shall be paid for based upon (a) actual unit cost or (b) as mutually agreed to by the Contractor and the Engineer. The Engineer will determine which method is to be utilized. If the actual unit cost method is utilized, the actual unit cost is determined by calculating the total cost incurred for completing 120 percent of the estimated quantity using the markups allowed under Article 7.3.4, which is then divided by the quantity of work performed, i.e., 120 percent of the estimated quantity. If costs applicable to the Work performed include fixed costs, such fixed costs shall be deemed to have been recovered by the Contractor by the payments made to the Contractor for 120 percent of the estimated quantity at the bid Unit Price. In computing the actual unit cost, such fixed costs shall be excluded.

At the discretion of the Engineer, the Engineer can make payment on the quantity in excess of 120 percent of the estimated quantity using exactly the provisions and procedures in the "Force Account" Articles 7.3 and 7.4.3.

.2 Decreases of more than 20 percent: If the actual quantity of work performed on an item of Work is less than 80 percent of the estimated quantity, the quantity shall be paid for (a) based upon actual cost using the markups allowed under Article 7.3.4, or (b) as mutually agreed to by the Contractor and the Engineer.

Payment for the actual quantity of work performed shall, in no case, exceed the payment which would have been made for performance of 80 percent of the estimated quantity at the bid Unit Price.

7.6 Deleted Work

7.6.1 Deleted Work. If work is deleted, payment will be made to the Contractor for costs incurred in connection with the deleted work if incurred prior to notification of deletion by the Engineer.

If approved material is ordered by the Contractor for the deleted work prior to the notification by the Engineer, and if orders for such materials cannot be canceled, payment for such material will be the actual cost to the Contractor. In such case, the material shall become the property of the District. If the material can be returned to the vendor, and if the Engineer so directs, the material shall be returned and the Contractor will be paid for the actual costs or charges made by the vendor for returning the material including any stocking charges.

The costs incurred or charges paid to the Contractor for Work completed prior to deletion shall be computed using the markups allowed in Article 7.3.4. Payment for

deleted work will be based on the approved schedule of costs or other mutually agreed value. A minimum of a 10 percent credit shall be provided to the District for overhead, profit and markup associated with the deleted work.

7.7 Differing or Unusual Site Conditions

7.7.1 Pursuant to Public Contract Code, Section 7104, the Contractor shall promptly, and before such conditions are disturbed, notify the Engineer in writing of: (1) material that the Contractor believes may be hazardous waste, as defined in Section 25117 of the Health and Safety Code (other than material indicated in the Contract Documents) and that is required by law to be removed to a Class I, Class II, or Class III disposal site; (2) subsurface or latent physical conditions at the site differing materially from those indicated in this contract; or (3) unknown physical conditions at the site, of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in this contract.

7.7.2 The Engineer will promptly investigate the conditions. If the Engineer finds that the conditions do materially differ, or do involve hazardous waste, and do cause an increase or decrease in the Contractor's Contract Sum and/or the Contract Time a contract adjustment will be made through the Change Order process, as determined by the Engineer.

7.7.3 If the Contractor and the Engineer disagree whether the conditions do materially differ or whether a hazardous waste is involved or whether the conditions cause an increase or decrease in the Contractor's Contract Sum and/or Contract Time, the Contractor shall nevertheless proceed with all Work to be performed under the contract and shall comply with the completion dates required by the contract. The Contractor waives any rights to an increase in Contract Time, or an increase in Contract Sum, unless it timely follows the Disputes and Claims procedures in Article 3.4.

ARTICLE 8 - TIME

8.1 Commencement, Prosecution, and Completion of Work

8.1.1 **Notice to Proceed.** The Notice to Proceed will not be issued until the contract is properly executed, bonds are furnished, proof of insurance submitted by the Contractor, and both the bonds and the insurance are approved by the District. The Contract Time will not be extended, and the Contractor will not receive any additional compensation, because of delays caused by receipt, review and approval by the District of the Contractor’s bonds and insurance. Except as required elsewhere, the Contractor is not authorized to perform any Work under this contract until it has received an official Notice to Proceed.

8.1.2 Prosecution of the Work. Work shall proceed at all times with such force and equipment as will be sufficient to complete the Work within the Contract Time.

8.1.3 Required Contract Completion. The Contractor expressly agrees that it will complete the Work within the Contract Time, subject to approved Change Orders that impact time.

8.1.5 Early Completion. The Contractor shall not be entitled to claim damages for expenses due to the District not authorizing early completion.

8.2 Liquidated Damages

8.2.1 Should the Contractor fail to complete all or any portion of the Work within the specified time therefor or within such extra time as may be allowed for delays by formal extensions granted by the District, deductions will be made from the Contractor's earnings for the time that the Work remains incomplete beyond the specified completion time. Liquidated damages will be apportioned such that the Contractor will be responsible for all delays not otherwise properly subject to time extensions.

8.2.2 Liquidated damages cover only certain damages and are limited to the cost of administration, overhead, and general loss of use of the facility by the District as a result of a delay, and does not cover any other type of damages set forth in Section 8.2.3. It being impracticable or extremely difficult to fix the actual amount of damage for the above-referenced categories of damages, the parties agree that the amounts set forth in this Contract as liquidated damages will be deducted from any money due the Contractor under the contract. Should the amount of the damages exceed the amount due the Contractor, the Contractor and its sureties shall be liable for the excess.

8.2.3 Liquidated damages shall not be deemed to include within their scope additional damages or administrative costs arising from defective work, lost revenues, interest expenses, cost of completion of the Work, cost of substitute facilities, claims and fines of regulatory agencies, damages suffered by others or other forms of liability claimed against the District as a result of delay (e.g., delay or delay-related claims of other contractors, Subcontractors or tenants), and defense cost thereof. The Contractor shall be fully responsible for the actual amount of any such damages it causes, in addition to the liquidated damages otherwise due the District.

8.3 Use of Facilities Prior to Completion of Contract

8.3.1 If the Contractor has received and provided to the District a temporary certificate of occupancy from governmental authorities having jurisdiction over the project and/or in the Engineer’s opinion, the Work under the contract, or any portion of the Work, is in a condition suitable for the District’s use, the District may, after written notice from the Engineer to the Contractor, use (which includes, but is not limited

to, taking over or placing into service) any portion or portions of the project designated by the Engineer.

8.3.2 Even if the District elects to use the Work or a portion of the Work prior to Contract Completion, the Contractor will nonetheless make all necessary repairs, renewals, changes, or modifications in the Work or any portion of the Work that does not meet the requirements of the Contract Documents or is deficient due to defective materials or workmanship, unless the deficiency is solely caused by ordinary wear and tear.

8.3.3 The use of any portion of the Work by the District does not relieve the Contractor of any of its responsibilities or liabilities under the Contract Documents or constitute a waiver by the District of any claims. Said use shall not cancel liquidated damages as of the first date of use, or any continuance thereof, nor impair, reduce, or change the amount of liquidated damages.

8.4 Delays and Extensions of Time

8.4.1 The Contractor shall take reasonable precautions to foresee and prevent delays to the Work including, but not limited to, maintaining construction schedules that are properly updated to reflect current conditions and the actual critical path, and continuous monitoring of critical and dependent activities of the Contractor, Subcontractors, Suppliers, the District, agencies and other third parties. When the Contractor foresees a delay event, and in any event upon the occurrence of a delay event, the Contractor shall immediately notify the Engineer in writing of the probability or the actual occurrence of a delay in the Contract Time, and its cause. With respect to all delays (compensable, excusable and/or inexcusable), the Contractor shall reschedule its Work and/or revise its operations, to the extent possible under the terms of the contract, to mitigate the effects of the delay through work-arounds, overtime and acceleration of the project schedule, re-sequencing the Work, or other methods commonly utilized in the construction industry.

8.4.2 For Inexcusable Delay (as defined in Article 1.2.1.21), the Contractor shall not be entitled to an extension of time or compensation for any loss, cost, damage, expense or liability resulting directly or indirectly from the Inexcusable Delay including, but not limited to, extended field or home office overhead, field supervision, cost of capital, interest, escalation charges, labor costs, materials expense, or acceleration costs.

8.4.3 For Excusable Delay (as defined in Article 1.2.1.17), the Engineer will grant the Contractor an extension of time in an amount equal to the period of Excusable Delay based on the analysis of schedule impact and delay analysis diagram, which shall be the Contractor's sole and exclusive remedy for such delay. Excusable Delays shall include labor strikes, adverse weather as defined in Article 8.5, and Acts of God.

8.4.4 For Compensable Delay (as defined in Article 1.2.1.5), the Engineer will grant the Contractor an extension of Contract Time with compensation in an amount that represents the Contractor's actual direct costs incurred as a direct result of the Compensable Delay. The Contractor may recover its direct costs only and may not recover (and waives) all other types of indirect, consequential, special and incidental damages.

8.4.5 For Concurrent Delay (as defined in Article 1.2.1.6), the following rules apply: if one or more of the Concurrent Delays are excusable or compensable, then the District will treat the period of Concurrent Delay as an Excusable Delay; and if all of the Concurrent Delays are inexcusable, then the District will treat the Concurrent Delay as inexcusable. These rules for Concurrent Delay shall be the Contractor's sole and exclusive remedy for periods of Concurrent Delay, and the Contractor's entitlement shall be limited to the measures of recovery defined herein for Inexcusable, Excusable and Compensable Delay, as applicable.

8.4.6 No time extension will be granted to the Contractor for encountering delays while performing Work after the specified or formally extended Contract Completion date, except for causes of delay specified in Article 8.4.4.

8.4.7 The Contractor shall provide notice and documentation of delays in accordance with the following rules:

.1 Within five days of knowing about an event that may cause a delay in the project schedule, the Contractor shall notify the Engineer in writing about the delay in the Work, the impact it may have on the project schedule, and the causes of the delay. The Contractor's notice shall set forth the anticipated impact of the delay on the critical path, specify any additional time requested, and provide a detailed description of the cause or causes of the delays.

.2 If the Contractor intends to request an extension of time or compensation for damages resulting from delay, then the Contractor shall make the request in writing to the Engineer not more than 15 days after the end of such delay. If any delay exceeds 30 days, however, then the request shall be made monthly and then updated every month after that (as applicable). The Contractor shall provide an Analysis of Schedule Impact of the delay (see Article 3.4.2.3 and 3.4.2.4) and update it monthly (as applicable). The Contractor shall also provide documentation showing that the delay was either excusable or compensable and that the Contractor has revised its construction schedule, to the extent possible, to mitigate the delay. No compensation for damages resulting from delay will be granted unless supported by cost records justifying the costs claimed in connection with the delay.

8.4.8 The Contractor's failure to give written notice of a delay or to submit or document a request for an extension of time or for damages resulting from delay in the manner and within the times stated above shall constitute a waiver of all rights thereto.

8.4.9 An extension in Contract Time must be approved by the Engineer to be effective. An extension of Contract Time with or without consent of the sureties, shall not release the sureties from their obligations, which shall remain in full force until the discharge of the contract.

8.4.10 The Engineer will investigate the facts and ascertain the extent of the delay, and issue a written statement regarding its findings. If the Contractor disagrees with any decision of the Engineer regarding delays and extensions in Contract Time, the Contractor may dispute the Engineer's decision in accordance with Article 3.4.

8.5 Weather Conditions Unfavorable for Prosecution of Work

8.5.1 The Engineer may suspend the Work whenever weather conditions or conditions resulting from inclement weather are unfavorable for the prosecution of the Work. The delay caused by such suspension may entitle the Contractor to an extension in Contract Time, but not to any other compensation.

8.5.2 If the Contractor believes that the Work should be suspended under this Article, the Contractor may request such suspension. The delay caused by the suspension may entitle the Contractor to an extension of Contract Time, but not to any other compensation. The Contractor's request for suspension must be agreed to by the Engineer in order to be granted an extension of Contract Time.

8.5.3 No extension of time will be granted for suspension of Work unless the suspension impacts the Contract Completion date or the timely completion of a milestone completion date for a portion of the Work. Determination that suspension of the Work for inclement weather conditions or conditions resulting from inclement weather impacts timely completion and entitles the Contractor to an extension of Contract Time shall be made and agreed to in writing by the Engineer and the Contractor for each day that work is suspended. In the event of failure to agree, the Contractor may protest under the provisions of Article 3.4.

8.5.4 If the Work is suspended and an extension of Contract Time is granted under this Article, the Contractor will be entitled to a one Work Day extension of time for each Work Day that the Contractor is unable to perform the Work for at least one-half of its current normal Work Day; and if the Work is suspended at the regular starting time on any Work Day and the Contractor's workforce is dismissed as a result of the suspension, then the Contractor will be entitled to a one Work Day extension of Contract Time whether or not conditions change thereafter and the major portion of the day is suitable for work.

8.5.5 The Contractor shall use best available technologies to secure the site to mitigate/minimize the effects of inclement weather in conformance with applicable Federal, State, and regional regulatory requirements.

ARTICLE 9 - INSURANCE AND BONDS

9.1 Faithful Performance and Payment Bonds

9.1.1 The Contractor shall furnish to the District a Faithful Performance Bond, and maintain it in an amount not less than 100 percent of the current Contract Sum, conditioned upon the faithful performance by the Contractor of all covenants and stipulations in the contract.

9.1.2 The Contractor shall furnish to the District a Payment Bond and maintain it, in an amount not less than 100 percent of the current Contract Sum.

9.1.3 The Payment Bond and the Faithful Performance Bond shall be on the forms of the District as provided for in Documents 00 61 13.16 and 00 61 13.13 and shall be properly executed as described therein.

9.1.4 If, at any time, during the performance of the Work any of the sureties, in the opinion of the District, are or become financially irresponsible, the District may require the Contractor to furnish other or additional sureties to the satisfaction of the District within 10 days after receipt of notice. If the Contractor fails to provide satisfactory sureties within the 10-day period, the contract may be terminated for cause under Article 11, and the materials purchased or the Work completed as provided in Article 11.

9.1.5 The Contractor and its sureties understand and agree that no modifications or alterations made in the Contract Documents shall operate to release any surety from liability on any bond or bonds required to be provided in this contract.

9.2 Insurance Requirements

9.2.1 The Contractor shall procure and maintain during the period of the contract all required insurance and shall submit certificates of insurance and additional insured endorsements to the policies to the Engineer for review and approval. The certificates of insurance shall be on the forms provided by the District. The insurance requirements must be met within the same period allowed for contract execution, as provided for in the Instructions to Bidders.

9.2.2 The Contract will not be executed until the certificates of insurance and endorsements to the policies have been received and accepted by the District. Acceptance of the certificates of insurance and endorsements by the District shall not relieve the Contractor from compliance with any of the insurance requirements or liability arising from said failure.

9.2.3 The District may require the Contractor to provide insurance policies to the Engineer for review. If requested, the Contractor agrees to provide the District with complete copies of the policies within 10 days following the request.

9.2.4 If the Contractor does not maintain all of the required insurance, or fails to timely deliver requested insurance policies to the District, the District reserves the right to stop the Work, and/or terminate the Contractor's right to proceed under the contract, in whole or in part. Any delay caused by the Work stoppage is an Inexcusable Delay.

ARTICLE 10 - WARRANTY

10.1 The Contractor warrants that any Work performed under the contract shall be performed in a competent manner in accordance with the duty of care set forth in Section 4.2.3; that any material furnished will be the best of its class; and that the Work shall fully meet the requirements of the Contract Documents.

10.2 The Contractor warrants workmanship, including subcontracted work, against defects for a period of one year from the date of Contract Completion unless a longer period of time is required by the Contract Documents.

10.3 The Contractor shall provide a similar one-year warranty for all materials and equipment provided under this contract unless a longer period of time is required by the Contract Documents.

10.4 If the District elects to use any portion or portions of the Work before Contract Completion, the warranty for those portions shall begin upon commencement of such use. The warranty for the remainder of the Work shall begin on the Contract Completion date.

10.5 If the District notifies the Contractor, within one year from the Contract Completion, or within any longer period of time required by the Contract Documents or another warranty period for partial occupancy as established under Section 10.4, that any portion of the Work fails to fulfill any of the requirements of the Contract Documents, the Contractor shall repair or replace the defective, non-conforming or otherwise unsatisfactory Work, without delay or further cost to the District in a manner that least inconveniences the District's operations. With regard to any defective work or material repaired or replaced by the Contractor, the one-year warranty will be measured from the date of the latest repair or replacement.

10.6 Should the Contractor fail to act promptly in accordance with this requirement, or should the exigencies of the case require repairs or replacements to be made before the Contractor can be notified or can respond to the notification, the District may, at its option, make the necessary repairs or replacements, or perform the necessary Work, and the Contractor shall pay to the District the actual cost of such repairs plus the markup percentages shown in Article 3.2.3.

10.7 If equipment has repeatedly malfunctioned, is unreliable, requires excessive maintenance, or if repair of the equipment will not result in equipment that is equivalent to that required by the Contract Documents (both in functionality and useful life), the Contractor shall replace, rather than repair, the equipment under the warranty.

10.8 The Contractor is responsible for all costs incidental to making good any and all of its warranties and agreements. These warranties and agreements are covenants that are binding on the Contractor and its sureties.

ARTICLE 11 - TERMINATION OR SUSPENSION OF THE CONTRACT

11.1 Termination by the District for Cause or Default

11.1.1 The District may terminate the Contractor's right to proceed under the contract, in whole or in part, for cause at any time after the occurrence of any of the following events:

.1 The Contractor becomes insolvent or files for relief under the bankruptcy laws of the United States.

.2 The Contractor makes a general assignment for the benefit of its creditors or fails to pay its debts as the same become due.

.3 A receiver is appointed to take charge of the Contractor's property.

.4 The Contractor abandons the Work. Abandonment is conclusively presumed when the District requests a written plan to cure a default and the Contractor does not submit the plan within five Work Days of the District's request.

11.1.2 If any of the following events occur, the District may require that the Contractor submit a written plan to cure its default:

.1 The Contractor fails to supply skilled supervisory personnel, an adequate number of properly skilled workers, proper materials, or necessary equipment to prosecute the Work in accordance with the Contract Documents.

.2 The Contractor fails to make progress so as to endanger performance of the Work within the Contract Time.

.3 The Contractor disregards legal requirements of agencies having jurisdiction over the Work, the Contractor, or the District.

.4 The Contractor materially fails to execute the Work in accordance with the Contract Documents.

.5 The Contractor is in default of any other material obligation under the Contract Documents.

11.1.3 The District may terminate the Contractor's right to proceed under the contract in whole or in part for default if the written plan is not received by the District within five days after the District's request or if the District does not accept the Contractor's plan for curing its default.

11.1.4 Upon any of the occurrences referred to in Articles 11.1.1, 11.1.2 and 11.1.3, the District may, at its election and by notice to the Contractor, terminate the contract in whole or in part; accept the assignment of any or all of the subcontracts; and then complete the Work by any method the District may deem expedient. If requested by the District, the Contractor shall remove any part or all of the Contractor's materials, supplies, equipment, tools, and construction equipment and machinery from the Work within seven days of such request; and, if the Contractor fails to do so, the District may remove or store, and after 90 days sell, any of the same at the Contractor's expense.

11.1.5 If the contract is terminated by the District as provided in Article 11.1, the Contractor shall not be entitled to receive any further payment until the expiration of 35 days after acceptance of all Work by the District.

11.1.6 No termination or action taken by the District after termination shall prejudice any other rights or remedies of the District provided by law or by the Contract Documents.

11.1.7 If, after termination for default, it is determined that the Contractor was not in default, or that default was excusable, the rights and obligations of the parties shall be the same as if the termination had been issued for convenience pursuant to Article 11.2.

11.2 Termination by the District for Convenience

11.2.1 The District may, at its option, and for its convenience, terminate this contract at any time by giving written notice to the Contractor specifying the effective date of termination. Upon such termination, the Contractor agrees to comply with the notice and further agrees to waive any claims for damages, including loss of anticipated profits, on account of the termination in accordance with Article 11.2.5; and, as the sole right and remedy of the Contractor, the District shall pay the Contractor in accordance with Article 11.2.4.

11.2.2 Upon receipt of notice of termination under Article 11.2, the Contractor shall, unless the notice directs otherwise, do the following:

.1 Immediately discontinue the Work to the extent specified in the notice.

.2 Place no further orders or subcontracts for materials, equipment, services, or facilities, except as may be necessary for completion of a portion of the Work that is not discontinued or is necessary to secure the project site.

.3 Promptly cancel, on the most favorable terms reasonably possible, all subcontracts to the extent they relate to the performance of the discontinued portion of the Work.

.4 Thereafter, do only such Work as may be necessary to preserve and protect Work already in progress and to protect materials, plants, and equipment in transit to or on the project site.

11.2.3 Upon termination, the obligations of the contract shall continue as to portions of the Work already performed and, subject to the Contractor's obligations under Article 11.2.2, as to bona fide obligations assumed by the Contractor prior to the date of termination.

11.2.4 Upon such termination, the District will pay to the Contractor the sum of the following:

.1 The amount of the Contract Sum allocable to the portion of the Work properly performed by the Contractor as of the effective date of termination, less sums previously paid to the Contractor.

.2 Previously unpaid costs of any items delivered to the project site that were already fabricated for subsequent incorporation into the Work.

.3 Any proven losses with respect to materials and equipment directly resulting from the termination.

.4 Reasonable demobilization costs.

11.2.5 The above reimbursement is the sole and exclusive remedy to which the Contractor is entitled in the event the contract is terminated for convenience; and the Contractor expressly waives any other claims, damages, demands, compensation or recovery related to this contract or project. The Contractor agrees to sign a general release incorporating this waiver.

11.3 Termination of the Contract - Act of God or Force Majeure

11.3.1 "Act of God" has the meaning set forth in Section 7105 of the Public Contract Code. "Force Majeure" shall solely have the meaning set forth in Section 1511, Subparagraph 2 of the Civil Code. If an Act of God or Force Majeure occurs, the Engineer may, by written notice, suspend or terminate this contract. If the contract is not suspended or terminated, or if the contract is resumed after suspension, the Contractor shall fully restore the work except as limited by Public Contract Code, Section 7105(a), in the case of an "Act of God."

11.3.2 If the contract is terminated because of an Act of God or Force Majeure, the Contractor will be paid for Work performed prior to the Act of God or Force Majeure at either (i) the Unit Prices named in the contract; or (ii) in the event no unit prices are named, a sum equal to the percentage that the Contract Sum for the Work completed, at the time of occurrence of the Act of God or Force Majeure bears to the Contract Sum for all Work to be performed under the contract as determined by the Engineer. In no event will the District be liable to the Contractor for breach of contract, extra work, or damages because the contract is terminated due to an Act of God or Force Majeure.

11.4 Suspension by the District

11.4.1 The Engineer may, in his or her sole discretion, order the Contractor, in writing, to suspend, delay, or interrupt the Work in whole or in part for as long as 90 days from the date of delivery of a written order of suspension. The order shall be specifically identified as a "suspension order" under this Article. The work may be suspended for a longer period or periods if the parties agree. Upon receipt of a suspension order, the Contractor shall comply with its terms and take all reasonable steps to minimize costs related to the suspension of the Work or the portion of the Work. Within 90 days after the issuance of the suspension order, or such extension to that period as is agreed upon by the Contractor and the District, the District will either cancel the suspension order or delete the suspended Work.

11.4.2 If a suspension order is canceled or expires, the Contractor shall resume the suspended Work. A Change Order may be issued to cover any adjustments of the Contract Sum or an extension of Contract Time necessarily caused by the suspension. If the Contractor disputes the adjustment of the Contract Sum or the Contract Time, the Contractor shall submit a claim per Article 3.4.

11.4.3 Costs directly associated with the suspension will be at the District’s expense if the suspension is not due to any fault of the Contractor.

11.4.3 A suspension order shall not be required to stop the Work as permitted or required under any other provision of the Contract Documents.

ARTICLE 12 - LABOR PROVISIONS

12.1 Prevailing Wages

12.1.1 Pursuant to Section 1773 of the Labor Code, the District has obtained from the Director of Industrial Relations of the State of California, the general prevailing rates of per diem wages and the general prevailing rates for holiday and overtime work in the locality in which the Work is to be performed, for each craft, classification, or type of worker needed to execute the contract. A copy of the prevailing wage rates is on file and available for inspection by any interested party on request at the District's Specifications and Engineering Support Section.

12.1.2 The holidays upon which such rates shall be paid shall be all holidays recognized in the collective bargaining agreement applicable to the particular craft, classification, or type of worker employed on the Work.

12.1.3 The Contractor shall post a copy of the general prevailing rate of per diem wages at the jobsite pursuant to Section 1773.2 of the Labor Code.

12.1.4 Pursuant to Section 1774 of the Labor Code, the Contractor and any of its Subcontractors shall not pay less than the specified prevailing rate of wages to all workers employed in the execution of the contract.

12.1.5 As set forth with more specificity in Section 1773.1 of the Labor Code, "per diem" wages include employer payments for health and welfare, pension, vacation, travel, subsistence and, in certain instances, apprenticeship or other training programs, and shall be paid at the rate and in the amount spelled out in the pertinent prevailing wage determinations issued by the Director of Industrial Relations.

12.1.6 The Contractor shall, as a penalty to the State or the District, forfeit not more than the maximum set forth in Section 1775 of the Labor Code for each calendar day, or portion thereof, for each worker paid less than the prevailing rates for the work or craft in which the worker is employed under the contract by the Contractor or by any Subcontractor under him. The difference between the prevailing wage rates and the amount paid to each worker for each calendar day or portion thereof for which such worker was paid less than the stipulated prevailing wage rate shall be paid to such worker by the Contractor.

12.1.7 The specified wage rates are minimum rates only and the District will not consider and shall not be liable for any claims for additional compensation made by the Contractor because of its payment of any wage rate in excess of the general prevailing rates. All disputes in regard to the payment of wages in excess of those specified herein shall be adjusted by the Contractor at its own expense.

12.1.8 General prevailing wage determinations have expiration dates with either a single asterisk or a double asterisk. Pursuant to California Code of Regulations, Title 8, Section 16204(b), the single asterisk means that the general prevailing wage determination shall be in effect for the specified contract duration. The double asterisk means that the predetermined wage modification shall be paid after the expiration date. Notwithstanding what is stated in Article 3.4 and Article 4.7 of the General Conditions, no adjustment in the Contract Sum will be made for the Contractor’s payment of these predetermined wage modifications.

12.2 Payroll Records

12.2.1 The Contractor and each Subcontractor shall keep an accurate payroll record, showing the name, address, social security number, work classification, straight time and overtime hours worked each day and week, and the actual per diem wages

paid to each journeyman, apprentice, worker or other employee employed in connection with the Work. The payroll records shall be certified and shall be available for inspection in accordance with the provisions of Section 1776 of the Labor Code.

12.2.2 The Contractor shall submit for each week in which any contract Work is performed a copy of all payroll records to the Engineer. The Contractor shall be responsible for submission of copies of payroll records of all Subcontractors. Payroll records shall be completed and submitted by the 25th of the month for the previous 30-day period which started on the 15th of the previous month to the 15th of the current month.

12.2.3 Certified payroll records shall be on the forms provided by the Department of Industrial Relations (reduced size sample in Appendix A) or contain the same information required on the Department's form. Copies of the form may be obtained from:

Division of Labor Standards Enforcement
Bureau of Field Enforcement
2031 Howe Avenue, Suite 100
Sacramento, CA 95825-5378
(916) 263-1811
(916) 263-5378

The Contractor or Subcontractor shall certify the payroll records as shown on the reverse of the State form. In addition, the records shall be accompanied by a statement signed by the Contractor or Subcontractor certifying that the classifications truly reflect the Work performed and that the wage rates are not less than those required to be paid.

12.2.4 In the event of noncompliance with the requirements of Section 1776 of the Labor Code, the Contractor shall have 10 days in which to comply subsequent to receipt of written notice specifying in what respects such Contractor must comply with said Section. Should noncompliance still be evident after such 10-day period, the Contractor shall, as a penalty to the State or the District, forfeit the amount set forth in Section 1776(h) of the Labor Code for each calendar day, or portion thereof, for each worker, until strict compliance is effectuated. Upon the request of the Division of Apprenticeship Standards or the Division of Labor Standards Enforcement, such penalties shall be withheld from progress payments then due.

12.3 Hours of Labor

12.3.1 Pursuant to the provisions of Sections 1810, et seq. of the Labor Code and any amendments thereof:

.1 Eight hours of labor constitutes a legal day's Work under the contract.

.2 The time of service of any worker employed upon the work shall be limited and restricted to eight hours during any one calendar day, and forty hours during any one calendar week except as provided in Article 12.3.1.4 below.

.3 The Contractor shall, as a penalty to the State or the District, forfeit the amount set forth in Section 1813 of the Labor Code for each worker employed in the execution of the contract by the Contractor or by any Subcontractor for each calendar day during which such worker is required or permitted to work more than eight hours in any calendar day and forty hours in any one calendar week in violation of this Article and the provisions of Labor Code, Sections 1810, et seq.

.4 Work performed by employees of the Contractor in excess of eight hours per day, and forty hours during any one calendar week, shall be permitted upon compensation for all hours worked in excess of eight hours per day at not less than one and one-half times the basic rate of pay.

.5 The Contractor and every Subcontractor shall keep an accurate record showing the name of and the actual hours worked each calendar day and each calendar week by each worker employed by him in connection with the Work; the record shall be kept open at all reasonable hours to the inspection of the District and to the Division of Labor Standards Enforcement of the State of California.

12.4 Employment of Apprentices

12.4.1 In the performance of the contract, the Contractor and any Subcontractor shall comply with the provisions concerning the employment of apprentices in Section 1777.5 of the Labor Code and any amendments thereof.

12.4.2 In the event the Contractor or any Subcontractor willfully fails to comply with the aforesaid section, such Contractor or Subcontractor shall be subject to the penalties for noncompliance in Labor Code, Section 1777.7.

ARTICLE 13 - MISCELLANEOUS PROVISIONS

13.1 Governing Law

The contract is governed by the laws of the State of California.

13.2 Antitrust Claims

By entering into the contract, the Contractor offers and agrees to assign to the District all rights, title, and interest in and to all causes of action it may have under Section 4 of the Clayton Act (15 U.S.C. Sec. 15) or under the Cartwright Act (Chapter 2 (commencing with Section 16700) of Part 2 of Division 7 of the Business and Professions Code), arising from purchases of goods, services, or materials pursuant to the contract. The Contractor shall

include in each subcontract a provision corresponding to the foregoing binding the Subcontractor to offer and agree to assign to the District such rights, title, and interest held by the Subcontractor. Such assignment shall be made and become effective at the time the District tenders final payment to the Contractor without further acknowledgment by the parties.

13.3 Non-Discrimination Clauses

13.3.1 There shall be no discrimination against any person, or groups of persons, per Government Code Section 12940, Labor Code Section 1735, or any other applicable law or regulation in the performance of this contract.

13.3.2 There shall be no discrimination in the performance of this contract, against any person, or group of persons, on account of race, color, religion, religious creed, national origin, ancestry, gender including gender identity or expression, age, marital or domestic partnership status, mental disability, physical disability (including HIV and AIDS), medical condition (including genetic characteristics or cancer), genetic information, sexual orientation, or military and veteran status. The Contractor shall not establish or permit any such practice(s) of discrimination with reference to the contract. Contractors determined to be in violation of this section will be deemed to be in material breach of the contract.

13.3.3 **Contractor and its subcontractors shall abide by the requirements of 41 CFR §§ 60-1.4(a), 60-300.5(a) and 60-741.5(a). These regulations prohibit discrimination against qualified individuals based on their status as protected veterans or individuals with disabilities, and prohibit discrimination against all individuals based on their race, color, religion, sex, or national origin in the performance of this contract. Moreover, these regulations require that covered prime contractors and subcontractors take affirmative action to employ and advance in employment individuals without regard to race, color, religion, sex, national origin, protected veteran status or disability.**

13.3.4 The Contractor shall include the nondiscrimination and compliance provisions of these clauses in all subcontracts.

13.4 Trenching and Shoring

The Contractor shall comply with Labor Code, Sections 6500, 6705, and 6707, and Public Contract Code, Section 7104, regarding trenching and shoring, and not withstanding any other provisions of the Contract Documents.

13.5 Third Party Claims

Pursuant to Public Contract Code, Section 9201, the District will provide Contractor with timely notification of the receipt of any third-party claims relating to this contract.

END OF DOCUMENT

EXHIBIT D
IRAN CONTRACTING ACT CERTIFICATION

Pursuant to Public Contract Code (PCC) § 2204, an Iran Contracting Act Certification is required for solicitations of goods or services of $1,000,000 or more.

To submit a bid or proposal to East Bay Municipal Utility District (District), you must complete **ONLY ONE** of the following two paragraphs. To complete paragraph 1, check the corresponding box **and** complete the certification for paragraph 1. To complete paragraph 2, check the corresponding box and attach a copy of the written permission from the District.

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

CERTIFICATION FOR PARAGRAPH 1:

I, the official named below, CERTIFY UNDER PENALTY OF PERJURY, that I am duly authorized to legally bind the BIDDER/bidder to the clause in paragraph 1. This certification is made under the laws of the State of California.

Firm: _____

By: _____ Date: _____
(Signature of Bidder)

Title: _____

Signed at: _____ County, State of: _____

OR

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

EXHIBIT E – BOND FORMS

EBMUD

DATE _____

PAYMENT BOND

CONTRACTOR (Name and California address where service may be effected)
SURETY (Name and California address where service may be effected)
AMOUNT OF BOND (Sum in words and figures)
CONTRACT DOCUMENTS (As named in the Contract)

KNOW ALL PERSONS BY THESE PRESENTS:

THAT, WHEREAS, the contractor named above, hereinafter called the Contractor, has this day entered into a Contract with East Bay Municipal Utility District, hereinafter called the District, to perform and complete the work set forth in the Contract Documents named in the Contract, all now on file in the office of the Secretary of the District, as will more fully appear by reference to said Contract, which is made a part hereof; and

WHEREAS, Sections 9550 to 9566 inclusive of the Civil Code of the State of California, and any amendments thereof, require contractors upon public work to file with the body by whom such contract was awarded a good and sufficient bond to secure the claims to which reference is made in said sections, NOW THESE PRESENTS

WITNESSETH: That the Contractor, as Principal, and the Surety named above, as Surety, are held and firmly bound unto any and all materialmen, persons, firms, or corporations furnishing materials, provisions, or other supplies used in, upon, for, or about the performance of the work contracted to be done, and to all persons, firms or corporations renting or hiring implements or machinery for or contributing to the said work to be done and to all persons who perform work or labor of any kind or nature thereon, or in connection therewith, and to all persons who supply both work and materials, in the sum entered on the first page hereof, lawful money of the United States of America, being not less than the total amount payable by the terms of said Contract, for which payment well, truly and promptly to be made we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly, and severally, firmly by these presents.

PAYMENT BOND

The condition of the above obligation is such that if the Contractor, or the Contractor's subcontractors, fail to pay for any materials, provisions or other supplies used in, upon, for, or about the performance of the work contracted to be done, or for any work or labor thereon of any kind, or for amounts due under the Unemployment Insurance Act with respect to such work or labor, the Surety will pay for the same, in an amount not exceeding the sum specified in this Bond, provided that any and all claims hereinunder shall be filed and proceedings had in connection therewith as required by the provisions of said Sections 9550 to 9566 inclusive of the Civil Code of the State of California, and any amendments thereof: PROVIDED ALSO, that in case suit is brought upon this Bond a reasonable attorney's fee shall be awarded by the court to the prevailing party in said suit, said attorney's fee to be fixed as costs in said suit, and to be included in the judgment therein rendered.

No prepayment or delay in payment and no change, extension, addition, or alteration of any provision of said Contract or Contract Documents agreed to between the Contractor and the District, and no forbearance on the part of the District, shall operate to release the Surety from liability on this Bond, and consent to make such alterations without further notice to or consent by the Surety is hereby given, and the Surety hereby waives the provisions of Section 2819 of the Civil Code of the State of California.

Dated the day and year entered on the first page hereof.

Each signator to this bond hereby declares under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

_____
Contractor

By _____

*Title _____

By _____

**Title _____

(SEAL OF SURETY)

_____
Surety

By _____

Title _____

Note: The signature of the Surety on this bond must be acknowledged before a Notary Public. An executed Power of Attorney indicating that the Surety's representative is authorized to bind the Surety must accompany this bond.

The foregoing Bond was accepted and approved this _____ day of _____ , 20 _____

_____ , East Bay Municipal Utility District

Specifications / Proposal No. _____

*If corporation, Corporate President or CEO; if Partnership, Partner.
**Corporate Secretary or financial officer.

EBMUD

DATE _____

FAITHFUL PERFORMANCE BOND

CONTRACTOR (Name and California address where service may be effected)
SURETY (Name and California address where service may be effected)
AMOUNT OF BOND (Sum in words and figures)
CONTRACT DOCUMENTS (As named in the Contract)

KNOW ALL PERSONS BY THESE PRESENTS:

THAT, the contractor named above, hereinafter called the Contractor, as Principal, and the Surety named above, as Surety, are held and firmly bound unto the East Bay Municipal Utility District, hereinafter called the District, in the sum entered above, lawful money of the United States of America, for the payment of which sum well and truly to be made to the District, we, and each of us, bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

The condition of the above obligation is such that whereas the Contractor and the District entered into a Contract of even date herewith, by the terms and conditions of which the Contractor agreed to perform and complete the work, or manufacture, complete, and deliver the material or equipment, set forth in the Contract Documents named in the Contract, all now on file in the office of the Secretary of the District, as will more fully appear by reference to said Contract, which is made a part of this bond;

NOW, THEREFORE, if the Contractor shall well and truly carry out, execute and perform all things by the Contractor to be carried out, executed and performed, according to the terms and conditions of said Contract, including any and all warranty and guaranty obligations contained therein, then this obligation shall become null and void, otherwise to remain in full force and effect throughout the period of performance, including any warranty or guaranty period.

No prepayment or delay in payment, and no change, extension, addition, or alteration of any provision of said Contract or Contract Documents agreed to between the Contractor and the District, and no forbearance on the part of the District shall operate to release the Surety from liability on this Bond, and consent to make such alterations without further notice to or consent by the Surety is hereby given, and the Surety hereby waives the provisions of Section 2819 of the Civil Code and Section 359.5 of the Code of Civil Procedure of the State of California.

Each signator to this bond hereby declares under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

Dated the day and year entered on the first page hereof.

_____
Contractor

By _____

*Title _____

By _____

**Title _____

(SEAL OF SURETY)

_____
Surety

By _____

Title _____

Note: The signature of the Surety on this bond must be acknowledged before a Notary Public. An executed Power of Attorney indicating that the Surety's representative is authorized to bind the Surety must accompany this bond.

The foregoing Bond was accepted and approved this _____ day of _____ , 20 _____

_____ , East Bay Municipal Utility District

Specifications / Proposal No. _____

*If corporation, Corporate President or CEO; if Partnership, Partner.
**Corporate Secretary or financial officer.

EXHIBIT F – ASSIGNMENT, ASSUMPTION, & CONSENT AGREEMENT

DOCUMENT 00 74 00

[INSERT TITLE OF SUPPLIER/VENDOR]
ASSIGNMENT, ASSUMPTION, AND CONSENT AGREEMENT

This Assignment, Assumption, and Consent Agreement (ASSIGNMENT) is effective on the date of the last signature below, and is by and among EAST BAY MUNICIPAL UTILITY DISTRICT (DISTRICT), [SUPPLIER NAME] (SUPPLIER), and [CONTRACTOR NAME] (CONTRACTOR) the Prime Contractor on Specification [SPECIFICATION # and NAME] (SPECIFICATION) (collectively, the PARTIES).

BACKGROUND

On or about [DATE], DISTRICT and SUPPLIER entered into an agreement known as "[RFQ/PO # and/or supplier agreement title]," (SUPPLIER AGREEMENT), a complete copy of which (including all exhibits, amendments, and modifications thereto as of the bid date for [SPECIFICATION # and NAME]) is attached to and incorporated into this ASSIGNMENT by this reference;

The DISTRICT desires to assign its rights and obligations under the SUPPLIER AGREEMENT;

The CONTRACTOR desires to accept and assume all of the rights, obligations, and liabilities of DISTRICT; and

The SUPPLIER desires to consent to such assignment, acceptance, and assumption.

AGREEMENT

In consideration of the mutual covenants and agreements set forth herein and for other valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the PARTIES agree as set forth below.

The DISTRICT hereby assigns the SUPPLIER AGREEMENT to the CONTRACTOR, and the CONTRACTOR hereby accepts and assumes full responsibility for the work performed by the SUPPLIER under the SUPPLIER AGREEMENT, and accepts and assumes all of the DISTRICT'S rights, obligations, and liabilities under the SUPPLIER AGREEMENT. The DISTRICT additionally assigns its rights and obligations under the SUPPLIER's performance and payment bonds to the CONTRACTOR.

CONTRACTOR shall, among other responsibilities, receive and review all SUPPLIER submittals and be responsible for the coordination of said submittals with the DISTRICT; ensure that SUPPLIER maintains its performance and payment bonds and the correct policies of insurance; coordinate the timely delivery and satisfactory installation of all products, materials, and services with the SUPPLIER, the DISTRICT, and CONTRACTOR's subcontractors; coordinate delivery of all SUPPLIER product manuals; obtain all SUPPLIER warranties and guarantees; and coordinate startup of SUPPLIER's products and DISTRICT training in accordance with the SPECIFICATION and the SUPPLIER AGREEMENT.

In the event of any conflict and/or ambiguity between the SPECIFICATION and the SUPPLIER AGREEMENT, requires the timely performance of all obligations owed to the DISTRICT under the SPECIFICATION and the SUPPLIER AGREEMENT, and fully provides the DISTRICT with all intended benefits under the SPECIFICATION and the SUPPLIER AGREEMENT.

ASSIGNMENT DIRECTED BY:

EAST BAY MUNICIPAL UTILITY DISTRICT

Date: _____ By _____

[Name and title]

ASSIGNMENT CONSENTED TO BY:

[SUPPLIER NAME]

By:

Date: _____ _____

[Name and title]

ASSIGNMENT ACCEPTED BY:

[CONTRACTOR NAME]

By:

Date: _____ _____

[Name and title]

END OF DOCUMENT

EXHIBIT G – SPECIFICATIONS AND DRAWINGS

SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. The requirements of this section apply to all submittals in the Contract Documents.

2. Submit samples, drawings, and data for the Engineer's review which demonstrate fully that the construction, and the materials and equipment to be furnished will comply with the provisions and intent of this Specification. All submittals shall be written in Standard American English and all numerical data, whether in drawings, test reports, engineering calculations, manufacturer's literature, or maintenance manuals, shall be in United States Customary System (USCS) measuring units (foot, pound, gallons, etc). If original design work was completed in metric units, their equivalent USCS dimension and unit shall be indicated. All submittals, in printed or electronic format, shall be original quality and completely legible. Any obfuscation or loss of clarity of original which may result in ambiguous interpretation is not acceptable.

3. Specific items to be covered by the submittals shall include, as a minimum, the following:

a. For equipment which requires electrical service, submit detailed information to show power supply requirements, wiring diagrams, control and protection schematics, shop test data, operation and maintenance procedures, outline drawings, and manufacturer's recommendation of the interface/interlock among the equipment.

b. For mechanical equipment submit all data pertinent to the installation and maintenance of the equipment including shop drawings, manufacturer's recommended installation procedure, detailed installation drawings, test data and curves, maintenance manuals, and other details necessary.

c. Substitutions

4. Additional submittals required: O&M Manuals

5. For mechanical or electrical equipment that require submittals: provide separate submittals for each piece of equipment to be installed at each site. Title the submittals to denote which site the equipment pertains to.

1.2 PRODUCT HANDLING

A. Submittals shall be accompanied by a cover page and shall be in strict accordance with the provisions of this section.

B. Submit priority of processing when appropriate.

C. Submit materials to the EBMUD Materials Testing Laboratory when so specified. Submit other submittals to Construction Division, EBMUD, in accordance with Article 3.1 unless specified otherwise.

D. Proposals for "or equal" substitutions made prior to bid opening, pursuant to PCC Section 3400 (see Instructions To Bidders, Article 3), shall be delivered after coordinating the delivery with the District. Supplier shall coordinate with the District's Purchasing Division at the following telephone numbers: (510) 287-1253 or (510) 287-2017.

1.3 SUBMITTALS

A. Submittals shall include the following information:

1. A copy of the applicable section(s), with addendum updates included as appropriate, with each paragraph check-marked to indicate specification compliance or marked to indicate requested deviations from specification requirements.

2. A check mark shall denote full compliance with a paragraph as a whole. If deviations from the specifications are indicated, and therefore requested by the Supplier, each deviation shall be underlined and denoted by a number in the margin to the right of the identified paragraph, referenced to a detailed written explanation of the reasons for requesting the deviation. The Engineer is the final authority for determining acceptability of requested deviations. The remaining portions of the paragraph not underlined will signify compliance on the part of the Supplier with the specifications.

B. Failure to include a copy of the marked-up specification sections, along with justification(s) for any requested deviations to the specification requirements, with the submittal shall be sufficient cause for rejection of the entire submittal with no further consideration.

C. Any deviation from the contract documents not specifically requested and clearly identified, although accepted through oversight, may be rejected at any stage of the Work. The Supplier shall, at its own expense, reconstruct all work affected by the later rejection of a contract deviation that was not specifically called out and explained for review and acceptance by the District as detailed above.

PART 2 - PRODUCTS

2.1 SCHEDULE OF SUBMITTALS

A. Schedule of Submittals shall be in the form of a submittal log similar to that shown in Appendix A.

B. Complete columns (a) through (l) showing all submittals required by the specifications.

1. Dates in columns (h) through (l) shall be coordinated with the construction progress schedule to ensure sufficient time is allowed for processing of submittals and procurement of material prior to start of a construction activity.

C. A Schedule of Submittals is not required for proposals for “or equal” substitutions made prior to bid opening pursuant to PCC Section 3400 (see Instructions To Bidders, Article 3).

2.2 SHOP DRAWINGS

A. Scale required:

1. Make all shop drawings accurately to a scale sufficiently large to show all pertinent features of the item and its method of connection to the work.

B. Type of prints required:

1. Provide electronic copies of all drawings, specifications, and cut sheets complied into a single organized PDF file.

2.3 COLORS

A. General:

1. Unless the precise color and pattern are specified elsewhere, submit accurate color charts and pattern charts to the Engineer for review and selection whenever a choice of color or pattern is available in a specified product. Label each chart naming the source, the proposed location of use on the project, and the project name itself.

2.4 MANUFACTURERS' LITERATURE

A. Where contents of submitted literature from manufacturers include data not pertinent to the submittal, clearly show which portions of the contents are being submitted for review.

B. Clearly mark the literature with the materials and options being provided to illustrate conformance with the specification details.

C. Provide the complete part number and include the legend containing the descriptive details that define the meaning of each digit of the number.

2.5 SUBSTITUTIONS

A. Engineer's approval required:

1. The contract is based on the materials, equipment, and methods described in the Contract Documents. Any Supplier-proposed substitutions are subject to the Engineer's approval.

2. The Engineer will consider proposals for substitution of materials, equipment, and methods only when such proposals are accompanied by full and complete technical data, and all other information required by the Engineer to evaluate the proposed substitution.

3. Where substitutions are proposed for consideration, Supplier shall submit a written request for the substitution and shall show that it is equal to the specified item. The proposed substitution shall be identified separately and included with the required submittal for the item. When submitting a variation or substitution the Supplier warrants that:

   a. The contract has been reviewed to establish that the substitution, when incorporated, will be compatible with other elements of work.

   b. The Supplier shall perform all necessary work for making substitutions workable and shall bear any additional cost necessary because of the proposed substitution.

4. Substitutions not specifically requested, although accepted through oversight, may be rejected at any stage of the work. The Supplier shall, at its own expense, reconstruct all work affected by the later rejection of a substitution that was not specifically requested.

B. Trade names and "or equal as approved by the Engineer" provision:

1. See Article 4.4 of the General Conditions.

2. See Instructions To Bidders, Article 3, for proposals for “or equal” substitutions made prior to bid opening as permitted pursuant to PCC Section 3400.

2.6 OPERATIONS AND MAINTENANCE MANUALS

A. See “Table 1: O&M Manual Summary” at the end of this section.

B. The provisions of this article are considered minimal requirements and do not supersede any requirements in individual sections of this specification.

C. When O&M manuals are required to be submitted covering items included in this work, prepare all such manuals in approximately 8-1/2" x 11" format in durable, three ring plastic binders. Each manual shall be identical and include at a minimum information identified on the O&M Manual Review Checklist attached in Appendix A. In addition, furnish the following:

1. Binder Cover: Identification on, or readable through, the front cover stating the District's specification (project) number and project title, District facility or facilities where the equipment will be installed, specification section number, and the system or equipment described in the manual.

2. Binder Spine Label: Include the system or equipment name as shown on the binder cover along with the specification section number.

3. Title page including applicable equipment tag numbers and equipment manufacturer's name, address, telephone number, and the submittal date. In addition, provide name, address and telephone number of the local manufacturer's representative.

4. Table of contents organized and referenced to manual section dividers

5. Complete instructions regarding storage, handling, installation, operation, servicing, and maintenance of all equipment involved

6. Comprehensive replacement parts list, with complete nomenclature of all replaceable parts, their part numbers, current cost, and name and address of nearest vendor of parts

7. Detailed description of handling, replacement, and disposal of all fluids and replacement parts

8. Copies of Safety Data Sheets (SDS) as required

9. Copies of all guarantees and warranties issued including the start and end dates for the warranty period or conditions for the initial start date and the duration

10. Copies of drawings with all data concerning changes made during construction

11. Copies of calculations or reports appropriately prepared including sketches, given or known information with the source of the data, equations with each variable defined and applicable units, cross-references, code/standard references, annotations and footnotes

12. All field and factory test data

13. Engineering calculations or reports pertinent to the content of the O&M manual. See Article 2.8 Engineering Calculations or Reports.

14. Provide a separate section with tab divider for documents developed in the field after the O&M manual has been accepted. These documents include, but not limited to the following: manufacturer's certificate of proper installation, field test results, etc.

D. Materials shall be word-processed.

E. For mechanical or electrical equipment that require O&M manuals: provide separate O&M manuals for each piece of equipment installed at each site. Title the O&M manuals to denote which site the equipment pertains to.

F. Manufacturer's literature shall be originals, or original quality copies. Specifically identify all equipment models and features being provided. Delete or cross out any extra information provided in standard manufacturer's literature that does not apply to the equipment furnished.

G. Operating and Testing Procedures, and Diagrams: All manufacturers' standard procedures shall be customized or rewritten as necessary to accurately describe the system as it is installed and operated for the project. Procedures shall include District device tag numbers (as shown on the P&IDs) whenever available. All diagrams illustrating the system shall be customized to show installed conditions, and shall include District device tag numbers whenever available.

H. Three-hole punch shall not obliterate any information. Reduce original material as necessary to provide a suitable margin for three-hole punching or provide three-hole punched clear plastic pockets for inserting single sheet material.

I. O&M Manual Review Checklist:

1. The manufacturer's representative shall fill out a minimum of one O&M Manual Review Checklist form per submittal (See Appendix A) and include a copy in each submitted manual. Provide more than one checklist when specified in the technical specification sections. Clearly identify the location in the O&M Manual for each element in the Technical Content section (O&M tab number and page number). If the content is in multiple locations or on multiple pages, identify each location in the space provided or in the Comments column on the form.

2. All portions of the form shall be completed prior to submittal, or the submittal may be returned unreviewed. Submittals may also be returned unreviewed if the O&M Manual Checklist form contains multiple errors and/or omissions.

J. O&M Manual Review Process

1. Preliminary O&M Manuals: Submit preliminary O&M manuals as searchable Portable Document Format (PDF) for review. The District will return the submittals to the Supplier along with comments identifying necessary corrections or additions to the manuals. The District reserves the right to keep possession of all O&M manuals, and have the Supplier arrange to correct the manuals to comply with the reviewer comments.

a. Preliminary O&M manuals shall be submitted and accepted prior to the delivery of the respective equipment or system.

2. Final O&M Manuals:

a. The manuals shall not be considered final until the submittal has received a review status of "No Exceptions Taken".

1) Once a manual has received a review status of "No Exceptions Taken", the front cover (and other places of the manual, as applicable) shall have all working revision numbers removed. The cover of the manual (both electronic and printed hardcopies) shall then be updated to include the word "FINAL" to indicate that this copy is the final version.

2) Submit the Final O&M Manuals per the requirements of Paragraph 2.6.C.

3) Submit requested number of Final O&M Manual hard copies as shown in Table 1 at the end of this section.

4) Final O&M manuals shall be submitted and accepted prior to RFS milestone.

K. Electronic Files:

1. After the District has accepted each O&M Manual, an electronic version shall be supplied in addition to the required number of hard copies.

2. Electronic files shall be created in both searchable Portable Document Format (PDF) compatible with Adobe Acrobat version XI and Word format compatible with Microsoft Word 2010 or later. The security features (e.g. password protection) of all submitted files shall be disabled so that the District can perform future editing without restriction. Custom-developed drawings included in the O&M manuals (i.e. loop diagrams, system interconnection diagrams, etc.) shall also be submitted electronically in both PDF and the native CAD file format for future editing of the drawings by the Engineer. For CAD files, the associated PDF files shall be saved such that all CAD layering is preserved in the PDF file.

3. Electronic versions shall match the hard copy page for page with blank pages deleted. Electronic files shall be converted to PDF directly rather than using optical scanning. For any document not already in electronic format, the documents shall be scanned using optical character recognition to provide searching capability in the document.

L. Maintenance Summary Forms

1. Furnish a completed Maintenance Summary Form (see Appendix A for typical format) as part of the O&M Manual. Include all typical, routine, or preventive maintenance required to ensure satisfactory performance during warranty period

and longevity of the equipment. Manufacturer's representative shall sign and date the form certifying accuracy of the information.

2. Briefly summarize each maintenance activity on the form. Specific references to more detailed maintenance information located elsewhere in the O&M manual may be placed in the "Comments" column. However, simply referencing other sections in the O&M manual without a brief description of the maintenance activity is not acceptable.

3. Information on the form shall be word-processed, or typewritten.

4. Maintenance Summary Forms shall be on 8-1/2 inch by 11-inch paper and may be as many pages as required to completely summarize the required maintenance. However, the order and format shall be in accordance with the supplied form. The Maintenance Summary Forms will be provided in electronic format (MS Word) upon request.

2.7 ENGINEERING CALCULATIONS OR REPORTS

A. Engineering calculations/reports required by this specification shall be based on well-established engineering theories and principles. Each calculation/report shall be a complete and independent package.

B. The Supplier (or Manufacturer) shall provide the signing Engineer all necessary reference drawings and data required for completion of the calculations.

C. The calculations/reports shall be comprehensive for each structure or item, in that all calculations/reports are contained within the individual structure or item's calculation/report document (i.e., no calculation/report references to other calculation documents).

D. Presentation format shall be similar to that described in Article 2.6 – Operations and Maintenance Manuals. As a minimum, all calculations/reports shall be bound in an appropriately labeled binder, and contain the following elements:

1. Facility title, including substructure number, equipment description, applicable equipment tag number(s), and applicable specification section.

2. Table of Contents

3. Introduction, including description of structure or item, purpose of calculation/report, design assumptions with justification, software utilized for the analysis including the version, and codes/standards used

4. A list of references used to provide the bases for assumptions, equations, or data used in the calculation/report

5. Calculations or reports appropriately prepared, including sketches and reference drawings, given or known information with the source of the data, equations with

each variable defined and applicable units, cross-references, code/standard references, annotations and footnotes

6. When spreadsheets are used, provide referenced equations and the formulas used in the calculations.

7. Results shall be clearly identified. Summary tables shall be used for large amounts of data (especially if a software application is used)

8. Final design details, ready for transmittal to design drawings or shop drawings

9. Seal or signature of Professional Engineer registered in the State of California, as appropriate, of the individual(s) who prepared the calculations/reports

10. Appendices, including input and output files from computer design, and photocopies of catalog sheets for any special material or equipment (e.g., manufacturer sheet for equipment, ICBO reports for anchors, etc.), and checker markups

E. When any part of the calculation/report has been prepared by computer software, a copy of the input and output files shall be included as part of the final design calculation.

F. Shop drawings shall not be submitted until all design calculations/reports have been appropriately reviewed, checked and signed. The checker markups and comments shall also be included in an appendix to each calculation.

2.8 SUBMITTAL QUANTITIES

A. Submit one (1) electronic copy of the scanned data and drawings in searchable PDF format (compatible with Adobe Acrobat version XI), with organized tabs and a table of contents listing all supplied equipment.

B. Submit one (1) electronic copy of each sample, unless specified otherwise.

C. Submit one (1) electronic copy of each manual, unless specified otherwise.

D. Submit quantity specified of materials submitted to the EBMUD Materials Testing Laboratory.

2.9 ELECTRONIC SUBMITTALS

A. Provide electronic submittals in searchable PDF (compatible with Adobe Acrobat version XI). All portions of the electronic submittals shall be legible and shall be in full color identical to the original material. Provide manufacturer’s literature in original electronic file, if available.

B. Provide one electronic submittal file for each submittal except as noted hereinafter. The electronic submittal file name shall use the following format: submittal number –

specification section number - description (e.g.: “001.1-01 33 00-Coating of Widgets”). Providing multiple electronic files for a single submittal (except as noted hereinafter) is not acceptable. The Supplier shall merge multiple files into a single electronic file.

C. For larger submittals containing multiple volumes, submit one electronic file for each hardcopy volume and each electronic submittal file name shall include the corresponding hard copy volume number (e.g. “001.1-01 33 00-Coating of Widgets – Volume 3”).

D. Exceptions requiring hardcopy material initially, are:

1. O&M processing, per Article 2.6

E. The Supplier is solely responsible for verifying that the hardcopy submittal and accompanying electronic submittal are identical and address/incorporate prior Engineer review comments.

F. All portions of the electronic submittals shall be provided with text searching capabilities whenever possible. For any document not already in electronic format, the documents shall be scanned using optical character recognition to provide text searching capability in the document.

1. Submittals and RFIs shall be linked to at least one drawing within the File Manager application of the CMIS that provides the most relevant details regarding the subject equipment, material, item, or work. Linking shall be accomplished using the CMIS’s “pin” feature. Submittals and RFIs received without at least one linked drawing or with a linked drawing that is not relevant will be Returned Without Review.

2.10 REVIEW CHECKLISTS

A. Review Checklists are required for some specification sections (when specified in the section) and for all O&M manual submittals.

B. Each submittal requiring review checklists shall comply with the following:

1. Each page of the submittal shall include a unique and sequential page number. The page numbers shall be located in the same general location on each page.

2. Page numbering may include “point numbers” (10.1, 10.2, etc.) to facilitate inserting pages without renumbering an entire submittal. However, all pages in the submittal shall be in numerical order.

3. The review checklists shall be completed in its entirety with accurate page number references for each checklist item. Submittals with inaccurate review checklists may be returned without review for correction.

4. The review checklist shall be inserted at the beginning of the submittal.

PART 3 - EXECUTION

3.1 GENERAL

A. Prepare and use a transmittal form for submittals that includes the following information:

1. *Project name and specification number

2. *Date of submittal

3. *“To:
East Bay Municipal Utility District
P.O. Box 24055
Oakland, CA 94623-1055
ATTN: I-Pei Hsiu MS 901”

Or

If and only if, this submittal is a proposal for “or equal” substitutions made prior to bid opening pursuant to PCC Section 3400 (see Instructions To Bidders, Article 3), use the following address (envelope shall be marked: “Submittal Request for Substitution, Specification No. 2617”):

“To: Purchasing Division, Contract Supervisor, MS #102
East Bay Municipal Utility District
P.O. Box 24055
Oakland, CA 94623-1055

4. *"From:" Name and address of Supplier

5. Name and address of subcontractor

6. Name and address of supplier

7. Name of manufacturer

8. *Spec. Section, Article Number, Paragraph and Subparagraph Number and/or drawing number and detail references

9. Location of use

10. *Submittal number

11. *Signature and title of transmitter

12. *Original submittal or resubmittal

Note: All transmittals shall include asterisked items as a minimum to be acceptable for review.

B. Use the "Item Number" on the Schedule of the Submittal for the corresponding submittal number. On a resubmittal, add a numerical suffix to the original submittal number. For example, 6.1 indicates the first resubmittal of submittal Number 6.

C. Use a separate transmittal form for each specific item or class of material or equipment within a division for which a submittal is required. Transmittal of a submittal of multiple items using a single transmittal form will be permitted only when the items taken together constitute a manufacturer's "package" or when items are so functionally related that review of the group as a whole is appropriate.

D. If a submittal contains multiple items, then each item shall be clearly labeled throughout the submittal or indexed in a manner eliminating confusion in identifying how each item relates to the whole. When submittal items have been assigned a “District equipment tag number” in the contract documents, each tag number shall be included throughout the submittal to clearly associate the specific submittal information to specific tag numbers.

E. Stamp or permanently print on each submittal the following certification statement.

"I hereby certify that the (equipment) (material) (article) shown and marked in this submittal is that proposed to be incorporated into Specification Number 2617 is in compliance with the Contract drawings and specifications, can be installed in the allocated spaces, and is submitted for District (record/review).

Certified by _____Date _____"

3.2 SCHEDULE OF SUBMITTALS

A. Submit initial Schedule of Submittals within 15 days after Notice to Proceed. Submit weekly updates thereafter.

B. If specifically requested, submit revised Schedule of Submittals within 7 days after date of request from the Engineer.

C. The Engineer will review Schedule of Submittals and will notify Supplier that schedule is acceptable or not acceptable within 10 days after receipt.

D. The Schedule of Submittals shall identify Supplier “or equal” substitution proposals made prior to bid opening (see Instructions To Bidders, Article 3), which have been accepted by the Engineer.

3.3 COORDINATION OF SUBMITTALS

A. General:

1. Prior to submittal for Engineer's review, use all means necessary to fully coordinate all material, including the following procedures:

    a. Determine and verify all field dimensions and conditions, materials, catalog numbers, and similar data.

    b. Coordinate as required with all trades and with all public agencies involved.

    c. Secure all necessary approvals from agencies having jurisdiction and signify with agency stamp, or other means, that approvals have been secured.

    d. Clearly indicate all deviations from the Contract Documents.

B. Grouping of submittals:

1. Unless otherwise specifically permitted by the Engineer, make all submittals in groups containing all associated items; the Engineer may reject partial submittals as not complying with the provisions of the Contract Documents.

C. Resubmittals:

1. The Supplier shall include a Comment and Response sheet with each resubmittal. The Comment and Response sheet shall be the first item after the submittal transmittal form. The Comment and Response sheet shall include each review comment (word for word) from the previous submittal cycle, followed by the Supplier's response clarifying how the comment has been addressed in the resubmittal. All responses shall at a minimum have a general description of what new information in the resubmittal addresses the review comment; and where in the resubmittal this new information can be located (tab number, page number, etc).

2. Resubmittals that do not comply with the requirements set forth in subparagraph C.1 above will be returned to the Supplier without review. The Supplier shall resubmit with an appropriate Comment and Response sheet as specified herein.

3. If the Supplier requires more than 2 rounds of review for a specific submittal before being accepted by the Engineer, the cost of District review time and administrative costs for the 3rd round of review and beyond will be deducted from progress payments due to the Supplier.

3.4 TIMING OF SUBMITTALS

A. Article 3.4 – Timing of Submittals, is not applicable for proposals for "or equal" substitutions made prior to bid opening pursuant to PCC Section 3400 (see Instructions to Bidders, Article 3).

B. General:

1. Make all submittals far enough in advance of the scheduled date of beginning of installation to provide all required time for reviews, for securing necessary approvals, for possible revision and resubmittal, and for placing orders and securing delivery.

2. In scheduling, unless otherwise noted, allow at least ten (10) workdays for each submital after the time of receipt for the Engineer's review. No time extension will be allowed for the Contract due to time loss in the review process.

3. The construction schedule shall allow the minimum number of work days shown for each of the sections listed:

Specification Section	Minimum Work Days for Submittal Review
16 70 00 – Control Panels	7
16 80 00 – Programmable Logic Controllers and Associated Equipment	7
26 22 13 – Low-Voltage Distribution Transformers	7
26 32 13.13 – Diesel Engine Driven Generator Sets	5
26 24 13 - Switchboards	7
26 36 23 – Automatic Transfer Switches	7

3.5 REVIEW BY ENGINEER

A. Acceptance of each submittal by the Engineer will be general only and shall not be construed as:

1. Permitting any departures from the contract requirements.

2. Relieving the Supplier of the responsibility for any errors and omissions in details, dimensions, or of other nature that may exist.

3. Approving departures from additional details or instructions previously furnished by the Engineer.

B. Submittals (excluding manuals and as-built drawings) will be returned to the Supplier marked "No Exceptions Taken", "Make Corrections Noted", "Revise and Resubmit", "Acknowledged Receipt", or “Rejected”, except that in some cases, all copies of a submittal may be returned to the Supplier marked "Returned Without Review". See paragraph 3.5.E for proposals for “or equal” substitutions made prior to bid opening pursuant to PCC Section 3400 (see Instructions To Bidders, Article 3).

1. "No Exceptions Taken" indicates that item covered by the submittal may proceed provided it complies with requirements of the specifications. Final acceptance will depend upon that compliance.

2. "Make Corrections Noted" indicates that item covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the specifications. Final acceptance will depend on that compliance.

3. "Revise and Resubmit" indicates that the Supplier shall not proceed with any phase of the item covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal in accordance with the notations and requirements of the specifications.

4. "Acknowledged Receipt" indicates that the item is required to be submitted to the Engineer primarily for information or record purposes, and is not subject to Engineer's review.

5. "Returned Without Review" indicates that the submittal was not reviewed by the Engineer due to the submittal being incomplete, illegible, inadequate, or otherwise failing to conform to the requirements of the specification. Supplier shall prepare a new submittal for this item.

6. "Rejected" indicates that the submittal proposes an action of which the Engineer does not approve, makes an assertion with which the Engineer disagrees, appears to show intent to violate the terms of the Contract, or is otherwise objectionable to the Engineer and is returned to the Supplier with prejudice.

C. Resubmit revised drawings or data as indicated unless otherwise specified.

D. Work requiring the Engineer's review and acceptance shall not begin until the submittals for that work have been returned as "No Exceptions Taken" or "Make Corrections Noted".

E. Proposals for "or equal" substitutions made prior to bid opening pursuant to PCC Section 3400 (see Instructions To Bidders, Article 3) will be evaluated by the Engineer, and if accepted, bidders will be notified by addenda.

3.6 CHANGES TO ACCEPTED SUBMITTALS

A. A resubmittal is required for any proposed change to a submittal that has been marked "No Exceptions Taken" or "Make Corrections Noted". Changes which require resubmittal include, but are not limited to, drawing revisions, changes in materials and equipment, changes to installation procedures and test data. All resubmittals shall include an explanation of the necessity for the change.

B. Minor corrections to an accepted submittal may be accomplished by submitting a "Corrected Copy".

C. For changes to submittals proposed by the Supplier for their own convenience, the District reserves the right to back charge for the associated Engineer review time and administrative costs.

3.7 O&M MANUAL SUMMARY LIST

A. Table 1 is a summary of equipment/systems that require O&M manuals. Additional O&M manuals might be required when specified elsewhere.

Table 1: O&M Manual Summary (Additional O&M manuals might be required in other Sections)		Number of Hard Copy(ies) to Print
Section	System / Equipment, or Facility	
16 70 00	Control Panels	
16 80 00	Programmable Logic Controllers and Associated Equipment	
26 22 13	Low-Voltage Distribution Transformers	
26 24 13	Switchboards	
26 24 16	Panelboards	
26 36 23	Automatic Transfer Switches	

END OF SECTION

APPENDIX A

Submittal Log

O&M Manual Review Checklist

Typical Maintenance Summary Form

EBMUD

SUBMITTAL LOG

SPEC. NO.	PROJECT TITLE	DATE

(a)	(b)	(c)	(d)							(e)	(f)	(g)	(h)	(i)
ITEM NO.	SPEC. SECTION	DESCRIPTION	TYPE OF SUBMITTAL							PLANNED SUBMIT DATE	ACTUAL DATE REC'D.	O.E.S. NO.	DATE RTND.	REMARKS
			Shop Dwg.	Catalog	Sample	Certificate	Test Data	Manual	Other					

A-1

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SUBMITTAL NO. _____

O&M MANUAL REVIEW CHECKLIST

SUBMITTAL NO. _____ DATED: _____
SPEC. SECTION: _____ REVIEW DATE: _____
SUBJECT: _____ REVIEWER: _____
EQUIP. ITEM: _____ SUPPLIER: _____
MANUFACTURER: _____
ACCEPTABLE: _____
UNACCEPTABLE: _____ PROJECT NO.: SD- _____

DISPOSITION	ACCEPTABLE YES	NO	NA	COMMENTS
GENERAL FORMAT				
• Minimum four copies				
• Three ring hard back cover				
• Cover label				
System/equipment names				
Equipment numbers				
Building				
Specification section				
• Title page				
• Typed table of contents				
• Sections parallel equipment specifications				
• Heavy section dividers w/numbered plastic tab				
• Pages punched for 3 ring binder (punching does not obliterate data)				
• Info larger than 8-1/2x11 folded showing title block				
OPTIONAL plan pockets				
• Identify applicable model nos. and data				
• Legible copies				
TECHNICAL CONTENT				
• Equipment descriptions:				
Equipment names, model nos. & tag nos.				
Equipment & major component functions				
Diagrams & illustrations				
• Performance information				
Nameplate data				
Performance test data/curves				
• Installation instructions				
Installation procedures & drawings				
Engineering data				

SUBMITTAL NO. _____

Wiring diagrams				
Alignment tolerances				
Adjustment procedures				
• Test procedures				
• Operating instructions				
Startup procedures				
Normal & routine operations				
Control functions				
Shutdown procedures				
Emergency operations				
• Troubleshooting guide				
• Safety precautions:				
Safety procedures				
Lockout discussion				
CAUTION, WARNING, DANGER text				
Special safety equipment				
• Maintenance summary forms				
(MFR's standard form is not acceptable)				
• Preventive maintenance instructions				
• Lubrication information:				
Location of lube points & frequency				
Recommended type & grade, MFR, temperature range				
• Overhaul instructions:				
Detailed assembly drawings w/parts list & numbers				
Teardown/rebuild instructions				
• Spare parts for equipment and components:				
Recommended spare parts list w/part numbers				
Instructions for ordering (motors, etc.)				
Long-term storage requirements				
• Electrical information:				
Nameplate data				
Relay, control, alarm contact settings				
Interconnection wiring diagram				
Motor standard test data & performance curves				
Motor space heaters				
• Instrumentation and control:				
Control diagrams				
Panel layout drawings				
Instrument data sheets				
Wiring and terminal strip diagrams				
Pneumatic piping drawings				
• Long-term shutdown protection				

TYPICAL MAINTENANCE SUMMARY FORM

1. EQUIPMENT ITEM _____
2. MANUFACTURER _____
3. EQUIPMENT IDENTIFICATION NUMBER(S) _____
4. WEIGHT OF INDIVIDUAL COMPONENTS (over 100 pounds) _____
5. NAMEPLATE DATA (hp, voltage, speed, etc.) _____
6. MANUFACTURER'S LOCAL REPRESENTATIVE _____

   Name _____ Telephone Number _____

   Address _____
7. MAINTENANCE REQUIREMENTS

Maintenance Operation List briefly each maintenance operation required and refer to specific information in manufacturer's standard maintenance manual, if applicable.	Frequency List required frequency of each maintenance operation.	Lubricant (If Applicable) Refer by symbol to lubricant list required.	Comments

8. LUBRICANT LIST

Reference Symbol	Shell	Chevron	Texaco	Arco	Or Equal
List symbols used in Item 7 above.	List equivalent lubricants, as distributed by each manufacturer for the specific use recommended.				

9. SPARE PARTS. Include your recommendations regarding what spare parts, if any, should be kept on the job

MAINTENANCE SUMMARY DATABASE TEMPLATE

Columns A through H:

	A	B	C	D	E	F	G	H
1	**MAINTENANCE SUMMARY DATABASE TEMPLATE (DRAFT)**							
2							**Manufacturer's Local**	
3	**Equipment ID No.[1]**	**Equipment Description**	**Manufacturer**	**Nameplate Data[2]**	**Units**	**Weight (lbs)[3]**	**Name**	**Company**
4	WRA-MFS-PMP-101-CFG	MF Feed Pump No. 1	Goulds	100	hp	250	James Beam	Wastewater Equipment Sales
5								
6								
7	WRA-SE-TNK-101	Influent Tank	Pacific Tank	1,000,000	gallons	NA	Jack Daniels	Big Tanks for Sale
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19	**NOTES**							
20	[1] Equipment numbers may be found in the instrumentation ("I") drawings for the project. All equipment numbers begin with an area code prefix of "W__" followed by the alphanumeric designations shown on the drawing. Please inc							
21	[2] Nameplate data rating for the equipment may be in a variety of units including horsepower, voltage, speed, etc. Please include units in the adjacent column.							
22	[3] For equipment items over 100 lbs, please provide weight.							
23	[4] List briefly each maintenance operation required and refer to specific information in manufacturer's standard maintenance manual, if applicable. **Multiple operations or tasks should be listed individually under a single piece**							
24	[5] Provide information for number of times the maintenance task is to be repeated. List the frequency (number of times in a given period) and the duration (period units, e.g., per day, week, month) in separate columns adjacent to or							
25	[6] Include recommendations regarding what spare parts, if any, should be kept on the job.							

Columns I through P:

	I	J	K	L	M	N	O	P
1								
2	**Representative**		**Maintenance Requirements**					
3	**Phone**	**e-mail**	**Maintenance Task[4]**	**Frequency[5]**	**Duration[5]**	**Lubricant**	**Comments**	**Spare parts[6]**
4	408.926.2258	jbeam@wwequip.com	(1) Grease main bearing	1	month	Mobil EZ Greazy	Your hands will get dirty	Main bearing
5			(2) Check oil fill level	2	week	Mobil Synthetic No. 2	Refill as necessary to maintain level between indicated markers.	
6			(3) Inspect for noise and vibration	1	month	NA		
7	510.256.9632	jdaniels@bigtanks.com	Inspect exterior coating	1	year		Look for flaking and chipping	can of spray paint
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20	lude the W__ prefix with the equipment numbers.							
21								
22								
23	**of equipment, see example above.**							
24	e another.							
25								

SECTION 01 43 11

SEISMIC QUALIFICATION AND CERTIFICATION

PART 1 - GENERAL

1.1 SUMMARY

A. All products to be furnished under this contract shall be designed, constructed, and installed in conformance with the seismic requirements contained in the California Building Code (CBC) as modified below and in the related sections.

B. Related Sections:

1. Section 01 33 00 – Submittal Procedures

2. Section 01 81 02 – Seismic Design Criteria

1.2 STRUCTURAL INTEGRITY AND ANCHORAGE

A. Structural integrity of the equipment shall be certified by calculations that demonstrate the adequacy of the equipment housing for seismic forces. These calculations may be based on principles of structural analysis and engineering mechanics, or based on approved shake table tests.

B. Provide electrical and mechanical equipment and other non-structural components with proper anchorage to the supporting structures designed to resist seismic forces as specified in Section 01 81 02.

C. The equipment and all components listed in the contract documents shall not undergo loss of their intended function after application of the Building Code prescribed seismic forces in Section 13.2 of ASCE 7

1.3 PROOF OF COMPLIANCE

A. For equipment installed in sites or structures designated as seismic design category C, D, E or F, prepare and submit the following:

1. Statement of seismic qualification, or special seismic certification:

a. “Statement of Seismic Qualification:” Provide manufacturer’s statement that the equipment satisfies the seismic design requirements of California Building Code 2022, including the requirements of ASCE 7, Chapter 13.

1) Supplier shall submit for review and approval test data or calculations certified by a Civil or Structural Engineer registered in the State of California to show compliance with the requirements of Article 1.2.

b. "Special Seismic Certification:" Provide manufacturer's certification of compliance when subjected to shake table testing, including both operability and containment of hazardous materials as appropriate for the unit being tested. The certification shall be prepared in accordance with:

1) IEEE Std. 693, for equipment listed in Paragraph 1.2.C above. This equipment shall meet or exceed IEEE Std 693 "High seismic level" qualification requirements.

2) ICC-ES AC 156, for equipment not covered in Paragraph 1.2.C. This equipment shall meet the "Post-Test Functional Compliance Verification" requirements for "Components with Ip=1.5."

2. Substantiating test data: With seismic qualification and special seismic certification statements, submit results of testing in accordance with applicable standards.

B. Exemptions: A "statement of seismic qualification" and a "special seismic certification" are not required for the following equipment:

1. Temporary or moveable equipment.

2. Equipment anchored to the structure and having a total weight of 20 pounds or less.

3. Distribution equipment anchored to the structure and having a total unit weight of 5 pounds per linear foot, or less.

PART 2 - NOT USED

PART 3 - NOT USED

END OF SECTION

SECTION 01 61 01

ELECTRICAL REQUIREMENTS FOR MECHANICAL PACKAGE SYSTEMS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included:

1. Furnish and install the electrical control panels and instrumentation devices furnished as part of a packaged mechanical system. This Section shall govern these panels when supplied skid-mounted on the mechanical unit or when furnished separately for floor or wall mounting.

2. In general package equipment interconnecting conduit and wire are not shown on the Contract Drawings. Furnish and install all conduits and wiring associated with a packaged mechanical system for a fully functioning and operational system.

3. All mounting and ancillary equipment required as part of the mechanical packaged system necessary for a fully functioning and operational system.

B. Related sections:

1. The equipment covered under this Section shall be provided as part of packaged process, HVAC, and mechanical systems furnished under the detailed technical Sections of these Specifications.

2. All electrical work performed under this Section shall conform to the electrical system requirements as specified under Division 26.

3. Section 16 80 00 – Programmable Logic Controllers and Associated Equipment.

4. Where conflicts occur between this Section and the specific product Technical Specifications as noted, the latter shall govern.

1.2 QUALITY ASSURANCE

A. All materials shall be listed by UL or other equivalent nationally recognized independent testing laboratory. All built-up control panels shall be similarly labeled and have the markings required by the National Electric Code, Article 409.110.

B. All work shall conform to the requirements of the National Electrical Code (NFPA 70).

1.3 SUBMITTALS

A. Submit in accordance with Section 01 33 00 – Submittal Procedures.

B. Submit the following for all control panels provided as part of mechanical packaged system:

1. Control panel internal and external elevations showing all components provided.

2. Complete Bill of Material.

3. Control schematic (elementary) with functional comments describing all controls, alarms, and interlocks. Provide rung and wire numbering for schematics. All relay contacts shall be cross-referenced to the associated relay coils using the rung numbers and each coil shall be tagged clearly identifying its function in the control scheme.

4. Wiring diagrams showing terminal numbers for all terminal strips and identifying all wiring points and devices located external to the control panel.

5. Scaled drawings for all skid mounted panels showing location on the skid and all interconnecting conduit and wire fill. Drawing shall show conformance with all clearance requirements required per the National Electrical Code including requirements for final installation in the field.

6. Letter of certification of testing. See Article 3.1.

C. Software programming logic for any PLCs provided in the panels. Submit hardcopies of programming logic for submittal review. Logic shall include abundant comments in sufficient detail to determine compliance with the detailed control descriptions included in the individual technical specifications of these specifications.

D. Submit O&M Manuals in accordance with Section 01 33 00. Submittal shall include copies of the final field verified shop drawings. Submit hardcopies and electronic copies on flash drive of the final as left PLC programs with the system O&M documentation.

E. Submit test data or calculations demonstrating compliance to the anchoring requirements per Section 01 43 11 Seismic Qualification and Certification, 01 81 02 and Seismic Design Criteria.

PART 2 - PRODUCTS

2.1 ELECTRICAL DEVICES FURNISHED WITH MECHANICAL EQUIPMENT

A. The Contract Drawings detail only the major components, required for the first named mechanical system. Interconnecting conduit and wire is not shown. Provide all electrical, instrumentation, and control hardware, conduit and/or wiring which is required for complete system operation.

B. The systems governed by this Section shall contain control panels which include instrumentation and control equipment furnished by the mechanical system supplier. In some instances the panels, along with instruments, motors, and connecting wiring, are completely mounted on the units furnished. In other cases, the panels are furnished

separately for floor or wall mounting. All panels and equipment requiring field interconnection wiring shall be provided with terminal connections which are clearly marked. Supplier shall furnish a complete field wiring diagram showing all required interconnections of the supplied equipment, labeled consistently with the terminal markings.

C. Provide panels rated for the NEMA environment shown on the electrical drawings. Provide stainless steel NEMA 4X enclosures in NEMA 4X areas unless indicated otherwise. Access doors or panels shall have continuous stainless steel hinges, oil resistant gasketing, and approved latching of fastening means to allow access. Front panels or sections containing instruments shall be reinforced to prevent warping or distortion.

D. All panel equipment shall be factory mounted, on suitable racks or subpanels and wired on or within the cabinet. Any process or sensor piping shall remain outside of the panel. Wiring shall comply with latest National Electrical Code. Wiring shall be grouped in plastic wireways and wired to sequentially arranged and uniquely numbered terminal blocks. Power and low voltage dc signal wiring shall be routed in separate wireways. Wiring troughs shall not be filled to more than 60 percent visible fill. Wiring trough covers shall be match marked to identify placement. If component identification is shown on covers for visibility, the ID shall also appear on the mounting subpanel. Wiring trough for supporting internal wiring shall be plastic type with snap-on covers. The side walls shall be open top type to permit wiring changing without disconnecting. Terminal blocks shall be arranged in vertical rows and separated into groups (power, ac control, dc signal, alarm, graphic, etc.). Provide minimum 30 percent spare of each type of terminal block. Direct interlock wiring between equipment will not be allowed. Only one side of a terminal block row shall be used for internal wiring. The field wiring side of the terminal shall not be within 6-inches of the side panel or adjacent terminal.

E. A 120 VAC convenience outlet and a switched overhead internal LED light shall be provided for panel over 24" width and 36" height. Print storage pockets shall be provided on the inside of each panel. Print pockets shall be of sufficient size to hold all of the prints required to service the equipment.

F. Nameplates shall be provided for all front of panel mounted equipment. The nameplates shall be approximately 1 inch by 3 inch constructed of black and white laminated, phenolic material having engraved letters approximately 1/4-inch high, extending through the white face into the black layer. Nameplates shall be attached to panels by self-tapping screws.

G. Power wire size shall be as required but no less than 12 AWG. Wire type shall be THWN stranded, insulated and rated for 600 volts unless specified otherwise. Wire color shall be:

1. Line power – black

2. Neutral or common – white

3. AC control – red

4. DC control – blue

5. DC return – white with blue stripes

6. Equipment or chassis ground – green

7. Specified externally powered circuits – yellow

8. Each wire shall be provided with a numbered heat shrink tubing identification markers at both ends. Identification markers shall be pre-typed. Handwritten markers or paper markers will not be permitted. When externally powered circuits are present, provide 1-inch by 3-inch yellow and black laminated phenolic nameplates inscribed "CAUTION: FOREIGN VOLTAGES PRESENT". Engraved letters shall be approximately ¼-inch high, extending through the yellow face into the black layer.

H. Panels containing door mounted controls or instruments shall utilize individual covers, window kits, NEMA rated devices or other mechanism as approved by the Engineer to maintain the overall NEMA rating of the panel.

I. Each panel shall be provided with an isolated copper grounding bus for all signal and shield ground connections. Shield grounding shall be in accordance with the instrumentation manufacturer's recommendations. Each panel shall be provided with a separate copper power grounding bus (safety) in accordance with the requirements of the National Electrical Code.

J. Each panel, where applicable, shall be provided with analog signal isolation (I/I) where analog signals are sent from one panel or console to another. Each panel shall be provided with surge suppression protection (electrical transients) for connections between AC power systems and electrical and electronic equipment. Surge suppressor grounding shall be in accordance with the manufacturer's recommendations.

K. All panels shall be protected from internal corrosion by the use of corrosion inhibiting vapor capsules as manufactured by Northern Instruments Model Zerust VC; Hoffman Engineering Model AHCI; or equal as approved by the Engineer.

L. All panels housing electrical equipment shall be designed for front access only unless otherwise noted.

M. Conductors extending beyond a panel to other auxiliary equipment which is prewired on a skid type or package base shall be protected by galvanized rigid steel conduit. Where terminating at a motor or other similar device requiring frequent movement or which produces excessive vibration liquid-tight type flexible conduit shall be used. Liquid-tight flexible conduit will be limited to three feet maximum length at any termination.

N. Gasketed type conduit hubs will be used for all conduit penetrations of the panel.

O. If a programmable logic controller is used to implement the specific controls, provide Allen-Bradley CompactLogix or Contrologix family of processors, no substitutions, to match existing District equipment. PLCs shall conform to the requirements of Section 40 94 43.

P. Provide a single main power disconnect for each panel. The main panel power disconnect handle shall be externally mounted (operable with the enclosure door closed) and padlockable in the off position. Disconnect shall be interlocked with the door to ensure panel is de-energized when the door is open. Provide a disconnect defeat mechanism to allow access to the panel interior components while energized by authorized personnel for maintenance and troubleshooting. A main panel power disconnect device shall be an integral part of the panel and shall be one of the following types:

1. A molded case thermal magnetic circuit breaker for 480 volt, 1 phase or 3 phase panels.

2. A circuit breaker or fractional horsepower manual motor starter switch without overloads for 120 volt, 1 phase panels.

Q. Unless otherwise noted all panels supplied with a 480 volt power feeder shall be provided with an integrally mounted dual winding 120 volt power or control power transformers with KVA as required. Control power transformers shall have primary and secondary fusing. Power transformers shall have circuit breaker primary and secondary protection. All transformers shall have the neutral grounded.

R. Starters incorporated into panels shall be of the combination motor circuit protector type with ambient compensated thermal type overload relays in each ungrounded conductor. Overloads shall be adjustable for either manual or automatic reset. Provide Size 1 NEMA starter size minimum.

S. All devices shall be of a heavy duty industrial type quality. Devices mounted in panel interiors shall be suitable for use in non ventilated panels subjected to a 40 degree C ambient without de-rating the system.

T. Schematic (elementary) diagrams, wiring (interconnection) diagrams, riser (interconnection with external components) diagrams, panel interior and exterior elevation drawings and equipment lists shall be furnished for all panels. For panels containing a complex control scheme, a written operational theory shall be cross referenced to the schematic diagram. The wiring diagram in its "as-built" form shall be fastened to the panel door. The Bill of Materials shall identify the manufacturer, manufacturer's part or model number and a cross reference as to its location in the panel.

U. Contacts for external alarms or equipment interlocking shall be of the isolated contact type and provided as required per individual equipment specifications and drawings. Contacts shall be rated at 10 amps continuous pilot duty. Unless noted otherwise, alarm contacts shall be of the maintained contact type requiring manual reset at the control panel via a suitably labeled reset pushbutton. Configure all alarm contacts for

external connection to the PLC to be fail-safe (i.e. on loss of continuity or loss of power.) Alarm contact should fail to the alarm or the inoperative condition unless otherwise indicated

V. All analog instrumentation signals shall be 4-20 ma DC and provided as required per the specifications and the drawings.

W. Auxiliary devices (solenoid valves, pressure switches, flow switches, etc.) located remotely from panels but furnished with the equipment shall have enclosures in conformance with the area classification noted on the Electrical Drawings. Provide fuse protection for all circuits to external devices.

X. Unless otherwise noted control panels furnished under this section shall contain door mounted control pushbuttons, selector switches, push-to-test red run lights, etc., as required for proper system operation, control, and monitoring. This equipment shall be mounted on the door of the control panel and comply with the panel NEMA rating.

Y. The electrical short circuit interrupting rating of the starters and circuit breakers supplied shall be adequate for its location in the system and shall be rated minimum of 65,000 AIC.

Z. Panels containing 480 V (power) and low voltage (less than 120 VAC or DC) digital or 4-20 ma DC analog control devices and circuits or PLC components shall be compartmentalized with full height plexiglass isolation barriers between the low voltage and 480 volt power devices within the panel.

PART 3 - EXECUTION

3.1 FACTORY QUALITY CONTROL

A. Control panels furnished on skids or separately mounted shall be UL 508 certified and tested at the factory with the mechanical equipment prior to being shipped. A letter of certification stating that the packaged system and controls have been satisfactorily tested shall be submitted to the Engineer prior to shipping the package.

END OF SECTION

SECTION 01 81 02

SEISMIC DESIGN CRITERIA

PART 1 - GENERAL

1.1 REFERENCES:

A. ASCE 7, American Society of Civil Engineers, Minimum Design Loads for Buildings and Other Structures.

1.2 RELATED SECTIONS:

A. Section 01 33 00 – Submittal Procedures

B. Section 01 43 11 – Seismic Qualification and Certification

C. Section 16 70 00 – Control Panels

D. Section 26 24 13 - Switchboards

E. Section 26 32 13.13 - Diesel Engine Driven Generator Sets

F. Section 26 36 23 – Automatic Transfer Switches

1.3 SYSTEM DESCRIPTION

A. Design Requirements:

1. Architectural elements, mechanical and electrical components, equipment housings and their attachments, supporting structures, and anchorages shall comply with the requirements of ASCE 7, using the following values:

a. Design spectral acceleration at short periods, S_{DS} =0.54

b. Design spectral acceleration at long periods, S_{D1} =0.36

c. Seismic Design Category, D

d. Component importance Factor, Ip = 1.50

e. Seismic Importance Factor for the design of tanks and the anchorage of tanks: I_e = [1.5]

f. If designated as part of an essential facility or containing highly toxic materials, in which case I_e = 1.50.

g. Component amplification factor, ap: In accordance with ASCE 7, Tables 13.5-1 and 13.6-1.

h. Component response modification factor, Rp: In accordance with ASCE 7, Tables 13.5-1 and 13.6-1.

i. Overstrength Factor, Ω: In accordance with ASCE 7, Tables 13.5-1 and 13.6-1 for anchorage in concrete.

2. Do not use friction to resist sliding due to seismic forces.

3. Do not use more than 60 percent of the weight of the mechanical and electrical equipment for designing anchors for resisting overturning due to seismic forces.

4. Do not use more than 60 percent of the weight of the tanks for resisting overturning due to seismic forces.

5. When designing anchors for uplift due to seismic forces, include the vertical seismic load effects (+/- 0.2SDSWp) and reduced dead loads as required by the Basic Load Combinations of ASCE 7-160. For example: use only 60 percent of the equipment or tank dead load for resisting overturning.

6. Resist seismic forces through direct bearing on anchors and fasteners. Do not design or provide connections that use friction to resist seismic loads.

7. Anchoring and fastening to concrete and masonry.

A. Use cast-in anchors (anchor bolts or welded studs) whenever possible for anchors at connections that resist seismic forces.

B. Do not use concrete anchors, flush shells, sleeve anchors, screw anchors, powder actuated fasteners, or other types of post-installed adhesive or mechanical anchors unless indicated on the Drawings or accepted in writing by the Engineer.

1.4 SEISMIC QUALIFICATION AND CERTIFICATION

A. The equipment and all components listed in this specification shall not undergo loss of their intended function after application of the Code prescribed seismic forces as specified in Section 01 43 11.

B. Certification that the equipment is seismically qualified for the above requirements shall be submitted as prescribed in Section 13.2 of ASCE 7.

1.5 SUBMITTALS

A. Shop drawings and calculations: Complete shop drawings and seismic calculations in accordance with Section 01 33 00 – Submittal Procedures.

B. When evaluating the strength of a structural element, indicate applied stresses compared to strength, or show Demand/Capacity ratios.

C. Evaluating the results by stating “Okay by Inspection” is not acceptable.

D. Calculations and details shall be prepared, stamped and signed by a Civil or Structural Engineer registered in the State of California with a minimum of three (3) years of experience in water or wastewater projects.

E. If the Supplier has not provided a complete and acceptable submittal by the second submission, the District, at its discretion, may provide the required seismic design services at the Supplier’s expense. The cost of providing the required seismic design services shall be deducted from the Supplier’s monthly progress payments.

F. Reference Drawings: include plans, sections, details and equipment information necessary to understand the seismic calculations. Reference plans shall show the location of all relevant equipment and related items for loading calculations.

G. Proof of Compliance for anchorage system as specified in Section 01 43 11.

H. Seismic Qualification and Certification shall be verified by an approved calculation that demonstrates the adequacy of the system for seismic forces. This calculation may be based on principles of structural analysis and engineering mechanics, or based on similarity to approved shake table tests as specified in Section 01 43 11.

I. Supplier shall submit for review and approval test data or calculations signed and sealed by a Civil or Structural Engineer registered in the State of California to show compliance with the above requirements.

PART 2 - NOT USED

PART 3 - NOT USED

END OF SECTION

SECTION 16 70 00

CONTROL PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Furnish all labor, materials, tools, equipment and services for supply, installation and wiring of control panel as indicated in accordance with provisions of the Contract Documents.

2. Completely coordinate with equipment being supplied under this RFQ.

3. Although such work is not specifically indicated, furnish and install all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation.

4. The Supplier shall furnish all labor, materials, appurtenances, and incidentals required for fabrication and integration of control panel into the compete overall switchboard lineup.

5. Refer to the Contract Drawings for additional control panel requirements and devices to be installed within the control panel. Furnish and install all devices shown on the Contract Drawings whether or not specifically listed herein.

6. The control panel identification to be provided is as follows:

a. CPNL-01

7. PLC Programming Requirements

a. Supplier shall provide all labor, materials, and services required to complete programming of incoming status and alarm signals into the new control panel CPNL-01 from new and existing facility loads. Programming shall be performed by a licensed and certified programming specialist with a minimum of 10 years of experience with comparable PLC systems from the equipment vendor identified on the Contract Drawings. Programming shall be performed using ladder logic only. Structured text and function block programming shall not be used.

b. Supplier shall be responsible for factory witness testing, field verification, and field commissioning of all programmed signals to ensure proper operation, alarm functionality, and integration within CPNL-01. Supplier shall coordinate with the Construction Contractor and the District during construction to achieve project completion. The Supplier shall be notified

by the Construction Contractor or the District a minimum of four weeks in advance of on-site testing and commissioning.

c. Programming required for communication between CPNL-01 and the existing valve house control panel shall be by Others. This includes all modifications and local programming at the existing valve house control panel. Supplier shall coordinate with Others to ensure proper signal mapping, communication interface compatibility, and successful integration.

B. Related sections:

1. Section 00 72 00 – General Conditions

2. Section 01 43 11 – Seismic Qualification and Certification

3. Section 01 81 02 – Seismic Design Criteria

4. Section 26 05 19 – Low Voltage Electrical Power Conductors and Cables

5. Section 26 05 53 – Identification for Electrical Systems

6. Section 26 24 13 - Switchboards

7. Section 26 27 26 - Wiring Devices

1.2 CODES AND STANDARDS

A. All equipment shall be designed, manufactured and supplied in accordance with the latest editions and revisions of the following:

1. American National Standard Institute, Inc. (ANSI).

2. California Administrative Code, Title 24, Part 3, Basic Electrical Regulations (BER).

3. Institute Of Electrical And Electronics Engineers, Inc. (IEEE).

4. Insulated Cable Engineers' Association (ICEA).

5. National Electrical Code (NEC).

6. National Electrical Manufacturer's Association (NEMA).

7. Underwriters' Laboratories (UL).

B. The following individual standards are specifically listed for their applicability to the particular type of equipment to be supplied, but are not intended as a complete or exclusive list of applicable standards or standards organizations:

National Electrical Manufacturers Association (NEMA):

ICS-1 *General Standards for Industrial Control and Systems*

ICS-2 *Industrial Control Devices, Controllers and Assemblies*

ICS-6 *Enclosures for Industrial Controls and Systems*

C. All equipment furnished shall be designed and constructed to comply with all applicable laws and regulations of the state of California, and the requirements of any local codes effective at the site.

1.3 SUBMITTALS

A. Submit shop drawings and product data in accordance with Section 01 33 00 – Submittal Procedures.

B. Provide submittals for approval as outlined below

1. Front and side elevations, top and floor plans, structural details, weights, and conduit entry/exit locations

2. Equipment anchorage provisions

3. Nameplate schedules

4. Major components technical bulletins, instruction and maintenance manuals and bill of materials

5. Complete AC, DC, and instrumentation loop control schematics

6. Complete panel wiring diagrams

7. Equipment seismic qualifications, seismic calculations, and anchorage details as specified in Sections 01 43 11, 01 81 02, and this section

8. Spare parts list

9. Factory acceptance testing reports

PART 2 - PRODUCTS

2.1 MATERIAL - GENERAL

Where manufacturers are named for a particular item of equipment, it is intended as a guide to acceptable quality and performance and does not except such equipment from the requirements of these specifications or plans.

All material of a given type shall be of a single manufacturer for all equipment. All material shall bear a UL label where such is available for the class of equipment

involved.

2.2 ELECTRICAL CONTROL PANELS (ECPS)

Electrical control panels (ECPS) shall be utilized as a central control station for the site.

A. Construction

1. Structure:

a. Electrical control panel enclosure shall consist of single or multiple-compartment, freestanding, NEMA 3r, code gauge steel enclosure designed for bottom conduit entry, deadfront non-walk-in enclosures for outdoor locations. The panel enclosure shall have minimum dimensions of 36”w x 24”d x 90”h. A full-length key lockable door with three-point latching mechanism shall be provided over the compartment. A common key shall open all doors. Panel doors shall open to at least 90° and shall be supplied with door latching rod with rollers. A backpan shall be provided in the compartment with barriers partitioning off differing purpose equipment (i.e. Power/control).

1) The ECP enclosure shall be given a rust preventative treatment, primed, and painted.

2) Enclosure exterior finish shall be manufacturer's standard medium gray for standalone ECPS, matching the switchboard’s exterior finish.

3) Panel interior (and backpan) finish shall be white enamel. The enclosure finish shall be uniform and completely free of pits and blemishes.

b. The arrangement of components in the ECP shall be as shown on the Contract Drawings and described in these specifications. All internal components shall be mounted on mounting pans. Door-mounted components shall be flush or semi-flush-mounted and arranged as shown. Door sheet steel gauge shall be selected to provide proper rigidity with doors open or closed, after all door-mounted components have been installed. Door stiffeners or ribs are not permitted.

c. ECP shall be supplied with interior data pocket for storage of sheets, and laptop computer shelf. Install of data pocket and laptop computer shelf shall not pierce finished control panel door with mounting hardware.

d. The electrical control panel shall be installed flush against the new switchboard lineup, with the front of the enclosure aligned with the switchboard front to form a continuous equipment lineup. Provide mounting provisions and anchorage as required for proper alignment and secure installation.

2. Wiring methods:

Wiring shall be routed in plastic ductwork with removable covers. Wiring not routed in ductwork shall be neatly bundled, treed, and laced with plastic ties. Wiring across door hinges shall be carefully made up and supported to avoid straining and chafing of the conductors or from putting any strain on their terminations.

120VAC and 24VDC control wiring shall be with SIS type wire #16 AWG minimum. Annunciator wiring shall be with #18 AWG SIS. 4-20mADC instrument loop wiring shall be shielded twisted pair, 600V, 16-gauge BELDEN #8719 or approved equal.

4-20mADC and 24VDC wiring shall not be run together with 120VAC wiring. Separate ductwork, wire bundles, and terminal blocks shall be used. 24VDC and 420mADC wiring shall cross 120VAC wiring at right angles where crossing is required.

4-20mADC wiring shall have shields grounded at one end only (panel terminal block) as shown on the Contract Drawings. Insulate shield at opposite end with heat shrink tube. At signal wire terminations strip back shield approximately 1.5 inches maximum to minimize RFI, EMI interference. Apply wire labels to signal cable, not signal conductors. Connect black wire electrically closest to 24V positive source, white wire closest to negative. Show cable number and wire color on submittal wiring schematics.

ECPs shall be completely factory-wired, and function tested with the District present prior to shipment. If witnessed factory test is performed outside of a 150-mile radius from job location, supplier to reimburse the District for overnight travel associated cost.

3. Terminal blocks:

Terminal blocks shall be of ample size to accept two no. 12 AWG field conductors per point and shall have compression type clamps capable of accepting ring and spade lug terminations. Terminal blocks shall be buchanan #b112 or equal. Terminal blocks shall be provided for all panel remote-wiring connections with 10% spare points.

4-20mADC signal wiring and other instrumentation circuits indicated shall be with din rail mount terminals as shown on the Contract Drawings. Din rail terminals shall be installed with proper accessories for a complete termination system including end plates, separator plates, rail clamps, terminal labels, etc. Din rail terminals shall be phoenix contact #UK3-TW1N, #UK4-T-P-P, #UK3-TW1N-PE, #UK6.3-HESILED or approved equal.

4. Wire marking:

Wire marking shall be as follows: all conductors lighting circuits and electronic-printed circuit boards and other similar devices shall be marked at each end with wire marker letters and numbers in accordance with the approved submittal drawings. Markers shall consist of plastic sleeves, heat shrunk or otherwise firmly anchored, with indelible ink machine printed characters.

The wire numbering system shall be by circuit branch and shall be submitted for review and approval.

5. Nameplates:

Each device shall be identified with a laminated phenolic nameplate fastened with corrosion resistant screws. Internal relays and other control devices shall be identified by equipment number and device designation in letters 3/16-inches high. Nameplates shall be black and white phenolic adjacent to the device. Nameplates shall be fastened to panels with stainless steel drive screws. Nameplates schedule shall be submitted to the construction manager for approval.

B. Panel and door-mounted components

Various special items shall be as shown; other components shall be as follows:

1. Ordinary relays (R):

Ordinary relays for 120VAC and 24VDC application shall be transparent dust cover 11-blade type square base plug-in, with top wired, din rail capable, industrial type sockets with screw terminals and mounted with spring retaining clips. Relays shall have mechanical on/off indicator or pilot lamp, with contacts rated 10A at 120VAC. Relays shall be Allen Bradley #700-HB Square D #KUP, Potter Brumfield #KUP, or approved equal. Latching relays shall be of a mechanical latching type. When an ordinary relay is not adequate for the application, a control relay or special relay shall be installed.

2. Control relays (CR):

Relays shall be heavy-duty switchboard type or industrial machine tool type, rated 600VAC, with a minimum of four contacts rated at 10 Amps continuous duty. Contacts shall be field interchangeable from normally open to normally closed.

3. Special relays:

Special relays shall be as listed below. Additional special relays shall be as shown on the plans:

a. AC undervoltage relay (27/AC): AC undervoltage relay shall be 120 Volt AC (nominal), single-phase with adjustable setpoint of 75% to 100% of

nominal voltage, and adjustable operating time of 0.4 to 10 seconds. Relay contacts shall be DPDT rated at 240 Volts AC, 5 Amps. AC undervoltage relay shall be Basler BE4-27T, style #IA1N2 or approved equal.

b. DC undervoltage relay (27/DC): DC undervoltage relay shall be 24 Volt DC (nominal) with adjustable dropout voltage setpoint of 19 to 27 Volts DC. Relay shall be 8-pin type, octal base, plug-in with DPDT contacts rated 240 Volts AC, 5 Amps. DC undervoltage relay shall be Diversified model #UOA-24-DLA or approved equal.

4. General purpose time delay relays (TD):

Time delay relay applications shall be limited to intervals of less than 180 seconds, relay contacts shall be rated for more than one million operations at 120VAC, 10 Amps and shall be of the sealed timing head type, having a linear variable.

5. Solid state control relays:

Solid state control relays shall accept a 120VAC input and shall have a 120VAC triac output. The relay output shall be rated to switch a 10 Amp load and the relay shall be designed for zero voltage turn on with a 4,000V rms optical isolation of inputs and outputs. Solid state control relays shall be Potter and Brumfield #SSRT-120A10 or approved equal.

6. Control circuit protection (FU):

Control circuits shall be protected with fuses as shown. Fuse rating shall be as shown on as recommended by protected equipment manufacturer.

Fuses below 10A shall be ¼-inch x 1¼-inch, 250V. Buss #AGC, ABC, MDL, or equal.

Fuse holders shall be drawout, type with led blown fuse indicators properly rated for voltage. Fuse holders shall be integrated with din rail mount terminals and accessories and shall be Phoenix Contact #UK6.3-HESILED or approved equal.

Spare fuses shall be furnished in quantities of 10% but not less than 10 units of each type and current rating used.

7. Selector switches (SS):

Selector switches and control switches (CS) used on control panels, switchgear or as otherwise called out shall be of the ‘transfer switch’ type commonly used in switchgear applications. Handles shall be of the pistol grip type or as shown. Contacts shall be rated 10 Amps continuous current and shall have noninductive interrupting rating of 40 Amps at 115VAC and 0.5 Amps at

125VDC for each contact. Two contacts of the same stage may be connected in series for application requirements within the increased rating of the unit.

Switches shall be provided complete with cover, front escutcheon, handle and with the legend plate engraved by the switch manufacturer in accordance with the plans.

The manufacturer's standard contact development diagram shall be submitted for each different switch arrangement required. The development diagram shall identify each switch it describes and shall call out all special operating features in addition to providing the standard contact status for each switch position.

Unless otherwise indicated, selector switches shall be of the heavy-duty, full-size NEMA 13 oiltight, NEMA 4/13 watertight, or NEMA 4x type as required by panel location.

Where no callout is given, the Supplier shall use the diagrammatic presentation to determine the type of selector switch to apply in conformance with the electrical symbol drawing.

Selector switches shall be Square D or Allen Bradley.

8. Pushbuttons (PB):

Pushbuttons shall be heavy-duty, full-size, NEMA 13 oiltight, NEMA 4/13 watertight, or NEMA 4x type as required by panel location. Lockout-stop buttons shall be equipped with an integral locking device and shall additionally be capable of receiving a 3/8-inch shackle padlock. Contacts shall be rated as required for selector switches.

Pushbuttons shall be Square D or Allen Bradley.

9. Panel indicating lamps (IL):

Panel indicating lamps shall be of the full-size, heavy-duty NEMA 13 oiltight, NEMA 4.13 watertight, or NEMA 4x type as required by panel location. Red, green and amber ILs shall have led cluster lamps, with matching lamp and lens color as shown. Unless specifically indicated, ILs shall be push-to-test type.

Panel indicating lamps shall be Square D or Allen Bradley.

Four (4) spare LED lamps of each color shall be provided.

10. Surge arrester:

The 120VAC input circuit to electrical control panels shall be protected by a MOV type surge arrester as shown. Surge arrester shall be for 120VAC, provide L-N, L-G, and N-G protection, rated 25kA for 8x20 surge, and shall be Joslyn #1260-11 or approved equal.

11. Metal oxide varistors (electronic equipment protection):

    a. Metal oxide varistors (MOVs) shall be provided throughout to protect electronic and other sensitive equipment from power transients and lightning surges.

    b. MOVs shall have the proper voltage rating for the application and shall be rated at least 30 joules, unless otherwise specified. MOVs shall start to conduct at approximately 10% above the working or normal voltage.

12. DC power supply:

    Direct current power supply shall operate from 120 AC unregulated power and, unless otherwise indicated, shall not exceed 30 Volt DC output. DC output voltage shall be regulated to ± 1.0% for 10% AC line voltage change and ± 0.1% over the rated output range. Output ripple shall be less than 15mV. Power supply shall be protected against output short-circuit. All power supply equipment shall be octal base plug-in modules and shall be manufacturer's catalogued items approved by the construction manager as suitable for application. Power supply shall be Allen Bradley 1606-Xl120D Phoenix 2938604, Action Pak 9046, Wilkerson MM9046 or approved equal.

13. Uninterruptible power supply:

    A UPS system shall be installed on a slide tray within the enclosure for user servicing. UPS system shall be APC SMT 1500 with AP9613 or approved equal.

14. UPS bypass

    A UPS bypass system shall be installed on a slide tray within the enclosure for user servicing. UPS bypassing system shall be Liebert 2U POD or approved equal.

15. I to I Isolator:

    a. Isolators shall be of the electronic, solid state type for inside the enclosure mounting and shall complete input/output isolation. It shall accept a 4-20mADC signal and shall output a similar 420mADC signal. The output shall have a suitable resistor which can be removed in the future. It shall be provided with a NEMA 1 cover, flexible cord plug-in connector, and gold flash jack.

    b. Isolator shall have an accuracy of 0.1% and a temperature variation of 0.0025% / °f. The input impedance shall be 50 Ohms and the output impedance shall be 1,500 Ohms. The input power shall be 115VAC, 60 Hz. Fuse protection shall be provided.

    c. Isolators shall be AGM or approved equal.

16. Signal transmission and signal conditioners:

    Unless otherwise indicated, electric or electronic signal shall be 4-20 milliamps DC. Signal conditioners shall be provided as required and shall be by AGM, 4000 series in type PTA module or approved equal.

17. Precision resistors:

    Precision resistors shall be wire-wound, one watt (minimum - larger when shown), 0.1% accuracy rating, with ohmic value as noted on the plans.

18. Programmable logic controller (PLC):

    Refer to Section 16 80 00 – Programmable Logic Controllers and Associated Equipment, for PLC requirements.

19. Strip heaters:

    Strip heaters shall be installed in all electrical control panels which are not installed in climate controlled areas. Strip heaters shall be 240 Volt, single-phase, AC, 500 Watt units connected for 120 Volt AC, 125 Watt service. Strip heaters shall be controlled by individual line voltage thermostats.

20. Axial fans:

    Axial fans shall be installed in all electrical control panels for air circulation. Fans shall be 4-11/16-inch square, axial fans, of the ball-bearing type. Fans shall be 120 Volts, single-phase, 60 Hertz, 3100 rpm rated at 115 cubic feet per minute (cfm) airflow. Fans shall be supplied complete with wire guards. Fans shall be Comair Rotrom #028422, model #MX2B3 or approved equal.

21. Thermostats:

    Thermostats shall be heavy-duty for line voltage operation with a three-position selector switch for Auto-Off-On control. Full load rating of the switch shall be not less than 16 Amps at 120V. The thermal switch shall be set to close on rising or decreasing temperature, as required. Thermostats shall be as manufactured by Honeywell, Johnson Service, or equal.

22. Panel Air Conditioners:

    A side-mounted panel air conditioner shall be provided for control panel temperature control. Supplier shall submit for approval calculations of heat loading within the control panel and select an appropriated sized air conditioner after District approval. Air conditioner shall be as manufactured by nVent Hoffman or equal.

23. Corrosion-inhibitors:

a. Corrosion-inhibitors shall produce corrosion-inhibiting vapors that provide a molecular film on metal surfaces. The film shall not affect electrical or mechanical operations of contacts, relays, or other devices.

b. The corrosion-inhibitors shall provide protection from humidity, salt and other corrosive gents for up to 24 months.

c. The corrosion-inhibitors shall be as manufactured by Cortec Corporation, Hoffman Engineering Company, or equal.

END OF SECTION

SECTION 16 80 00

PROGRAMMABLE LOGIC CONTROLLERS AND ASSOCIATED EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes

1. The Supplier of the control panel shall furnish all labor, materials, equipment, appurtenances, and incidentals required to install and function test the programmable logic controller (PLC) and auxiliaries as specified herein, and as shown on the Contract Drawings.

2. The Supplier shall furnish engineering and technical expertise as required for complete integration of a PLC system for proper monitoring, data storage, and communications. Programming of the PLC system shall be By Others.

3. The complete proven and documented system shall meet the highest standards for this type of service.

4. New PLC systems completely furnished and installed by the Supplier shall include the EBMUD Mokelumne Hatchery PLC.

B. Related sections:

1. Section 00 72 00 – General Conditions

2. Section 01 43 11 – Seismic Qualification and Certification

3. Section 01 81 02 – Seismic Design Criteria

4. Section 16 70 00 – Control Panels

5. Section 26 05 19 – Low Voltage Electrical Power Conductors and Cables

6. Section 26 05 53 – Identification for Electrical Systems

7. Section 26 27 26 - Wiring Devices

C. Description of System

1. PLC systems as shown on the Contract Drawings shall be furnished and installed under this contract. PLC shall monitor local functions, as shown on the Contract Drawings and described in these specifications. PLC programming and communications configuration shall be By Others.

2. No erratic operation of any PLC device shall be allowed during operation, start-up, shutdown, loss of power, or restoration of power.

3. The Supplier shall be responsible for PLC physical network integration as shown on the Contract Drawings and shall provide:

   a. Termination, labeling, and testing of all Ethernet CAT6A cables.

   b. Termination, labeling, and testing of all PLC, I/O and TB interconnect cables,

   c. Configuration of all Ethernet device settings for optimal communication speed and integrity of data.

   d. Test, debug, and optimization of in-service Ethernet network.

1.2 QUALITY ASSURANCE

A. PLC shall be designed, built, tested, and installed in accordance with the latest editions and revisions of the following:

NEMA ICS 1	*General Standards for Industrial Control and Systems*
NEMA ICS 1.1	*Safety Guidelines for the Application, Installation, and Maintenance of Solid State Control*
NEMA ICS 3	*Industrial Systems*
NEMA/EIA 232-D	*Interface Between Data Terminal Equipment and Data Communications Equipment Employing Serial Binary Data Interchange*
ANSI/TIA/EIA-568-A	*Commercial Building Telecommunications Cabling Standard*
ANSI/TIA/EIA-568-B.1	*Commercial Building Telecommunications Cabling Standard, Part 1: General Requirements*
ANSI/TIA/EIA-568-B.2	*Commercial Building Telecommunications Cabling Standard, Part 2: Balanced Twisted-Pair Cabling Components, 2001*

1.3 QUALIFICATIONS

1. The PLC components shall be supplied and integrated by the Supplier. The Supplier shall perform all work necessary to select, furnish, supervise

installation, connect, function test, and place into operation a complete PLC system as specified herein.

2. The Supplier's technicians performing the installation and function testing of the PLC System shall have at least three years experience on similar projects. The technicians' full resumes shall be available upon request.

3. The Supplier's technician performing configuration and testing of the Ethernet networks shall be a network specialist with current certification by Microsoft (MCSE) or Cisco with a minimum of three years relevant experience. Cat 6A Ethernet cable termination and cable testing shall be performed by technicians under the supervision of the network specialist.

1.4 CONTRACT DRAWINGS AND SPECIFICATIONS

1. The PLC System Drawings and Specifications include:

   a. PLC Layout Diagram

   b. PLC Typical I/O Connection Diagrams

   c. PLC I/O Point Lists

   d. PLC Comm Diagram

   e. PLC Loop Diagrams

2. The PLC layout typical I/O connection diagrams are intended to show the basic interconnections required for the communications bus and the various I/O modules.

3. The PLC logic diagrams are intended to show the basic control logic rather than a complete PLC program description. All programming required for a complete and operating system including controlled start-up and shutdown sequences shall be performed By Others.

4. The PLC I/O points lists are intended to indicate the minimum number of points required to be installed.

1.5 SUBMITTALS

1. Submit shop drawings and product data in accordance with Section 01 33 00 – Submittal Procedures.

2. Shop drawings, schematics, and wiring diagrams, submitted shall include:

   a. Product or item names as used herein and on the drawings.

   b. The manufacturer's model or other designation for each item.

c. Bill of materials listing all items included in the system.

d. System block diagram showing all major hardware components with locations and code designations indicated.

e. Connection diagrams showing all wiring between PLC modules, auxiliary devices and interfacing items. All items shall be identified as named herein or in the drawings. All termination points shall be shown and labeled. DC polarities shall be shown.

f. Pin-out diagrams for all RS-232, RS-485, and similar comm cables shall be shown. Typical Ethernet Cat 6A cable pinout diagram for straight-through or crossed connection shall be shown, and the type (straight-through or crossed) shall be noted for each cable in the Supplier's network diagram.

g. All cables shall be identified by the wire labeling code shown on the drawings and to be installed at each end of each wire. All device and equipment labeling codes shall be shown. All wire sizes, color codes, and special cable types shall be shown.

h. Index with proper identification and cross-referencing.

i. Exceptions to the specifications or drawings shall be clearly indicated. The shop drawing submittal shall contain sufficient details so that the District may make a proper evaluation.

j. Proposed factory testing forms.

k. Spare parts list.

3. Equipment test forms for factory testing.

1.6 OPERATION AND MAINTENANCE (O&M) MANUALS

1. Operation and Maintenance Manuals shall include:

a. A comprehensive index.

b. A complete "As Constructed" set of favorably reviewed shop drawings.

c. System schematic drawings "As Constructed", illustrating all components and electrical connections of the system supplied under this Section.

d. A complete list of equipment supplied, including serial numbers, ranges, and pertinent data.

e. Full specifications on each item.

f. Detailed operation, maintenance, and service instructions including a step-by-step trouble-shooting guide for each item supplied.

g. Special maintenance requirements particular to this system.

h. The operating instructions shall also incorporate a functional description of the entire system, with references to the system's schematic drawings and instructions applicable to this project.

i. Complete parts list with stock numbers.

j. Recommended spare parts list.

k. Factory testing data in approved forms.

l. A draft O&M manual shall be submitted for review three weeks prior to equipment scheduled factory testing. Four (4) copies of the approved O&M manual including factory test result on the approved test forms shall be supplied in indexed, subdivided, Levelox three-post notebook binders at the time of shipment of the equipment. O&M manuals and documents shall be provided to the District electronically in unlocked and editable form (Microsoft Word and AutoCAD).

1.7 AS-BUILT DRAWINGS

All drawings and software submittals described above shall be corrected to the final as-built state of the equipment and delivered to the District prior to final acceptance of the equipment. Copies for inclusion in all equipment manuals shall be provided. All drawings shall be provided to the District electronically in an unlockable and editable format (AutoCAD).

1.8 SITE CONDITIONS

A. General Environment

The PLC shall withstand anticipated environmental conditions of 5 to 50ºC temperature and 10 to 95% humidity. Electro-magnetic interference (EMI) and radio frequency interference (RFI) as may be anticipated in a typical industrial environment shall not impede proper functioning of the PLC systems. EMI and RFI are expected from two-way radios, lightning strikes, motors, transformers, contactors, relays, etc.

B. Power Source

Normal fluctuations of the 120VAC 60 Hz power supply shall not cause improper operation of the PLC system. Normal fluctuations are voltage excursions between 100 and 130V, or surges caused by switching of electrical loads. Battery power shall be supplied at 24VDC.

On loss of station AC power the PLC shall initiate an orderly shutdown of its control functions. On restoration of power the PLC shall restart the system in an orderly and controlled sequence.

No erratic operation of any PLC output device is allowed during start-up, shutdown, operation, or on loss or restoration of power.

C. Surge Protection

PLC power supply, CPU and all I/O devices shall have built-in surge withstand capacity to prevent damage from electrical surges on any connected line.

Additional surge protection shall be provided on any 4-20mA DC signal loops which extend beyond the perimeter of the building housing the PLC Control Panel. Surge protection shall be properly applied devices, Bournes/Joslyn #1820-28-A3 or equal by Alan Scientific.

PART 2 - PRODUCTS

2.1 GENERAL

The Supplier shall furnish equipment which is of one manufacturer to the maximum possible extent. Where this is not practical, all equipment of a given type shall be the product of one manufacturer.

2.2 PLC COMPONENTS

A. The PLCs shall be Allen Bradley CompactLogix series 5069 hardware as shown.

B. Components shall be as specified below.

2.3 PLC CPU AND COMMUNICATIONS MODULES

For CompactLogix, the PLC CPU shall be a 5069-L3100ERM.

2.4 RACK AND POWER SUPPLY

A. CompactLogix PLC Assembly

CompactLogix PLC shall be assembled on DIN-rail appropriately sized for the power supply, CPU, and IO modules as shown on the Contract Drawings.

B. Power supply shall be installed on the DIN-rail to provide uninterruptible power for CPU, Communication Module, and I/O Modules. Power supplies to be Allen Bradley 1606-XL120D.

2.5 PLC INPUT OR OUTPUT (I/O) MODULES

A. General

1. All CompactLogix I/O shall be DIN-rail mounted modules of a universal type.

2. All I/O internal circuits shall be electrically isolated from external circuits.

3. Each discrete input or output point shall have a visual indicator to display on/off status, and write-on labels for point identification adjacent to each indicator.

B. Module Types

1. Discrete Input (DI) Modules:

Discrete input (DI) modules-24 VDC
- Allen Bradley 5069-IB16
- 16 points per module
- 10 VDC to 32 VDC input voltage
- Sink type connection

2. Discrete Output (DO) Modules:

Discrete Output (DO) Modules-24 VDC
- Allen Bradley 5069-OB16
- 16 points per module
- 12/24 VDC source logic
- Provide auxiliary relays (DOX) for all DO points. Auxiliary relays (DOXs) shall be DPDT, 10A rated, standard square base plug-in relays with indicating light to facilitate troubleshooting. Relays shall be Allen Bradley Model 700 HB 32Z24-1 or equal.

3. Analog Input Modules:

Analog Input (AI) Modules Voltage/Current
- Allen Bradley 5069-IF8
- 4-20 mADC input
- Differential inputs
- 18-bit resolution
- ± 0.05% full scale recovery
- 8 points per module

4. Analog Output Modules:

- Allen Bradley 5069-OF8
- 4-20 mADC output
- 16-bit resolution
- 8 points per module
- Configure for 4-20 mADC output

2.6 PLC COMMUNICATION AND CABLES

A. All PLC power supply, communication, and interconnect cables shall be the PLC manufacturer's standard cables and shall be furnished by the ISS.

B. RS-232/485 serial cables shall be configured and provided as required. Serial cable pinouts shall be documented in the plans.

C. Ethernet cables for inside-panel interconnection shall be Belden factory assembled shielded cables. Category 6A Ethernet cables shall be Belden OSP6AF of required length or equal.

2.7 ETHERNET SWITCH

A. (8) Fast Ethernet Coper Ports shall be provided for use as shown on the plans. Ethernet switch shall be N-Tron 108TX or approved equal.

2.8 SERIAL INTERFACE MODULE

A. Serial interface module shall be Allen Bradley Model 5069-SERIAL as manufactured by Allen Bradley. Module shall provide serial communication interface capability for RS-232 and RS-485 devices and shall be compatible with the CompactLogix 5069 I/O platform.

B. Module shall support configurable serial communication parameters including baud rate, parity, stop bits, and data bits. Module shall be configured for the communication protocol required by connected field devices as indicated on the Contract Drawings.

2.9 SERIAL TO FIBER CONVERTER

A. Serial-to-fiber media converter shall be provided for use as shown on the plans. Converter shall be Moxa TCF-90 series or approved equal.

PART 3 - EXECUTION

3.1 CONSTRUCTION

A. Components shall be installed in accordance with the manufacturer's instructions and located as shown on the Contract Drawings or as approved by the submittal process.

B. The Supplier shall be responsible for coordinating the equipment and assuring a fully operable and factory tested system.

C. All analog and digital I/O points shall be wired out to panel terminal strips.

D. PLC DI and DO modules shall be connected with #18 AWG type SIS or MTW (fine strand) wire. PLC AI and AO modules shall be connected with #18 shielded twisted pair, Belden #8760 or approved equal.

E. 24VDC control, analog signal, and communication wiring shall be carefully segregated from 120VAC power wiring. Cross low voltage and AC power wiring at right angles only as necessary.

F. Terminate 100BaseTX Cat 6A Ethernet shielded cable with shielded RJ45 connectors properly matched to the Cat 6A cable, and including protective boot with cable strain relief. Termination shall be performed with appropriate crimping tools.

G. Terminations shall be carefully coordinated per the Supplier's Network diagram and shall be "straight-through" or "crossed" as required. Termination shall be supervised by the Supplier's certified network specialist. All Ethernet cables shall be labeled at both ends according to the Supplier's Network Diagram.

H. Testing of Ethernet Cat 6A cabling shall be performed by the Supplier's network specialist. Testing shall follow termination and shall include:

1. Testing for proper termination including proper coordination of RX and TX pairs for "straight-through" or "crossed" connection as required.

2. Testing for opens, shorts, polarity reversals, and presence of AC and DC voltage.

3. Testing with calibrated Fluke "DSP" or Agilent "WireScope" according to the latest revision of the TIA/EIA-568-B.

4. Certification that cables are acceptable for intended 100BaseTX service and submittal of test data, properly labeled and organized.

3.2 TESTING

A. General

This specification subsection shall define factory testing requirements for the equipment supplied under Section 16 70 00 for additional control panel details.

B. Test Forms

Equipment shall be tested as described herein. Test forms for the factory testing shall be submitted for review and approval per Part 1.05 - Submittals.

C. Witness Testing

The District shall send a representative to witness factory testing. The equipment supplier shall make all reasonable efforts to accommodate scheduling for the factory

test. Completed test forms shall be supplied to the District at completion of the factory testing.

D. Retest

Any equipment, material, or workmanship found defective during testing shall be immediately replaced/corrected and all necessary retesting shall be satisfactorily completed and documented in the testing forms.

E. Test Equipment

All necessary test equipment to perform the testing described herein shall be supplied by the equipment supplier. All test forms shall include a listing of the test equipment used in obtaining the test results contained on that form. Test instrument information shall include manufacturer, model number, and serial number.

F. Factory Tests

1. The following factory tests as a minimum shall be performed:

   a. Point-to-point testing for all PLC I/O.

   b. Continuity testing of all wiring.

   c. Yellow line all schematics and wiring drawings against wiring checks.

   d. Provide testing of discrete and analog PLC inputs and outputs from the field terminal connections by simulated contact closure and analog signal injection to verify proper PLC I/O addressing.

   Successful completion and documentation of the above factory tests are required for equipment release for shipment. Acceptance of factory test results does not relieve the equipment supplier for the requirement of conforming to the contract documents.

END OF SECTION

SECTION 26 05 19

LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Work necessary to provide a complete and operable low voltage cable system as specified herein.

B. Related sections: Refer to other divisions and sections of the contract documents to determine the extent and character of related electrical work specified elsewhere, but which shall be done under this section.

1. Section 00 72 00 – General Conditions

2. Section 01 33 00 – Submittal Procedures

3. SSection 26 05 26 – Grounding and Bonding for Electrical Systems

4. Section 26 05 53 – Identification of Electrical Systems

1.2 REFERENCES

A. Low-Voltage cables shall be installed in accordance with the latest editions and revisions of the following:

1. ASTM International (ASTM)

a. B3 – Standard Specification for Soft or Annealed Copper Wire

b. B8 – Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft

c. B33 – Standard Specification for Tinned-Coated Soft or Annealed Copper Wire for Electrical Purposes

2. Insulated Cable Engineers Association (ICEA), American National Standards Institute (ANSI), and National Electrical Manufacturers Association (NEMA)

a. ANSI/NEMA WC 57, ICEA S-73-532 – Standard for Control, Thermocouple Extension and Instrumentation Cables

b. ANSI/NEMA WC 70, ICEA S-95-658 – Standard for Power Cables rated 2000 Volts or less for the Distribution of Electrical Energy

3. National Fire Protection Association (NFPA)

    a. NFPA 70 – National Electrical Code

4. Underwriters Laboratory (UL)

    a. Standard 44 – Thermoset Insulated Wires and Cables

    b. Standard 83 – Thermoplastic Insulated Wires and Cables

    c. Standard 1063 – Machine Tool Wires and Cables

    d. Standard 1277 – Standard for Electrical Power and Control Tray Cables with Optional Optical-Fiber Members

    e. Standard 1581 – Reference Standard for Electrical Wires, Cables and Flexible Cords

1.3 SUBMITTALS

A. Provide submittals in accordance with Section 01 33 00 – Submittal Procedures.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

A. Provide cables as specified under the type number in this Section (Type 1, Type 2, etc.).

B. Type 11 (Power and control cables 600 Volts and less)

1. Unless otherwise indicated, provide stranded copper conductors with size as indicated on the Contract Drawings.

2. Provide the following types of insulation:

    a. Type XHHW-2 insulation for conductors No.14 and larger having cross linked polyethylene insulation rated at 90 degrees C in wet and dry locations.

    b. Insulation shall be self-lubricating for sizes #8 AWG and larger.

3. Single conductor control wiring shall be No.14 AWG and shall have insulation type XHHW-2.

4. Acceptable products:

    a. Okonite, X-Olene Type XHHW-2

    b. Southwire, SIMpull Type XHHW-2

c. Cerrowire, SLiPWire XHHW-2

d. Or equal as approved by the Engineer

C. Multi-conductor Power, Control, and Instrumentation Cable 600 Volts and Less:

1. Provide cable that is UL listed and conforms to the requirements of UL 1277 and CEC Article 340, or UL listed Power Limited Circuit Cable that conforms to the requirements of Article 725 of the National Electrical Code. Provide cables permanently and legibly marked with the manufacturer's name, the nominal voltage, the type of cable, and the UL label (or submit evidence of UL listing).

2. Type 10 (600 Volt, Twisted, Shielded Pair or Triad Instrumentation Cable):

a. General: Type TC, single pair or triad instrumentation cable designed for noise rejection for process control, computer, or data log applications. Suitable for installation in conduit, cable tray, or other approved raceways. Minimum cable temperature rating shall be 90 degrees C dry locations, 75 degrees C wet locations.

b. Individual Conductors: No.18 AWG stranded bare soft annealed copper, Class B, 7-strand concentric per ASTM B8, size as indicated on the drawings; 7-strand tinned copper drain wire.

c. Insulation and Jacket: Each conductor 15mil nominal PVC/nylon insulation. Conductors color scheme shall follow current ICEA standard, See section 3.4C. Jacket flameretardant and sunlight and oil resistant PVC with 45 mil nominal thickness. Aluminum/polyester shield overlapped to provide 100 percent coverage.

1) Acceptable products:

a) Belden

i) 3088A (pairs)

ii)3089A (triads)

b) Okonite Okoseal-N Type P-OS

i) 264-60-3301 (pairs)

ii)264-65-3301 (triads)

c) Or equal as approved by the Engineer

3. Type 14 (600 Volt Individually Shielded Pairs with a Common Overall Shield Instrumentation Cable):

a. General: Type TC, twisted, shielded pairs of instrument cables, grouped in a single cable, designed for use for instrumentation, process control, and computer applications. Suitable for installation in conduit, wireway, or other approved raceways. Minimum cable temperature rating shall be 90 degrees C dry locations and 75 degrees C wet locations.

b. Conductors: No. 18 stranded bare annealed copper, Class B, 7-strand, concentric per ASTM B8. Tinned copper drain wires sized as shown on the Drawings, one for each pair and one for the overall group.

c. Insulation and Jacket: Each conductor 15mil PVC and 4mil nylon insulation. Conductors color scheme shall follow current ICEA standard, See section 3.4C.. Outer jacket flame retardant and sunlight and oil resistant PVC with 45 mil minimum thickness. Individual pair shield aluminum/polyester. Group shield aluminum/polyester, overlapped for 100 percent coverage.

d. Acceptable Manufacturers:

1) Belden No. 1048A (2 pairs), 1049A (4 pairs), 1050A (8 pairs)

2) Okonite Okoseal-N Type SP-OS 261-60-3304 (4 pairs), 261-60-3308 (8 pairs)

3) Or equal as approved by the Engineer

4. Type 19 (600 Volt Unshielded MultiConductor Control and Power Cable):

a. #14 AWG and larger

1) General: UL listed, Type TC-ER, 600V multi-conductor copper control cable with Class B stranding per ASTM B8, #10 AWG unless noted otherwise on the drawings. Suitable for installation in conduit, cable tray, or other approved raceways. Minimum cable temperature rating of 90 degrees C for dry and wet locations.

2) Insulation and jacket: Provide conductors having 30-mil ethylene-propylene rubber (EPR) insulation and chlorinated polyethylene (CPE) jacket of minimum thickness as required by UL 1277. Color-code the conductor group in accordance with ICEA S-73-532, See section 3.4C.

3) Acceptable Manufacturers:

a) The Okonite Company, Okonite-FMR Okolon TS-CPE Type TC-ER Cable

b) General Cable FREP, Spec 4300, FR-EPR/CPE, Control, Unshielded.

c) Or equal as approved by the Engineer.

b. #16 AWG and smaller

1) General: UL Listed, Type TC-ER, multi-conductor copper control cables. Suitable for installation in conduit, cable tray, or other approved raceways. Minimum cable temperature rating shall be 90 degrees C dry locations, 75 degrees C wet locations.

2) Individual Conductors: Stranded bare soft annealed copper, Class B, 7-strand concentric per ASTM B8, size and number of conductors as indicated on the drawings.

3) Insulation and Jacket: Each conductor nominal 15-mil PVC/nylon insulation. Color-code the conductor group in accordance with ICEA S-73-532, See section 3.4C., Jacket flame-retardant and sunlight- and oil-resistant PVC with 45 mil nominal thickness, adjusted as necessary to meet the jacket thickness requirements of UL 1277.

4) Acceptable products:

a) Belden UL Control Cable, 600V Type TC Cable

i) Examples:

(1) 27325A (2-conductor)

(2) 28326A (4-conductor)

(3) 28327A (7-conductor)

b) Southwire, Unshielded Multiconductor Type TC-ER 600Volt

i) Examples:

(1) 677071 (2-conductor)

(2) 582642 (4-conductor)

(3) 581513 (7-conductor)

c) Or equal as approved by the Engineer.

5. Type 31 (600 Volt Multi-Conductor Control Cable with a Common Overall Shield):

a. General: UL Listed, Type TC-ER, multi-conductor copper control cable for cables. Suitable for installation in conduit, cable tray, or other approved raceways. Minimum cable temperature rating shall be 90

degrees C dry locations, 75 degrees C wet locations. Overall aluminum/poly foil shield in contact with a stranded tinned copper drain wire.

b. Individual Conductors: No.18 AWG stranded bare soft annealed copper, Class B, 7-strand concentric per ASTM B8, size and number of conductors as indicated on the drawings.

c. Insulation and Jacket: Each conductor nominal 15-mil PVC/nylon insulation. Color-code the conductor group in accordance with ICEA S-73-532, See section 3.4C. Jacket flame retardant and sunlight and oil resistant PVC with minimum thickness per UL 1277.

d. Acceptable products:

1) Belden UL Control Cable, 600V Type TC Cable

a) Examples:

i) 27325AS (2-conductor)

ii) 28326AS (4-conductor)

iii) 28327AS (7-conductor)

2) Southwire, Shielded Multiconductor Type TC-ER 600Volt

a) Examples:

i) 677081 (2-conductor)

ii) 588461 (4-conductor)

iii) 588463 (7-conductor)

3) Or equal as approved by the Engineer.

6. Type 27 (600 Volt, Individually Shielded Triads with a Common Overall Shield Instrumentation Cable):

a. General: Twisted, shielded triads of instrument cables, Type TC, grouped in a single cable, designed for use for instrumentation, process control, and computer applications. Suitable for installation in conduit, wireway, or other approved raceways. Minimum cable temperature rating shall be 90 degrees C dry locations and 75 degrees C wet locations.

b. Conductors: No. 18 AWG stranded bare annealed copper, Class B, 7-strand, concentric per ASTM B8, size as indicated on the drawings.

Tinned copper drain wires, one for each triad and one for the overall group.

c. Insulation and Jacket: Each conductor 15-mil PVC and 4-mil nylon insulation. Triad conductors pigmented black, red, and blue, or black, white, and red, with red or white conductor numerically printed for group identification. Outer jacket flame-retardant and sunlight- and oil-resistant PVC with 45 mil minimum thickness, adjusted as necessary to meet the jacket thickness requirements of UL 1277. Individual triad shield 1.35-mil aluminum/polyester. Group shield 2.35-mil aluminum/polyester, overlapped for 100 percent coverage.

d. Conductors shall be numerically printed for group identification.

e. Acceptable products:

1) Belden No. 1093A (4 triads); 1094A (8 triads)

2) Okonite Okoseal-N Type SP-OS 261-65-3304 (4 triads); 261-65-3308 (8 triads)

3) Or equal as approved by the Engineer

D. Type 15 (RS-485):

1. General: industrial low-capacitance shielded cables for EIA RS-485 applications, including security access card readers, suitable for outdoor use and installation in conduit and other approved raceways.

2. Conductors:

a. One (1) Pair of 22 AWG, 7x30 strand tinned copper

b. One (1) Conductor of 22 AWG, 7x30 strand tinned copper

3. Conductor insulation:

a. Pair(s) shall be insulated with foam high density polyethylene and color coded in White w/ Orange Stripe & Orange w/White Stripe.

b. Conductor(s) shall be insulated with Polyvinyl Chloride and color coded in Blue w/ White Stripe.

4. Shield:

a. Pair(s) shall be individually shielded via aluminum foil polyester tape providing 100% coverage.

b. Overall shield shall be aluminum foil polyester tape providing 100% coverage and a tinned copper braid providing 65% percent coverage and, 7x30 strand tinned copper 22 AWG drain wire.

5. Jacket: UV and oil resistant PVC, 300 volt, -20 degrees C to +60 degrees C operating temperature.

6. Characteristic Impedance: 120 Ohms per pair

7. Applicable Standards: CEC/UL CM and PLTC OIL RES II, UL 1685 Flame Test, UL 1581 Sunlight Resistance Test.

8. Acceptable products:

a. Belden No. 3106A (for one pair RS-485 applications)

b. Belden No. 3107A (for two pair RS-485 applications)

c. Or equal as approved by the Engineer

E. Flexible Cord and Cable Sealing Fittings:

1. Provide liquid-tight strain relief connectors for exposed flexible cord and power cable where cables enter electrical panels and enclosures.

2. Acceptable manufacturers:

a. OZ Gedney

b. Hubbell

c. Appleton

d. Or equal as approved by the Engineer

F. Electrical Tape for Color Coding:

1. Electrical tape shall be premium grade, not less than 7 mils thick, rated for 90 degree C minimum, flame-retardant, weather resistant, and available in suitable colors for color coding. The tape shall be resistant to abrasion, ultraviolet rays, moisture, alkalis, solvents, acids, and suitable for indoor and weather-protected outdoor use. The tape shall be suitable for use with PVC and polyethylene jacketed cables, and meet or exceed the requirements of UL 510.

2. Acceptable manufacturers:

a. 3M 35 Scotch Vinyl Electrical Tape for Color Coding

b. Plymouth Rubber Company Premium 37 Color Coding Tape

c. Or equal as approved by the Engineer

G. Low Voltage Splices, 600 volts and below:

1. General: when approved by Engineer, or shown on the Drawings, provide low voltage splices consisting of 600 volt compression type connectors and connector insulators, suitable for indoor and outdoor field installations.

2. Long Barrel compression connectors

a. Acceptable products:

1) Burndy

2) ABB Installation Products

3) Panduit

4) Or equal as approved by the Engineer

b. Provide two-way, un-insulated, compression connectors, long barrel type, suitable for use with stranded copper conductors. Provide UL listed connectors rated 600 volts minimum.

3. Connector Insulation

a. Connector insulators shall be cold shrink type factory expanded and assembled tubular EPDM rubber sleeves, suitable for field installation. Insulators shall shrink over in-line connections, forming a water-proof seal. Provide insulators rated for 1000 volts, minimum.

b. Acceptable products:

1) 3M

2) Or equal as approved by the Engineer

PART 3 - EXECUTION

3.1 CONDUCTOR 600 VOLTS AND BELOW

A. Provide conductor sizes indicated on Contract Drawings with no splices except as accepted in writing by the Engineer.

B. Wire nuts may be used on 120 Volt lighting and 120 Volt receptacle circuits only. Place no more than one conductor in any single-barrel pressure connection. Use crimp connectors with tools by same manufacturer and/or UL listed for connectors of all stranded conductors.

C. Soldered mechanical joints insulated with tape will not be acceptable.

D. Color coding on wire sizes larger than No. 6 AWG shall be by taping the individual conductors with the appropriate colored self-adhesive vinyl electrical tape. Vinyl plastic insulating tape for wire and cable splices and terminations shall be flame retardant, 7-mil thick minimum, rated for 90 degrees C minimum meeting the requirements of UL 510.

E. Provide terminals and connectors acceptable for the type of material used.

F. Arrange wiring inside control panels, motor starters, switcboards, etc., neatly cut to proper length, remove surplus wire, and bridle and secure in an acceptable manner. Identify all circuits entering switchboards, motor starters, control panels, etc.. Terminate cable conductors on the same side of the terminal blocks as shown on the Contract Drawings.

G. Terminate control and instrumentation wiring with methods consistent with terminals provided, and in accordance with terminal manufacturer's instructions. Where terminals provided will accept such lugs, terminate all control and instrumentation wiring with insulated, ring terminal compression lugs. Control panel incoming field wireway sizes indicated on the Contract Drawings are considered minimum. Supplier shall adjust wireway sizes to meet CEC percentage fill requirements.

H. For control and instrumentation wire terminals designed to accept only bare wire compression terminations, use insulated wire ferrules on ends of wire. Tighten all terminal screws with torque screwdriver to recommended torque values.

I. Attach compression lugs with a tool specifically designed for that purpose which provides a complete, controlled crimp where the tool will not release until the crimp is complete. Use of plier type crimpers is not acceptable.

J. Cap spare conductors and conductors not terminated with UL listed end caps.

K. Where conductors pass through holes or over edges in sheet metal, remove all burrs, chamfer all edges, and install bushings and protective strips of insulating material to protect the conductors.

L. For conductors that will be connected by others, provide at least 6 feet spare conductor in freestanding panels and at least 2 feet spare in other assemblies. Provide additional spare conductor length in any particular assembly where it is obvious that more conductor length will be needed to reach the termination point.

M. Do not strip cables more than eight inches from the nearest termination point of that cable.

N. Bundle and label all spare pairs with the cable designation. Tag all individual pairs to enable identification of spare pairs when making future terminations.

O. Splices will not be permitted except as accepted in writing by the Engineer.

P. Ends of cable shall not be exposed to environment more than 24 hours after pulling or splicing. After 24 hours, purge the cable with nitrogen and seal with tape.

3.2 MULTI-CONDUCTOR POWER, CONTROL, AND INSTRUMENTATION CABLES 600 VOLTS AND LESS

A. Splices will not be permitted except as accepted in writing by the Engineer.

B. Where connections of cables installed under this section are to be made under Div. 40, Process Integration, leave pigtails of adequate length for neat bundled type connections.

C. Maintaining the integrity of shielding of instrumentation cables is essential to the operation of the control systems. Take special care in cable installation to ensure that grounds do not occur because of damage to the jacket over the shield. Shields shall be grounded at one location only as shown on the drawings.

3.3 CONDUCTOR COLOR CODING

A. Color coding of multiconductor control and instrumentation cable is specified in the individual cable type specification.

B. For power conductors, provide all single conductors and individual conductors of multiconductor power cables with integral insulation pigmentation of the designated colors, except conductors larger than No. 6 AWG may be provided with color coding by wrapping the conductor at each end and at all accessible locations with vinyl tape. Where this method of color coding is used, wrap at least six full overlapping turns of tape around the conductor covering an area 1-1/2 to 2 inches wide at a visible location at all conductor termination and pulling points.

C. Phase A, B, C implies a positive sequence connection (i.e., counterclockwise electrical phasor rotation and clockwise motor rotation).

D. Use the following colors:

System	Conductor	Color
All Systems	Equipment Grounding	Green
240/120 Volts, 1-Phase, 3-Wire	Grounded Neutral	White
	Phase A	Black
	Phase B	Red
208Y/120 Volts, 1-Phase, 3-Wire	Grounded Neutral	White
	Phase A	Black
	Phase B	Red

208Y/120 Volts, 3-Phase, 4-Wire	Grounded Neutral	White
	Phase A	Black
	Phase B	Red
	Phase C	Blue
480Y/277 Volts, 3-Phase, 4-Wire	Grounded Neutral (if used)	White, Black Tracer
	Phase A	Brown
	Phase B	Orange
	Phase C	Yellow
48V DC Positive		Red
48V DC Negative		Black
Single Conductor, AC		Red
Multiple Conductor Control Cables		ICEA Method 1, Table E-2
Multiple Conductor Power Cables (Sizes #10 AWG and smaller)		ICEA Method 1, Table E-2
Multiple Conductor Power Cables (Sizes #8 AWG and larger)		ICEA Method 4
Multiple Conductor DC Power Cables		ICEA Method 1, Option C
Twisted shield pair	Positive	White
	Return	Black
Twisted shield triad (for RTDs)	Positive	Red
	Compensation	White
	Return	Black
24V DC Positive		Blue
24V DC Negative		Gray
Single-Conductor, DC Alarm, Annunciator, Instrumentation, and Telemetering (if not shielded)		Purple

E. All conductors carrying AC foreign voltage over 100 VAC into control panels, switchboards, and other enclosures shall be yellow. Multi-conductor cables carrying such foreign voltage shall be marked with yellow tape at each termination point.

3.4 LACING OF WIRES AND CABLES

A. Lace all wires and cables in pull or junction boxes, manholes, handholes, wireways, and at each termination. Lace wires and cables so that the wires of the individual circuits are laced together by circuit and the laced together circuit or cable shall be tagged with the cable number. Bundle all wiring entering and exiting the control panels into groups. Bundle and lace power, lighting, control, alarm, annunciator, and instrumentation wiring as specified herein.

END OF SECTION

SECTION 26 05 26

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Furnish all labor, materials, equipment, and incidentals required and install a complete grounding system in strict accordance with Article 250 of the California Electrical Code (CEC), as shown on the Contract Drawings and as specified herein.

2. All raceways, conduits and ducts shall contain equipment grounding conductors. If a size is not shown on the Contract Drawings, size in accordance with the CEC. Minimum sizes shall be No. 12 AWG.

3. Provide ground test stations where shown on the drawings.

B. Related Sections

1. Section 00 72 00 – General Conditions

2. Section 01 33 00 – Submittal Procedures

3. Section 26 05 19 – Low Voltage Electrical Power Conductors and Cables

4. Section 26 05 53 – Identification of Electrical Systems

1.2 REFERENCES

A. Grounding systems shall be designed, built, tested, and installed in accordance with the latest editions and revisions of the following:

1. ASTM International (ASTM)

a. B2 – Standard Specification for Medium-Hard Copper Wire

b. B187 – Standard Specification for Copper Bar, Bus Bar, Rod, and Shapes

c. B8 – Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft

d. B418-95a Type II – Standard Specification for Cast and Wrought Galvanic Zinc Anodes

2. California Code of Regulations (CCR)

a. Title 24, Part 3 – California Electrical Code (CEC), Article 250 (Grounding)

3. Institute of Electrical and Electronics Engineers (IEEE)

a. IEEE Std 80 – IEEE Guide for Safety in AC Substation Grounding

b. IEEE Std 837 – IEEE Standard for Qualifying Permanent Connections Used in Substation Grounding

c. IEEE Std 142 – IEEE Recommended Practice for Grounding of Industrial and Commercial Power Systems

4. Underwriters Laboratories (UL)

a. 467 – UL Standard for Grounding and Bonding Equipment

b. 224 – UL Standard for Extruded Insulating Tubing

5. Canadian Standards Association (CSA)

a. CAN/CSA-C22.3 No. 6-M91 – Principles and Practices of Electrical Coordination Between Pipelines and Electric Supply Lines

6. InterNational Electrical Testing Association (NETA)

a. ATS – Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems

7. National Association of Corrosion Engineers (NACE)

a. RP0177 – Mitigation of Alternating Current & Lightning Effects on Metallic Structures and Corrosion Control Systems

8. National Electrical Contractors Association (NECA)

a. NECA 331, Standard for Building and Service Entrance Grounding and Bonding

1.3 SUBMITTALS

A. Submittals shall be made in accordance with Section 01 33 00 – Submittal Procedures. In addition to these requirements, provide the following:

1.4 QUALITY ASSURANCE

A. All grounding and bonding products shall be UL listed.

PART 2 - PRODUCTS

2.1 GENERAL

A. Grounding system connections:

1. Accessible connections to equipment or connections to structural steel

a. Make connections to equipment, structural steel, and other accessible connections using one- or two-hole welded copper lugs as required for the cable size specified. An acceptable alternative to exothermically welded connections is a compression radial swage connection.

b. Acceptable manufacturers:

1) Exothermic welded connections

a) Erico (Cadweld)

b) Harger (Ultraweld)

c) Or equal as approved by the Engineer

2) Compression radial swage connections

a) DMC Power

b) No substitutions

B. Fasteners

1. Use silicon bronze alloy hardware for all grounding connections to structures or equipment.

2. Acceptable manufacturers:

a. Burndy, “Durium” hardware

b. AFL Global, “Everdur” hardware

c. Or equal as approved by the Engineer

C. Electrical joint inhibitor compound

1. Used for all bolted grounding connections as a moisture and oxidizing seal.

2. Acceptable manufacturers:

a. Sanchem Inc., NO-OX-ID (A-Special Electrical Grade)

b. Or equal as approved by the Engineer

PART 3 - EXECUTION

3.1 PREPARATION

A. Prepare and clean piping, rods, and conductors prior to exothermic welding in conformance with the specific requirements of the welding system.

3.2 INSTALLATION

A. General

1. All equipment enclosures, and all other equipment and materials required by the CEC to be grounded, shall be grounded and bonded in accordance with the CEC.

2. Care shall be taken to ensure good ground continuity, in particular between equipment frames and enclosures. Where necessary, jumper wires shall be installed.

3. Install equipment grounding conductors with all feeders and branch circuits. Each circuit shall have a dedicated equipment grounding conductor from source to load without splicing or "tee tapping" (e.g., three different receptacle circuits in a common home-run conduit back to a lighting panelboard shall have three separate equipment grounding conductors back to the lighting panelboard).

B. Ground connections

1. Ground all grounding type receptacles to the outlet boxes with a No. 12 THWN/THHN/MTW green conductor connected to the ground terminal of the receptacle and fastened to the outlet box by means of a grounding screw.

2. Single-point ground instrumentation cable shields at the signal ground bus at the control panel end of the circuit.

C. Grounding wires

1. Unless otherwise specified, provide continuous, unspliced equipment grounding conductors.

2. Lay all underground grounding conductors slack and, where exposed to mechanical injury, protect by pipes or other substantial guards. If guards are steel pipe, or other magnetic material, electrically connect conductors to both ends of the guard. Make connections as specified in this Section.

D. Fasteners

1. Clean the connector and conductor surfaces with a wire brush or emery cloth to a shiny, bright surface. For plated surfaces, use compatible solvent cleaning in order not to remove any portion of the plating.

2. Apply electrical joint inhibitor compound immediately after cleaning.

3. All fasteners shall engage a minimum of four full threads for electrical connections and equipment mounting.

4. Coat all bolts with electrical joint inhibitor compound.

5. Torque fasteners to equipment manufacturer's specifications. If not specified by the manufacturer, torque fasteners to NETA specifications.

END OF SECTION

SECTION 26 05 53

IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. All electrical equipment and systems shall include identification tags or nameplates as shown on the Contract Drawings and as specified herein.

2. The Supplier shall develop a tagging system in accordance with the information shown on the Contract Drawings and the procedure specified in this Section.

B. Related Sections:

1. Section 01 33 00 – Submittal Procedures

1.2 SUBMITTALS

A. Submittals shall be made in accordance with Section 01 33 00 – Submittal Procedures.

A. In addition to the requirements of Section 01 33 00:

1. A tagging system scheme or schedule shall be submitted to the Engineer for review and approval prior to tagging of equipment.

PART 2 - PRODUCTS

2.1 PRODUCTS

A. Wire labels for #1 AWG and smaller

1. Wire labels relying on adhesives or taped-on markers are not acceptable.

2. Individual wires #1 AWG and smaller in each cable or wire bundle shall be identified with legible permanent sleeve of white heat-shrink polyolefin with machine printed weatherproof black marking.

3. Meet UL Standard 224 for flammability

4. Provide necessary tools and accessories to print labels and shrink labels.

5. Acceptable Manufacturers:

   a. Brady Model B-342 Brady PermaSleeve 1.5” width one-sided thermal transfer labels

   b. Panduit

   c. Or equal as approved by the Engineer

B. Wire labels for #1/0 and larger sizes and cable identification tags

1. Cable tags shall be of the reusable labeling type so that changing of the labels can occur without removing the tag from the conduit. Construct the label holder so that the labels can slide on and off when they need to be changed or replaced. The tags shall be suitable for industrial use.

2. Tag holders shall be PVC for horizontal orientation sized to hold the alphanumeric conduit tag designations specified in the cable schedule on the drawings.

3. Tags shall be black letters on yellow background.

4. Attach the cable tag holder to the cable or wire bundle using UV protected, self-locking black nylon cable ties.

5. Acceptable Manufacturers:

   a. Almetek ID Marking Systems, Mini Tags

   b. Tyco Electronics, K-Type cable Markers

   c. Or equal as approved by the Engineer

C. Equipment Nameplates

1. Reference Contract Drawings for nameplate letter and background color requirements.

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PART 3 - EXECUTION

3.1 GENERAL

A. Conductor Identification:

1. Identify conductors at each termination and in all accessible locations such as control panels, panelboards, wireways, junction terminal boxes, switchboards,

etc. A typical circuit will have the following identification: conduit tag, overall cable tag, and individual wire labels.

B. Legend Plates and Nameplates

1. Install nameplates on devices or equipment as specified in Contract Drawings.

2. Provide legend plate engraving for pilot devices as shown on the Contract Drawings; if not shown, Supplier shall submit a schedule showing proposed legend plate text for the Engineer's approval.

3.2 TAGGING OF WIRES AND CABLES

A. All wires and cables shall be tagged and laced in wireways, and at each termination. Each wire and cable shall be tagged at least once as it passes through each junction box, and at each termination. Each wire and cable shall be tagged at least once as it passes through wireways. Wires and cables shall be laced so that the wires of the individual circuits are laced together by circuit and the laced together circuit or cable shall be tagged with the cable number. Power, lighting, control, alarm, annunciator, and instrumentation wiring shall be bundled, laced, and tagged, as specified herein.

B. All wires and cables within control panels, switchboards mechanical mounting panels, terminal junction boxes, etc., shall be tagged at each termination with conductor tags as specified. All circuit identification tags shall be readily accessible for inspection at the locations cited above.

C. Label wires with cable numbers as shown on the Contract Drawings. Cable labels shall be placed within one inch of the ends of the cable jacket.

B. All spare pairs shall be bundled and labeled with the cable designation. All individual pairs shall be tagged to enable identification of spare pairs when making future terminations.

D. Identify multi-circuit control cables and individual instrumentation and control circuits as indicated on the Contract Drawings. Multi-circuit cable shall be tagged with the cable name around the entire cable assembly and shall have the individual circuits tagged as well. Tag twisted, shielded pairs and where exposed, multipair cable twisted pairs around each pair separately.

A. Identify each individual conductor at each termination. This includes such locations as switchboards, control panels, junction/terminal boxes, and junction boxes, and all other locations where conductors are terminated. Identify the termination of these conductors in accordance with the accepted shop drawings. Tag conductors with sleeve type labels.

B. Where more than 1 nominal voltage system exists, identify each ungrounded system conductor by phase and system. Permanently post means of identification at each

branch-circuit panelboard, switchboard, or other type of power distribution equipment.

C. Include the following minimum information for wire and cable identification:

1. Circuit number or load identification tag number

2. Origin (from source)

3. Destination (to load)

D. Wire Numbers:

1. The Supplier shall coordinate the wire numbering system with all vendors of equipment so that each and every field wire has a unique wire number associated with it for the entire system.

END OF SECTION

SECTION 26 22 13

LOW-VOLTAGE DISTRIBUTION TRANSFORMERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Work necessary to furnish, install and test energy efficient, dry-type, single-phase and three-phase low-voltage transformers as specified herein and in other Sections as noted.

B. Related sections

1. Document 00 72 00 – General Conditions

2. Section 01 33 00 – Submittal Procedures

3. Section 01 43 11 – Seismic Qualification and Certification

4. Section 01 81 02 – Seismic Design Criteria

5. Section 26 05 53 – Identification for Electrical Systems

6. Section 26 24 13 - Switchboards

1.2 REFERENCES

A. Low-voltage distribution transformers shall be designed, built, tested, and installed in accordance with the latest editions and revisions of the following:

1. California Code of Regulations (CCR)

a. Title 24, Part 3 – California Electrical Code (CEC)

2. Code of Federal Regulations (CFR)

a. Title 10, Chapter II, Subchapter D, Part 431, Subpart K – Distribution Transformers

3. Institute of Electrical and Electronics Engineers (IEEE)

a. ANSI/IEEE Std 693, IEEE Recommended Practice for Seismic Design of Substations

b. IEEE C57.12.01, General Requirements for Dry-Type Distribution and Power Transformers Including Those with Solid Cast and/or Resin-Encapsulated Windings

c. IEEE C57.12.91, Test Code for Dry-Type Distribution and Power Transformers

d. ANSI/IEEE C57.96, Distribution and Power Transformers, Guide for Loading Dry-Type appendix to ANSI C57.12 standards

4. National Electrical Contractors Association (NECA)

a. ANSI/NECA 409 – Standard for Installing and Maintaining Dry-Type Transformers

5. National Electrical Manufacturers Association (NEMA)

a. ST-20 – Dry Type Transformers for General Applications

b. TP-1 – Guide for Determining Energy Efficiency for Distribution Transformers

c. TP-2 – Standard Test Methods for Measuring the Energy Consumption of Distribution Transformers

6. National Fire Protection Association (NFPA)

a. ANSI/NFPA 70 – National Electrical Code (NEC)

b. NFPA 70E – Standard for Electrical Safety in the Workplace

7. Underwriters Laboratories (UL)

a. UL 506 – Specialty Transformers

1.3 SUBMITTALS

A. In addition to the requirements of Section 01 33 00 – Submittal Procedures, provide:

1. Product data

2. Plan, front, and side view drawing including overall dimensions, weights, and anchoring details

3. Internal schematics (elementary diagrams) and connection diagrams

4. Transformer mounting bracket design for wall-mount applications

5. Dimensioned as-built documents, installation, and O&M manuals

6. Quality Assurance/Control Submittals

a. Certified factory test reports

b. IEEE Std 693 seismic qualification certification per Section 01 43 11 – Seismic Qualification and Certification

c. Transformer anchorage calculations per Sections 01 43 11 – Seismic Qualification and Certification and 01 81 02 – Seismic Design Criteria

d. Low noise, -5dB below NEMA standard certification

1.4 QUALITY ASSURANCE

A. Transformers shall have the UL Energy Efficiency Verification mark and shall be certified to meet or exceed the minimum energy efficiency requirements of 20 C.F.R. §410

B. Transformers shall be qualified for use in seismic areas as follows:

1. High seismic loading as defined in IEEE Std 693, for in-service installation bolted to a concrete pad, metal platform, or inside of a switchboard in accordance with the anchor design provided in the seismic anchorage calculation submittal specified in this Section

2. Seismic compliance shall be qualified only through shake table testing. Compliance by calculation is not acceptable.

C. Electrical safety

1. All personnel working on the installation and operation of the equipment specified in this Section shall have documented and current training for all work tasks specified in this Section as required by NFPA 70E, Article 110.4 (latest edition)

1.5 DELIVERY, STORAGE, AND HANDLING

A. Follow the manufacturer’s handling instructions.

B. Ship equipment, material, and spare parts complete except where partial disassembly is required by transportation regulations or for protection of components.

C. All mechanical and electrical equipment shall be coated, wrapped, and otherwise protected from snow, rain, drippings of any sort, dust, dirt, mud, flood and condensed water vapor during shipment and while stored or installed in place during construction. The protective coverings shall remain in place until the work areas are substantially free of all construction dust, dirt, mud, accumulated water, moisture, and debris. Space heaters shall be energized at all times during storage.

D. Outdoor transformers are not weather resistant until completely and properly installed and shall be treated exactly the same as indoor transformers until after they are installed. Transformers that are not installed and energized immediately shall be stored in a clean, dry, rodent-free space having a uniform temperature to prevent condensation.

PART 2 - PRODUCTS

2.1 DISTRIBUTION TRANSFORMERS - LOW VOLTAGE LIGHTING AND POWER

A. Acceptable manufacturers

1. Eaton DOE 2016 Efficient Transformers

2. General Electric by ABB Type QL DOE 2016 Design

3. Hammond HPS Sentinel G

4. Or equal as approved by the Engineer

B. Rating

1. Three-phase: kVA, primary voltage, and secondary voltage as indicated on the Contract Drawings

2. Single phase: kVA, primary voltage, and secondary voltage as indicated on the Contract Drawings

3. BIL: 10 kV (480V rated transformer)

4. Taps: Installed where indicated on the Contract Drawings, with at least four 21/2 percent primary winding taps, two above and two below nominal

5. Sound level: Special low noise design, -5dB less than NEMA ST-20 maximum average sound level for dry type transformers

6. Efficiency: low loss type, with minimum efficiencies per 20 C.F.R. §410

C. Construction

1. 220 degrees C insulation system based upon 150 degrees C rise for transformers 75kVA and above. For transformers less than 75kVA the insulation shall be 220 degrees C with 115 degree C rise. Transformer shall be rated for 40 degrees C ambient.

2. Low voltage windings shall have a 10 kV Basic Impulse Insulation Level (BIL).

3. Temperature rating of transformer enclosure shall be 90 degrees C maximum

4. Indoor transformers shall be the ventilated type with a NEMA 2 enclosure

5. Outdoor transformers shall be non-ventilated, totally enclosed type with NEMA 3R enclosure

6. Transformers installed within switchboards shall be open core and coil type without a separate enclosure and mounted within the switchboard structure. The switchboard enclosure shall provide the required environmental protection. Transformers shall be designed for operation within the switchboard assembly without exceeding the temperature limits of adjacent equipment. Adequate ventilation shall be provided within the switchboard to dissipate transformer heat.

7. Primary and secondary coil windings shall be copper

2.2 ENCAPSULATED GENERAL PURPOSE TRANSFORMER

A. Acceptable manufacturers

1. Eaton, General Purpose Encapsulated Transformers, Type EPT

2. Or equal as approved by the Engineer

B. Rating

1. Three-phase: kVA, primary voltage, and secondary voltage as indicated on the drawings

2. BIL: 10kV

3. Taps: Installed where indicated on the drawings, with at least four 2-1/2 percent primary winding taps, two above and two below nominal

4. Sound level: Special low noise design, -5 dB less than NEMA ST-20 maximum average sound level for dry type transformers

C. Construction

1. 200 degrees C insulation system with 115 degree C rise, encapsulated design. Transformer shall be rated for 40 degrees C ambient.

2. Primary and secondary coil windings shall be copper

3. Enclosure shall be NEMA 3R for indoor or outdoor use

PART 3 - EXECUTION

3.1 CLEANING

A. After the pre-energization checkout has been completed, remove all rubbish and debris from inside and around the transformers. Remove dirt, dust, or concrete spatter from the interior and exterior of the equipment using brushes, vacuum cleaner, or clean, lint-free rags. Do not use compressed air.

B. Replace all covers. Check for pinched wires and securely fasten all covers.

END OF SECTION

SECTION 26 24 13

SWITCHBOARDS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Furnish, install and test the switchboard as shown on the Contract Drawings in accordance with these specifications.

2. The switchboard assembly shall include a control panel, 480V 3Ø 1000A automatic transfer switch (ATS), 120/208V-3Ø 225A panelboard, 45kVA 480V:120/208V 3Ø transformer, and transition sections as required. All components shall be provided in enclosures and mounted within the same switchboard lineup. Transition sections shall be provided and sized as required for proper equipment alignment, cable routing, and a complete installation.

3. Switchboards shall be sized to include all equipment, spares and spaces as shown on the Contract Drawings.

4. Provide with an electrical power monitoring unit, surge protective devices, and power fail relays

5. Switchboard main disconnect shall be 100% rated and shall be equipped with an arc flash reduction maintenance system (ARMS), ground fault protection relay, and auxiliary breaker status contacts.

6. The switchboard identification to be provided is as follows:

a. SWBD-01

B. Related sections:

1. Section 00 72 00 – General Conditions

2. Section 01 33 00 – Submittal Procedures

3. Section 01 43 11 – Seismic Qualification and Certification

4. Section 01 81 02 – Seismic Design Criteria

5. Section 16 70 00 – Control Panels

6. Section 26 05 19 – Low Voltage Electrical Power Conductors and Cables

7. Section 26 22 13 – Low Voltage Distribution Transformers

8. Section 26 24 16 - Panelboards

1.2 SECTION 26 28 16 – CIRCUIT BREAKERSQUALITY ASSURANCE

A. Seismic design requirements:

1. The switchboard shall be designed to withstand seismic forces as required in Sections 01 43 11 and 01 81 02.

B. The switchboard shall be the product of a manufacturer who shall also be the manufacturer of all the circuit breakers and fused switches included in the switchboard.

C. All units and sections shall be UL labeled. Switchboard containing service entrance equipment shall be UL labeled "Suitable for Use as Service Equipment."

1.3 SUBMITTALS

A. Submit shop drawings and product data in accordance with Section 01 33 00 – Submittal Procedures.

B. Furnish submittals for approval as outlined below:

1. Shop drawings of the equipment proposed to meet both this specification and PG&E's (Pacific Gas and Electric) Service Requirements ("Green Book") for Electric Switchboards: 0 Through 600 Volts. The Engineer will submit the shop drawings to PG&E for approval. Drawings shall include the District's name and job location. Under no circumstances shall manufacturing proceed without PG&E and the Engineer approval of this submittal.

2. Equipment shop drawings showing elevation and plan views, compartment arrangement, dimensions, weight, shipping splits, and metering layouts

3. Single line diagrams, point-to-point compartment wiring diagrams for metering, and relay and control circuits. Show wire and terminal numbers.

4. Bus material, ratings, and insulation details

5. Product data sheets and catalog numbers for circuit breakers and fused switches. List all options, trip adjustments, and accessories furnished specifically for this project. Submit time current characteristic curves for each protective device provided.

6. Itemized bill of material for metering, protective relays, accessories, and control equipment.

7. Nameplate schedule.

8. Conduit entry/exit locations.

9. Major component ratings including:

   a. Voltage

   b. Continuous current

   c. Interrupting ratings

C. Where applicable, the following additional information shall be submitted to the Engineer:

   1. Busway connection

   2. Connection details between close-coupled assemblies

D. Composite floor plan of close-coupled assemblies

E. Prior to delivery, submit the following to the Engineer:

F. Submit anchoring calculations per the requirements of Sections 01 43 11 and 01 81 02.

G. Submit certification that the switchboards have been designed and constructed to withstand the seismic forces as described in the abovementioned sections.

H. Spare parts list

1.4 DELIVERY, STORAGE AND HANDLING

A. Follow the manufacturer's handling instructions.

B. Ship equipment, material, and spare parts complete except where partial disassembly is required by transportation regulations or for protection of components.

C. All mechanical and electrical equipment shall be coated, wrapped, and otherwise protected from snow, rain, drippings of any sort, dust, dirt, mud, flood and condensed water vapor during shipment and while stored or installed in place during construction. The protective coverings shall remain in place until the work areas are substantially free of all construction dust, dirt, mud, accumulated water, moisture, and debris. Space heaters shall be energized at all times during storage.

1.5 REFERENCE STANDARDS

A. The switchboards shall be designed, built, and tested in accordance with the latest editions and revisions NEMA Standard PB-2, and Underwriters' Laboratories (UL) Standard No. UL-891. Switchboards shall also comply with any applicable ANSI and IEEE Standards and the requirements of the California Electric Code (CEC).

B. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

C. Utility service equipment and installation shall comply with the requirements of the serving utility, Pacific Gas and Electric Company (PG&E), including the PG&E Electric and Gas Service Requirements (Greenbook), latest edition, and applicable PG&E service planning and installation standards.

1.6 WARRANTY

A. Manufacturer's standard warranty

PART 2 - PRODUCTS

2.1 GENERAL

A. The switchboard shall have an individually mounted main breaker with group mounted feeders (Class 2). The switchboard shall be a fully integrated system that provides distributed power as shown on the Contract Drawing single line diagram.

B. The switchboard and components shall be from the same manufacturer.

2.2 UTILITY METERING

A. Provide a utility metering compartment integral to the switchboard assembly for a 1000A, 480V, 3 phase, 4 wire service. Metering compartment shall comply with current PG&E utility metering requirements.

B. Provide a barrier separating the utility metering compartment from all customer sections and provide a hinged sealable door for utility access. Bus work shall include provisions for mounting utility company current transformers and potential taps as required by the utility company.

C. Provide service entrance labeling and all applicable service entrance features in accordance with NEC, local code, and PG&E requirements.

D. Metering section shall include provisions for PG&E furnished revenue meter, current transformers, and associated metering wiring. Provide meter mounting provisions, current transformer mounting provisions, test blocks, terminal blocks, conduits, and wiring required for utility revenue metering in accordance with PG&E standards.

E. Switchboard manufacturer shall coordinate metering compartment construction, dimensions, and equipment requirements with PG&E prior to issuing shop drawings to ensure compliance with current PG&E service and metering requirements.

2.3 SWITCHBOARD

A. Ratings

1. Service: As shown on the Contract Drawings.

2. The switchboard and protective devices shall be fully rated for a short circuit current of 65,000 rms symmetrical amperes or as shown on the Contract Drawings, whichever is greater. Systems employing series connected ratings shall not be used. Main and feeder devices shall be coordinated for selective tripping.

3. The manufacturer shall design the switchboard, including devices, for continuous operation at its rated current in a 25 degree C ambient temperature.

4. Switchboards shall be UL listed.

B. Construction

1. Switchboards shall be NEMA 3R outdoor type, free-standing, front accessible, and front and rear aligned with depth as shown on the Contract Drawings. Side access shall not be required. All connections, load terminations, and bus maintenance shall be accessible from the front or the top. All protective devices shall be group-mounted, front removable, and arranged to permit against-the-wall mounting.

2. Isolated compartments shall be provided for main circuit device and metering equipment.

3. Feeder devices shall be arranged in group mounted construction. Feeder section(s) shall be isolated from main section, and from adjacent feeder sections.

4. Side, top, and rear covers shall be code gauge steel, bolted to 12 gauge frame structure members. Front doors shall be flush, hinged, with screw fasteners.

5. A cable pull section shall be furnished where shown on the Contract Drawings, which shall be per PG&E requirements.

6. IR Window

   a. Switchboard rear sections shall be provided with infrared viewing windows to allow infrared thermographic inspection of bus connections and cable terminations without opening energized equipment. Provide sightglass window in enclosure for use with an infrared camera. IR sightglass shall include a 3 inch IR crystal insert that provides direct line of sight for infrared inspections, is transparent to visible light, and serves as a physical barrier between the camera and the target.

   b. Sightglass shall have an anodized aluminum housing with aluminum security cover, stainless steel tamperproof screws, low smoke and fume gasket, and overall IP65 ingress protection. Cover shall swivel open to provide access to the IR window. Windows shall be permanently

installed, impact resistant, and certified for use on energized electrical equipment.

c. See Contract Drawings for switchboard sections requiring infrared viewing windows.

7. All metal surfaces shall be chemically cleaned and primed. The finishing coat of paint shall be ANSI Z55.1 No. 61, light gray enamel.

C. Buses

1. All buses shall be silver plated copper.

2. Buses shall be braced for the specified equipment short circuit current rating.

3. All joint connections shall be welded or shall be joined with bolts and Belleville washers.

4. Provide a copper ground bus extending throughout the entire length of the switchboard, equipped with lugs for external ground connections, sized for cables shown on the drawings.

5. Unused spaces, or spaces indicated for future devices shall include doors, bus, device supports or mounting plates and connections.

D. Manufacturers:

1. Eaton Type Pow-R-Line C

2. General Electric Spectra Series

3. Square D Type QED

4. Or equal as approved by the Engineer

2.4 COMPONENTS

A. Main Circuit Protective Device

1. Main circuit breaker shall be insulated case, 3 Pole, 600 Volt, 100 percent rated, bolt-on type, manually operated with stored energy closing mechanism. Trip device shall be solid state with the following:

a. Long time pickup and delay

b. Short time pickup and delay with short time i^2t switch

c. Adjustable and high instantaneous pickup

d. Ground fault pickup and delay with i^2t switch

e. Overload

f. Short circuit and ground fault indicator lights

g. Ground fault delay and pickup trips for selective tripping

h. Arc Flash Reduction Maintenance System

i. 100 percent equipment rated

2. Equip main device with auxiliary contacts for remote status and trip indication. Device trip setting and frame rating shall be as shown on the Contract Drawings.

3. Acceptable Manufacture:

a. General Electric, Power Break I with MicroVersa Trip

b. Cutler Hammer, Magnum SB with Seltronic Trip

c. Or equal as approved by the Engineer.

B. Power Monitor

1. Provide shorting blocks for incoming current transformer (CT) circuits and fuse blocks for incoming voltage circuits to provide an intermediate termination point between the power meter and the associated circuits.

C. Surge Protective Device

1. Provide two integral surge protective devices within the switchboard assembly. Each device shall be suitable for application on a 480V 3-phase system and shall be UL 1449 listed. One surge protective device shall be installed on the load side of the main breaker and one surge protective device shall be installed on the load side of the automatic transfer switch, as indicated on the Contract Drawings. Each surge protective device shall have a minimum surge current capacity of 200 kA per phase and shall include replaceable surge modules, internal overcurrent protection, and visual status indication.

D. Power Failure Relay

1. Provide power failure relay for monitoring loss of normal power. Relay shall be suitable for monitoring a 480V, 3-phase system and shall provide dry contacts for indication of loss of power and restoration of power. Relay shall be mounted within the switchboard control section and wired to terminal blocks for connection to external monitoring or control systems as indicated on the Contract Drawings.

E. GFCI

1. Provide ground fault circuit interrupter (GFCI) receptacle on the front face of the switchboard as indicated on the Contract Drawings. Receptacle shall be factory wired and powered from panelboard PNL-01 within the switchboard.

F. Feeder Protective Devices

1. Feeder circuit breakers with a rating greater than 150A shall be molded case, 3 Pole, 600 Volt, 80 percent equipment rated, bolt-on type equipped with an adjustable, temperature insensitive, solid state, trip device similar by the General Electric Company's "MicroVersa Trip"; Cutler Hammer "Seltronic", or equal as approved by the Engineer with adjustable and high instantaneous, short time, long time and ground fault delay pickup trips for selective tripping.

2. Feeder protective devices less than or equal to 150A rating shall be molded case circuit breakers bolt-on type with fixed thermal-magnetic trips.

3. Supply five spare thermal-magnetic circuit breakers with ratings as shown on the Contract Drawings.

G. Wiring

1. Low voltage instrument and control wiring shall be copper, Type SIS, flameproof switchboard wire identified with shrink on marker sleeves at each end. Low voltage wiring terminal blocks shall have marking strips and shall be mounted vertically in an accessible location. All terminal lugs shall be of the full loop type.

H. Marking and Identification

1. Provide nameplates on all hinged doors for unit load description and for each control or indicating device. Engrave nameplates as shown on the Contract Drawing or as directed, using lettering approximately 3/8in high for unit identification nameplates and 1/4in high elsewhere. The nameplates shall be black and white laminated phenolic material. The engraving shall extend through the white exterior lamination to the black core. Nameplates shall be screw fastened.

2. A manufacturer's plaque shall be fastened to the front of the switchboard. The plaque shall indicate model number, serial number, amperes, volts, short circuit rating, etc.

3. Furnish each switchboard with a sign marked "DANGER – 480 VOLTS KEEP OUT". Letters shall be not less than 1-in high, 1/4-in stroke. Signs shall be adhesive backed mylar, OSHA approved.

I. Spare Parts

1. Provide the following spare parts in the quantities specified for the switchboards:

a. One dozen each size of cover bolts, cage nuts and door fasteners

b. Six cans of aerosol touch-up paint

c. 50 percent replacement fuses, all types and sizes

d. Two of each color replacement lens caps for pilot lights

2. Spare parts shall be boxed or packaged for long term storage. Identify each item with manufacturers name, description and part number on the exterior of the package.

PART 3 - EXECUTION

3.1 GENERAL

A. Factory quality control

1. Perform manufacturers standard production testing and inspection in accordance with NEMA and ANSI standards.

2. Provide a Factory Acceptance Test (FAT) for the switchboard assembly.

3. Notify the Engineer and the District a minimum of fourteen (14) days prior to the scheduled FAT to allow for witness testing.

4. The FAT shall include verification of the following:

a. Equipment operation.

b. Control functions.

c. Protective relay settings and operation.

d. Metering operation.

e. Communications functionality.

f. Inspection of wiring, labeling, and workmanship.

5. The Engineer and Owner shall be permitted to witness the FAT.

6. Provide documented test results and inspection reports for review.

7. Correct all deficiencies identified during testing prior to shipment.

8. Do not ship the switchboard until FAT documentation has been submitted and accepted by the Engineer and District.

3.2 CLEANING

A. Remove all rubbish and debris from inside and around the switchboard. Remove dirt, dust, or concrete spatter from the interior and exterior of the equipment using brushes, vacuum cleaner, or clean, lintfree rags. Do not use compressed air.

END OF SECTION

SECTION 26 24 16

PANELBOARDS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Furnish all labor, materials, equipment, and incidentals required and install all panelboards as shown on the Contract Drawings and as specified herein.

B. Related sections

1. Section 00 72 00 – General Conditions

2. Section 01 33 00 – Submittal Procedures

3. Section 01 43 11 – Seismic Qualification and Certification

4. Section 01 81 02 – Seismic Design Criteria

5. Section 26 05 53 – Identification for Electrical Systems

6. Section 26 24 13 - Switchboards

7. Section 26 28 16 – Circuit Breakers

1.2 REFERENCES

A. Panelboards shall be designed, built, tested, and installed in accordance with the latest editions and revisions of the following:

1. Institute of Electrical and Electronics Engineers (IEEE)

a. ANSI/IEEE C62.41.1-2002, Guide on the Surge Environment in Low-Voltage AC Power Circuits

b. ANSI/IEEE Std 693, IEEE Recommended Practice for Seismic Design of Substations

2. National Electrical Contractors Association (NECA)

    a. ANSI/NECA 407, Standard for Installing and Maintaining Panelboards

3. National Electrical Manufacturers Association (NEMA)

    a. NEMA PB 1.1 – General Instructions for Proper Installation, Operation, and Maintenance of Panelboards Rated 600 Volts or Less

4. National Fire Protection Association (NFPA)

    a. NFPA 70E, Standard for Electrical Safety in the Workplace

5. Underwriters Laboratories (UL)

    a. UL 508A, Industrial Control Panels

    b. UL 1449, Standard for Surge Protective Devices

1.3 SUBMITTALS

A. Submit shop drawings and product data in accordance with Section 01 33 00 – Submittal Procedures.

B. Bill of materials

C. Shop drawings

1. Summary report of all panelboards supplied under this Section, including panelboard tag name, type, service, number of circuits, direction of feed, mounting, main device ratings, terminal lug data, and short-circuit rating.

2. Detailed description and layout for each panelboard including the following:

    a. Panel electrical and construction ratings

    b. Catalog numbers and rating data for main and branch protective devices

    c. Description of all options

    d. Panel interior layout

3. Outline drawing showing dimensions

4. Wiring diagram

D. Quality assurance/control submittals

1. IEEE Std 693 seismic qualification certification per Section 01 43 11 – Seismic Qualification and Certification

2. UL labeling

3. Provide electrical safety submittals that are specific to the work in this Section:

a. Task-specific job briefing and planning checklist for the specific work to be performed

b. Hazardous energy control plan, including task-specific procedural steps for the specific work to be performed, in accordance with the Supplier's lockout/tagout (LOTO) program

E. As-built shop drawings, installation, and O&M manuals per Section 01 33 00 – Submittal Procedures

1.4 QUALITY ASSURANCE

A. Panelboards shall be designed for use in seismic areas as follows:

1. High seismic loading as defined in IEEE Std 693, for in-service installation bolted to a concrete mounting surface in accordance with the anchor design provided in the seismic anchorage calculation submittal specified in this section.

2. Seismic compliance shall be qualified only through shake table testing. Compliance by calculation is not acceptable.

B. Provide a seismic qualification label on each panelboard

C. Provide UL labeled panelboards

1.5 DELIVERY, STORAGE AND HANDLING

A. Follow the manufacturer's handling instructions, the requirements of NEMA PB 1.1,

B. Panelboards that are not installed and energized immediately shall be stored in a clean, dry, rodent-free, and heated building having a uniform temperature and air circulation to prevent condensation.

C. Leave original packing materials intact until panelboards are ready for installation.

PART 2 - PRODUCTS

2.1 GENERAL

A. Panelboards shall include the quantity, ampere and ratings of circuit breakers as shown on the panelboard schedules included in the Contract Drawings.

B. Provide additional features including ground fault circuit interrupting breakers and Surge Protective Devices (SPD) equipment where noted in this Section

C. Asset Names:

1. PNL-01

2.2 PANELBOARDS

A. Acceptable Products:

1. Eaton, Pow-R-Line (or equivalent model)

2. ABB, A-Series II (or equivalent model)

3. Siemens, P-Series (or equivalent model)

4. Or equal as approved by the Engineer

B. Rating

1. Panelboard ratings shall be as shown on the Contract Drawings. All panelboards shall be rated for the voltage specified on the Contract Drawings.

2. Panelboards shall be fully rated for the specified circuit breaker fault current interrupting capacity. Series connected short circuit ratings are not acceptable.

3. Indoor enclosure rating shall be NEMA Type 1 gasketed, unless noted otherwise on the Contract Drawings.

4. Outdoor enclosure rating shall be NEMA Type 3R, unless noted otherwise on the Contract Drawings.

C. Construction

1. All interiors shall be completely factory assembled with circuit breakers, wire connectors, etc. All wire connectors, except screw terminals, shall be of the anti-turn solderless type and all shall be suitable for copper wire of the sizes indicated.

2. Interiors shall be so designed that circuit breakers can be replaced without disturbing adjacent units and without removing the main bus connectors and shall be so designed that circuits may be changed without machining, drilling or tapping.

3. Branch circuits shall be arranged using double row construction except when narrow column panels are indicated. Branch circuits shall be numbered by the manufacturer.

4. A nameplate shall be provided listing manufacturer's name, panel type and rating.

5. Construction of panel shall be door-in-door type.

D. Buses

1. Bus bars for the mains shall be of copper. Full size neutral bars shall be included. Phase bussing shall be full height without reduction. Cross connectors shall be copper.

2. Neutral bussing shall have a suitable lug for each outgoing feeder requiring a neutral connection.

3. Spaces for future circuit breakers shall be bussed for the maximum device that can be fitted into them.

4. Provide equipment ground bars

E. Boxes

1. Recessed or flush mounted boxes shall be made from galvanized code gauge steel having multiple knockouts, unless otherwise noted. Boxes shall be of sufficient size to provide a minimum gutter space of 4 inches on all sides.

2. Surface mounted boxes and trims shall have an internal and external finish as hereinafter specified below. Surface mounted boxes shall be field punched for conduit entrances.

3. Provide at least 4 studs for mounting the panelboard interior

F. Trim

1. Hinged doors covering all circuit breaker handles shall be included in all panel trims.

2. Doors shall have semi flush type cylinder lock and catch, except that doors over 48 inch in height shall have a vault handle and 3point catch, complete with lock, arranged to fasten door at top, bottom and center. Door hinges shall be concealed. Furnish two keys for each lock. All locks shall be keyed alike; directory frame and card having a transparent cover shall be furnished on each door.

3. The trims shall be fabricated from code gauge sheet steel.

4. All exterior and interior steel surfaces of the panelboard shall be properly cleaned and finished with ANSI Z55.1, No. 61 light gray paint over a rust inhibiting phosphatized coating. The finish paint shall be of a type to which field applied paint will adhere.

5. Trims for flush panels shall overlap the box by at least 3/4 inch all around. Surface trims shall have the same width and height as the box. Trims shall be fastened with quarter turn clamps.

G. Acceptable Manufacturers:

1. Eaton, PowRLine

2. General Electric, A-Series II

3. Siemens P-Series

4. Or equal as approved by the Engineer

2.3 COMPONENTS

A. Circuit breakers

1. Equip panelboards with circuit breakers with frame size and trip settings as shown on the Contract Drawings.

2. Provide circuit breakers from the same manufacturer as the panelboard manufacturer to ensure compatibility.

3. Circuit breakers shall be molded case, bolt-in type. Handle ties are not acceptable.

4. Circuit breakers shall have an interrupting capacity of not less than 22,000 amperes RMS symmetrical.

5. GFCI (ground fault circuit interrupter) shall be provided for circuits where shown on the Contract Drawings. GFCI units shall be 1 pole, 120 volt, molded case, bolton breakers, incorporating a solid state ground fault interrupter circuit insulated and isolated from the breaker mechanism. The unit shall be UL listed Class A Group I device (5 milliamp sensitivity, 25 millisecond trip time) and an interrupting capacity of 10,000 amperes RMS. GFCI units used for heat trace or where required by the manufacturer shall have 30 mA sensitivity.

B. Transient Voltage Surge Suppression (TVSS)

1. Acceptable products

a. Eaton, SPD (or equivalent model)

b. ABB, Tranquell ME (or equivalent model)

c. Siemens, TPS (or equivalent model)

d. Or equal as approved by the Engineer

2. Provide an SPD for application within an ANSI/IEEE C62.41 Category A environment, 60 kA per mode, 120 kA per phase

3. The TVSS shall be mounted integrally with all AC panelboards specified in this Section and on the Contract Drawings and shall be manufactured by the same manufacturer as the panelboard.

4. The suppression voltage rating (SVR) shall be tested in accordance with UL-1449.

5. Provide a remote status Form C dry contact for remote annunciation of fault condition status.

6. Provide an LCD surge counter that indicates how many surges have occurred at the location.

C. Marking and Identification

1. Provide equipment nameplate per Section 26 05 53 – Identification for Electrical Systems.

2. Provide nameplates for unit load description and for each control or indicating device. Engrave nameplates as shown on the Contract Drawing or as directed, using lettering approximately 3/8-in high for unit identification nameplates. The nameplates shall be black lettering on white laminated phenolic material.

3. A manufacturer's plaque shall be fastened to the panelboard. The plaque shall indicate model number, serial number, amperes, volts, short circuit rating, etc.

PART 3 - NOT USED

END OF SECTION

SECTION 26 27 26

WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Furnish all labor, materials, equipment, and install wiring devices as shown on the Contract Drawings and as specified herein.

2. Provide all interconnecting conduit and branch circuit wiring for receptacle circuits in accordance with the CEC.

B. Related sections

1. Section 00 72 00 – General Conditions

2. Section 01 33 00 – Submittal Procedures

3. Section 26 05 53 – Identification for Electrical Systems

4. Section 26 28 16 – Circuit Breakers

1.2 SUBMITTALS

A. Submittals shall be in accordance with Section 01 33 00 – Submittal Procedures..

1.3 REFERENCE STANDARDS

A. Wiring devices shall be designed, built, tested, and installed in accordance with the latest editions and revisions of the following:

1. California Code of Regulations (CCR)

a. Title 24, Part 3 – California Electrical Code (CEC)

2. National Electrical Contractors Association (NECA)

a. ANSI/NECA 130 – Standard for Installing and Maintaining Wiring Devices

3. Underwriters Laboratories

a. UL 498 – Standard for Attachment Plugs and Receptacles

b. UL 943 – Standard for Safety for Ground Fault Circuit Interrupters

B. U.S. General Services Administration's Federal Specification's (GSA)

1. Specification WS 896 Switches, Toggle (Toggle and Lock), Flush Mounted (General Specification)

2. Specification WC 596-F Connectors, Plug, Electrical, General Purpose, General Grade, Groudning, 2 Pole, 3 Wire, 20 Amperes, 250 Volts, 50/60 Hertz

C. Underwriters Laboratories

D. ANSI/NECA 130 – Standard for Installing and Maintaining Wiring Devices

1. UL 498

PART 2 - PRODUCTS

2.1 MATERIALS

A. Wall Switches

1. Switches shall be extra heavy duty, industrial specification grade, toggle action, and flush mounting quiet type with ground screw terminal.

2. Number of poles as shown on the Contract Drawings.

3. Toggle switch shall be white color.

4. Rating shall be 20A, 120/277 Volt.

5. Acceptable manufacturers:

a. Hubbell HBL Extra Heavy-Duty Specification Grade Catalog Number HBL1221W (single-pole), HBL1223W (three-way), and HBL1224W (four-way)

b. Eaton Wiring Devices

c. Legrand/Pass & Seymour, Inc.

d. Or equal as approved by the Engineer

B. Single Receptacles – Special Use

1. Provide the following industrial specification grade receptacle types where shown on the drawings:

a. 20 Amp, 125 Volt, 2 Pole, 3 Wire, power lock type

b. 20 Amp, 250 Volt, 2 Pole, 3 Wire, NEMA 6-20R

c. 30 Amp, 125 Volt, 2 Pole, 3 Wire, twist-lock type, NEMA L5-30R

d. 20 Amp, 250 Volt, 2 Pole, 3 Wire, twist-lock type, NEMA L6-20R

e. 30 Amp, 250 Volt, 2 Pole, 3 Wire, twist-lock type, NEMA L6-30R

f. Receptacles called out on drawings but not listed above shall still be industrial grade.

2. Acceptable Manufacturers:

a. Eaton Wiring Devices

b. Hubbell, Inc.

c. Pass & Seymour, Inc.

d. Or equal as approved by the Engineer.

C. Single or Duplex Receptacles – general purpose type

1. Receptacles shall be extra heavy duty, industrial specification grade, straight blade, 2 pole, 3 wire grounding recessed receptacle.

2. Rating shall be 20A, 125Volt with NEMA 5-20R configuration.

3. High impact and chemical resistant nylon face and color white

4. Single or duplex as shown on the Drawings.

5. Acceptable Manufacturers:

a. Cooper Wiring Devices

b. Hubbell, Inc.

c. Legrand/Pass & Seymour, Inc.

d. Or equal as approved by the Engineer

D. Single or Duplex Receptacles – corrosion resistant

1. Industrial grade corrosion resistant type receptacles shall have a high impact and chemical resistant nylon face with color gray.

2. Line contacts shall be made of solid brass that is resistant to corrosion.

3. Single or Duplex as shown on the Contract Drawings

4. 20A, 125V with NEMA 5-20R configuration

5. Acceptable Manufacturers:

    a. Cooper Wiring Devices, M-1

    b. Crouse-Hinds, Co.

    c. Appleton Electric

    d. Or equal as approved by the Engineer.

E. Duplex Receptacles - Ground fault interrupter type

1. Industrial grade, 20 Amp, 125 Volt, 2 Pole, 3 Wire, GFCI feed thru type with "test" and "reset" buttons.

2. NEMA 5-20R configuration.

3. Acceptable Manufacturers:

    a. Eaton Wiring Devices

    b. Hubbell, Inc.

    c. Or equal as approved by the Engineer.

F. Device plates

1. Plates for indoor flush mounted devices shall be of the required number of gangs for the application involved and shall be as follows:

    a. NEMA 1 (Finished) Areas: Smooth, high impact nylon of the same manufacturer and color (white) as the device. Color selection shall be submitted and approved by the Engineer.

    b. NEMA 4X, 4 and 12 (Indoor Process) Areas: Stainless steel, brushed with stainless steel mounting screws.

2. Plates for indoor surface mounted device boxes shall be cast metal of the same material as the box.

3. Install oversized plates where standard plates do not fully cover the wall opening.

4. Device plates for toggle-switches style disconnect switches specified in Section 26 28 16, switches mounted outdoors, or indicated as weatherproof shall be gasketed, with provisions for padlocking switches "On" and "Off".

5. Multiple surface mounted devices shall be ganged in a single, common box and provided with an adapter, if necessary, to allow mounting of single gang device plates on multigang cast boxes.

6. Engraved device plates shall be provided where required.

7. Device plates for UPS power receptacles shall be labeled “UPS POWERED, CIRCUIT NO. LP-XXXX”. The UPS circuit number is as shown on the drawings.

8. Identify receptacle and light switch device plates as required in Section 26 05 53.

G. Weatherproof Switch Cover with Device (Outdoor)

1. Single pole toggle switch with metal switch cover

2. 10A, 125V

3. Acceptable Manufacturers:

a. Emerson

b. Crouse-Hinds

c. Or equal as approved by the Engineer.

H. Weatherproof Receptacle Cover

1. Industrial specification grade UL listed for wet locations with self-closing spring door and gasketing

2. Suitable for single and duplex receptacles

3. Cover manufactured by same manufacturer of receptacle

4. Acceptable Manufacturers:

a. Eaton Wiring Devices

b. Hubbell/Bell

c. Or equal as approved by the Engineer

I. Weatherproof while in use cover

1. UL listed single or two gang box cover made of die cast aluminum vertical arrangement

2. Acceptable Manufacturers:

    a. Emerson

    b. Crouse-Hinds

    c. Or equal as approved by the Engineer.

J. Multi Outlet Assemblies

1. Assembly enclosures shall consist of two-piece, all steel or anodized aluminum raceways which shall allow for field installation of wiring and standard receptacles as shown on the Contract Drawings.

2. Multi outlet assemblies shall be UL Listed as a multi-outlet assembly.

3. The multi outlet assembly shall include surge suppression modules that can be easily removed and replaced without removing the metal cover. The surge protective devices shall be tested per UL 1449.

4. Raceway bases and removable covers shall be .040-inch steel, minimum of 2-1/8-inch high by 1-5/8-inch deep. Entrance fittings shall be sized for 3/4-inch conduit.

5. Raceways shall include all fittings, couplings, etc. for the complete installation of a finished system.

6. Provide outlets, jacks, and terminators of the type and location shown on the drawings.

7. Acceptable Manufacturers:

    a. Legrand Wiremold, Plugmold

    b. Or equal as approved by the Engineer.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Provide weatherproof covers and device covers in areas designated NEMA 3R, 4 or 4X on the Contract Drawings.

B. Provide While-in-Use covers in outdoor areas.

C. Install receptacles with the ground pin “up”.

D. Indicate circuit number for receptacle and light switches per Section 26 05 53.

3.2 ENERGIZATION

A. After energizing, test wiring devices for proper voltage, polarity, and ground continuity. Correct faulty circuit conditions, remove malfunctioning wiring devices, replace with new devices, and retest.

B. Test GFCI devices for proper operation.

END OF SECTION

SECTION 26 28 16

CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes

1. Enclosed circuit breakers

B. Related sections

1. Section 00 72 00 – General Conditions

2. Section 01 33 00 – Submittal Procedures

3. Section 01 43 11 – Seismic Qualification and Certification

4. Section 01 81 02 – Seismic Design Criteria

5. Section 26 05 33 – Identification for Electrical Systems

1.2 SUBMITTALS

A. Submit shop drawings and product data in accordance with Section 01 33 00.

B. Provide submittals for approval as outlined below:

1. Product data

2. Warranty

3. Bill of materials

4. Plan, elevation, and section drawings including overall weights, dimensions, and anchoring details

5. Instruction manuals

6. As-built documents and Operation and Maintenance (O&M) manuals

1.3 REFERENCES

A. Circuit Breakers shall be designed, built, tested, and installed in accordance with the latest editions and revisions of the following:

1. National Electrical Manufacturers Association (NEMA):

a. NEMA AB 1 – Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures

b. NEMA KS 1 – Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum)

c. NEMA 250 – Enclosures for Electrical Equipment (1000 Volts Maximum)

2. Underwriters Laboratories (UL)

a. 98 – UL Standard for Safety Enclosed and Dead-Front Switches

b. 489 – Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures

PART 2 - PRODUCTS

2.1 ENCLOSED CIRCUIT BREAKERS

A. Circuit breaker

1. Protective devices shall be molded case circuit breakers with inverse time and instantaneous tripping characteristics.

2. Circuit breakers shall be operated by a toggle-type handle and shall have a quick-make, quick-break over-center switching mechanism that is mechanically trip-free. Automatic tripping of the breaker shall be clearly indicated by the handle position. Contacts shall be non-welding silver alloy.

3. Circuit breakers shall have the following minimum symmetrical interrupting capacity unless otherwise indicated on the Contract Drawings:

a. 10,000 Amperes for 125VDC systems

b. 22,000 Amperes for 120/240VAC and 208Y/120V systems

c. 65,000 Amperes for 480V systems

4. Trip units

a. Circuit breakers with trip settings less than 100 Amperes shall have non-interchangeable thermal-magnetic trip units and inverse time-current characteristics.

b. Circuit breakers with trip settings between 100 and 250 Amperes shall have interchangeable trip, true digital rms sensing electronic trip units.

c. Circuit breakers 400 Ampere frame and higher shall have interchangeable trip, true digital rms sensing electronic trip units with a digital current display.

5. Provide UL-listed DC molded-case circuit breakers for use in all grounded and ungrounded battery supply circuits. Standard AC circuit breakers are not acceptable.

6. Ground fault protection shall be provided where indicated in Contract Drawings.

7. Series rated circuit breakers are not acceptable.

8. The switchboard main circuit breaker shall be 100% rated and equipped with an arc flash reduction maintenance system, ground fault protection relay, and auxiliary breaker status contacts for monitoring and control.

9. Acceptable manufacturers

   a. Circuit breakers with less than 100 Ampere trip rating:

      1) General Electric, Thermal-Magnetic Trip

      2) Eaton, Series C thermal-magnetic trip

      3) Or equal as approved by the Engineer.

   b. Circuit breakers with trip settings between 100 and 250 Amperes.

      1) General Electric, Spectra RMS with digital, solid-state, RMS sensing trip system

      2) Eaton, Series C with Digitrip 310 LSIG trip unit

      3) Or equal as approved by the Engineer

   c. Circuit breakers 400 Ampere frame and higher

      1) General Electric, Spectra RMS with MicroVersaTrip Plus LSIG trip unit

      2) Eaton, Series C with OPTIM 550 LSIG trip unit

      3) Or equal as approved by the Engineer

B. Accessories

1. Provide shunt trips, bell alarms and auxiliary switches as shown on the Contract Drawings.

C. Enclosures

1. Unless otherwise specified herein or indicated on the Contract Drawings, enclosed circuit breakers shall be in steel NEMA 12 enclosures for indoor installations and in Type 316 stainless steel NEMA 3R enclosures for outdoor or indoor wet installations as identified on the Contract Drawings.

2. All enclosed circuit breakers shall have nameplates that contain a permanent record of catalog number and maximum rating. Provide handle mechanisms that are padlockable in the OFF position.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install devices in accordance with manufacturer's instructions and accepted shop drawings.

END OF SECTION

SECTION 26 32 13.13

DIESEL ENGINE DRIVEN GENERATOR SET

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Furnish integrated engine-generator package system. The system shall include a skid mounted diesel engine-generator unit, control panel, 100% rated 800A frame LSIG main breaker with 400A trip plug, low voltage distribution circuit breakers, panelboard, generator starting battery and battery charger, 50% rated radiator mounted load bank, sound attenuation weatherproof enclosure, wiring and conduit, piping, cooling and ventilation equipment, exhaust components, and appurtenances as shown on the Contract Drawings and as specified herein.

2. The system shall meet or exceed NFPA 110 requirements for providing Level 1, Class 96, Type 10 life safety emergency power.

3. Each system shall meet or exceed EPA Tier 4 Final emissions requirements for non-road compression ignition engines.

4. Supplied with a 660 gallon belly tank sized for a minimum 24 hours continuous run time at 50% load based on the generator full rated capacity.

5. The diesel engine driven generator set and load bank identification to be provided is as follows:

a. EGEN-01

b. LB-01

B. Related sections:

1. Section 00 72 00 – General Conditions

2. Section 01 43 11 – Seismic Qualification and Certification

3. Section 01 61 01 – Electrical Requirements for Mechanical Package Systems

4. Section 26 05 19 – Low Voltage Electrical Power Conductors and Cables

5. Section 26 05 53 – Identification for Electrical Systems

6. Section 26 24 16 – Panelboards

7. Section 26 27 26 – Wiring Devices

8. Section 26 28 16 – Circuit Breakers

9. Section 26 36 23 – Automatic Transfer Switches

1.2 QUALITY ASSURANCE

A. Seismic design requirements:

1. See Section 01 43 11, 01 81 02 for seismic requirements.

The system shall have affixed a permanent engraved nameplate in a readily visible location, stating that the equipment is suitable for use as Level 1, Class 96, Type 10 life safety emergency power in accordance with NFPA 110 requirements. The Supplier shall obtain all permits required to operate the life safety emergency power system from the applicable local air quality authority.

B. Supplier shall prepare and submit all required permit applications for the generator engine to the governing air quality district following approval of the generator submittal(s) by the District (EBMUD). Supplier shall pay all associated application and permit fees. Upon receipt of the issued permits, the Supplier shall provide copies of all permits to the District (EBMUD) for review and final approval. Generator procurement and construction shall not proceed until the District (EBMUD) has reviewed and approved the issued permits.

C. The diesel engine-driven generator set shall meet or exceed CARB and EPA Tier 4 Final emissions requirements.

1.3 SUBMITTALS

A. Submittals for approval shall be made in accordance with Section 01 33 00 – Submittal Procedures and with this specification.

B. Submit the manufacturer's product data of the complete and assembled system specified herein and as shown on the Contract Drawings. Submittals shall include but not be limited to:

1. Component List – A breakdown of all components and options, including quantity, description, manufacturer, and model number

2. Technical Data – Manufacturer produced specifications or data sheets for all equipment supplied, including the following tabular data:

a. Engine type, aspiration, compression ratio, and combustion cycle, bore, stroke, displacement, and number of cylinders

b. Power rating at 0.8 power factor with and without fan

c. Engine lubricating oil capacity

d. Engine coolant capacity without radiator

e. Engine coolant capacity with radiator

f. Coolant pump external resistance (maximum)

g. Coolant pump flow at maximum resistance

h. Fuel consumption: 50, 75, and 100 percent load (gallons per hour)

i. Maximum continuous duty horsepower with fan

j. Jacket water heater ratings

k. Generator:

1) Ratings, standby power kW

2) Line to Line Voltage

3) Phases

4) Connections

5) Frame number

6) Insulation class

7) Number of leads

8) Total weight

9) Rotor weight

10) Air flow required

11) Fuel to line and generator efficiency at 0.8 power factor for 25, 50, 75, and 100 percent load

12) Time constants, short circuit transient (T'D)

13) Time constants, armature short circuit (TA)

14) Reactance, subtransient – direct axis (X"D).

15) Reactance, transient – saturated (X'D)

16) Reactance, synchronous – direct axis (XD)

17) Reactance, negative sequence (X2)

18) Reactance, zero sequence (X0)

19) Reactance, fault current, 3 phase symmetrical

20) Space heater ratings

l. Radiator:

1) Fan drive ratio

2) Fan power

3) Air flow and maximum external pressure differential

4) Radiator coolant capacity and protection level in degrees F

m. Engine-generator Set:

1) Dimensions: length, width, height, access clearances

2) Sound level

3) Total weight

4) Mounting bolt pattern

n. Exhaust silencer:

1) Dimensions: length, width, height

2) Weight (pounds)

3) Inlet and outlet sizes (inches)

4) Attenuation (db vs. frequency)

5) Pressure loss

o. Sound-attenuating weatherproof enclosure

1) Dimensions: length, width, height

2) Weight (pounds)

3) Insulation material, thickness, flame rating

4) Attenuation (db vs. frequency)

5) Nominal (free-field) exterior sound level at 1 meter and 7 meter

6) Configuration and size of: Access doors; control panels; fluid connections, fill ports, and drains; electrical connections; air inlet and discharge; exhaust discharge

p. Lube oil sump capacity

q. Vibration Isolators:

1) Load ratings

2) Dimensions: length, width, height

r. High Temperature Insulation Blankets:

1) Materials of construction and dimension details

2) R-factor and personnel protection capability; touch temperature

s. Generator Distribution Circuit Breakers and Control Panels:

1) Distribution Circuit Breakers Rated Maximum Voltage

2) Distribution Circuit Breakers Operating Voltage

3) Distribution Circuit Breaker Continuous current and short circuit ratings

4) Distribution circuit breaker types

5) Current transformer type, ratings, and accuracy

6) Potential transformer type, ratings, and accuracy

7) Control power transformer type and capacity

8) Internal control wiring conductor and insulation information

9) Instruments, meters, protective relays, circuit breaker control switches and indicating lights

10) Space heater ratings

11) Terminal blocks

12) Nameplates

t. Starting Batteries:

1) Type

2) Dimensions

3) Weight

4) Volume

5) Number of plates

6) Ratings

7) Battery sizing calculations

8) Battery container information

u. Battery Charger:

1) Nominal voltage and current ratings

2) Adjustable float and equalize voltages

3) Recommended float voltages

4) Voltage regulation

5) Input voltage

6) Weight

7) Dimensions

8) Ambient temperature ratings

9) Enclosure NEMA rating

v. Distribution panelboard and circuit breakers

w. Light fixtures, switches, and convenience receptacles

x. Radiator mounted resistive load banks and control panel

y. Nameplates

3. Complete specifications, outline dimensional drawings, and descriptive literature

4. General assembly drawings

5. Front, side, and section views

6. Three-line and control schematic (elementary) diagrams in ladder type format for the entire system

7. Complete schematic, wiring, and interconnection diagrams showing all terminal and destination markings for all equipment, as well as the functional relationship between all electrical components

8. Operating, maintenance, and testing manuals for all equipment, including, but not limited to the following

    a. Engine

    b. Generator

    c. Voltage Regulator

    d. Electronic Governor

    e. Distribution Circuit Breakers and Control Panels

    f. Batteries

    g. Battery Charger

    h. Jacket water heaters

    i. Silencer

    j. Load bank and control panel

    k. All final factory and field test reports

9. Recommended spare parts and current price list

10. Proposed factory and field test procedures

11. The name, address, and phone number of the local sales representative and technical assistance for each piece of equipment

12. The name, address, and phone number of the local parts distributor for each piece of equipment

13. Provide seismic computations carried out by a professional structural engineer registered in the State of California. Submit calculations that verify that the diesel engine driven generator set systems have been designed and constructed to withstand the specified seismic requirements. Submit calculations prior to manufacture of the equipment.

14. Warranty Statements: Warranty verification published by the manufacturers of the equipment

15. With the initial shop drawing submittal, the equipment supplier shall provide written certification that they have reviewed the proposed installed operating conditions, operating environment, and range of operating conditions as shown on the drawings and described in these specifications, and that equipment proposed is in all respects suitable for these conditions. Initial shop drawing submittals without the supplier's written certification will be returned to the Supplier for resubmittal.

16. Manufacturer's certification shall be supplied with each system that verifies the torsional vibration compatibility of the rotating element of the prime movers and generators for the intended use.

17. Manufacturer's written certificate of proper installation

18. The manufacturer shall submit written compliance and performance with the drawings and specifications for the entire system after installation.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Follow the manufacturer's handling instructions.

B. Ship equipment, material, and spare parts complete except where partial disassembly is required by transportation regulations or for protection of components.

C. All mechanical and electrical equipment shall be coated, wrapped, and otherwise protected from snow, rain, drippings of any sort, dust, dirt, mud, flood and condensed water vapor during shipment and while stored or installed in place during construction. The protective coverings shall remain in place until the work areas are substantially free of all construction dust, dirt, mud, accumulated water, moisture, and debris. Space heaters shall be energized at all times during storage.

1.5 REFERENCES

A. Diesel Engine Driven Generator shall be designed, built, and tested in accordance with the latest editions and revisions of the following:

1. UL 2200 – Stationary Engine Generator Assemblies

2. California Code of Regulations:

a. Title 24, Part 3 – California Electrical Code (CEC)

1.6 JOB CONDITIONS

A. The operating environment of the diesel engine driven generator set shall be:

1. Altitude: Approximately 100 feet above Mean Sea Level for Mokelumne River Fish Hatchery

2. Outside temperature, maximum: 120 degrees F

3. Outside temperature, minimum: 25 degrees F

4. Fuel type: Diesel No .2

1.7 WARRANTY

A. The diesel engine driven generator set manufacturer's and dealer's standard warranty shall in no event be for a period of less than two (2) years from date of initial start-up of the system or 2500 operating hours, whichever comes first. It shall include repair labor, reasonable travel expense necessary for repairs at the jobsite, and expendables (lubricating oil, filters, antifreeze, and other service items made unusable by the defect) used during the course of repair. Submittals received without written warranties as specified will be rejected in their entirety.

PART 2 - PRODUCTS

2.1 GENERAL

A. Unless otherwise noted, all products shall be factory installed into an integrated, skid-mounted, UL 2200 listed enclosed diesel engine driven generator set package.

2.2 DIESEL ENGINE

A. The engine shall be a stationary, liquid cooled, four-cycle design, turbocharged, compression ignition diesel design. Continuous standby output shall be 500 KW, 0.8 power factor, 480 volts wye connected, three-phase, 60 hertz, when driving a synchronous generator at a speed not to exceed 1800 RPM. The engine shall have 6 cylinders minimum, be designed to use No. 2 low sulfur diesel fuel, and CARB/EPA Tier 4 Final certified.

B. The engine shall be equipped with air filters, fuel filters and pressure gauge, lubricating oil cooler, filters, and pressure gauge, water pump and temperature gauge, service hour meter, flywheel, and flywheel housing.

C. The flywheel shall be statically and dynamically balanced, and shall be capable of being rotated 50 percent above the maximum rated engine speed without failure. Provide flywheel housing with a drain hole. Means for manually turning the crankshaft shall be provided. Mount the engine on suitable vibration isolators furnished by the engine supplier.

D. Block shall be of one piece design and cast of high tensile strength iron in the system manufacturer's own foundry. Crankshaft shall be a one piece forging with wear surfaces hardened through heat treat methods. Pistons shall be elliptically

ground across the skirt and tapered from crown to skirt. Compression rings shall be keystone sectioned. Valves shall be hard-faced with replaceable inserts.

E. The engine shall be provided with a full pressure lubricating oil system arranged to distribute oil to all moving parts of the engine and to cool the pistons. The system shall include an engine-driven positive-displacement pump, pressure regulating valves, oil filter, oil strainer, oil cooler, oil level indicator, low oil pressure shutdown, crankcase ventilator, and necessary piping and fittings.

F. Provide lubricating oil filters of the full-flow type, capable of filtering the full rate of oil flow of the oil pump at maximum engine speed. The filter shall provide a means of automatically bypassing lubricating oil if the condition of the filter so requires.

G. Lubricating oil strainer and filter shall be cleanable, or replaceable, without disconnecting any piping.

H. The engine shall be electronically controlled, fuel injected; and shall be provided with all necessary fuel system equipment including piping, fittings, valves, pump, filters, strainer and appurtenances.

I. A manual fuel priming pump shall be supplied for priming and bleeding air from the system.

J. A fuel oil filter shall be installed in the piping ahead of the injection pumps on each unit. Pressure transducers shall be provided on both sides of the filter to indicate condition of the filter.

K. Supply flexible fuel lines at the engine fuel supply to isolate vibration.

L. Install a fuel oil solenoid valve in the piping ahead of the fuel filters on the unit, if required to prevent flooding of the engine's fuel system.

M. Acceptable manufacturers:

1. Caterpillar C18 T4F

2. Or equal as approved by the Engineer.

2.3 GOVERNOR, ELECTRONIC-SPEED CONTROL

A. The engine governor shall control engine speed while optimizing both steady state and transient engine performance. The governor shall monitor all significant engine parameters, and adjust engine performance according to speed, altitude, temperature, after cooler or combustion air temperature, jacket water temperature, and filtered fuel pressures.

B. The governor shall incorporate programmable control software capable of adjusting engine operation to desired performance levels. The governor shall be configured to

avoid interruption of power; it shall be programmed such that in the event of system faults which do not require shutdowns, the engine shall continue operation at power levels sufficient to remain within performance limits.

C. The governor shall display real time and historical data to allow the user to optimize operation and provide accurate service information in the event of a malfunction. The service information shall be accessible through a data link for remote monitoring, or through an ethernet communication port. A data link failure shall not cause an interruption of engine operation.

D. The engine governor shall maintain ±0.25 percent steady state speed regulation, and be adjustable from a remote location. Speed drop shall be adjustable from 0 (isochronous) to 10 percent from no load to full rated load. Ramping up to rated speed during startup shall be delayed with a controlled rate of acceleration until engine oil pressure is assured. In the event of a DC power loss, the fuel system shall remain closed.

E. Acceptable manufacturers:

1. Caterpillar Advanced Diesel Engine Management System (ADEM A4)

2. Or equal as approved by the Engineer

2.4 RADIATOR, ENGINE MOUNTED

A. Heat rejected to the engine jacket water shall be discharged to the atmosphere through a close coupled radiator. The radiator shall be sized to cool the engine continuously while operating at full rated load and at site conditions.

B. A thermostatic valve shall be installed to maintain a constant temperature of the water leaving the engine.

C. The fan, fan drive, and fan belts shall be covered by a strong grille for personnel protection. The guarding shall conform to IEC 34-5, ISO and OSHA standards. Acoustically insulated drainable deflector shall be installed to direct discharge air vertically upward.

D. The cooling system shall be filled with a permanent anti-freeze solution capable of protecting the engine at a temperature of +15 degrees F.

E. The radiator cooling fan shall be a blower type driven from the engine.

F. Radiator shall be finned copper coils with copper alloy water boxes.

2.5 INLET AIR SYSTEM

A. The air cleaner shall be engine mounted with dry element requiring replacement no more frequently than 250 operating hours or once each year. The air cleaner shall be designed to permit easy replacement of the element.

2.6 EXHAUST SYSTEM

A. The exhaust silencer shall be critical grade and shall have manufacturer's published octave band insertion loss data demonstrating performance suitable for generator exhaust applications.

B. The exhaust system shall include flexible exhaust section and exhaust silencer. The exhaust system shall effectively reduce exhaust noise.

1. The flexible section shall consist of a convoluted seamless stainless steel tube without joints or packing and with flanged ends.

2. Flanges shall match the engine exhaust outlet connection and shall be ANSI 150 lb drilling unless otherwise required by the engine manufacturer.

3. The flexible section shall be capable of absorbing vibration of the engine and of compensating for the expansion and contraction due to heat of the exhaust gases.

4. The exhaust system shall be designed and installed to prevent rainwater or condensate from draining back toward the engine.

5. Factory-assemble and support all piping, hangers, clamps, connectors, silencer, and appurtenances. All welds and fittings shall be air tight.

6. Exhaust components exposed to weather shall be protected with a high-temperature coating suitable for exhaust service.

7. Install thermal insulation over the exhaust system.

C. If exhaust direction is horizontal, terminate piping with a weather-protected outlet arranged to prevent rain entry.

D. Acceptable manufacturers:

1. Riley-Beaird, Inc.

2. Maxim Silencer

3. Harco Exhaust Silencer

4. Or equal as approved by the Engineer

2.7 WIRING AND CONDUIT

A. Engine and generator control wiring shall be multi-strand, minimum 14 gauge, insulated copper wire rated at 600 volts AC, 90 degrees C dry or wet, resistant to heat, abrasion, oil, water, antifreeze, and diesel fuel. Each cable will be heat stamped throughout the entire length to identify the cable's origin and termination.

Cables shall be enclosed in nylon flexible conduit which is slotted to allow easy access and moisture to escape. Reusable bulkhead fittings will attach the conduit to generator set mounted junction boxes.

B. For other power and control wiring, provide conduit and low voltage power and control wiring as specified in Section and 26 05 19.

2.8 JACKET HEATER

A. Engine shall be provided with 208 volt AC, single-phase general purpose water jacket heater with thermostat. On vee type engines, two heaters shall be provided. The heaters shall be sized to maintain the engine at 90 degrees F with 20 degrees F ambient and include adjustable thermostats. All heaters shall be automatically deactivated while the engine is running.

B. The heater shall be hardwired to a panelboard that shall be provided as part of the diesel engine driven generator system.

C. Acceptable manufacturers:

1. Kim Hotstart Industrial Engine Pre-heaters and adjustable thermostat

2. Or equal as approved by the Engineer

2.9 STARTING SYSTEM

A. The engine starting system shall include 24 volt DC batteries, electric starting motor, starting relay, and automatic reset circuit breaker to protect against butt engagement. Starting system equipment shall meet the requirements of NFPA 110, Paragraph 5.6.4 – Prime Mover Starting Equipment for Level 1 installations.

B. The starting batteries for the unit shall be low maintenance, high output lead acid type, 24 volt system. Batteries shall be mounted in a leak proof, rubber or plastic lined, caustic resistant frame and enclosure. Batteries shall be provided with intercell connectors, bolts, racks, and accessories as required for a complete system. The batteries shall have a full warranty for two (2) years and shall have a minimum one minute rating of 1400 amperes to a voltage of 1.0 volts per cell.

C. The batteries shall be accessible from the outside of the sound enclosure using pad-lockable doors.

D. Acceptable manufacturers:

1. Alcad

2. Hoppecke

3. Or equal as approved by the Engineer

2.10 BATTERY CHARGER

A. Provide a 24 volt automatic float battery charger with constant voltage regulation, suitable for maintaining the diesel engine driven generator set starting batteries. The rated output shall be such that this rating is not exceeded when charging the batteries from a totally discharged condition back up to equalize voltage. Chargers shall operate at 120 volts AC, single phase 60 Hz, hardwired to a local panelboard that shall be provided as part of each diesel engine driven generator system.

B. Provide battery chargers that meet the requirements of NFPA 110, Paragraph 5.6.4 – Prime Mover Starting Equipment for Level 1 systems.

C. The battery chargers shall be accessible from the outside of the sound enclosure using pad-lockable doors.

2.11 SOUND ENCLOSURE

A. General:

1. Enclosure shall be designed and constructed for use with UL 2200 listed generator set package. Enclosure shall be factory installed as part of the package generator assembly

2. Construction: 14-gauge steel, polyester powder coating. Stainless steel fasteners

3. Provide lockable, double-door access on both sides of unit. Doors shall fully open (180 degrees).

4. Lube oil drain and coolant drain shall extend to the outside of the enclosure for access, and shall terminate with manual drain valves.

5. Lockable access for oil fill, coolant fill, distribution circuit breakers, local panelboard, load bank control panel, battery, and battery charger access.

6. Externally mounted emergency stop pushbutton, appropriately identified for the purpose. Pushbuttons shall be heavy duty, corrosion resistant, watertight type mounted in NEMA 4 steel enclosures. Pushbuttons shall be provided with a shroud or other means to prevent inadvertent or accidental operation.

7. Control panel viewing window and radiator sight window

8. Interior enclosed and gasketed fluorescent lighting fixtures and weatherproof light switch, specified in Section 26 27 26. Light fixtures shall operate on 120 volt AC, single phase input power hardwired to a local panelboard that shall be provided as part of each diesel engine driven generator system.

9. Acoustic insulation, 2" minimum thickness, for sound attenuation of at least 15 dBA. Insulation shall be UL 94-HFI flame rating.

10. External sound power level, nominal 73 dBA at 7 meters

11. No wood or other combustible or flammable materials shall be incorporated as part of the enclosure.

2.12 GENERATOR

A. General:

1. The generator shall be rated for continuous standby service at 500 kW, 625 kVA, 0.8 power factor, 480 VAC, three phase four-wire, 60 Hz, 1800 rpm.

2. The generator shall be capable of starting loads with a transient voltage dip on application of each step not exceeding 10 percent of rated voltage.

3. The generator shall be close-coupled, open drip-proof, single bearing construction, brushless revolving field, synchronous alternating current type with windings in the pole faces of the rotating field.

4. The generator shall be supplied with a side mounted terminal box which is designed to accommodate the connections to the load.

5. The rotor assembly shall demonstrate 125 percent over speed capability at 170 degrees C for 2 hours. Rotor dynamic, two plane balance shall not exceed 0.002 inch peak to peak amplitude at operating speed. All rotating components shall be secured with SAE Grade 8 hardware.

6. All winding insulation materials shall be Class H with no more than a Class B temperature rise in accordance with NEMA standards. No materials shall be used which support fungus growth. Materials shall be impervious to oil, dirt, and fumes encountered in diesel engine operating environments.

7. The generator shall be supplied with permanent magnet generators (PMG) to provide power to the voltage regulator.

B. Frame: The generator frame shall be fabricated from heavy steel members welded to the end bell or bearing bracket pilot rings. The generator feet shall be welded to the frame. Eye bolts shall be fastened to the generator frame to facilitate lifting of the generator with an overhead hoist. Steel wrapper cover shall enclose the frame assembly.

C. Stator: The generator stator core shall be constructed of laminated electrical grade steel. The laminations shall be secured under pressure and clamped to steel end rings. Windings shall be inserted into the stator slots and the entire assembly shall be vacuum pressure impregnated with 100 percent epoxy resin. The stator leads shall terminate in standard connection lugs for connection to bus bar terminal assemblies.

D. Rotor:

1. The shaft shall be machined from high strength steel stock or forging. The mechanical centerline shall be scribed on the drive end for proper alignment.

2. The spider shall be laminated, and be an integral part of the rotor pole.

3. The poles shall be individually punched of high strength laminations which are held together with rivets or bolts. The field windings shall use insulated copper wires which are wet layer wound on the laminated poles. The wound poles shall be anchored to the spider with specially made tapered keys. Damper bars shall be inserted below the surface of the pole face and shall be welded/brazed to a continuous shorting ring or plate. The rotor assembly shall be shrunk and keyed on the shaft. The rotor shall be dynamically balanced to assure compliance with NEMA vibration limits and long bearing life. A dynamically balanced blower shall be mounted on the shaft at the drive end.

E. Exciter:

1. The generator exciter shall be brushless with the circuit consisting of an inverted synchronous AC generator with the field winding stationary and three-phase armature windings rotating with the generator rotor. The AC output shall be rectified through a three-phase full wave semiconductor bridge rectifier mounted on the rotor shaft.

2. The exciter armature shall be constructed from laminations and riveted under pressure. The three-phase windings shall be inserted in the slots and the entire assembly shall be vacuum pressure impregnated with 100 percent epoxy resin. The exciter armature shall be pressed on a tubing and keyed into position.

3. The three-phase full wave rectifier shall be constructed of three forward and three reverse diodes, and shall be mounted on two separate rings acting as negative and positive polarity heat sinks. The rectifier assembly shall be keyed on the same tubing as the exciter armature. Both the exciter armature and the rectifier assembly shall be dynamically balanced. The sleeve tubing shall be pressed and keyed on the main rotor shaft.

4. The exciter stator shall be constructed of laminations stacked under pressure and welded. Field windings shall be inserted and the entire assembly vacuum pressure impregnated with 100 percent epoxy resin. The stator shall be mounted on the bearing bracket.

F. Permanent Magnet Generator: The permanent magnet generator (PMG) shall provide power to the voltage regulator under all operating conditions regardless of the main generator output. The PMG shall be a single-phase AC generator with rotating permanent magnets providing excitation.

G. Bearings: Provide regreasable type bearings with grease fill and drain ports.

H. Generator shall be provided with 120 volt AC, single phase space heaters and thermostats, hardwired to a local panelboard that shall be provided as part of each diesel engine driven generator system.

I. Acceptable manufacturers:

1. Caterpillar

2. Or equal as approved by the Engineer.

2.13 VOLTAGE REGULATOR

A. The voltage regulator shall be digital, microprocessor based, with fully programmable operating and protection characteristics. The regulator shall be capable of sensing true RMS voltage in all three phases of the generator output, or operating in single phase sensing mode. The regulator shall exhibit the following operational characteristics:

1. Generator output voltage maintained within ±0.25 percent at steady state conditions.

2. Generator output voltage maintained within ±0.25 percent of rated value for any load variation between no load and full load.

3. Generator output voltage drift less than ±0.25 percent of rated value at constant temperature.

4. Generator output voltage drift less than ±0.5 percent of rated value within a 40 degree change in temperature over an ambient temperature range of -40 degrees C to 70 degrees C.

5. Response time of less than 20 milliseconds

6. Voltage buildup with generator output as low as 6 volts

7. At full throttle engine starting, the regulator output voltage overshoot shall be less than 5 percent of its rated value with respect to the volts per hertz curve (meets ISO 8325-3 Class G2 Specifications).

8. Power dissipation of 55 watts at 15 amperes under normal operating conditions; less than 55 ma while at rest

9. Telephone Influence Factor (TIF) of less than 50

10. Electromagnetic Interference/Radio Frequency Interference (EMI/RFI) suppressed to MIL Standard 461C, Part 9, and VDE 875, level N

11. Maintain stable voltage control with 20 percent total harmonic distortion

B. The regulator shall include the following features:

1. A voltage level rheostat to provide generator output voltage adjustment from -10 percent to +10 percent of nominal voltage, in addition to a programmable output voltage level from -25 percent to +25 percent

2. Automatic gain adjustment to provide output voltage compensation for changes in load or frequency

3. Manual gain adjustment from 0 to 10 percent to provide compensation for line losses between generator output terminals and the load

C. The regulator shall allow system parameter setup and monitoring, and provide fault alarm and shutdown information through a diagnostic interface allowing connection to an external personal computer (not provided). The regulator shall be factory set and field programmable for the following:

1. Voltage output

2. Minimum voltage

3. Voltage droop/crosscurrent adjustment

4. Voltage gain (IR compensation)

5. Internal voltage gain

6. Current output

7. Field current variation

8. Single or three phase sensing

9. Dual voltage/frequency slopes

10. Slope intersect (knee) frequency

11. Under frequency set point

12. Overvoltage trip

13. Overvoltage trip time

D. The regulator shall include the following alarm and shutdown features:

1. Overvoltage/undervoltage

2. Overexcitation

3. Loss of excitation

4. Rotating diode failure

5. Instantaneous overcurrent trip

6. Loss of sensing

7. Loss of frequency

8. EEPROM failure

E. The regulator shall be protected against long term overcurrent conditions. Generator output shall shut off when shorted, or when the excitation current exceeds normal values for more than 15 seconds. The regulator shall not be damaged or operate improperly when subjected to an open or shorted input due to sensing loss, or when the sensing source has shorted to ground or an adjacent conductor.

F. The regulator module shall be in a shock resistant plastic housing, and shall withstand shock tolerances of up to 20 g's, vibrations of 4.5 g's (peak) between frequencies from 18 to 2000 hertz in three perpendicular planes, and mechanical shocks of 15 g's in all three planes.

G. The regulator shall be suitable for operation in a temperature range from -40 degrees C to 70 degrees C.

H. The regulator shall be salt spray resistant as described by MIL Standard 810-C, Method 509.1 and ASTM B117.

I. The regulator shall be manufactured by the supplier of the engine-generator set.

2.14 HIGH TEMPERATURE INSULATION BLANKETS

A. General: Exhaust silencer and exhaust piping shall be insulated with high temperature insulation blankets.

B. Materials: Blankets shall consist of a woven 300 series stainless steel wire mesh liner, Type E fiberglass insulation (MIL Spec Mil-I-16411-E), and a cold face of flexible silicone-impregnated fiberglass cloth.

C. Construction:

1. Blanket thickness shall be 1-inch and have a density of 11.3 lbs per cu. ft. minimum.

2. The blankets shall be custom fitted to tightly cover pipe, flanges, flexible connector, and exhaust silencer.

3. All edges of cold face cloth shall be machine stitched with permanently mounted stainless steel hooks. Blankets shall be laced in place with stainless steel tie wire and shall be readily removable for equipment maintenance.

D. Acceptable manufacturers:

1. Advanced Thermal Products, Inc. Type D Filomat

2. Plant Insulation Co., Emeryville, CA, Harmat 11.3#/1200F

3. Or equal as approved by the Engineer

2.15 ENGINE MOUNTED CONTROL PANEL

A. General: Provide an engine mounted UL listed control panel for local monitoring, control, and indication of engine parameters. The control panel shall be housed in a NEMA 1 enclosure located within the weatherproof generator enclosure, vibration isolated from the engine assembly, and suitable for NFPA 110 Level 1 emergency power system installations.

B. Panel shall include an LCD display to monitor the following parameters:

1. Speed

2. Engine Intake Manifold Temperature

3. Exhaust Temperature

4. Engine Oil Pressure

5. Fuel Pressure

6. DC battery voltage

7. Fuel consumption rate

8. Total fuel consumption

9. Operating hours

10. Generator AC Voltage, each phase, line to line, 1 percent accuracy

11. Generator AC current, each phase, 1 percent accuracy

12. Generator power, kW total and per phase

13. Generator power, kVA total and per phase

14. Generator power, kVAR, total and per phase

15. Generator power, kWh total

16. Generator power, kVARh total

17. Generator power factor, average and per phase

18. Generator percent of rated power, total

19. Generator frequency

20. Real time clock

21. Stamps event code, hour of first and last, total occurrences

22. Sensor diagnostics, open, shorted

C. Provide panel with a local annunciator that includes all the safety indicator functions that meets the requirements of NFPA 110, Table 5.6.5.2 – Safety Indications and Shutdowns for Level 1 systems, and include the following additional status/fault indicators and optional shutdowns:

1. Diagnostic LED status indicators: One red, one amber

2. Engine status indicators: Run, auto, stop

3. Engine protection alarms with configurable High/Low limits

4. High coolant temperature alarm indication

5. Any distribution circuit breaker (serving loads within the packaged engine-generator assembly) trip alarm indication

6. Low coolant level shutdown

7. The battery charger AC failure alarm shall be provided with an adjustable time delay (on delay) with a range of 1 to 999 seconds

D. The panel shall include the following controls:

1. Emergency stop pushbutton (externally mounted on the outside of the sound enclosure)

2. Three position control switch: Run, Auto, Off

3. Lamp test pushbutton

4. Alarm acknowledge pushbutton

5. Keypad for access to LCD display values

E. The panel shall be provided with an optional programmable relay output module with relay outputs for customer external alarm and status signal interconnections. Relay outputs shall be programmed to provide the following:

1. Generator in auto (two outputs)

2. Generator running (two outputs)

3. Battery system common alarm (two outputs)

4. Generator common alarm (two outputs)

5. Two spare output contacts minimum

6. One output powered from the generator control system 24 VDC batteries to energize the fuel oil solenoid open when the generator is running

7. Two outputs powered from the generator control system 24 VDC batteries to energize fuel system anti-siphon solenoid valves specified in Section 33 56 13.13 – Aboveground Diesel Fuel Storage Tanks and Accessories to open when the generator is not running.

8. Two outputs powered from the generator control system 24 VDC batteries to shunt trip the low voltage distribution circuit breakers that feed the ATS's specified in Section 26 36 23, and also the Load Banks specified in this section, when the "low fuel main tank" externally generated alarm contact is received.

F. The control panel shall be provided with an Ethernet communications interface wired to field terminal blocks for customer connection.

G. The panel shall be manufactured by the diesel engine-driven generator set manufacturer.

H. Supply generator with optional input expansion module, output expansion module, and remote annunciator module.

I. Acceptable manufacturers:

1. Caterpillar EMCP 4.4

2. Or equal as approved by the Engineer

2.16 LOW VOLTAGE DISTRIBUTION CIRCUIT BREAKERS

A. Provide generator mounted low voltage distribution circuit breakers, quantity and size as shown on the drawings. Circuit breakers shall be UL listed, three pole, with shunt trip and auxiliary contacts, and shall be capable of being padlocked in the OPEN position or shall be in a padlockable enclosure. For additional requirements, see Section 26 28 16.

B. The distribution circuit breakers shall be accessible from the outside of the sound enclosure using pad-lockable doors.

2.17 LOAD BANK

A. General:

1. Provide stationary, 50% rated, resistive, engine radiator forced air-cooled load bank. Load banks shall be suitable for installation within the engine radiator air outflow.

B. Provide 250 kW, 480 volt, 3-phase, 60 Hz resistive load bank.

C. Load bank shall be constructed from galvanized steel, formed into a rigid enclosure to match the height and width of the engine radiator or duct, designed for NEMA 3R outdoor construction. Include lifting eyes and radiator duct flanges for a complete installation.

D. Resistive load elements shall be constructed from corrosion resistant materials such as chromium alloy wire, and shall be suitable for operation at the full range of output temperatures from the diesel engine driven generator system. Provide load steps at 50 kW intervals from no load to full load.

E. Load banks shall be completely cooled from the diesel engine driven radiator fan cooling air; additional cooling systems shall not be required for proper operation.

F. Provide local load bank control panels with power ON/OFF switch, master load ON/OFF switch, individual step toggle switches for application of load steps, and manual/auto switch for control of an automatic load step controller. The control panel shall be housed in a NEMA 4 enclosure and operate from 120 volt AC, single phase, 60 Hertz input power, hardwired to a local panelboard that shall be provided as part of each diesel engine driven generator system. The control panels shall be accessible from the outside of the sound enclosure using pad-lockable doors.

G. Acceptable manufacturers:

1. Avtron Resistive Load Banks

2. Simplex Radiator Airflow Cooled Stationary Load Banks

3. Or equal as approved by the Engineer

2.18 PANELOARDS

A. General: Provide local lighting panelboard to power auxiliary loads for the diesel engine driven generator systems. Power the local panelboard from an external source as shown on the Contract Drawings.

B. Panelboard shall be rated for 100 amperes minimum continuous current at 120/208 volts AC, 3-phase, 4-wire, and 10,000 amperes RMS symmetrical interrupting capacity. Panelboards shall be provided with a main circuit breaker, and branch circuit breakers sized for the loads in accordance with the CEC. Provide the

panelboard with six installed spare 20 ampere single pole circuit breakers. Panelboard enclosure ratings shall be NEMA 4. The panelboard shall be accessible from the outside of the sound enclosure using pad-lockable doors.

C. For additional requirements, see Section 26 24 16.

2.19 INSTRUCTION AND NAMEPLATES

A. The engine and generator shall have corrosion resistant nameplates, which shall be mounted in locations approved by the Engineer. An engraved plastic operating placard shall be mounted on or adjacent to the control panel.

B. Placards shall be a summary of start-up, running, and shutdown operations for the engine and generator. Each operational step shall be covered by direct or succinct statements. Layout and wording of the placard shall be approved by the Engineer.

2.20 DESCRIPTION OF OPERATION

A. General:

1. Under normal operations, the distribution circuit breakers are closed, and the Engine Control Switch is placed in the AUTO position.

B. Manual operation: The diesel engine driven generator set shall manually start and stop in response to controls located at the local control panel. Manual operation shall occur in the following steps:

1. To start the engine-generator set:

a. Place the Engine Control Switch in the "RUN" position.

2. To stop the engine-generator set:

a. Place the Engine Control Switch in the "STOP" position.

C. Automatic operation: The engine-generator set shall automatically start and stop in response to controls located at automatic transfer switch. Automatic operation shall occur in the following steps:

1. Place the Engine Control Switches in the "AUTO" position.

D. Provide an adjustable time delay from 0 to 30 minutes which shall delay the "STOP" signal to the engine-generator set so that it may run unloaded after a "STOP" signal is received. The timer circuits shall be active during both manual and automatic operations.

E. Shutdowns: The engine-generator set shall stop immediately, and shall be prevented from starting, after one or more of the shutdown alarms listed in NFPA 110, Table

5.6.5.2 – Safety Indications and Shutdowns for Level 1 systems or any the following alarms have occurred, regardless of the mode of operation (MANUAL or AUTO):

1. High coolant temperature
2. Low coolant level
3. Overcurrent
4. Any distribution circuit breaker trip

PART 3 - EXECUTION

3.1 GENERAL

A. Perform the work in a workmanlike manner with craftsmen skilled in the particular trade. Provide equipment and work presenting a neat and finished appearance.

3.2 FACTORY QUALITY CONTROL

A. General:

1. The diesel engine driven generator system panel shall be tested by the manufacturer to demonstrate ability to generate power without distress to any component. The Engineer shall witness all tests. The Supplier shall give the Engineer two weeks advance notice of all tests. Testing shall consist of no less than one trip per Article 1.6 for each assembled diesel engine-driven generator system. The Supplier shall pay for all District travel expenses for two (2) District employees related to the inspection and witness testing including hotel fees, airfare, rental car fees, and meals.

2. Tests are to determine proper operation and capacity of the equipment and to demonstrate compliance with the specifications. All equipment that fails any test will be rejected, and complete retesting will be required after the Supplier makes corrections or modifications to equipment which has previously failed any test.

3. The engine-generator shall be factory tested to assure compliance with the specifications, NEMA MG 1, and the manufacturer's quality control provisions. Provide electronic copies of all factory test reports to the Engineer for review and approval prior to shipment.

4. The Supplier shall provide load bank, fuel, test equipment, labor, materials, and all other equipment and services required for all tests.

5. The Supplier shall submit detailed factory test procedures to the Engineer for review. Tests shall not begin until the Engineer has approved the test procedures.

B. The following measurements and tests shall be made on the generator and the exciter:

1. Resistance of armature and field windings

2. Exciter field current at no load with normal voltage and frequency on the generator

3. High potential tests of the generator field windings, exciter armature windings, and exciter field windings

C. Load Tests:

1. The engine-generator set shall be tested under load.

2. Demonstrate motor starting capability of the engine-generator set. Voltage dips shall be measured and recorded to demonstrate conformity to the specifications. Stepped testing using the skid-mounted load bank is acceptable for purposes of this test.

3. Each engine-generator shall be operated for 1/2 hour at one half the kW rating at 0.8 power factor.

4. Each engine-generator shall also operate for four hours continuously at 100 percent of its kW rating at 0.8 power factor. The engine water temperatures shall not exceed manufacturer's recommended operating temperature during this test.

5. The temperature rise of the windings of the generator shall be measured using the embedded temperature detectors.

6. During the load tests, the following parameters shall be recorded at 15 minute intervals:

a. Time

b. Water temperature

c. Oil pressure

d. Fuel pressure

e. Exhaust temperature

f. Speed

g. Voltage output (phase-to-phase)

h. Amperage (each phase)

i. Power factor

j. Kilowatts

k. Generator winding temperature

7. The radiator mounted load bank shall be tested for proper operation in each control mode (manual and auto), and at each step interval.

D. Distribution Circuit Breaker Tests:

1. Visual and Mechanical Inspection:

a. Compare equipment nameplate data with drawings and specifications.

b. Inspect physical and mechanical condition.

c. Inspect anchorage and alignment.

d. Verify the unit is clean.

e. Operate the circuit breaker to insure smooth operation.

f. Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data.

g. Inspect operating mechanism, and contacts.

E. Alarm, Control, and Monitoring Equipment Tests:

1. Each alarm and safety shutdown provision shall be demonstrated by being caused by the abnormal condition unless an alternative test condition has been approved by the Engineer prior to the scheduling of the tests.

2. Each protective device, control circuit and monitoring device shall be operated to demonstrate its proper operation.

F. Batteries and Battery Charger:

1. Inspect and test the batteries and battery charger for conformance with these specifications prior to shipment. The Supplier shall provide factory test procedures for the batteries and battery charger to the Engineer for review and approval, in accordance with these specifications.

2. Each protective device, control circuit and monitoring device shall be operated to demonstrate its proper operation.

END OF SECTION

SECTION 26 36 23

AUTOMATIC TRANSFER SWITCHES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes

1. Automatic transfer switch (ATS) installed on emergency power system. The transfer switch and identification to be provided is as follows:

a. ATS-01

2. ATS shall be furnished as an integrated component of the switchboard lineup. See Section 26 24 13, Switchboards.

3. Although such work is not specifically indicated, furnish and install all supplementary or miscellaneous items, appurtenances, and devices incidental to or necessary for a sound, secure, and complete installation.

B. Related Sections:

1. Section 00 72 00 – General Conditions

2. Section 01 33 00 – Submittal Requirements

3. Section 01 43 11 – Seismic Qualification and Certification

4. Section 01 81 02 – Seismic Design Criteria

5. Section 26 05 19 – Low Voltage Electrical Power Conductors and Cables

6. Section 26 05 33 – Identification for Electrical Systems

7. Section 26 27 26 – Wiring Devices

8. Section 26 32 13.13 – Diesel Engine Driven Generator Set

1.2 QUALITY ASSURANCE

A. The equipment furnished under this section shall be the product of a manufacturer who has produced this same type of equipment for a period of at least 5 consecutive years.

B. The transfer switch shall be manufactured in a certified ISO Standard 9001 facility.

1.3 SUBMITTALS

A. Submit shop drawings and product data in accordance with Section 01 33 00 – Submittal Procedures.

B. Furnish submittals for approval as outlined below:

1. Product data
2. Warranty
3. Bill of materials
4. Manufacturer's nameplate data
5. Plan, front, and side view drawing including overall dimensions, weights, and mounting details
6. Internal schematics (elementary diagrams), wiring diagrams, and point-to-point interconnection diagrams for all connections
7. Physical drawings showing equipment arrangement and terminal block locations
8. Equipment seismic qualifications, seismic calculations, and anchorage details as specified in Sections 01 43 11, 01 81 02, and this section
9. Training schedule
10. Complete installation and instruction manuals
11. As-built documents and Operation and Maintenance (O&M) manuals
12. Spare parts list
13. Factory acceptance testing reports

1.4 REFERENCES

A. Automatic Transfer Switch shall be designed, built, tested, and installed in accordance with the latest editions and revisions of the following:

1. Underwriters Laboratories (UL):
   a. UL 1008 – Automatic Transfer Switches
2. National Fire Protection Association (NFPA):
   a. NFPA 110 – Standard for Emergency and Standby Power Systems

b. NFPA 70 – National Electrical Code

3. Institute of Electronic and Electrical Engineers

a. IEEE 446 – Recommended Practice for Emergency and Standby Power Systems.

4. National Electrical Manufacturers Association

a. NEMA – AC Automatic Transfer Switch Equipment

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with these specifications, the typical equipment, systems and accessories installed shall be manufactured by:

1. ASCO, 300 Series

2. GE, Zenith, ZTS Series

3. Russelectric Inc., RMT Series

4. Or equal as approved by the Engineer

2.2 AUTOMATIC TRANSFER SWITCH

A. The switch shall be rated and UL listed for emergency use and be open transition type, 3-pole suitable for 600 VAC, 3-phase, 60 Hz operation with ampere rating as indicated on the Contract Drawings.

1. Separately mounted in NEMA 3R switchboard enclosure within the switchboard lineup, as shown in the Contract Drawings.

2. Capable of switching all classes of load, and rated for continuous duty when installed in a non-ventilated enclosure

3. 6 cycle or less closing and withstand current rating: 65,000 amperes RMS minimum

4. Complete with all accessories; Nameplate with Standard UL-1008 listing acceptable for use on emergency systems or life safety systems

5. Double throw, actuated by 2 electrical operators, momentarily energized and connected to a simple over-center linkage

a. Minimum transfer time of 400 milliseconds. Provide adjustable transfer time delay, 1-300 seconds factory set at 3 seconds.

b. Switches shall be capable of transferring successfully in either direction with 70 percent of rated voltage applied to the terminals.

6. The time delay between the opening of the closed contacts and the closing of the open contacts shall allow for voltage decay before transfer, allowing the motor and transformer loads to be re-energized after transfer with normal in-rush current.

7. Normal and Emergency Contacts: Positively interlocked mechanically and electrically to prevent simultaneous closing.

   a. Main contacts shall be of silver-tungsten alloy, mechanically locked in position in both the normal and standby positions without the use of hooks, latches, or magnets.

   b. Provide separate arcing contacts with magnetic blowouts on each pole.

   c. Interlocked molded case circuit breakers, switches or contactors are not acceptable.

8. Equip transfer switch with a permanently attached, safe, manual operator designed to prevent injury to personnel in the event the electrical operator should become energized during manual transfer.

   a. Manual operator shall provide the same contact-to-contact transfer speed as the electrical operator to prevent a flashover from slowly switching the main contacts.

   b. Transfer switch shall have an external manual operator arranged so that the switch can be operated manually under full load without opening the enclosure door.

9. Switches: Capable of normal operation during and after seismic loading. Seismic loading shall not cause false operation.

10. Transfer switch shall include bypass-isolation switches so that transfer switch can be removed for testing or maintenance without load interruption. The bypass switch shall have the following:

    a. The same rating as the transfer switch

    b. Manually operated with quick make/quick break contact action

    c. Switch positions include automatic, bypass normal and bypass emergency

    d. Normal failure sensing and a time delay relay to start engine automatically if the ATS has been removed for service or fails

e. Include electrical and mechanical interlocks to prevent improper sequence.

B. Include a test switch to simulate normal power failure and mount pilot lights on the switchboard cabinet door housing the ATS to indicate switch position.

C. Relays, timers, control wiring, and accessories shall be front accessible.

D. Identify control wire terminations by tubular sleeve-type markers at both ends in accordance with the approved shop drawings.

E. Provide control relays, timers, terminal blocks, wiring, and similar equipment in accordance with the relevant individual specification sections of this contract.

F. The transfer switch shall be equipped with a microprocessor based control panel mounted on the switchboard cabinet door housing the ATS.

2.3 PERFORMANCE

A. Should the voltage of the normal source drop below 80 percent on any phase after an adjustable time delay of 0.5-3 seconds to allow for momentary dips, transfer to the emergency source shall occur.

B. Transfer to the emergency power source shall occur when 90 percent of rated voltage and frequency has been obtained by the emergency generator.

C. After restoration of normal power on all phases to 90 percent of rated voltage, an adjustable time delay period of zero to 60 minutes shall delay retransfer to the normal source to allow for stabilization of normal power.

D. After retransfer to the normal source, the emergency generator shall operate unloaded for a nominal 5 minute adjustable cool down period before shutdown.

2.4 ACCESSORIES

A. Provide automatic transfer switch with the following features:

1. Time delay relays to control contact transition time on transfer to either source, pneumatic type, adjustable 1-300 seconds

2. Test switch to simulate normal power failure

3. Relay contacts which close when normal source fails

4. Relay contacts which open when normal source fails

5. 2 auxiliary contacts rated 15 amperes at 120 VAC on main shaft, closed on normal

6. 2 auxiliary contacts rated 15 amperes at 120 VAC on main contacts, closed on standby

7. Pilot lights to indicate transfer and bypass switch position

2.5 OPERATIONAL TESTING FEATURES

A. Provide a means to automatically start and run the emergency generator for a set period of time for the purpose of testing or exercising the complete engine, generator, and load transfer control.

B. After completion of the set period of time for testing and exercising, the emergency source shall automatically shut down.

C. Such periods for testing or exercising to be adjustable in multiples of 15 minutes per period with the period repeated on any combination of days over a cycle of 7 days before recycling.

D. During the period of testing or exercising, emergency power shall not automatically assume its load.

PART 3 - EXECUTION

3.1 FACTORY QUALITY CONTROL

A. Factory qualification tests shall be performed on transfer switch samples of identical design and rating as the specified equipment. These tests shall be conducted without the use of current limiting fuses unless such fuses are specifically part of the tested transfer switch assembly.

B. Oscillograph recordings across the main contacts shall demonstrate that no contact separation occurs and that electrical continuity is maintained across all phases during the short circuit withstand and closing tests.

C. Temperature rise testing shall be conducted in accordance with UL 1008. A post endurance temperature rise test shall also be performed after completion of the overload and endurance tests to verify the transfer switch can continue to carry full rated current.

D. Verify the ability of the transfer switch to carry full rated current after completing the overload and endurance tests

END OF SECTION

ELECTRICAL GENERAL NOTES

1. PROVIDE FIRE STOPPING SYSTEMS FOR CONDUIT AND RACEWAY SYSTEMS AT PENETRATIONS, SLEEVES, AND SLOTS OF FIRE RATED CONSTRUCTION FOR HORIZONTAL AND INTRABUILDING PATHWAYS AND SPACES.
2. ALL HOLES THROUGH MASONRY SHALL BE MADE WITH CORE DRILLS IF NOT SLEEVED THROUGH THE WALLS. IF CONDUITS REQUIRE CORE DRILLING, OTHER METHODS SUCH AS CHISELING OR HAMMERED OUT OPENINGS ARE NOT ACCEPTABLE. THE HOLES SHALL BE MADE NO LARGER THAN ¼ LARGER DIAMETER THAN THE CONDUIT. ALL OPENINGS SHALL BE GROUTED USING CONSTRUCTION-GRADE NON-SHRINK GROUT WHERE INSTALLED THROUGH CONCRETE AND CAULKED USING CONSTRUCTION-GRADE NATURAL CURE SILICONE CAULK WHERE INSTALLED THROUGH SIDING MATERIALS IF SHOWN, DRYWALL OR OTHER FINISHES ABOVE FINISH GRADE.
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ROUTING ALL CONDUITS NOT SHOWN ON THE PLANS. THIS SHALL INCLUDE ALL CONDUITS SHOWN ON THE ONE-LINES AND HOME-RUNS SHOWN ON THE PLAN DRAWINGS.
4. ALL CONDUITS LEAVING OR ENTERING PANELS, ENCLOSURES, AND SWITCHBOARDS FROM EXTERIOR OR COLD AREAS SHALL BE DUCT SEALED AT BOTH ENDS.
5. ALL INDOOR BUILDING CONDUIT PENETRATIONS INTO TOP, SIDE, OR BOTTOM OF ELECTRICAL ENCLOSURES ARE REQUIRED TO BE MADE USING MYERS HUBS FOR TERMINATION OF ELECTRICAL CIRCUITS.
6. ALL OUTDOOR BUILDING CONDUIT PENETRATIONS INTO SIDE OR BOTTOM OF ELECTRICAL ENCLOSURES ARE REQUIRED TO BE MADE USING WATERTIGHT MYERS HUBS FOR TERMINATION OF ELECTRICAL CIRCUITS. TOP CONDUIT PENETRATIONS INTO OUTDOOR INSTALLED ENCLOSURES IS PROHIBITED.
7. WHEN CONNECTIONS ARE COMPLETE IN THE CONNECTION BOX, COAT THE TERMINAL BLOCKS AND WIRE ENDS WITH PROTECTIVE COMPOUND, NO-OXIDE OR EQUAL, TO PREVENT CORROSION.
8. ALL PULL BOXES SHALL BE SIZED AS REQUIRED, WITH A MINIMUM SIZE OF 12” x 10” x 8”, UNLESS NOTED OTHERWISE, IN ACCORDANCE WITH NEC SECTION 314.28.
9. USE STAINLESS STEEL FASTENERS FOR MOUNTING OF JUNCTION BOXES OR OTHER DEVICES.
10. PROVIDE EQUIPMENT SUPPORTS, PIPE, AND DUCT HANGERS, AS REQUIRED TO SAFELY AND PERMANENTLY CARRY THE WEIGHT OF EQUIPMENT.
11. FACTORY SWEEPS SHALL BE USED AT ALL CONDUIT BENDS. FIELD BENDS ARE NOT ACCEPTABLE. WHEN FACTORY SWEEPS ARE UNAVAILABLE, SWEEPS SHALL BE SIZED TO MEET MINIMUM CABLE BENDING RADIUS OF 12 TIMES CABLE OUTER DIAMETER AND MAXIMUM SIDEWALL PRESSURE REQUIREMENTS.
12. PULL CABLES USING SUFFICIENT LUBRICATION PER CABLE MANUFACTURER’S RECOMMENDATIONS.
13. ALL BREAKERS SHALL HAVE TERMINALS RATED A MINIMUM OF 75°C.
14. ALL POWER CONDUCTORS FOR 480V AND BELOW SYSTEMS SHALL BE 600 VOLT RATED, STRANDED COPPER WITH TYPE THHN/THWN-2 INSULATION.
15. UNLESS SHOWN OTHERWISE, ALL LIGHTING & RECEPTACLE HOMERUNS SHALL BE 3/4" CONDUIT CONTAINING (AS A MINIMUM) (2) #12 AND (1) #12 GROUND.
16. SPARE WIRES SHALL BE TAPED AND COILED.
17. ALL WIRING (INTERNAL AND EXTERNAL) SHALL BE TAGGED AT BOTH ENDS WITH PREPRINTED WIRE MARKERS. THE CONTRACTOR SHALL SUBMIT THE WIRE MARKING CODE TO THE DISTRICT FOR ACCEPTANCE PRIOR TO THE MANUFACTURE OF THE EQUIPMENT.
18. LOCKOUT AND TAGOUT PROCEDURE SHALL BE COORDINATED WITH THE DISTRICT. LIVE/ENERGIZED WORK IS NOT ALLOWED WITHOUT PRIOR APPROVAL OF THE DISTRICT.
19. CONNECTORS FOR 480V AND BELOW RATED POWER CONDUCTORS: CONTRACTOR SHALL USE PRESSURE TYPE INSULATED TWIST-ON CONNECTORS FOR NO. 10 AWG AND SMALLER. USE SOLDERLESS MECHANICAL TERMINAL LUGS FOR NO. 8 AWG AND LARGER.
20. ALL WIRING INSTALLATIONS TO FOLLOW MANUFACTURER’S INSTRUCTIONS AND RECOMMENDATIONS.
21. THE CORRECTION OF ANY DEFECTS SHALL BE COMPLETED WITHOUT ANY ADDITIONAL CHARGE AND SHALL INCLUDE THE REPLACEMENT OR THE REPAIR OF ANY OTHER PHASE OF THE INSTALLATION, WHICH MAY HAVE BEEN DAMAGED THEREIN.
22. ALL ABOVE-GROUND RACEWAYS SHALL BE GALVANIZED RIGID STEEL (GRS) CONDUIT. ALL UNDERGROUND CONDUITS SHALL BE SCHEDULE 40 RIGID PVC. CONDUITS TRANSITIONING FROM BELOW GRADE TO ABOVE GRADE SHALL BE PVC-COATED RIGID STEEL CONDUIT, EXTENDING A MINIMUM OF 18 INCHES ABOVE FINISHED GRADE BEFORE CONTINUING AS GALVANIZED RIGID STEEL (GRS) CONDUIT.

MODULAR PLC PROGRAMMING & TESTING

1. CONTRACTOR SHALL PROVIDE NECESSARY PROGRAMMING OF MODULAR PLC SYSTEM TO FACILITATE INCORPORATION OF ANY DISCRETE AND ANALOG I/O INSTALLED IN THIS PROJECT ALONG WITH DEVICE CONNECTED VIA COMMUNICATING CABLING (ETHERNET).
2. COORDINATE WITH DISTRICT FOR THE INCORPORATION OF MODULAR PLC I/O AND DATA INTO DISTRICT OWNED AND PROGRAMMED SCADA SYSTEM.
3. CONTRACTOR SHALL FULLY FUNCTION TEST ALL I/O AND COMMUNICATION CABLE CONNECTED DEVICES FOR PROPER OPERATION. COORDINATE WITH DISTRICT FORCES FOR ANY ADDITIONAL FUNCTION TESTING AND COMMISSIONING SUPPORT FOR INCORPORATION OF MODULAR PLC SYSTEM INTO THE OVERALL SCADA NETWORK.

GROUNDING NOTES

1. GROUND RODS FOR THIS PROJECT SHALL BE ¾” X 10’ COPPER CLAD STEEL, UNLESS NOTED OTHERWISE.
2. MULTIPLE ROD GROUNDING SYSTEMS SHALL BE CONNECTED TOGETHER WITH 4/0 BARE STRANDED COPPER CABLE. ALL BELOW GROUND CONNECTIONS SHALL BE EXOTHERMIC WELDED (CADWELD).
3. PROVIDE 1” PVC CONDUIT SLEEVES FOR GROUNDING CABLE PENETRATIONS THROUGH CONCRETE FLOORS AND/OR WALLS.
4. CONNECTING SURFACES OF STEEL AND CABLES SHALL BE THOROUGHLY CLEANED TO BRIGHTNESS AND PREPARED PRIOR TO COMPLETING THE CONNECTION.
5. LOCATION OF GROUND RODS AND GROUNDING CABLE SHOWN ON GROUNDING PLAN DRAWING IS APPROXIMATE, UNLESS LOCATED BY DIMENSIONS. FIELD DETERMINE EXACT LOCATIONS TO SUIT JOB SITE CONDITIONS AND TO AVOID OBSTRUCTIONS. BRANCH GROUNDING CABLE CONNECTION TO MAIN GROUNDING CABLE SHALL BE TEE TAP AS SHOWN IN THE CONSTRUCTION DRAWINGS. INSTALL UNDERGROUND GROUNDING CABLE, IN GENERAL, A MINIMUM TWENTY-FOUR (24) INCHES BELOW FINISHED GRADE.
6. COMPLETELY AND EFFECTIVELY GROUND ELECTRICAL EQUIPMENT AS REQUIRED BY THE NEC AND EQUIPMENT MANUFACTURER.
7. TOP OF GROUND RODS SHALL BE EMBEDDED 12” MINIMUM BELOW GRADE.
8. A GROUND CONDUCTOR SIZED PER NEC ARTICLE 250 IS REQUIRED IN ALL CONDUITS.
9. ALL CONDUITS SHALL INCLUDE A SEPARATE EQUIPMENT GROUNDING CONDUCTOR.
10. LABEL ALL CONNECTIONS AT GROUND BUSBARS, EQUIPMENT, AND TEST WELLS. APPLY METAL TAGS TO CABLES; LABELS SHALL INDICATE CABLE PURPOSE AND POINT OF TERMINATION FOR THE OPPOSITE END OF CABLE.
11. ALL REQUIRED BONDS MAY NOT BE SHOWN; PROVIDE ADDITIONAL BONDS TO ALL DEVICES, INSTRUMENTS, CABINETS, CONTROL VALVES, ETC. AS REQUIRED TO COMPLY WITH UL AND NEC.
8. PROVIDE ELECTRICAL GROUNDING AND BONDING SYSTEM INDICATED WITH ASSEMBLY OF MATERIALS INCLUDING GROUNDING ELECTRODES, BONDING JUMPERS, AND ADDITIONAL ACCESSORIES AS REQUIRED FOR A COMPLETE INSTALLATION.
9. ALL GROUNDING CONDUCTORS SHALL PROVIDE A STRAIGHT DOWNWARD PATH TO GROUND WITH GRADUAL BEND AS REQUIRED. GROUNDING CONDUCTORS SHALL NOT BE LOOPED OR SHARPLY BENT. ROUTE GROUNDING CONNECTIONS AND CONDUCTORS TO GROUND IN THE SHORTEST AND STRAIGHTEST PATH POSSIBLE TO MINIMIZE TRANSIENT VOLTAGE RISES.
10. TIGHTEN GROUNDING AND BONDING CONNECTORS, INCLUDING SCREWS AND BOLTS, IN ACCORDANCE WITH MANUFACTURER'S PUBLISHED TORQUE TIGHTENING VALUES FOR CONNECTORS AND BOLTS. WHERE MANUFACTURER'S TORQUING REQUIREMENTS ARE NOT AVAILABLE, TIGHTEN CONNECTION TO COMPLY WITH TIGHTENING TORQUE VALUES SPECIFIED IN UL TO ASSURE PERMANENT AND EFFECTIVE GROUNDING.
11. ALL GROUNDING CONNECTIONS SHALL BE INSPECTED FOR TIGHTNESS, AND EXOTHERMIC WELDED CONNECTIONS SHALL BE APPROVED BY THE INSPECTOR HAVING JURISDICTION, BEFORE BEING PERMANENTLY CONCEALED.
12. ALL EXISTING GROUND BARS, WIRES, AND CONNECTIONS SHALL BE FIELD VERIFIED. ANY DEFICIENT ITEMS SHALL BE REPLACED AS REQUIRED TO ACHIEVE ADEQUATE GROUNDING REQUIRED
13. CONTRACTOR SHALL REPAIR, AND/OR REPLACE, EXISTING GROUNDING SYSTEM COMPONENTS DAMAGED DURING CONSTRUCTION AT THE CONTRACTOR'S EXPENSE.
14. ALL STEEL STRUCTURES AND ALL MISCELLANEOUS STEEL, INCLUDING LIGHT FRAMEWORK, STEEL SUPPORT STRUCTURES, AND METAL BUILDINGS, SHALL BE SOLIDLY CONNECTED TO THE EXISTING GROUNDING ELECTRODE SYSTEM WITH 4/0 BARE COPPER GROUND CABLE.

FIELD SERVICES & TRAINING

1. UPON REQUEST AND CONFIRMATION OF DISTRICT, CONTRACTOR SHALL COORDINATE WITH VENDORS TO PROVIDE MANUFACTURER’S FIELD SERVICES AND OPERATOR TRAINING FOR UP TO ONE (1) 2-HOUR SESSION UPON COMPLETION OF START-UP AND COMMISSIONING.
2. THE TRAINING DATE SHALL BE SELECTED BY THE DISTRICT. THE CONTRACTOR SHALL PROVIDE WRITTEN CONFIRMATION TO THE DISTRICT AT LEAST TWO (2) WEEKS BEFORE THE TRAINING IS HELD. AT THE SAME TIME, THE CONTRACTOR SHALL SUBMIT A TRAINING AGENDA, SPECIFIC TO THE PROJECT AND THE APPLICABLE SECTION. THE AGENDA SHALL INCLUDE A DETAILED COURSE OVERVIEW, COURSE OBJECTIVES, A COURSE OUTLINE, AND THE ESTIMATED DURATION OF EACH TOPIC.
3. CONTRACTOR SHALL ARRANGE FOR AND SECURE A VIDEOGRAPHER TO DIGITALLY RECORD AND PROFESSIONALLY EDIT THE TRAINING SESSION FOR EACH INSTALLED EQUIPMENT, SYSTEM, AND FACILITY. FINALIZED VIDEOS SHALL BE PROVIDED IN MP4 FORMAT BY ELECTRONIC TRANSFER.
4. THE TRAINING SHALL INCLUDE, BUT IS NOT LIMITED TO, THE GENERATOR, SWITCHBOARD, ATS, CONTROL PANEL, AND ASSOCIATED EQUIPMENT. IT SHALL ALSO PROVIDE A THOROUGH REVIEW OF THE FINAL APPROVED O&M MANUAL, DRAWINGS, AND DIAGRAMS (E.G., CONTROL WIRING), WITH TOPICS SPECIFICALLY ADDRESSING THE MAINTENANCE AND OPERATION OF ALL APPLICABLE EQUIPMENT, SYSTEMS, AND FACILITIES.

ELECTRICAL TESTING REQUIREMENTS

GENERAL FIELD TESTING

1. INSTALLATION OF THE ELECTRICAL EQUIPMENT SHALL BE COMPLETE AND THE ENGINE-GENERATOR PACKAGE SYSTEM SHALL BE SERVICED, ADJUSTED, AND READY FOR USE BEFORE THE FIELD TESTS ARE SCHEDULED.
2. REPAIRS AND ADJUSTMENTS SHALL BE MADE BY THE CONTRACTOR AS REQUIRED TO ACHIEVE SATISFACTORY PERFORMANCE OF THE ELECTRICAL EQUIPMENT. IF REPAIRS OR ADJUSTMENTS ARE MADE DURING THE TESTS, ADDITIONAL TESTING SHALL BE PERFORMED AT NO ADDITIONAL COST TO THE DISTRICT.
3. RECORDS OF THE TESTS SHALL BE MADE BY THE CONTRACTOR, AND COPIES OF THE TEST RECORDS SHALL BE SUBMITTED TO THE ENGINEER.
4. THE CONTRACTOR SHALL SUBMIT DETAILED FIELD TEST PROCEDURES TO THE ENGINEER FOR REVIEW. TESTS SHALL NOT BEGIN UNTIL THE ENGINEER HAS APPROVED THE TEST PROCEDURES.
5. THE SUPPLIER SHALL PROVIDE ALL LABOR, TOOLS, TEST EQUIPMENT, SOFTWARE, FUEL, LABOR, MATERIAL AND TECHNICAL SUPERVISION TO PERFORM THE FIELD TESTING UNDER THIS TESTING REQUIREMENT SECTION, UNLESS SPECIFICALLY NOTED OTHERWISE.
6. THE ONSITE ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR INSTALLING AND TERMINATING FIELD WIRING AND COMMUNICATION CABLE(S) TO THE EQUIPMENT SUPPLIED UNDER THIS CONTRACT FROM FIELD DEVICES AND OTHER EQUIPMENT. THE SUPPLIER FIELD TECHNICIANS SHALL COORDINATE WITH THE ELECTRICAL CONTRACTOR AND HIS ONSITE TESTING AGENCY IN VERIFYING PROPER INPUT, REGISTRATION, AND SCALING OF ALL HARDWIRED I/O TO THE CONTROL PANEL.
7. THE CONTRACTOR SHALL ENGAGE THE SERVICES OF A RECOGNIZED TESTING SERVICE AGENCY FOR THE PURPOSE OF PERFORMING INSPECTIONS AND TESTS FOR EQUIPMENT SAFETY AND OPERABILITY, AND FUNCTIONALLY VERIFY THE CONTROL SYSTEM OPERATES IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
8. THE INTENT OF THESE TESTS IS TO ASSURE THAT ALL ELECTRICAL EQUIPMENT INSTALLED BY THE CONTRACTOR UNDER THIS CONTRACT IS OPERATIONAL WITHIN INDUSTRY AND MANUFACTURER'S TOLERANCES AND TO FUNCTIONALLY TEST ALL NEW SYSTEMS AND THEIR INTEGRATION WITH EXISTING SYSTEMS, WHICH INCLUDES ALL NEW EQUIPMENT INTERFACING WITH THE EXISTING AUTOMATIC TRANSFER SWITCH AND EXISTING SCADA SYSTEM. NEW EQUIPMENT TO BE TESTED INCLUDE THE NEW SWITCHBOARD (SWBD-01), NEW AUTOMATIC TRANSFER SWITCH (ATS-01) AND EMERGENCY GENERATOR (EGEN-01), AND NEW CONTROL PANEL (CPNL-01) WITH PLC (PLC-01).
9. CONTRACTOR SHALL SUBMIT PROOF OF TESTING SERVICE AGENCY'S QUALIFICATIONS TO DISTRICT FOR APPROVAL.
10. THE CONTRACTOR AND THE ELECTRICAL TESTING SERVICE AGENCY SHALL RESOLVE ANY DEFICIENCIES AND RETEST IN A TIMELY MANNER TO FACILITATE THE PROJECT START-UP AND OPERATION.
11. THE CONTRACTOR SHALL PERFORM ROUTINE INSULATION RESISTANCE, CONTINUITY, AND ROTATION TESTS FOR ALL DISTRIBUTION AND UTILIZATION EQUIPMENT.
12. ANY SYSTEM MATERIAL OR WORKMANSHIP WHICH IS FOUND DEFECTIVE ON THE BASIS OF ELECTRICAL TESTS SHALL BE REPLACED AND RETESTED AT NO ADDITIONAL COST TO THE DISTRICT.
13. THE TESTING SERVICE SHALL MAINTAIN A WRITTEN RECORD OF ALL TESTS AND UPON COMPLETION OF THE PROJECT, AND ASSEMBLE AND CERTIFY A FINAL TEST REPORT.
14. THE INSPECTIONS AND TESTS SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE FOLLOWING APPLICABLE CODES AND STANDARDS FOR THE GENERATOR, SWITCHBOARD AND COMPONENTS WITHIN, ATS, LOW-VOLTAGE CABLING, AND COMMUNICATION CABLING. INCLUDE ALL REQUIRED AND OPTIONAL TESTS AS THEY APPLY TO THE STANDARDS. THE TESTING STANDARDS ARE AS FOLLOWS:
    - 14.1. INTERNATIONAL ELECTRICAL TESTING ASSOCIATION (NETA), ATS-2003 ACCEPTANCE TESTING SPECIFICATIONS FOR ELECTRICAL POWER DISTRIBUTION EQUIPMENT AND SYSTEMS.
    - 14.2. NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION - NEMA
    - 14.3. AMERICAN SOCIETY FOR TESTING AND MATERIALS - ASTM
    - 14.4. INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS - IEEE
    - 14.5. AMERICAN NATIONAL STANDARDS INSTITUTE - ANSI
    - 14.6. STATE AND LOCAL CODES AND ORDINANCES
    - 14.7. INSULATED CABLE ENGINEERS ASSOCIATION - ICEA
    - 14.8. OSHA PART 1910; SUBPART S, 1910.308
    - 14.9. NATIONAL FIRE PROTECTION ASSOCIATION - NFPA

ELECTRICAL TESTING REQUIREMENTS (CONTINUED)

ON-SITE GENERATOR / ATS / LOAD BANK TESTING REQUIREMENTS

- ELECTRICAL TESTING CANNOT BEGIN UNTIL DISTRICT COMPLETES ALL WIRING AND PROGRAMMING FOR INTEGRATION OF NEW EQUIPMENT AND DEVICES INTO SCADA. CONTRACTOR SHALL COORDINATE WITH THE DISTRICT OVER THE TESTING SCHEDULING.
- ON UTILITY POWER, BRING ALL LOADS TO MAX SPEEDS/FLOWS.
- SIMULATE LOSS OF UTILITY BY TRIPPING SWITCHBOARD (SWBD-01) 1000A-3P MAIN BREAKER.
- OBSERVE ATS-01 SWITCH TO EMERGENCY AND EGEN-01 STARTUP.
- OBSERVE EGEN-01 CAPABLE OF STARTING ALL LOADS AT MAX SPEEDS/FLOWS.
- WAIT 2-HOURS WITH EMERGENCY POWER RUNNING.
- SIMULATE RETURN OF UTILITY POWER BY CLOSING SWITCHBOARD (SWBD-01) 1000A-3P MAIN BREAKER.
- OBSERVE ATS-01 TRANSFER BACK TO NORMAL AFTER SOME TIME DELAY.
- OBSERVE ATS-01 RUNNING EGEN-01 FOR X MINUTES OF "COOL DOWN".
- DURING THE TEST, OBSERVE EGEN-01 POWER OUTPUT ON EGEN-01 CONTROLLER DISPLAY AND VERIFY COMMUNICATION SIGNALS PRESENT AT SCADA. ALSO, VERIFY EXISTING SCADA DFS RECEIVES STATUS OF ATS-01 IN EMERGENCY. VERIFY ALL HARDWIRE AND COMMUNICATION CABLE I/O ADDED PER THIS CONTRACT IS AVAILABLE IN EXISTING SCADA SYSTEM. THIS INCLUDES YORK CHILLER, UV PANEL, FILTRATION PANEL, ATS-02, EGEN-02, ATS-01, EGEN-01, AND LB-01 I/O. PROGRAMMING OF EXISTING SCADA SYSTEM FOR INTEGRATION OF THESE I/O TO BE BY OTHERS IN COORDINATION WITH THE CONTRACTOR.
- SIMULATE NEW ATS-01/EGEN-01 FAILED/UNAVAILABLE BY OPENING NEW EGEN-01 BREAKER. SIMULATE LOSS OF PRIMARY EMERGENCY POWER BY OPENING EGEN-01 800A-3P MAIN BREAKER. OBSERVE AFTER GENERATOR SUPPLIER COORDINATED TIME DELAY THE TRANSITION TO EMERGENCY AND STARTING OF EXISTING ATS-02/EGEN-02 FOR YORK CHILLER. AFTER VERIFICATION OF ATS-02/EGEN-02 OPERATION, SIMULATE RETURN OF ATS-01/EGEN-01 BY CLOSING EGEN-01 800A-3P BREAKER. OBSERVE ATS-01 TRANSFER TO EGEN-01, OBSERVE ATS-02 TRANSFER TO 'NORMAL'. RETURN TO UTILITY BY CLOSING SWITCHBOARD (SWBD-01) 1000A-3P MAIN BREAKER.
- TEST THE LOAD BANK FOR EGEN-01 AT BELOW 30% OF THE GENERATOR'S FULL LOAD AND ABOVE 30% TO VERIFY ITS OPERATION. WHEN THE GENERATOR OPERATES BELOW 30% OF ITS FULL LOAD, THE LOAD BANK SHALL MAINTAIN A MINIMUM OF 30% LOAD ON THE GENERATOR. WHEN THE GENERATOR OPERATES ABOVE 30% LOAD, THE LOAD BANK SHALL NOT OPERATE. ALL LOAD BANK STEPS SHALL BE TESTED.
- TEST ALL EXISTING EQUIPMENT CONNECTED TO THE NEW SWITCHBOARD (SWBD-01) FOR FULL OPERATION.

START-UP TESTING

THE SUPPLIER SHALL PERFORM THOROUGH START-UP TESTING IN COORDINATION WITH THE DISTRICT. THE DESIGNATED SUPPLIER COMMISSIONING ENGINEER SHALL BE RESPONSIBLE FOR SUBMITTAL OF TEST PROCEDURES, TEST SCHEDULING AND COORDINATION, AND DOCUMENTATION AND SUBMITTAL OF TEST RESULTS. START-UP TESTS SHALL INCLUDE:

A. POINT-TO-POINT WIRE CHECKING OF ALL PLC INPUT/OUTPUT CIRCUITS.

B. VERIFICATION OF PROPER FUNCTIONING OF ALL ANALOG I/O LOOPS.

C. VERIFY PROPER REGISTRATION, FUNCTIONING, AND DISPLAY/LOGGING OF ALL ALARMS.

D. WITH ALL OUTPUTS DISABLED, MANUALLY ACTIVATE EACH INPUT DEVICE AND CHECK FOR STATUS CHANGE AT THE APPROPRIATE INPUT POINT.

E. WITHOUT CAUSING ANY UNDESIRABLE ACTIONS TO OCCUR, USE “FORCING” TO VERIFY THAT EACH DISCRETE AND ANALOG OUTPUT IS PROPERLY ADDRESSED AND WIRED.

F. VERIFY PROPER COMMUNICATION, DATA EXCHANGE, AND CONTROL FUNCTIONALITY WITH OTHER ONSITE PLCS AND SCADA SYSTEMS. PROGRAMMING OF THESE OTHER SYSTEMS FOR TRANSMISSION/RECEPTION OF DATA, SET-POINTS AND CONTROL FUNCTIONALITY WILL BE BY OTHERS. SUPPLIER SHALL COOPERATE IN THE VERIFICATION OF END-TO-END FUNCTIONALITY AND INTEGRATION OF THESE SYSTEMS.

G. VERIFY PROPER OPERATION OF CONTROL SYSTEM TO LOSS OF COMMUNICATION AND DETECTION, ALARMING, AND RECOVERY FROM COMMUNICATION FAILURE.

H. SCHEDULE AND PERFORM DEMONSTRATION TESTING OF ALL I/O TO BE WITNESSED BY DESIGNATED DISTRICT’S REPRESENTATIVE.

PROJECT NOTES - 1.DWG

3" ON ORIGINAL DOCUMENT
0 1 2 3

NO.	DATE	REVISION	BY	REC.	APP.

EETSINC
6060 SUNRISE VISTA DRIVE, #1450
CITRUS HEIGHTS, CA 95610
WWW.EETSINC.COM

REGISTERED PROFESSIONAL ENGINEER — KOOSHA TOOFAN — 20418 — Exp. SEPT. 30, 2027 — Electrical Engineer — STATE OF CALIFORNIA

DESIGNED BY: KOOSHA TOOFAN	
DESIGN CHECKED BY: JOHN GUILLORY	
DRAWN BY: KOOSHA TOOFAN	
SR. PROJ ENGR. R.P.E. NO.: 20418	
APPROVED: KOOSHA TOOFAN	
PRINCIPAL IN CHARGE, R.P.E. NO.: 20418	

EBMUD

EAST BAY MUNICIPAL UTILITY DISTRICT
OAKLAND, CALIFORNIA

MOKELUMNE RIVER HATCHERY
ELECTRICAL DESIGN
ELECTRICAL

ELECTRICAL PROJECT NOTES

PROJ NO.			
SCALE: AS SHOWN	100-Z-011.3		0
DATE: 02OCT2025	STRUCT.	DISC. NUMBER	REV.

FIELD QUALITY CONTROL FOR WIRE/CABLE INSTALL

AFTER INSTALLING CONDUCTORS AND CABLES AND BEFORE ELECTRICAL CIRCUITRY HAS BEEN ENERGIZED, PERFORM THE FOLLOWING VISUAL AND MECHANICAL INSPECTIONS:

- VERIFY CABLES AND CONDUCTORS COMPLY WITH THE CONTRACT DOCUMENTS.
- VERIFY CABLES AND CONDUCTORS ARE BRACED FOR SHORT CIRCUIT STRESSES WHERE SPECIFIED.
- VERIFY CABLES AND CONDUCTORS ARE CORRECTLY IDENTIFIED AT EACH TERMINATION, SPLICE, AND TAP WHERE APPLICABLE.
- VERIFY CORRECT PHASE ROTATION IS MAINTAINED THROUGHOUT PROJECT.
- INSPECT ALL EXPOSED SECTIONS OF CABLES AND CONDUCTORS FOR PHYSICAL DAMAGE AND CORRECT CONNECTION.
- INSPECT ALL BOLTED AND COMPRESSION CONNECTIONS.
- VERIFY PHASE IDENTIFICATION IS A, B, C, LEFT TO RIGHT, FRONT TO BACK AND TOP TO BOTTOM. IF CORRECTIONS ARE REQUIRED CHANGE FEEDER AND BRANCH CIRCUIT IDENTIFICATION AT EACH END OF CIRCUIT SO THAT CORRECT PHASE IDENTIFICATION IS MAINTAINED THROUGHOUT THE PROJECT. IF INCORRECT IDENTIFICATION IS NOTED ON EXISTING SYSTEMS NOTIFY THE ENGINEER AND DISTRICT FOR ACTION TO BE TAKEN.

DATA & COMMUNICATION CABLE

1. DATA AND COMMUNICATION CABLES SHALL BE USED FOR DATA EXCHANGE THROUGHOUT THE WORK. MAJOR CATEGORIES AND TYPES OF DATA AND COMMUNICATION CABLES ARE LISTED BELOW IN NOTE #2. ADDITIONAL SPECIAL CABLES IN COMPLIANCE WITH THE EQUIPMENT MANUFACTURER'S RECOMMENDATIONS AND THE REQUIREMENTS OF THE WORK SHALL BE PROVIDED AS NECESSARY.
2. CATEGORY 6A ETHERNET CABLE SHALL CONSIST OF FOUR (4) TWISTED PAIRS OF #23 AWG SOLID BARE COPPER CONDUCTORS WITH POLYOLEFIN INSULATION. CABLE SHALL INCLUDE AN OVERALL ALUMINUM/POLYESTER FOIL SHIELD WITH DRAIN WIRE, GEL-FILLED WATER BLOCKING, AND UV-RESISTANT POLYOLEFIN OUTER JACKET SUITABLE FOR OUTSIDE PLANT (OSP) APPLICATIONS. CABLE SHALL BE BELDEN OSP6AF OR APPROVED EQUAL.

FIBER OPTIC CABLE

1. FIBER OPTIC CABLE IN DUCT: FIBER CABLE SHALL BE OF THE HEAVY-DUTY, LOOSE-TUBE TYPE, INTENDED FOR OUTDOOR USE IN DIRECT BURIAL, DUCT, CABLE TRAY, OR AERIAL APPLICATIONS. CABLE SHALL BE DOUBLE-JACKETED WITH AN OUTER AND INNER MDPE JACKET SEPARATED BY A FIBERGLASS STRENGTH MEMBER. FIBER COUNT SHALL BE SIX (6) MULTIMODE, 62.5MM OPTICAL FIBERS PER CABLE. FIBER SHALL BE INSTALLED IN 2.5M DIAMETER, GEL-FILLED BUFFER TUBES. BUFFER TUBES SHALL BE GROUPED SYMMETRICALLY AROUND A DIELECTRIC CENTRAL STRENGTH MEMBER AND SURROUNDED BY A WATER BLOCKING AGENT. CABLE SHALL BE SUITABLE FOR A MAXIMUM 600LB INSTALLATION TENSION. FIBER OPTIC CABLE OPERATING TEMPERATURE RANGE SHALL BE -40°C TO +80°C.
2. THE FIBER OPTIC CABLE SHALL MEET THE FOLLOWING SPECIFICATIONS AT 850NM AND 1300NM WAVELENGTHS. AT 850NM, THE MAXIMUM ATTENUATION SHALL NOT EXCEED 3.5DB/KM, WITH A MINIMUM BANDWIDTH OF 220MHZ-KM AND A MAXIMUM GIGABIT TRANSMISSION DISTANCE OF 300 METERS. AT 1300NM, THE MAXIMUM ATTENUATION SHALL NOT EXCEED 1.0DB/KM, WITH A MINIMUM BANDWIDTH OF 600MHZ-KM AND A MAXIMUM GIGABIT TRANSMISSION DISTANCE OF 550 METERS.

SWITCHBOARD (SWBD-01) NOTES

1. SWITCHBOARD: BASIS OF DESIGN SHALL BE EATON POW-R-LINE XPERT SWITCHBOARD, OR APPROVED EQUAL. SWITCHBOARD SHALL BE FRONT ACCESS / FRONT AND REAR ALIGNMENT, TYPE 3R (NON-WALK-IN) FLAT ROOF, 480Y/277V, 3-PHASE, 4-WIRE. BUS SHALL BE 1200A SILVER-PLATED COPPER. MINIMUM INTERRUPTING RATING SHALL BE 65 kAIC. BUS BRACING RATING SHALL BE 65 kA.
2. 1000A UTILITY METERING - PACIFIC GAS & ELECTRIC (PG&E).
3. SWITCHBOARD SHALL BE NEMA 3R OUTDOOR TYPE, FREE-STANDING, FRONT ACCESSIBLE, AND FRONT AND REAR ALIGNED WITH DEPTH AS SHOWN ON THE DRAWINGS. SIDE ACCESS SHALL NOT BE REQUIRED. ALL CONNECTIONS, LOAD TERMINATIONS, AND BUS MAINTENANCE SHALL BE ACCESSIBLE FROM THE FRONT OR THE TOP. ALL PROTECTIVE DEVICES SHALL BE GROUP-MOUNTED, FRONT REMOVABLE, AND ARRANGED TO PERMIT AGAINST-THE-WALL MOUNTING.
4. MAIN CIRCUIT BREAKER SHALL BE CAPABLE OF BEING RACKED IN OR OUT WITH THE COMPARTMENT DOOR CLOSED. A MECHANICAL INDICATOR SHALL BE PROVIDED ON THE DRAWOUT CASSETTE TO SHOW BREAKER POSITION STATUS AS EITHER "CONNECTED," "TEST," OR "DISCONNECTED."
5. MAIN CIRCUIT BREAKER SHALL BE ELECTRICALLY OPERATED AT 120VAC FROM THE CONTROL POWER TRANSFORMER INTERNAL TO THE SWITCHGEAR ASSEMBLY. BREAKER OPERATING MECHANISM SHALL BE ELECTRICALLY CHARGED, STORED ENERGY TYPE. CHARGING MOTOR SHALL INCLUDE A LIMIT SWITCH FEATURE AND AN ANTI-PUMP RELAY. MAKE PROVISIONS FOR MANUAL CHARGING OF THE MECHANISM AND FOR SLOW CLOSING OF THE CONTACTS FOR INSPECTION AND ADJUSTMENT.
6. A MANUFACTURER'S PLAQUE SHALL BE FASTENED TO THE FRONT OF THE SWITCBOARD. THE PLAQUE SHALL INDICATE MODEL NUMBER, SERIAL NUMBER, AMPERES, VOLTS, SHORT CIRCUIT RATING, ETC.
7. PROVIDE INTERIOR LED LIGHTS AND LIGHT SWITCH. POWER FOR THE SPACE HEATERS AND LIGHTS SHALL BE OBTAINED FROM THE CONTROL POWER TRANSFORMER WITHIN THE SWITCHBOARD.
8. PRIOR TO FABRICATION, SUBMIT THE FOLLOWING TO THE ENGINEER FOR APPROVAL: SHOP DRAWINGS OF THE PROPOSED EQUIPMENT DEMONSTRATING COMPLIANCE WITH THIS SPECIFICATION AND PG&E'S SERVICE REQUIREMENTS ("GREEN BOOK") FOR ELECTRIC SWITCHBOARDS: 0 THROUGH 600 VOLTS. THE ENGINEER WILL SUBMIT THESE SHOP DRAWINGS TO PG&E FOR APPROVAL. DRAWINGS SHALL INCLUDE THE DISTRICT'S NAME AND JOB LOCATION. UNDER NO CIRCUMSTANCES SHALL MANUFACTURING PROCEED WITHOUT BOTH PG&E AND ENGINEER APPROVAL OF THIS SUBMITTAL.

   EQUIPMENT SUBMITTALS SHALL ALSO INCLUDE ELEVATION AND PLAN VIEWS, COMPARTMENT ARRANGEMENTS, DIMENSIONS, WEIGHTS, SHIPPING SPLITS, AND METERING LAYOUTS. PROVIDE SINGLE-LINE DIAGRAMS AND POINT-TO-POINT COMPARTMENT WIRING DIAGRAMS FOR METERING, RELAY, AND CONTROL CIRCUITS, WITH WIRE AND TERMINAL NUMBERS CLEARLY INDICATED. INCLUDE DETAILS OF BUS MATERIALS, RATINGS, AND INSULATION. PRODUCT DATA SHEETS AND CATALOG NUMBERS SHALL BE SUBMITTED FOR CIRCUIT BREAKERS AND FINGER-SAFE FUSE SWITCHES USED IN CONTROL CIRCUITS, LISTING ALL OPTIONS, TRIP ADJUSTMENTS, AND ACCESSORIES FURNISHED SPECIFICALLY FOR THIS PROJECT. TIME-CURRENT CHARACTERISTIC CURVES FOR EACH PROTECTIVE DEVICE PROVIDED SHALL ALSO BE SUBMITTED. AN ITEMIZED BILL OF MATERIALS SHALL BE INCLUDED FOR ALL METERING, ACCESSORIES, AND CONTROL EQUIPMENT. SUBMITTAL TO INCLUDE WARRANTY AND MAINTENANCE INFORMATION.

   PRIOR TO DELIVERY, SUBMIT ANCHORING CALCULATIONS AND CERTIFICATION THAT THE SWITCHGEAR HAS BEEN DESIGNED AND CONSTRUCTED TO WITHSTAND SEISMIC FORCES, IN ACCORDANCE WITH THE REQUIREMENTS OF THE PROJECT SPECIFICATIONS.

EMERGENCY GENERATOR (EGEN-01) NOTES

1. THE ENGINE GENERATOR UNIT SHALL BE DELIVERED INCLUDING UNLOADING AS APPLICABLE TO THE SITE.
2. GENERATOR ACCESSORIES INCLUDE BATTERIES, BATTERY CHARGER, BLOCK HEATER, THERMOSTATICALLY CONTROLLED STRIP HEATER, OUTPUT TERMINAL BOX, 100% RATED 480V 3-POLE 65KAIC SOLID STATE LSIG CIRCUIT BREAKER, CRITICAL SILENCER, FAILURE AND RUN RELAY, AIR CLEANER INDICATOR, AND GOVERNOR ELECTRONIC-SPEED CONTROL.
3. THE UL 2200 STATIONARY ENGINE GENERATOR SET SHALL BE SUPPLIED WITH ROOF MOUNTED LOAD BANK AND AUTOMATIC CONTROLLER. THE LOAD BANK SHALL BE RATED FOR 50% GENERATOR OUTPUT CAPACITY AND SHALL BE CAPABLE OF SWITCHING RESISTIVE ELEMENTS ACCORDING TO THE GENERATOR OUTPUT, IN A MINIMUM OF FIVE (5) STEPS. THE LOAD BANK SHALL BE COMPRISED OF RESISTIVE ELEMENTS AND CONTACTORS TO ACHIEVE ITS SWITCHING STAGES.
4. THE LOAD BANK SHALL BE SUPPLIED AND INSTALLED BY THE FACTORY OR DEALER, REMOVED FOR SHIPPING, AND REINSTALLED AT JOB SITE BY CONTRACTOR. THE GENERATOR SET SHALL BE SUPPLIED WITH A SOUND ATTENUATED WEATHERPROOF ENCLOSURE, PROVIDING A SOUND LEVEL OF 75 DB(A) WHILE THE GENERATOR IS OPERATING AT 100% LOAD AT 7 METERS (23 FEET).
5. LOAD BANK SHALL BE CONFIGURED TO MAINTAIN MINIMUM 30% LOAD ON GENERATOR IN ALL OPERATION SCENARIOS.
6. LOAD BANK SHALL BE CONSTRUCTED FROM GALVANIZED STEEL, FORMED INTO A RIGID ENCLOSURE MATCHING THE HEIGHT AND WIDTH OF THE ENGINE RADIATOR OR DUCT, AND DESIGNED FOR NEMA 3R OUTDOOR CONSTRUCTION, WITH LIFTING EYES AND RADIATOR DUCT FLANGES PROVIDED FOR COMPLETE INSTALLATION. RESISTIVE LOAD ELEMENTS SHALL BE FABRICATED FROM CORROSION-RESISTANT MATERIALS SUCH AS CHROMIUM ALLOY WIRE AND SHALL BE SUITABLE FOR OPERATION ACROSS THE FULL RANGE OF OUTPUT TEMPERATURES FROM THE DIESEL ENGINE DRIVEN GENERATOR SYSTEM, WITH LOAD STEPS PROVIDED AT 50 KW INTERVALS FROM NO LOAD TO FULL LOAD. LOAD BANK SHALL BE FULLY COOLED BY THE DIESEL ENGINE RADIATOR FAN COOLING AIR, WITH NO ADDITIONAL COOLING SYSTEMS REQUIRED FOR PROPER OPERATION.
7. CONTRACTOR SHALL SUBMIT ALL REQUIRED APPLICATIONS AND PAY ALL ASSOCIATED FEES FOR THE GENERATOR ENGINE PERMITS, TO THE GOVERNING AIR QUALITY BOARD AFTER APPROVAL OF THE GENERATOR SUBMITTAL(S) BY EBMUD. PERMIT APPROVAL ALLOWS FOR GENERATOR PROCUREMENT AND CONSTRUCTION.
8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INSTALLATION OF THE ENGINE GENERATOR, RELATED FUEL STORAGE SYSTEMS, LOAD BANK, AND SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS AND PAYING ALL FEES ASSOCIATED WITH THE INSTALLATION, INCLUDING THE AIR QUALITY PERMIT. UPON PERMIT APPROVAL, THE CONTRACTOR SHALL INSTALL THE ENGINE-GENERATOR SET IN COMPLIANCE WITH CONDITIONS IN THE PERMITS, AND THEREAFTER, OBTAIN FIELD APPROVAL FROM THE LOCAL AIR QUALITY MANAGEMENT DISTRICT INSPECTOR.
9. SUPPLY GENERATOR WITH OPTIONAL INPUT EXPANSION MODULE, OUTPUT EXPANSION MODULE, AND REMOTE ANNUNCIATOR MODULE.
10. GENERATOR SHALL BE TIER 4 FINAL RATED.
11. GENERATOR: BASIS OF DESIGN SHALL BE CATERPILLAR MODEL D350DC DIESEL ENGINE DRIVEN GENERATOR SET WITH C18 ENGINE, OR APPROVED EQUAL. GENERATOR SHALL BE RATED 480V, 3-PHASE, 60 HZ, 500 KW / 625 KVA. GENERATOR SET SHALL MEET ALL SPECIFIED ELECTRICAL RATINGS, EMISSIONS REQUIREMENTS, AND ACCESSORIES INDICATED IN THE CONTRACT DOCUMENTS.
12. THE DIESEL ENGINE DRIVEN GENERATOR SET MANUFACTURER'S AND DEALER'S STANDARD WARRANTY SHALL IN NO EVENT BE FOR A PERIOD OF LESS THAN TWO (2) YEARS FROM DATE OF INITIAL START-UP OF THE SYSTEM OR 2500 OPERATING HOURS, WHICHEVER COMES FIRST. IT SHALL INCLUDE REPAIR LABOR, REASONABLE TRAVEL EXPENSE NECESSARY FOR REPAIRS AT THE JOBSITE, AND EXPENDABLES (LUBRICATING OIL, FILTERS, ANTIFREEZE, AND OTHER SERVICE ITEMS MADE UNUSABLE BY THE DEFECT) USED DURING THE COURSE OF REPAIR. SUBMITTALS RECEIVED WITHOUT WRITTEN WARRANTIES AS SPECIFIED WILL BE REJECTED IN THEIR ENTIRETY.
13. EXHAUST SILENCERS AND EXHAUST PIPING SHALL BE INSULATED WITH HIGH TEMPERATURE INSULATION BLANKETS CONSISTING OF A WOVEN 300 SERIES STAINLESS STEEL WIRE MESH LINER, TYPE E FIBERGLASS INSULATION (MIL SPEC MIL-I-16411-E), AND A COLD FACE OF FLEXIBLE SILICONE-IMPREGNATED FIBERGLASS CLOTH. BLANKETS SHALL BE 1 INCH THICK WITH A MINIMUM DENSITY OF 11.3 LBS/CU. FT., AND SHALL BE CUSTOM FITTED TO TIGHTLY COVER PIPE, FLANGES, FLEXIBLE CONNECTORS, AND EXHAUST SILENCERS. ALL EDGES OF THE COLD FACE CLOTH SHALL BE MACHINE STITCHED WITH PERMANENTLY MOUNTED STAINLESS STEEL HOOKS, AND BLANKETS SHALL BE LACED IN PLACE WITH STAINLESS STEEL TIE WIRE, DESIGNED TO BE READILY REMOVABLE FOR EQUIPMENT MAINTENANCE. ACCEPTABLE MANUFACTURERS INCLUDE ADVANCED THERMAL PRODUCTS, INC. (TYPE D FILOMAT) AND PLANT INSULATION CO., EMERYVILLE, CA (HARMAT 11.3#/1200F), OR EQUAL AS APPROVED BY THE ENGINEER.
14. PROVIDE SENSORS AND ANNUNCIATOR PANEL TO INDICATE AND ALARM THE FOLLOWING ENGINE MALFUNCTIONS, AND SHUT DOWN THE ENGINE ON FAILURE OF FUNCTIONS NOTED:
    - HIGH WATER TEMPERATURE
    - LOW WATER TEMPERATURE
    - LOW FUEL
    - LOW OIL PRESSURE
    - OVERSPEED
    - RUNNING
    - FAIL TO START
    - EMERGENCY SHUTDOWN
    - BATTERY CHARGER

EMERGENCY GENERATOR (EGEN-01) NOTES (CONTINUED)

15. THE SUBMITTAL SHALL SHOW ALL WIRING, INCLUDING BOTH SCHEMATIC AND TERMINAL DIAGRAMS, AS WELL AS INTERCONNECTION WIRING OF THE ENGINE AND GENERATOR. A SCALED DRAWING SHALL BE SUBMITTED FOR APPROVAL SHOWING ALL DETAILS OF THE ENGINE GENERATOR, SUPPORT BASE AND MOUNTING, FUEL TANK, SILENCER, CIRCUIT BREAKER, LOAD BANK, CONTROLLER, BATTERY, CHARGER, AND CONTROL PANEL.

    THE SUBMITTAL SHALL ALSO INCLUDE PRODUCT DATA SUCH AS PROTOTYPE TEST CERTIFICATION AND A SPECIFICATION SHEET IDENTIFYING ALL STANDARD AND OPTIONAL ACCESSORIES TO BE SUPPLIED. PROVIDE A SCHEMATIC WIRING DIAGRAM, DIMENSIONAL PLAN AND ELEVATION DRAWING, AND AN INTERCONNECTION DIAGRAM THAT CLEARLY IDENTIFIES BY TERMINAL NUMBER EACH REQUIRED INTERCONNECTION BETWEEN THE GENERATOR SET AND THE TRANSFER SWITCH.

    IN ADDITION, THE SUBMITTAL SHALL INCLUDE A CERTIFICATE VERIFYING THAT THE GENERATOR SET IS LISTED TO UL 2200 OR HAS BEEN SUBMITTED TO AN INDEPENDENT THIRD-PARTY CERTIFICATION PROCESS FOR COMPLIANCE AS INSTALLED, INCLUDING VERIFICATION OF AIR BOARD EMISSIONS WITHIN THE APPLICABLE JURISDICTION. A FACTORY TEST AND EVALUATION REPORT, MANUFACTURER'S INSTALLATION AND OPERATING INSTRUCTIONS, SOURCE QUALITY CONTROL DOCUMENTATION, AND ANY REQUIRED FIELD OR SITE QUALITY CONTROL REPORT SHALL ALSO BE SUBMITTED. A MANUFACTURER'S REPORT, SPECIAL PROCEDURE SUBMITTAL, AND QUALIFICATION STATEMENT SHALL BE PROVIDED FOR REVIEW AS APPLICABLE.

PG&E COORDINATION NOTES

1. PRIOR TO THE START OF ANY WORK, THE CONTRACTOR SHALL ATTEND THE PRE-CONSTRUCTION MEETING WITH PG&E AND THE DISTRICT TO REVIEW AND CONFIRM THE DELINEATION OF WORK SCOPE BETWEEN THE CONTRACTOR AND PG&E, PG&E REQUIREMENTS, AS WELL AS TO DISCUSS THE REQUIRED DOWNTIMES FOR PG&E TO COMPLETE THEIR DEMOLITION AND INSTALLATION WORK.
2. THE CONTRACTOR SHALL EXTEND THE THREE (3) 5" PG&E T-13680 TRANSFORMER SECONDARY CONDUITS FROM THEIR EXISTING STUB-OUT LOCATION IN THE EXISTING SWITCHBOARD INCOMING SECTION TO THE NEW SWITCHBOARD LOCATION, IN ACCORDANCE WITH PG&E ENGINEERING DRAWINGS.
3. THE CONTRACTOR SHALL PROVIDE A SOIL COMPACTION REPORT AT THE NEW SWITCHBOARD (SWBD-01) LOCATION. THE CONTRACTOR SHALL COORDINATE WITH PG&E PRIOR TO POURING THE NEW EQUIPMENT PAD AND CONFIRM ALL SOIL REPORT REQUIREMENTS ARE ACCEPTABLE AND APPROVED BY PG&E.
4. THE NEW FOUNDATION PAD SHALL EXTEND A MINIMUM OF 48" IN FRONT OF THE ELECTRIC METER SECTION, AS SHOWN ON STRUCTURAL SHEET 100-S-040.
5. THE CONTRACTOR SHALL COORDINATE WITH PG&E TO INSPECT AND APPROVE THE NEW SERVICE CONDUIT INSTALLATION PRIOR TO BACKFILLING THE TRENCH.
6. PG&E WILL PERFORM THE FOLLOWING IN TWO PHASES:

   PHASE 1: DISCONNECT AND REMOVE EXISTING SERVICE CONDUCTORS AND REMOVE THE CT AND ELECTRIC METER.

   PHASE 2: PULL AND TERMINATE NEW CONDUCTORS FROM TRANSFORMER T-13680 TO THE NEW SWITCHBOARD (SWBD-01), AFTER THE CONTRACTOR HAS COMPLETED THE NEW CONDUIT INSTALLATION.

EMERGENCY GENERATOR (EGEN-01) STRUCTURAL NOTES

1. GENERATOR
   - 1.1. GENERATOR DRY WEIGHT: 16,343 LBS (INCLUDES GENSET, SOUND ENCLOSURE, SUB-BASE FUEL TANK, FUEL AND MISCELLANEOUS PARTS, e.g., CIRCUIT BREAKER).
   - 1.2. FUEL TANK TOTAL CAPACITY 700 GALLONS x 7.2 LBS/GALLON = 5040 LBS.
   - 1.3. LOAD BANK: 250 LBS
   - 1.4. TOTAL WEIGHT: 21,650 LBS.
2. DESIGN CODES:
   - 2.1. CALIFORNIA BUILDING CODE 2022
   - 2.2. ACI 318-19
3. EARTHQUAKE DESIGN DATA:
   - 3.1. RISK CATEGORY: II.
   - 3.2. SEISMIC IMPORTANCE FACTOR I/e: 1.0.
   - 3.3. MAPPED SPECTRAL RESPONSE ACCELERATION PARAMETERS, SS= 0.51 AND S1 =0.2.
   - 3.4. SITE SOIL CLASS: D.
   - 3.5. DESIGN SPECTRAL RESPONSE ACCELERATION PARAMETERS, SDS= 0.54 AND SD1= 0.37.

GEOTECHNICAL DESIGN DATA & RECOMMENDATIONS

1. MAXIMUM NET ALLOWABLE BEARING PRESSURE FOR SHALLOW SPREAD FOOTING: 3000 PSF.
2. NEW SLAB-ON-GRADE SHALL BE SUPPORTED ON COMPACTED SELECT FILL. THE COMPACTED FILL SHALL BE AT LEAST ONE FOOT THICK BENEATH CONCRETE SLABS.
3. MATERIAL FOR SELECT FILL SHALL BE INORGANIC, WELL GRADED, FREE OF ROCKS OR CLODS GREATER THAN 4 INCHES IN GREATEST DIMENSION, AND HAVE LOW POTENTIAL FOR EXPANSION.
4. THE MATERIAL SHALL HAVE A LIQUID LIMIT LESS THAN 35, A PLASTICITY INDEX LESS THAN 15 AND A MAXIMUM OF 25 PERCENT PASSING THE No. 200 SIEVE.
5. AS PER GEOTECHNICAL REPORT RECOMMENDATIONS, THE AVAILABLE ON-SITE FILL AND NATIVE MATERIAL ARE ANTICIPATED TO BE SUITABLE FOR USE AS SELECT FILL.
6. ALL LOOSE SOIL SHALL BE REMOVED TO PLACING ANY CONCRETE UNLESS NOTED OTHERWISE.
7. ALL SOFT OR ORGANIC TOPSOIL SHALL BE REMOVED PRIOR TO SLAB PLACEMENT.

GENERAL STRUCTURAL NOTES

1. THIS PLAN HAS BEEN DESIGNED BASED ON DRAWINGS AND INFORMATION SUPPLIED BY OTHERS. ADKO ENGINEERING IS NOT RESPONSIBLE FOR DESIGN REVISIONS NECESSARY DUE TO INCORRECT INFORMATION THAT IT RELIED ON FOR THE DESIGN.
2. ENGINEER WILL NOT SUPERVISE, DIRECT, CONTROL OR HAVE AUTHORITY OVER OR BE RESPONSIBLE FOR THE CONTRACTOR'S MEANS, METHODS, TECHNIQUES, SEQUENCES OR PROCEDURES OF CONSTRUCTION, OR THE SAFETY PRECAUTIONS AND PROGRAMS INCIDENT THERETO, OR FOR ANY FAILURE OF THE CONTRACTOR TO COMPLY WITH LAWS AND REGULATIONS APPLICABLE TO THE FURNISHING OR PERFORMANCE OF WORK.
3. ALL WORKERS SHALL BE PROPERLY TRAINED FOR SAFETY AND USE OF ALL EQUIPMENT.
4. CONTRACTOR IS RESPONSIBLE FOR COMPLYING WITH ALL APPLICABLE OSHA STANDARDS INCLUDING FALL PROTECTION.
5. ADKO ENGINEERING ASSUMES NO RESPONSIBILITY FOR WORK SITE SAFETY PRACTICES. PERSONAL WORKER PROTECTION, OR ANY JOB SITE CONDITIONS. ADKO ENGINEERING WARRANTS THE STRUCTURAL INTEGRITY OF THE DESIGN AS STATED AND / OR SHOWN ON THE DESIGN DRAWINGS FOR THE FINAL PRODUCT ONLY AND IS NOT RESPONSIBLE FOR ANY STRUCTURAL OR SAFETY DEFICIENCIES AT ANY STAGE OF ERECTION OTHER THAN FINAL PRODUCT.
6. FINAL DESIGN AND LOCATION OF THE EQUIPMENT FOUNDATION PAD SHALL BE COORDINATED WITH THE FINAL APPROVED SHOP DRAWINGS AND THE DISTRICT PRIOR TO ROUGH-IN.

CONCRETE NOTES

1. ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4000 P.S.I.AT 28 DAYS. CEMENT SHALL CONFORM TO ASTM C-150, TYPE I SPECIFICATIONS. CONCRETE SHALL BE AIR ENTRAINED BETWEEN 5% AND 8%. NORMAL WEIGHT AGGREGATE SHALL COMPLY WITH ASTM C-33 SPECIFICATIONS. CONCRETE SHALL BE OBTAINED FROM A SINGLE SOURCE. WATER SHALL BE CLEAN, POTABLE AND FREE OF DELETERIOUS MATERIAL. THE MAXIMUM WATER TO CEMENT RATIO IS 0.5.
2. THE CONCRETE SHALL BE THOROUGHLY WORKED AROUND THE REINFORCEMENT, AROUND EMBEDDED FIXTURES AND INTO THE CORNER OF FORMS.
3. PROTECT FRESHLY PLACED CONCRETE FROM PREMATURE DRYING AND EXCESSIVE HOT OR COLD TEMPERATURES. COMPLY WITH ACI 305 "HOT WEATHER CONCRETING" AND/OR ACI 306 "COLD WEATHER CONCRETING". CONCRETE SHALL NOT BE PLACED ON FROZEN SOIL.
4. ALL CONCRETE AND REINFORCING STEEL SHALL BE PLACED IN ACCORDANCE WITH ALL LATEST BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE.
5. REINFORCING SHALL COMPLY WITH ASTM A-615 SPECIFICATIONS FOR DEFORMED TYPE GRADE 60 STEEL. REINFORCEMENT SHALL BE LAPPED 2'-0" MINIMUM AT ALL SPLICE LOCATIONS AND TIED WITH WIRE. SPLICES SHALL BE KEPT TO A MINIMUM.
6. REINFORCING BARS SHALL NOT BE WELDED WITHOUT APPROVAL OF THE STRUCTURAL ENGINEER.
7. REINFORCED CONCRETE SHALL BE DESIGNED, MIXED AND PLACED IN ACCORDANCE WITH THE LATEST EDITION OF THE ACI CODE AND APPLICABLE ASTM STANDARDS.
8. CONCRETE SHALL BE MIXED IN APPROVED TRANSIT MIXERS. MAXIMUM ELAPSED TIME FROM THE TIME THAT WATER IS ADDED TO THE MIX UNTIL THE CONCRETE IS DEPOSITED IN THE WORK SHALL NOT EXCEED 90 MINUTES. ONLY THOSE ADMIXTURES SPECIFIED IN THE CONTRACTORS MIX DESIGN SUBMITTAL SHALL BE USED. CONCRETE SHALL BE MIXED.
9. FOR NOT LESS THAN 70 NOR MORE THAN 100 REVOLUTIONS AT MIXING SPEED PRIOR TO PLACEMENT. MAXIMUM SLUMP SHALL NOT EXCEED 4".
10. ENGINEER'S PRIOR APPROVAL MUST BE SECURED FOR ALL SUBSTITUTIONS.
11. UNLESS OTHERWISE NOTED, THE MINIMUM CLEAR DISTANCE BETWEEN THE FACE OF CONCRETE AND THE OUTSIDE OF THE REINFORCING BARS SHALL BE 1".
12. BEFORE ANY CONCRETE IS PLACED, APPLICABLE DRAWINGS SHALL BE CHECKED TO DETERMINE THAT ANCHOR BOLTS, EMBEDDED STEEL, PIPING, CONDUITS, GROUNDING WIRES, OPENINGS, ETC. ARE PROPERLY PLACED.
13. IF GROUT IS NEEDED BELOW BASE PLATES FOR LEVELING PURPOSES A MINIMUM OF 1.5" OF STRUCTURAL NON-SHRINK GROUT SHALL BE USED UNLESS OTHERWISE NOTED.
14. STRUCTURAL GROUT SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 5000 PSI AT 28 DAYS.
15. PROPOSED STRUCTURES ARE NOT INTENDED FOR HUMAN OCCUPANCY.

PROJECT NOTES - 2.DWG

3" ON ORIGINAL DOCUMENT
0 1 2 3

NO.	DATE	REVISION	BY	REC.	APP.

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REGISTERED PROFESSIONAL ENGINEER — KOOSHA TOOFAN — No. 20418 — Exp. SEPT. 30, 2027 — Electrical Engineer — STATE OF CALIFORNIA

DESIGNED BY: KOOSHA TOOFAN	
DESIGN CHECKED BY: JOHN GUILLORY	
DRAWN BY: KOOSHA TOOFAN	
SR. PROJ ENGR. R.P.E. NO.: 20418	
APPROVED: KOOSHA TOOFAN	
PRINCIPAL IN CHARGE, R.P.E. NO.: 20418	

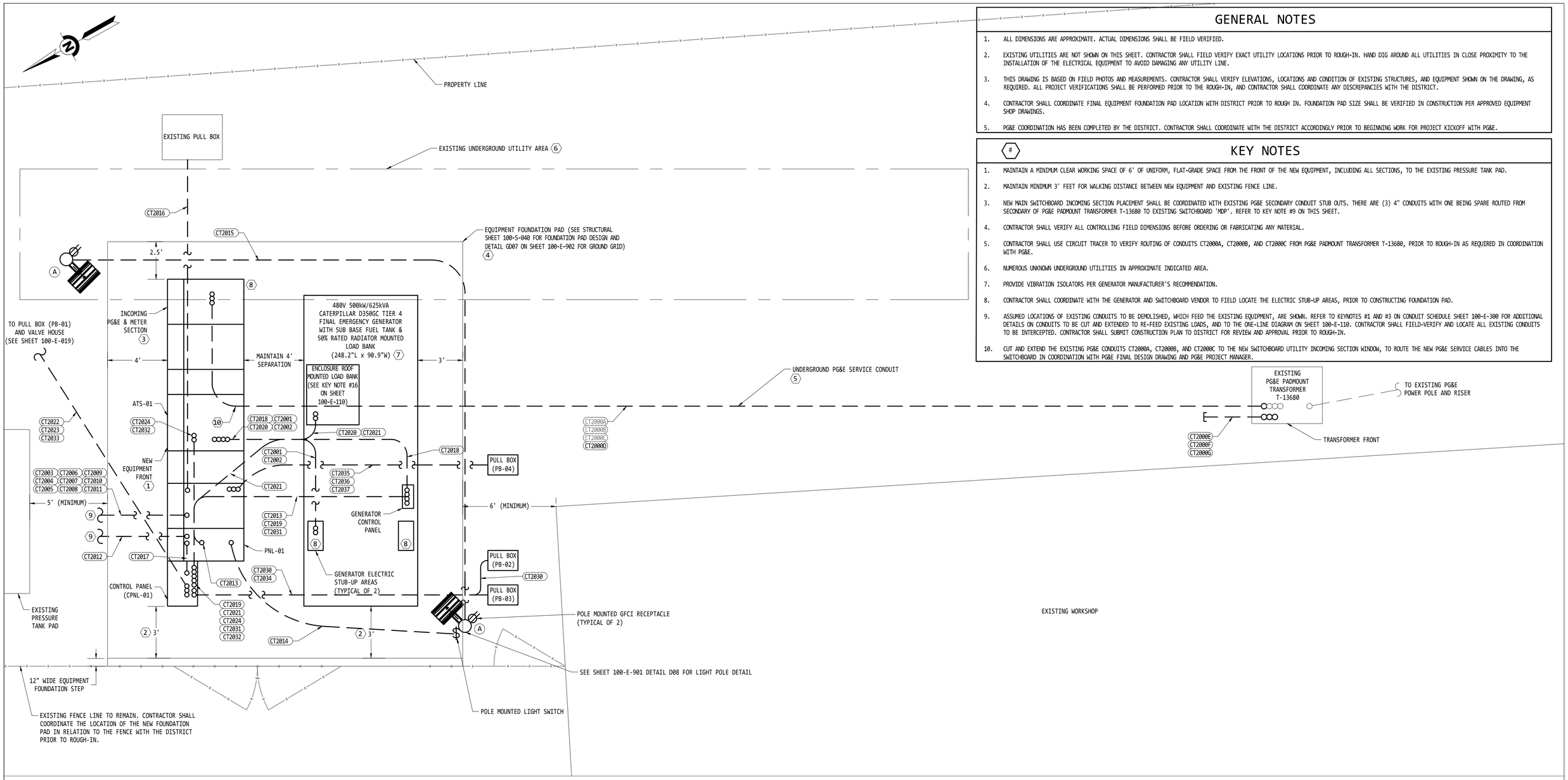
EBMUD

EAST BAY MUNICIPAL UTILITY DISTRICT
OAKLAND, CALIFORNIA

MOKELUMNE RIVER HATCHERY
ELECTRICAL DESIGN
ELECTRICAL

ELECTRICAL & STRUCTURAL PROJECT NOTES

PROJ NO.		
SCALE: AS SHOWN	100-Z-011.4	0
DATE: 02OCT2025	STRUCT. DISC. NUMBER	REV.



GENERAL NOTES

1. ALL DIMENSIONS ARE APPROXIMATE. ACTUAL DIMENSIONS SHALL BE FIELD VERIFIED.
2. EXISTING UTILITIES ARE NOT SHOWN ON THIS SHEET. CONTRACTOR SHALL FIELD VERIFY EXACT UTILITY LOCATIONS PRIOR TO ROUGH-IN. HAND DIG AROUND ALL UTILITIES IN CLOSE PROXIMITY TO THE INSTALLATION OF THE ELECTRICAL EQUIPMENT TO AVOID DAMAGING ANY UTILITY LINE.
3. THIS DRAWING IS BASED ON FIELD PHOTOS AND MEASUREMENTS. CONTRACTOR SHALL VERIFY ELEVATIONS, LOCATIONS AND CONDITION OF EXISTING STRUCTURES, AND EQUIPMENT SHOWN ON THE DRAWING, AS REQUIRED. ALL PROJECT VERIFICATIONS SHALL BE PERFORMED PRIOR TO THE ROUGH-IN, AND CONTRACTOR SHALL COORDINATE ANY DISCREPANCIES WITH THE DISTRICT.
4. CONTRACTOR SHALL COORDINATE FINAL EQUIPMENT FOUNDATION PAD LOCATION WITH DISTRICT PRIOR TO ROUGH IN. FOUNDATION PAD SIZE SHALL BE VERIFIED IN CONSTRUCTION PER APPROVED EQUIPMENT SHOP DRAWINGS.
5. PG&E COORDINATION HAS BEEN COMPLETED BY THE DISTRICT. CONTRACTOR SHALL COORDINATE WITH THE DISTRICT ACCORDINGLY PRIOR TO BEGINNING WORK FOR PROJECT KICKOFF WITH PG&E.

KEY NOTES

1. MAINTAIN A MINIMUM CLEAR WORKING SPACE OF 6' OF UNIFORM, FLAT-GRADE SPACE FROM THE FRONT OF THE NEW EQUIPMENT, INCLUDING ALL SECTIONS, TO THE EXISTING PRESSURE TANK PAD.
2. MAINTAIN MINIMUM 3' FEET FOR WALKING DISTANCE BETWEEN NEW EQUIPMENT AND EXISTING FENCE LINE.
3. NEW MAIN SWITCHBOARD INCOMING SECTION PLACEMENT SHALL BE COORDINATED WITH EXISTING PG&E SECONDARY CONDUIT STUB OUTS. THERE ARE (3) 4" CONDUITS WITH ONE BEING SPARE ROUTED FROM SECONDARY OF PG&E PADMOUNT TRANSFORMER T-13688 TO EXISTING SWITCHBOARD 'MDP'. REFER TO KEY NOTE #9 ON THIS SHEET.
4. CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.
5. CONTRACTOR SHALL USE CIRCUIT TRACER TO VERIFY ROUTING OF CONDUITS CT2000A, CT2000B, AND CT2000C FROM PG&E PADMOUNT TRANSFORMER T-13680, PRIOR TO ROUGH-IN AS REQUIRED IN COORDINATION WITH PG&E.
6. NUMEROUS UNKNOWN UNDERGROUND UTILITIES IN APPROXIMATE INDICATED AREA.
7. PROVIDE VIBRATION ISOLATORS PER GENERATOR MANUFACTURER'S RECOMMENDATION.
8. CONTRACTOR SHALL COORDINATE WITH THE GENERATOR AND SWITCHBOARD VENDOR TO FIELD LOCATE THE ELECTRIC STUB-UP AREAS, PRIOR TO CONSTRUCTING FOUNDATION PAD.
9. ASSUMED LOCATIONS OF EXISTING CONDUITS TO BE DEMOLISHED, WHICH FEED THE EXISTING EQUIPMENT, ARE SHOWN. REFER TO KEYNOTES #1 AND #3 ON CONDUIT SCHEDULE SHEET 100-E-300 FOR ADDITIONAL DETAILS ON CONDUITS TO BE CUT AND EXTENDED TO RE-FEED EXISTING LOADS, AND TO THE ONE-LINE DIAGRAM ON SHEET 100-E-110. CONTRACTOR SHALL FIELD-VERIFY AND LOCATE ALL EXISTING CONDUITS TO BE INTERCEPTED. CONTRACTOR SHALL SUBMIT CONSTRUCTION PLAN TO DISTRICT FOR REVIEW AND APPROVAL PRIOR TO ROUGH-IN.
10. CUT AND EXTEND THE EXISTING PG&E CONDUITS CT2000A, CT2000B, AND CT2000C TO THE NEW SWITCHBOARD UTILITY INCOMING SECTION WINDOW, TO ROUTE THE NEW PG&E SERVICE CABLES INTO THE SWITCHBOARD IN COORDINATION WITH PG&E FINAL DESIGN DRAWING AND PG&E PROJECT MANAGER.

ELECTRICAL SITE PLAN

NOT TO SCALE

LEGEND

- UNDERGROUND CONDUIT
- ABOVEGROUND CONDUIT
- NEW (BOLD LINES)
- EXISTING (FADED LINES)

3" ON ORIGINAL DOCUMENT

0 1 2 3

NO.	DATE	REVISION	BY	REC.	APP.

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PRINCIPAL IN CHARGE, R.P.E. NO.: 20418	

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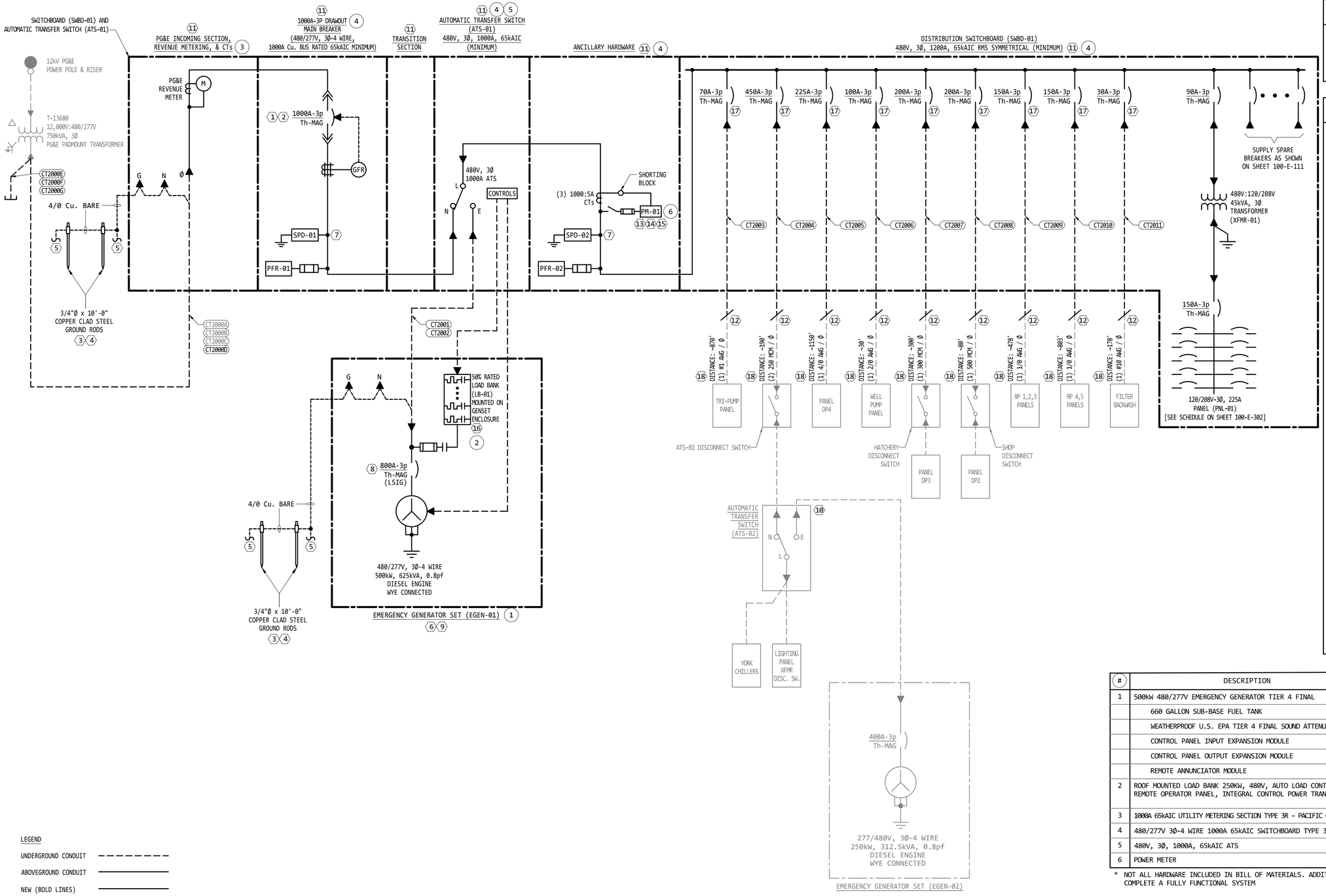
OAKLAND, CALIFORNIA

MOKELUMNE RIVER HATCHERY
ELECTRICAL DESIGN
ELECTRICAL

NEW SWITCHBOARD & EMERGENCY GENERATOR PLAN

PROJ NO.				
SCALE: AS SHOWN	100-E-020			0
DATE: 02OCT2025	STRUCT.	DISC.	NUMBER	REV.

& EMERGENCY GENERATOR PLAN.DWG



GENERAL NOTES

1. CONTRACTOR TO PROVIDE PG&E APPROVED METERING ENCLOSURES. UTILITY METER AND CT TO BE PROVIDED BY PG&E. CONTRACTOR SHALL COORDINATE WITH PG&E FOR METER & CT REQUIREMENTS PRIOR TO ISSUANCE OF SHOP DRAWINGS.
2. CONTRACTOR SHALL COORDINATE WITH THE PG&E PROJECT REPRESENTATIVE AND PG&E GREENBOOK FOR THE CUTOVER TO THE NEW SWITCHBOARD METERING SECTION.

KEY NOTES

1. MAIN CIRCUIT BREAKER SHALL BE 100% RATED AND SHALL BE EQUIPPED WITH AN ARC FLASH REDUCTION MAINTENANCE SYSTEM (ARMS) AND GROUND FAULT PROTECTION RELAY.
2. PROVIDE WITH AUXILIARY BREAKER STATUS CONTACTS.
3. INSTALL AND SIZE GROUND RODS AS SHOWN ON THIS SHEET.
4. PER NEC SECTION 250.56, MAINTAIN A SEPARATION OF NOT LESS THAN 6-FEET BETWEEN THE INSTALLED GROUND RODS.
5. EXTEND TO EXISTING GROUNDING ELECTRODE SYSTEM (GES), WHICH SHALL BE FIELD LOCATED BY CONTRACTOR.
6. GROUND GENERATOR PER MANUFACTURER'S REQUIREMENTS.
7. SURGE PROTECTIVE DEVICE (SPD) IS MOUNTED DIRECTLY ADJACENT TO ITS FEEDER CIRCUIT BREAKER. KEEP WIRING AS SHORT AND AS STRAIGHT AS POSSIBLE.
8. EMERGENCY GENERATOR SUPPLIED WITH A 100% RATED GENERATOR BREAKER. BREAKER SHALL HAVE AN 800A FRAME WITH A 400A TRIP PLUG.
9. EMERGENCY GENERATOR SUPPLIED WITH A BELLY TANK SIZED FOR MINIMUM 24 HOURS OF CONTINUOUS RUN TIME AT 50% LOAD.
10. CONTRACTOR SHALL SET ATS-02 CONTROLLER TO DELAY TRANSITION TO EGEN-02 VIA ATS CONTROLLER. WITH LOSS OF UTILITY POWER, NEW 500kW EMERGENCY GENERATOR (EGEN-01) SHALL BE THE PRIMARY EMERGENCY BACK UP POWER SOURCE. IF BOTH UTILITY AND THE 500kW EMERGENCY GENERATOR ARE DOWN, THEN THE EXISTING 250kW EMERGENCY GENERATOR (EGEN-02) SHALL OPERATE TO PROVIDE BACKUP POWER TO THE YORK CHILLERS AND LIGHTING PANEL (LP) TRANSFORMER. THIS EXISTING ATS-02 CONTROLLER TIME DELAY SETTING SHALL BE COORDINATED WITH THE NEW ATS-01 DURING STARTUP AND COMMISSIONING.
11. NEW MAIN SWITCHBOARD (SWBD-01) AND ATS-01 TO REPLACE EXISTING PANEL MDP, PANEL DP1 & LP2, MANUAL TRANSFER SWITCHES MTSS AND MTSH, ATS-03, AND 30kVA STEP-DOWN TRANSFORMER.
12. BREAK INTO EXISTING CONDUIT. EXTEND NEW CONDUIT, SIZE MATCHING EXISTING, INTO NEW SWITCHBOARD (SWBD-01). DEMO EXISTING CABLING, PULL NEW CABLES IN KIND, AND TERMINATE TO NEW SWITCHBOARD (SWBD-01). COORDINATE WITH DISTRICT FOR FINAL APPROVED CUT-OVER LOCATIONS.
13. USE SHORTING BLOCKS FOR INCOMING CURRENT (CT) CIRCUITS, AND FUSE BLOCKS FOR INCOMING VOLTAGE CIRCUITS, TO CREATE AN INTERMEDIATE CONTACT POINT BETWEEN THE POWER METER AND LOAD.
14. POWER METER SHALL BE POWERED FROM PNL-01.
15. 5A LOAD CURRENT ØA,B,C USING #10 THHN/THWN COPPER CONDUCTORS, AND 480V POTENTIAL ØA,B,C USING #12 THHN/THWN COPPER CONDUCTORS.
16. THE LOAD BANK IS TO BE SET UP WITH AN AUTOMATIC LOAD ADDER/REMOVER TO MAINTAIN A MINIMUM LOAD OF 30% AT ALL TIMES, REGARDLESS OF THE FACILITY LOADS CONNECTED WHEN THE GENERATOR IS RUNNING.
17. CONFIRM THAT THE RATING OF THE NEW BREAKER MATCHES THE RATING OF THE EXISTING BREAKER BEING REPLACED FOR THE EXISTING FED LOAD, PRIOR TO ISSUANCE OF SHOP DRAWINGS.
18. ESTIMATED DISTANCE FROM SOURCE TO LOAD AND CABLE RATING ARE SHOWN. EQUIPMENT GROUNDING CONDUCTOR NOT LISTED AND SHALL BE PROVIDED IN ACCORDANCE WITH NEC REQUIREMENTS.

#	DESCRIPTION	MANUFACTURER (OR EQUAL)	PART #	QTY
1	500kW 480/277V EMERGENCY GENERATOR TIER 4 FINAL	CATERPILLAR	C18 T4F	1
	660 GALLON SUB-BASE FUEL TANK	CATERPILLAR	-	1
	WEATHERPROOF U.S. EPA TIER 4 FINAL SOUND ATTENUATED ENCLOSURE	CATERPILLAR	-	1
	CONTROL PANEL INPUT EXPANSION MODULE	CATERPILLAR	-	1
	CONTROL PANEL OUTPUT EXPANSION MODULE	CATERPILLAR	-	1
	REMOTE ANNUNCIATOR MODULE	CATERPILLAR	-	1
2	ROOF MOUNTED LOAD BANK 250KW, 480V, AUTO LOAD CONTROL, REMOTE OPERATOR PANEL, INTEGRAL CONTROL POWER TRANSFORMER	TRYSTAR	MODEL L	1
3	1000A 65kAIC UTILITY METERING SECTION TYPE 3R - PACIFIC GAS & ELECTRIC	EATON	-	1
4	480/277V 3Ø-4 WIRE 1000A 65kAIC SWITCHBOARD TYPE 3R	EATON	IFS POW-R-LINE XPERT	1
5	480V, 3Ø, 1000A, 65kAIC ATS	ASCO	ASCO-300	1
6	POWER METER	EATON	PXM1300	1

* NOT ALL HARDWARE INCLUDED IN BILL OF MATERIALS. ADDITIONAL HARDWARE SHALL BE SUPPLIED AS REQUIRED TO COMPLETE A FULLY FUNCTIONAL SYSTEM

LEGEND

UNDERGROUND CONDUIT	
ABOVEGROUND CONDUIT	
NEW (BOLD LINES)	
EXISTING (FADED LINES)	
SPD	SURGE PROTECTIVE DEVICE
GFR	GROUND FAULT RELAY
PFR	POWER FAIL RELAY
LSIG	LONG TIME, SHORT TIME, INSTANTANEOUS, GROUND
Th-MAG	THERMAL MAGNETIC
CT	CURRENT TRANSFORMER

ONE-LINE DIAGRAM

NOT TO SCALE

3" ON ORIGINAL DOCUMENT

0 1 2 3

NO.	DATE	REVISION	BY	REC.	APP.

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OAKLAND, CALIFORNIA

MOKELUMNE RIVER HATCHERY
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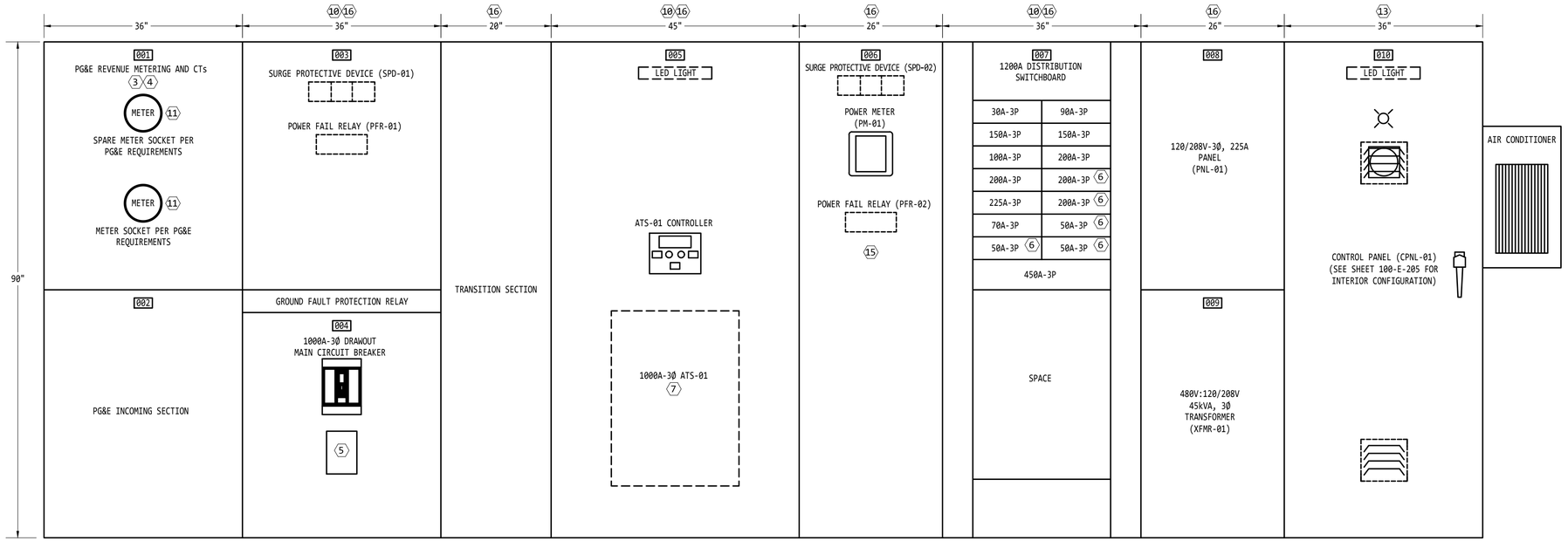
ONE-LINE DIAGRAM

PROJ NO.		
SCALE: AS SHOWN	100-E-110	0
DATE: 02OCT2025	STRUCT. DISC. NUMBER	REV.

DIAGRAM.DWG



SWITCHBOARD (SWBD-01), ATS (ATS-01), & CONTROL PANEL (CPNL-01) ELEVATION VIEW 1 2 8 9 10 12 14

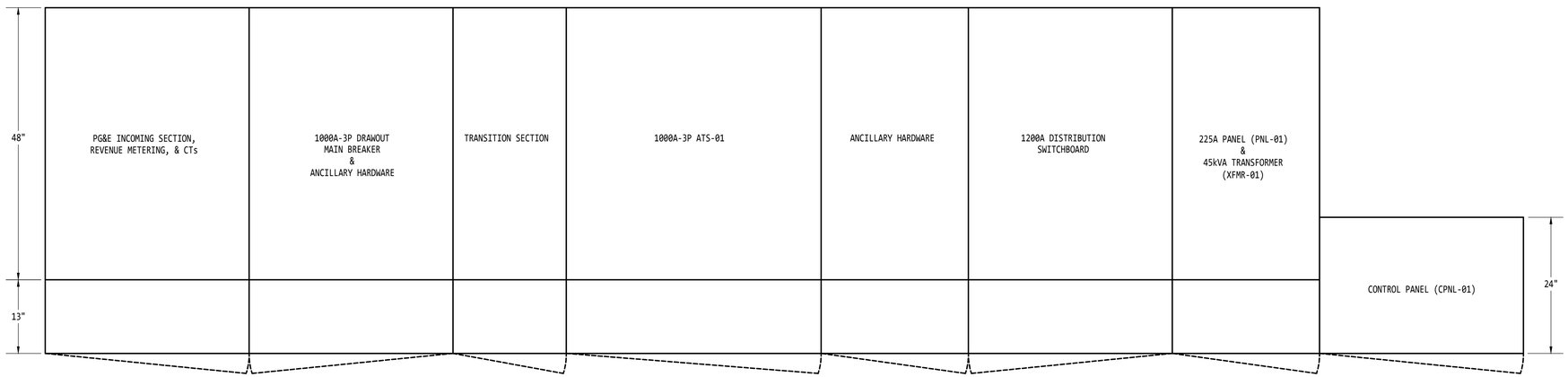
NOT TO SCALE
(SHOWN WITH WEATHER WRAP DOORS REMOVED FOR CLARITY)

GENERAL NOTES

1. ALL DIMENSIONS ARE APPROXIMATE. ACTUAL DIMENSIONS SHALL BE PER APPROVED SHOP DRAWINGS.
2. INSTALL SUN SHIELD TO PROTECT THE EQUIPMENT LINEUP, INCLUDING THE CONTROL PANEL, FROM DIRECT SUNLIGHT.
3. ALL NUTS, BOLTS, SCREWS AND HINGES SHALL BE STAINLESS STEEL.
4. SUPPLY HEATER PACKAGE, WHICH INCLUDES HEATER, THERMOSTAT, AND FUSED DISCONNECT FOR EACH SECTION.

KEY NOTES

1. CONTRACTOR TO COORDINATE SWITCHBOARD REQUIREMENTS WITH PG&E PRIOR TO ISSUANCE OF SHOP DRAWINGS.
2. MANUFACTURER TO INSTALL SPACE HEATERS POWERED FROM 225A PNL-01, WITH THERMOSTAT AND APPROPRIATE WIRING, IN SWITCHBOARD. SPACE HEATERS SHALL BE SUPPLIED WITH LABELED HEATER DISCONNECTS FOR SAFETY DURING MAINTENANCE.
3. UTILITY CTs SHALL BE LOCATED WITHIN APPROVED CT COMPARTMENTS APPROVED BY PG&E.
4. SUPPLY A DUAL-SOCKET METERING PANEL IN SWITCHBOARD PER PG&E REQUIREMENTS.
5. MAIN CIRCUIT BREAKER TO BE EQUIPPED WITH AN ARC FLASH REDUCTION MAINTENANCE SYSTEM AND GROUND FAULT PROTECTION RELAY.
6. SPARE BREAKER.
7. ASCO 300 ATS SHALL BE INSTALLED BY SWITCHBOARD SUPPLIER PRIOR TO SHIPMENT TO PROJECT LOCATION.
8. EQUIPMENT TO BE EATON POW-R-LINE-C OR APPROVED EQUAL. EQUIPMENT SHALL BE FRONT ACCESS ONLY.
9. SWITCHBOARD SHALL BE NEMA 3R OUTDOOR RATED.
10. SWITCHBOARD (SWBD-01) REAR SECTION SHALL HAVE AN IR WINDOW.
11. CONTRACTOR SHALL COORIDNATE WITH PG&E TO SUPPLY A METER SOCKET, ENCLOSURE, AND METER COMPLIANT WITH UTILITY STANDARDS PRIOR TO ISSUANCE OF SHOP DRAWINGS.
12. THE DESIGN OF THE SWITCHBOARD (SWBD-01) IS SUCH THAT ALL CABLING BETWEEN SECTIONS ARE HOUSED BETWEEN SWITCHBOARD (SWBD-01) SECTIONS. IF APPROVED SHOP DRAWINGS OF CONTRACTOR SUPPLIED SWITCHBOARD (SWBD-01) REQUIRE EXTERNAL CONDUIT AND WIRES TO MAKE CONNECTIONS BETWEEN SECTIONS, THIS EQUIPMENT SHALL BE PROVIDED AT NO ADDITIONAL COST TO THE DISTRICT.
13. CONTROL PANEL SHALL MATCH OTHER SECTIONS IN HEIGHT AND ENCLOSURE COLOR.
14. FRONT ACCESS ONLY, FRONT AND REAR ALIGN, AND FLAT ROOF.
15. PROVIDE A GFCI RECEPTACLE ON THE FRONT OF COMPARTMENT. THE RECEPTACLE SHALL BE CONNECTED TO PNL-01 CIRCUIT #8.
16. PROVIDE SIGHTGLASS WINDOW IN ENCLOSURE FOR USE WITH AN IR CAMERA. IR SIGHTGLASS SHALL INCLUDE A 3-INCH IR CRYSTAL INSERT THAT PROVIDES DIRECT LINE OF SIGHT FOR INFRARED INSPECTIONS, IS TRANSPARENT TO VISIBLE LIGHT, AND SERVES AS A PHYSICAL BARRIER BETWEEN THE CAMERA AND THE TARGET. SIGHTGLASS SHALL HAVE AN ANODIZED ALUMINUM HOUSING WITH AN ALUMINUM SECURITY COVER, STAINLESS STEEL TAMPERPROOF SCREWS, A LOW-SMOKE AND FUME GASKET, AND OVERALL IP65 INGRESS PROTECTION. THE COVER SHALL SWIVEL OPEN TO PROVIDE QUICK ACCESS TO THE IR WINDOW.



SWITCHBOARD (SWBD-01), ATS (ATS-01), & CONTROL PANEL (CPNL-01) PLAN VIEW

NOT TO SCALE

EQUIPMENT NAMEPLATE LEGEND

NUMBER	1ST LINE	2ND LINE	3RD LINE
001	PG&E REVENUE METERING AND CTs	-	-
002	PG&E INCOMING SECTION	-	-
003	LINE SIDE	AUXILIARY DEVICES	-
004	1000A-3Ø	MAIN CIRCUIT BREAKER	-
005	1000A-3Ø	ATS	-
006	LOAD SIDE	AUXILIARY DEVICES	-
007	1200A	DISTRIBUTION SWITCHBOARD	-
008	120/208V-3Ø	225A PANEL	-
009	480V:120/208V	45kVA, 3Ø	TRANSFORMER
010	CONTROL PANEL	-	-

LEGEND

UNDERGROUND CONDUIT
ABOVEGROUND CONDUIT
NEW (BOLD LINES)
EXISTING (FADED LINES)

3" ON ORIGINAL DOCUMENT
0 1 2 3

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MOKELUMNE RIVER HATCHERY
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EQUIPMENT ELEVATION & PLAN VIEWS

PROJ NO.		
SCALE: AS SHOWN	100-E-111	0
DATE: 02OCT2025	STRUCT. DISC. NUMBER	REV.

ELEVATION & PLAN VIEWS.DWG

#	DESCRIPTION	MANUFACTURER (OR EQUAL)	PART #	QTY
1	COMPACTLOGIX CONTROLLER	ALLEN BRADLEY	5069-L3100ERM	1
2	DI 16 CH 24VDC	ALLEN BRADLEY	5069-IB16	3
3	DO 16 CH 24VDC	ALLEN BRADLEY	5069-OB16	1
4	AI 8 CH 24VDC 4-20mA	ALLEN BRADLEY	5069-IF8	1
5	AO 8 CH 24VDC 4-20mA	ALLEN BRADLEY	5069-OF8	1
6	SERIAL INTERFACE MODULE	ALLEN BRADLEY	5069-SERIAL	1
7	DUPLEX GFCI CONVENIENCE RECEPTACLE	-	-	-
8	UPS RECEPTACLE	-	-	-
9	AUXILIARY RELAYS	ALLEN BRADLEY	700-HB32Z24	16
10	AUXILIARY RELAY BASES	ALLEN BRADLEY	700-HN127	16
11	ETHERNET SWITCH	N-TRON	108TX	1
12	POWER FAIL RELAY	TIME-MARK	2652	-
13	1500VA 120V UPS	APC	SMT 1500 WITH AP9613	1
14	4-20 mADC SURGE SUPPRESSOR	BOURNS	-	1
15	4-20 mADC ISOLATOR	AGM	4000-13EA-DIN	1
16	HEATER	-	-	-
17	120VAC SURGE ARRESTOR	JOSTYN	1260	1
18	ENCLOSURE NEMA 3R DEADFRONT 90"x24"x36"	-	-	1
19	BACKPANEL FOR ITEM 25	-	-	1
20	PANEL FAN	HOFFMANN	A-4AXFN	2
21	FAN BRACKET	HOFFMANN	A-BRKT4	2
22	FAN GUARD	HOFFMANN	A-GARD4	2
23	FAN & HEATER THERMOSTATS	HOFFMANN	D-AH2002A	1
24	PUSH TO TEST INDICATION LIGHT-RED	ALLEN BRADLEY	800H	1
25	PANEL LIGHT (LED)	-	-	1
26	GROUND BUS	-	-	1
27	TERMINAL BLOCKS, FUSE HOLDERS, ETC.	PHOENIX CONTACT	-	-
28	120VAC-24VDC POWER SUPPLY	ALLEN BRADLEY	1606-XL120D	1
29	AIR CONDITIONER	HOFFMAN	-	1
30	SERIAL TO FIBER CONVERTER	MOXA	TCF-90	1
31	-	-	-	-

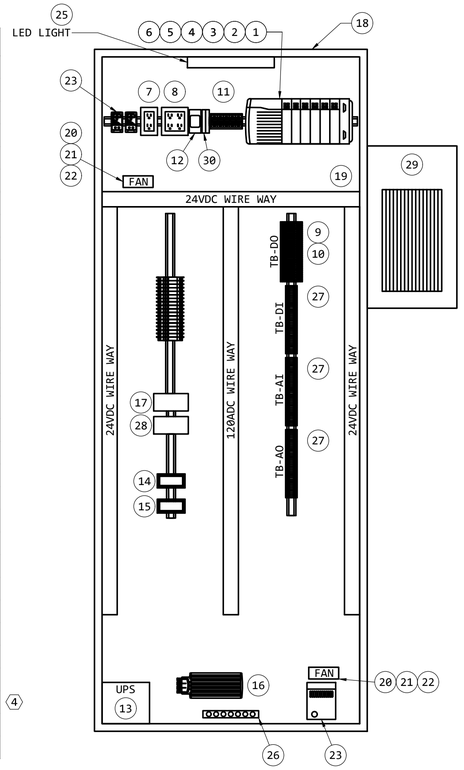
4

NEW CONTROL PANEL (CPNL-01) BILL OF MATERIALS

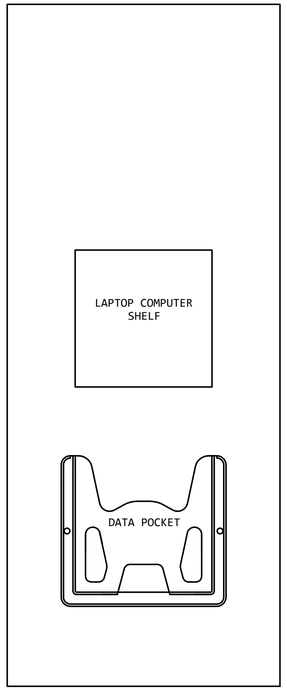
#	DESCRIPTION	MANUFACTURER (OR EQUAL)	PART #	QTY
1	FIBER SPLCE BOX	BELDEN	-	1
2	-	-	-	-
3	-	-	-	-

5

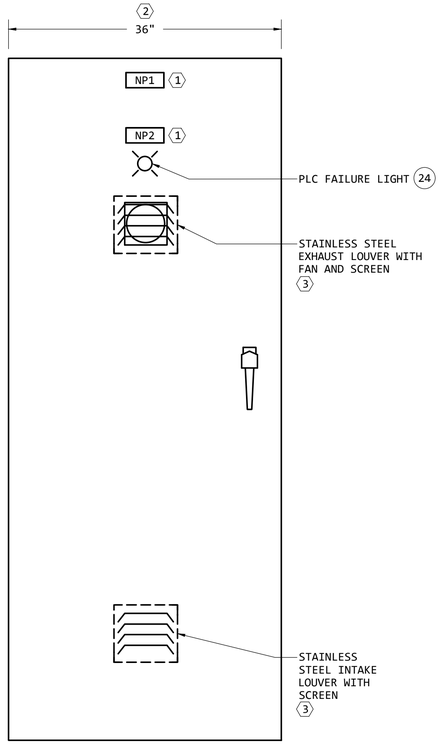
VALVE HOUSE EXISTING APC CABINET BILL OF MATERIALS



CONTROL PANEL (CPNL-01)
INTERIOR ELEVATION
NOT TO SCALE



CONTROL PANEL (CPNL-01)
INTERIOR DOOR ELEVATION
NOT TO SCALE



CONTROL PANEL (CPNL-01)
EXTERIOR DOOR ELEVATION
NOT TO SCALE

GENERAL NOTES

1. REPRESENTATIVE OF MAJOR COMPONENTS ONLY, IN CONTROL PANEL.
2. WIRE SPARE PLC I/O POINTS TO TERMINAL BLOCKS.
3. CONTRACTOR SHALL SUPPLY ANY ADDITIONAL DEVICES AS REQUIRED, TO COMPLETE A FULLY FUNCTIONAL SYSTEM.
4. CONTROL WIRING SHALL BE MARKED AT BOTH ENDS BY PERMANENT WIRE MARKERS.

KEY NOTES

1. SUPPLY WITH CUSTOM ENGRAVED PHENOLIC NAMEPLATES.
2. CONTROL PANEL SHALL BE 36" IN WIDTH.
3. SUPPLY CONTROL PANEL INTAKE LOUVERS WITH SCREENS AS REQUIRED FOR PROPER ENCLOSURE VENTILATION.
4. THE CONTRACTOR SHALL SIZE THE AC UNIT APPROPRIATELY TO ENSURE PROPER COOLING OF THE HEAT LOAD WITHIN THE CONTROL PANEL.
5. SUPPLY LOOSE FOR INSTALLATION IN EXISTING APC CABINET IN VALVE HOUSE. SEE SHEET 100-E-022 KEY NOTE #2.

NP #	NAMEPLATE (NP) SCHEDULE
NP1	CONTROL PANEL
NP2	PLC FAILURE

A DATA POCKET SHALL BE MOUNTED TO THE INSIDE OF THE PANEL ENCLOSURE OUTER DOOR. NO PENETRATIONS THROUGH THE DOOR SHALL BE ALLOWED FOR MOUNTING. THE DATA POCKET SHALL BE HOFFMANN ADP2 OR APPROVED EQUAL.

A LAPTOP COMPUTER SHELF SHALL BE MOUNTED TO THE INSIDE OF THE PANEL ENCLOSURE OUTER DOOR. NO PENETRATIONS THROUGH THE DOOR SHALL BE ALLOWED FOR MOUNTING. THE LAPTOP COMPUTER SHELF SHALL BE HOFFMANN AASHLF1818 LARGE FOLDING SHELF, 18" x 18", STEEL OR APPROVED EQUAL. MOUNT 36" ABOVE FINISHED FLOOR.

3" ON ORIGINAL DOCUMENT
0 1 2 3

NO.	DATE	REVISION	BY	REC.	APP.

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REGISTERED PROFESSIONAL ENGINEER — KOOSHA TOOFAN — 20418 — Exp. SEPT. 30/2027 — Electrical Engineer — STATE OF CALIFORNIA

DESIGNED BY: KOOSHA TOOFAN
DESIGN CHECKED BY: JOHN GUILLORY
DRAWN BY: KOOSHA TOOFAN
SR. PROJ ENGR. R.P.E. NO.: 20418
APPROVED: KOOSHA TOOFAN
PRINCIPAL IN CHARGE, R.P.E. NO.: 20418

EBMUD

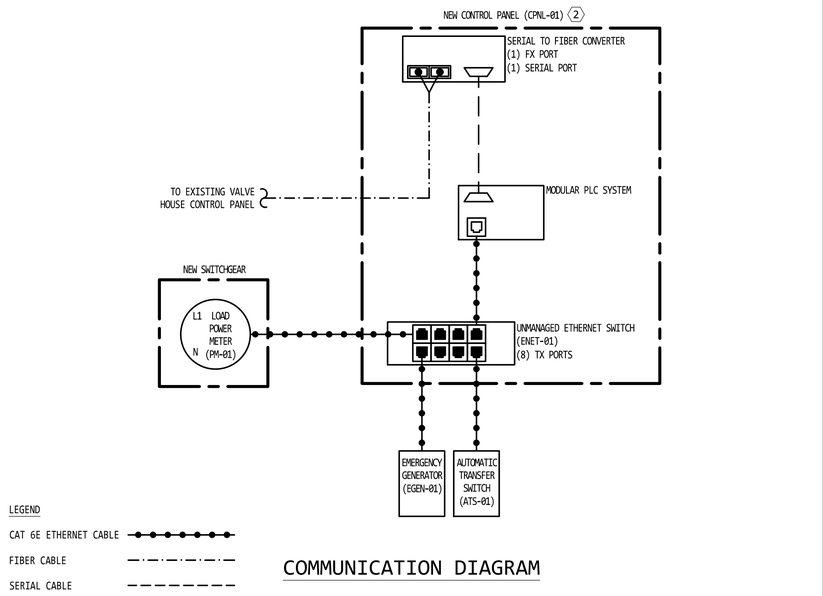
EAST BAY MUNICIPAL UTILITY DISTRICT
OAKLAND, CALIFORNIA

MOKELUMNE RIVER HATCHERY
ELECTRICAL DESIGN
ELECTRICAL

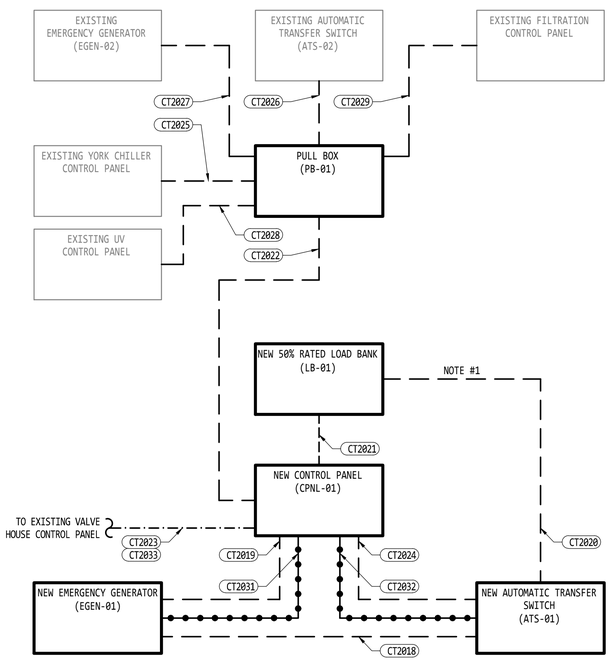
CONTROL PANEL ELEVATION & BILL OF MATERIALS

PROJ NO.		
SCALE: AS SHOWN	100-E-205	0
DATE: 02OCT2025	STRUCT. DISC. NUMBER	REV.

ELEVATION & BOM.DWG



COMMUNICATION DIAGRAM



STATUS SIGNAL/ALARM BLOCK DIAGRAM

DETAIL NOTE:

1. AUTOMATIC LOAD DUMP COMMAND CIRCUIT SHALL BE WIRED TO THE LOAD BANK TO DISCONNECT AND DISABLE ALL LOAD STEPS USING A NORMALLY CLOSED (NC) SET OF AUXILIARY CONTACTS FROM THE AUTOMATIC TRANSFER SWITCH (ATS-01). ALL RELEVANT AND REQUIRED CONTACTS SHALL BE UTILIZED TO ACHIEVE LOAD DUMP FUNCTIONALITY.

3" ON ORIGINAL DOCUMENT
0 1 2 3

DIAGRAM.DWG

PLC POINT #	DEVICE	DESCRIPTION
DI-001	EGEN-01	GENERATOR IN RUNNING
DI-002	EGEN-01	GENERATOR LOW FUEL
DI-003	EGEN-01	GENERATOR ALARM
DI-004	EGEN-01	GENERATOR FAIL TO START
DI-005	EGEN-01	GENERATOR EMERGENCY SHUTDOWN
DI-006	EGEN-01	GENERATOR BATTERY CHARGER
DI-007	ATS-01	ATS-01 IN NORMAL
DI-008	ATS-01	ATS-01 IN EMERGENCY
DI-009	LB-01	LOAD BANK OVER TEMPERATURE
DI-010	LB-01	LOAD BANK LOAD DUMP
1 DI-011	52a	MAIN BREAKER 52a STATUS
DI-012	ATS-02	ATS-02 IN NORMAL
DI-013	ATS-02	ATS-02 IN EMERGENCY
DI-014	PFR-01	NORMAL UTILITY POWER AC FAIL
DI-015	PFR-02	NORMAL/EMERGENCY LOAD POWER AC FAIL
DI-016	PFR-03	CONTROL PANEL (CPNL-01) AC FAIL
DI-017	PR-UF	CONTROL PANEL (CPNL-01) DC FAIL
DI-018	ZS-01	CONTROL PANEL DOOR SWITCH
DI-019	YC	YORK CHILLER COMPRESSOR #1 FAIL
DI-020	YC	YORK CHILLER COMPRESSOR #2 FAIL
DI-021	YC	YORK TEMPERATURE HIGH
DI-022	YC	YORK CHILLER ASSISTANCE PUMP #1 FAIL
DI-023	YC	YORK CHILLER ASSISTANCE PUMP #2 FAIL
DI-024	UV	UV SYSTEM FAIL
DI-025	FS	FILTRATION SYSTEM FAIL
DI-026	EGEN-02	GENERATOR IN RUNNING
DI-027	EGEN-02	GENERATOR LOW FUEL
DI-028	EGEN-02	GENERATOR ALARM
DI-029	EGEN-02	GENERATOR FAIL TO START
DI-030	EGEN-02	GENERATOR EMERGENCY SHUTDOWN
DI-031	EGEN-02	GENERATOR BATTERY CHARGER
DI-032	-	-
DI-033	-	-
DI-034	-	-
DI-035	-	-
DI-036	-	-
DI-037	-	-
DI-038	-	-
DI-039	-	-
DI-040	-	-
DI-041	-	-
DI-042	-	-
DI-043	-	-
DI-044	-	-
DI-045	-	-
DI-046	-	-
DI-047	-	-
DI-048	-	-
DO-001	-	-
DO-002	-	-
DO-003	-	-
DO-004	-	-
DO-005	-	-
DO-006	-	-
DO-007	-	-
DO-008	-	-
DO-009	-	-
DO-010	-	-
DO-011	-	-
DO-012	-	-
DO-013	-	-
DO-014	-	-
DO-015	-	-
DO-016	-	-

PLC POINT #	DEVICE	DESCRIPTION
AI-001	-	-
AI-002	-	-
AI-003	-	-
AI-004	-	-
AI-005	-	-
AI-006	-	-
AI-007	-	-
AI-008	-	-
AO-001	-	-
AO-002	-	-
AO-003	-	-
AO-004	-	-
AO-005	-	-
AO-006	-	-
AO-007	-	-
AO-008	-	-

CONTROL PANEL (CPNL-01) INPUT/OUTPUT SCHEDULE

GENERAL NOTES

1. TELEMETRY SHALL BE FULLY FUNCTIONAL PRIOR TO DISTRICT ACCEPTANCE.
2. CONTRACTOR SHALL COMPLETE CONTROL CABLING FOR A FULL FUNCTIONAL SYSTEM.
3. ALL NETWORK CONFIGURATION AND PROGRAMMING BY OTHERS.

KEY NOTES

1. 52A CONTACT OPENS WHEN THE BREAKER (52) OPENS. 52A CONTACT CLOSES WHEN 52 CLOSES.
2. COMMUNICATION HARDWARE LOCATED INSIDE CONTROL PANEL (CPNL-01) SHOWN ON SHEET 100-E-205.

COMPACTLOGIX INPUTS

COMMUNICATION SIGNALS		
INPUT #	DEVICE	DESCRIPTION
1	ATS (ATS-01)	OPERATIONAL DATA
2	GENERATOR (EGEN-01)	OPERATIONAL DATA
3	POWER METER (PM-01)	VOLTAGE (3Ø)
4	POWER METER (PM-01)	CURRENT (3Ø)
5	POWER METER (PM-01)	POWER (W/VA/VAR)
6	POWER METER (PM-01)	POWER FACTOR

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EAST BAY MUNICIPAL UTILITY DISTRICT
OAKLAND, CALIFORNIA

MOKELUMNE RIVER HATCHERY
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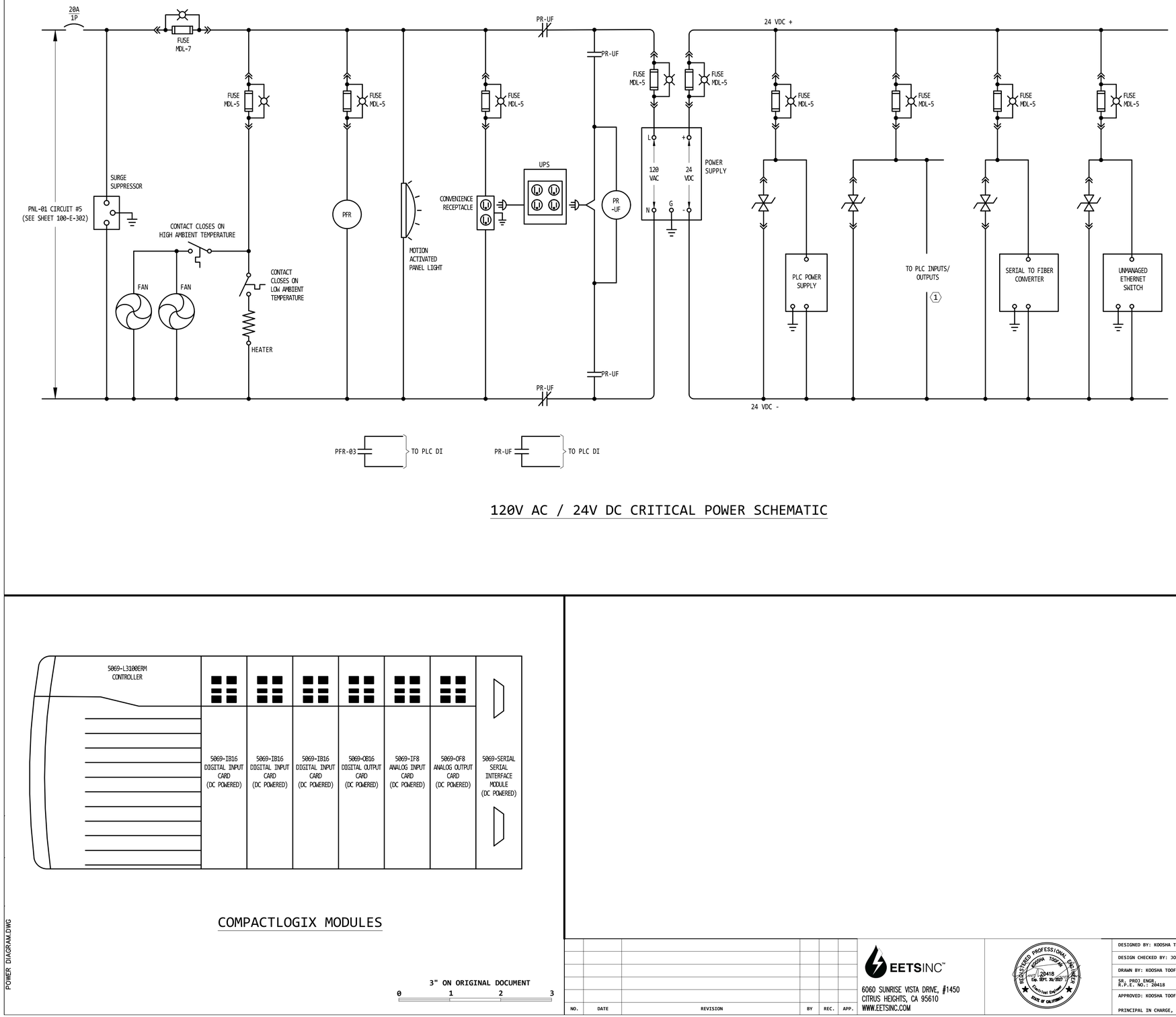
COMMUNICATION DIAGRAMS & INPUT/OUTPUT SCHEDULE

PROJ NO.			
SCALE: AS SHOWN	100-E-206		0
DATE: 02OCT2025	STRUCT.	DISC. NUMBER	REV.



120V AC / 24V DC CRITICAL POWER SCHEMATIC

GENERAL NOTES

1. SUPPLY 25% SPARE AC AND DC CIRCUITS.
2. ALL DIGITAL OUTPUTS TO UTILIZE INTERPOSING DISCRETE RELAYS TO ACTIVATE FINAL LOADING.

KEY NOTE

(#)

1. SUB-FUSE ALL INDIVIDUAL SIGNAL CONDITIONERS, ISOLATORS AND INSTRUMENTS.

COMPACTLOGIX MODULES

3" ON ORIGINAL DOCUMENT
0 1 2 3

POWER DIAGRAM.DWG

NO.	DATE	REVISION	BY	REC.	APP.

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20418
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CONTROL PANEL POWER DIAGRAM

PROJ NO.		
SCALE: AS SHOWN	100-E-207	0
DATE: 02OCT2025	STRUCT. DISC. NUMBER	REV.

SYMBOL	QUANTITY	TAG	CATALOG #	ARRANGEMENT	DESCRIPTION	LLF	LUM LUMENS	LUMINAIRE WATTS	TOTAL WATTS	VOLTAGE	NOTES
	2	A	FXLEDSSF @ 137W_4K	SINGLE	FLOOD LIGHT WITH SLIPFITTER MOUNTING ARM	1.000	17898	129.343	256.686	120	20' DARK BRONZE POLE WITH GFCI RECEPTACLE

LIGHTING SCHEDULE (1)(3)(4)(5)

PANEL: '01' TYPE: AS SPECIFIED FRAME: 225A MAIN: 150A-3P (2)

SERVICE: 120/208 VOLT, 3Ø-4 WIRE MOUNT: INSIDE SWITCHBOARD (SWBD-01)

LOAD	KW	CB	#	S/N	#	CB	KW	LOAD
NEW GENERATOR AUXILIARY LOADS	-	30/2 (6)	1	X	2	20/1	-	(2) NEW OUTDOOR POLE-MOUNTED LIGHTS
			3	X	4	20/1	-	(2) NEW OUTDOOR GFCI RECEPTACLES
NEW CONTROL PANEL (CPNL-01)	-	20/1	5	X	6	20/1	-	CONTROL PANEL (CPNL-01) AC UNIT
EXISTING LIFT STATION	-	60/3	7	X	8	20/1	-	SWITCHBOARD GFCI
			9	X	10	20/1	-	POWER METER
			11	X	12	20/1	-	SWITCHBOARD HEATERS
SPARE	-	20/1	13	X	14	20/1	-	SPARE
SPARE	-	20/1	15	X	16	20/1	-	SPARE
SPACE	-	20/1	17	X	18	20/1	-	SPACE
	-	-	19	X	20	-	-	
	-	-	21	X	22	-	-	
	-	-	23	X	24	-	-	
	-	-	25	X	26	-	-	
	-	-	27	X	28	-	-	
	-	-	29	X	30	-	-	

PANEL SCHEDULE

ITEM #	PULL BOX TAG	DESCRIPTION	MAKE/MODEL	PLAN SHEET REFERENCE	DESCRIPTION
1	PB-01	MINIMUM INNER DIMENSIONS: 16"(L) x 10"(W)	CHRISTY B1730	100-E-019	CONTROL WIRING FOR YORK CHILLER AND OTHER EQUIPMENT
2	PB-02	MINIMUM INNER DIMENSIONS: 16"(L) x 10"(W)	CHRISTY B1730	100-E-020	CONTROL PULL BOX FOR FUTURE WIRING
3	PB-03	MINIMUM INNER DIMENSIONS: 16"(L) x 10"(W)	CHRISTY B1730	100-E-020	INSTRUMENTATION PULL BOX FOR FUTURE WIRING
4	PB-04	MINIMUM INNER DIMENSIONS: 16"(L) x 10"(W)	CHRISTY B1730	100-E-020	POWER PULL BOX FOR FUTURE WIRING

PULL BOX SCHEDULE

KEY NOTES

1. CONTRACTOR SHALL VERIFY MOUNTING REQUIREMENTS OF ALL LIGHT FIXTURES AND COORDINATE WITH LIGHT FIXTURE SUPPLIER TO FURNISH ALL REQUIRED MOUNTING HARDWARE AND ACCESSORIES THAT ARE SUITABLE FOR THE SPECIFIC MOUNTING SURFACE AND ENVIRONMENT, REGARDLESS OF WHAT IS SPECIFIED IN THE LUMINARIES SCHEDULE.
2. PANEL SHALL BE RATED 22kAIC RMS SYMMETRICAL MINIMUM.
3. GFCI RECEPTACLE SHALL BE WEATHER RESISTANT AND RATED FOR OUTDOOR USE, AND SHALL BE EQUIPPED WITH GROUND FAULT PROTECTION.
4. LIGHT SHALL BE CONTROLLED VIA LIGHT SWITCH ONLY. NO PHOTOCELL OPERATION PERMITTED.
5. THE LOCATIONS OF THE LIGHTING FIXTURES ARE SHOWN DIAGRAMMATICALLY ON PLAN SHEET 100-E-020. VERIFY EXACT LOCATIONS WITH SITE CONDITIONS DURING INSTALLATION. COORDINATE FINAL INSTALLATION LOCATIONS WITH THE DISTRICT PRIOR TO ROUGH-IN.
6. COORDINATE BREAKER RATING FOR GENERATOR AUXILIARY LOADS WITH THE APPROVED GENERATOR SUBMITTAL. ADJUST BREAKER RATING AS REQUIRED.

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PRINCIPAL IN CHARGE, R.P.E. NO.: 20418

EBMUD

EAST BAY MUNICIPAL UTILITY DISTRICT
OAKLAND, CALIFORNIA

MOKELUMNE RIVER HATCHERY
ELECTRICAL DESIGN
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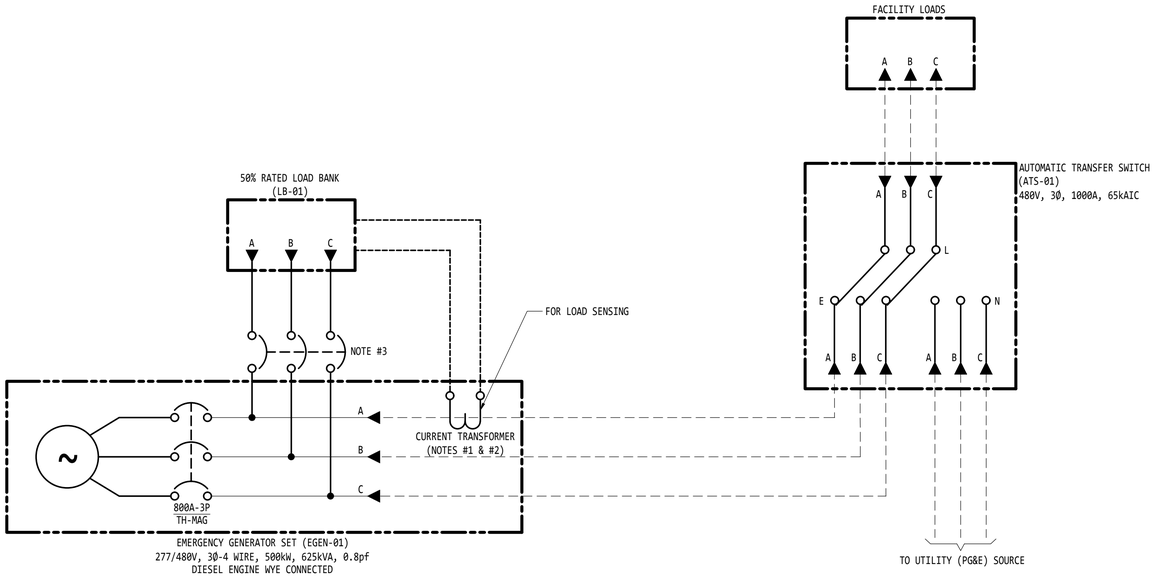
PANEL, LIGHTING, & PULL BOX SCHEDULES

PROJ NO.		
SCALE: AS SHOWN	100-E-302	0
DATE: 02OCT2025	STRUCT. DISC. NUMBER	REV.

PULL BOX SCHEDULES.DWG

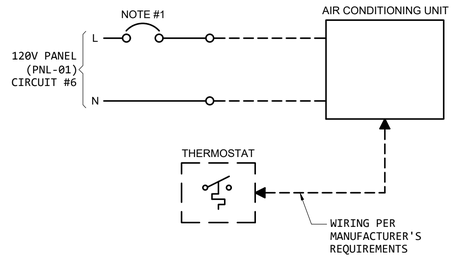


LOAD BANK LOAD MONITORING SCHEMATIC

DETAIL NOTES:

1. INSTALL THE CT BETWEEN THE LOAD BANK AND BUILDING LOAD LOCATION AS SHOWN. PLACING THE CT BETWEEN THE LOAD BANK AND GENERATOR WILL RESULT IN LOAD BANK FAILURE.
2. CT SHALL BE INSTALLED TO MONITOR THE A-PHASE LEG AS SHOWN TO MAINTAIN AN OPERATOR-SETTABLE MINIMUM LOAD OF 30% ON THE EMERGENCY GENERATOR WHEN RUNNING AT ALL TIMES.
3. SIZE BREAKER AS REQUIRED.

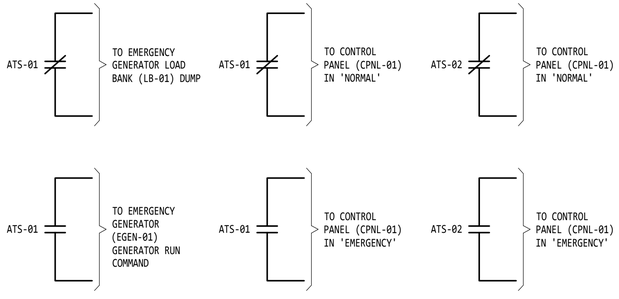
CONTROL PANEL (CPNL-01) INTRUSION SWITCH SCHEMATIC



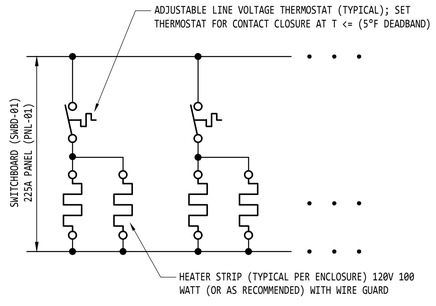
CONTROL PANEL (CPNL-01) AIR CONDITIONING UNIT CONTROL SCHEMATIC

DETAIL NOTE:

1. CONTRACTOR SHALL SIZE THE A/C UNIT BASED ON THE CONTROL PANEL'S CALCULATED HEAT LOAD AND SHALL SIZE THE FEEDER CIRCUIT BREAKER FROM PANEL PNL-01 ACCORDINGLY.



ATS SCHEMATICS



SWITCHBOARD (SWBD-01) & ATS-01 HEATER CONTROL SCHEMATIC

DETAIL NOTE:

1. EACH SWITCHBOARD ENCLOSURE SHALL HAVE A THERMOSTATICALLY CONTROLLED STRIP HEATER. EACH THERMOSTAT SHALL CONTROL NO MORE THAN TWO STRIP HEATERS IN ADJACENT PANELS OR SECTIONS.

SCHEMATICS.DWG

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OAKLAND, CALIFORNIA

MOKELUMNE RIVER HATCHERY
ELECTRICAL DESIGN
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MISCELLANEOUS SCHEMATICS

PROJ NO.		
SCALE: AS SHOWN	100-E-303	0
DATE: 02OCT2025	STRUCT. DISC. NUMBER	REV.

MOKELUMNE RIVER HATCHERY	
ASSET TAG LIST	NEW EQUIPMENT DESCRIPTION
SWBD-01	480V 1000A SWITCHBOARD
ATS-01	480v, 3Ø, 1000A AUTOMATIC TRANSFER SWITCH
EGEN-01	500kW, 480/277V, 3Ø-4 WIRE EMERGENCY GENERATOR
LB-01	50% RATED LOAD BANK
XFMR-01	45kVA 480:120/208V-3Ø TRANSFORMER
PNL-01	120/208V-3Ø 225A PANELBOARD
CPNL-01	CONTROL PANEL
PM-01	POWER METER
ENET-01	ETHERNET SWITCH
PLC-01	COMPACTLOGIX PLC
-	-
-	-
-	-
-	-

ASSET TAG LIST

TAG LIST.DWG

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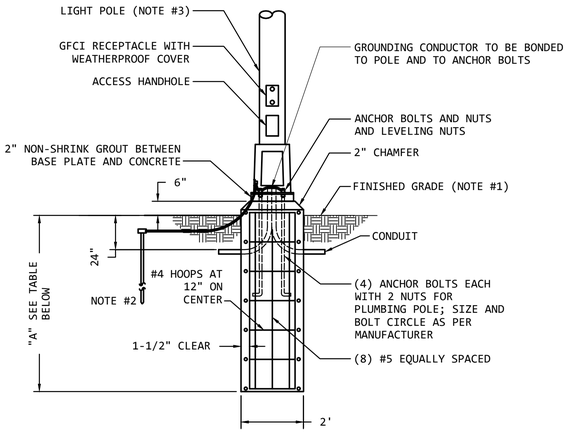
ASSET TAG LIST

PROJ NO.				
SCALE: AS SHOWN	100-E-500			0
DATE: 02OCT2025	STRUCT.	DISC.	NUMBER	REV.

D08
TYP



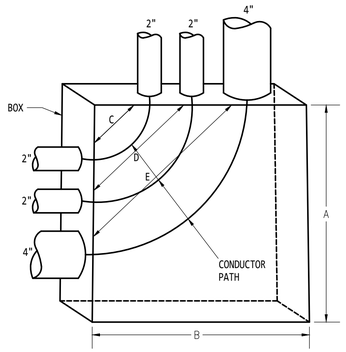
LIGHT STANDARD BASE

NOT TO SCALE

DETAIL NOTES:
1. FOUNDATION TO BEAR AGAINST ORIGINAL SOIL OR 90% COMPACTED BACKFILL OF APPROVED TYPE.
2. 3/4"Ø x 10'-0" COPPER CLAD STEEL GROUND ROD.
3. ADD LIGHT SWITCH AS SHOWN IN PLAN VIEW ON SHEET 100-E-020.

POLE HEIGHT	EMBEDMENT "A"
10'-0	5'-6"
20'-0	6'-6"
30'-0	7'-6"

D09
TYP



A = (6 x 4 INCH) + 2 INCH + 2 INCH
= 28 INCH MINIMUM

B = (6 x 4 INCH) + 2 INCH + 2 INCH
= 28 INCH MINIMUM

C = 6 x 2 INCH
= 12 INCH MINIMUM REQUIRED BETWEEN RACEWAYS ENCLOSING THE SAME CONDUCTOR

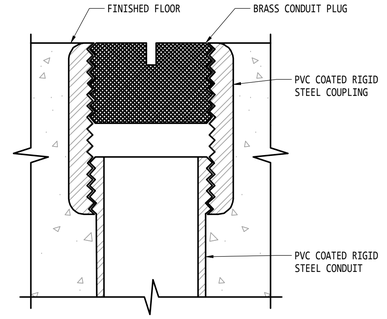
D = 6 x 2 INCH
= 12 INCH MINIMUM REQUIRED BETWEEN RACEWAYS ENCLOSING THE SAME CONDUCTOR

E = 6 x 4 INCH
= 24 INCH MINIMUM REQUIRED BETWEEN RACEWAYS ENCLOSING THE SAME CONDUCTOR

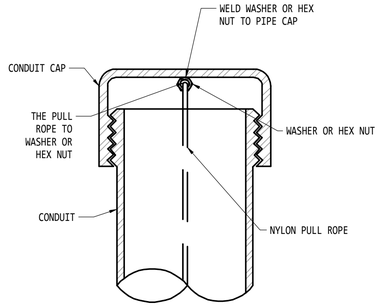
RACEWAY ENCLOSING SAME 600V & BELOW CONDUCTORS IN BOX

NOT TO SCALE
(SEE NEC SECTION 314.28 FOR BOX SIZING)

D10
TYP



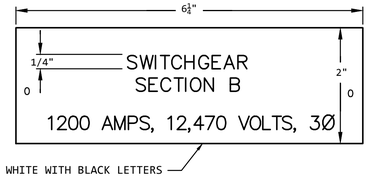
ENCASE CONDUITS



EXPOSED CONDUITS

SPARE CONDUIT

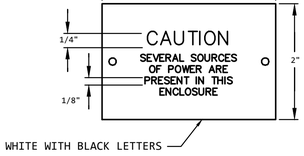
NOT TO SCALE



SWITCHGEAR SECTION NAMEPLATE

NOT TO SCALE
(NOTES #1 & #2)

DETAIL NOTES:
1. PLAQUE DIMENSIONS SHALL BE ADJUSTED AS REQUIRED.
2. ENGRAVED PHENOLIC PLAQUE.



CAUTION NAMEPLATE

NOT TO SCALE
(NOTE #1)

DETAIL NOTE:
1. PLAQUE DIMENSIONS SHALL BE ADJUSTED AS REQUIRED.

3" ON ORIGINAL DOCUMENT
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NO.	DATE	REVISION	BY	REC.	APP.

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EBMUD

DETAILS ON THIS SHEET ARE TYPICAL ONLY AND ALL INSTALLATION AND REQUIREMENTS SHOULD BE COORDINATED WITH THE CONTRACTED VENDOR.

EAST BAY MUNICIPAL UTILITY DISTRICT
OAKLAND, CALIFORNIA

MOKELUMNE RIVER HATCHERY
ELECTRICAL DESIGN
ELECTRICAL

ELECTRICAL DETAILS – 2

PROJ NO.		
SCALE: AS SHOWN	100-E-901	0
DATE: 02OCT2025	STRUCT. DISC. NUMBER	REV.

DETAILS – 2.DWG