



Humboldt Bay Municipal Water District
Protective Relay Upgrade

TECHNICAL SPECIFICATION

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**TECHNICAL SPECIFICATION
(Hybrid Option)**

FOR

**PROTECTIVE RELAY UPGRADES
4.16KV HYDRO SWITCHGEAR**

AT

**Humboldt Bay Municipal Water District
Ruth Lake Hydroelectric Plant
40 Lower West Side Rd
Mad River, CA 95526**

1 PROJECT SUMMARY

- 1.1 Humboldt Bay Municipal Water District (OWNER) is soliciting a firm fixed price proposal for VENDOR services in support of electrical switchgear relay replacements. The delivery of services will occur in 2018 at the Ruth Hydroelectric Plant.

This work scope encompasses Generator protective device relay replacement at 4160V Medium Voltage Generator protection panels. This project is for services to provide a fully functional and complete system in accordance with scope of work in Section 2. The VENDOR shall provide a firm fixed price estimate to include the following services:

- Materials procurement
- Pre-installation quality check, relay bench testing, equipment preparation
- Technical assistance in support of installation of new equipment by HBMWD electricians.
- Testing and commissioning
- PG&E relay pre-parallel protective relay testing and test report per Rule 21.
- PG&E Pre-Parallel inspections and protective relay functional tests per Rule 21.
- Final report, as-built drawings

The VENDOR's proposal shall be complete with provisions for all supervision, labor, equipment, materials, tools, transportation, and supplies.

The OWNER to facilitate this work and provide material and facilities per section 3.

- 1.2 Proposal General Provisions

The VENDOR shall comply with the following general provisions, unless otherwise agreed upon by OWNER.

- 1.2.1 The VENDOR shall furnish all supervision, labor, pertinent items to carry out their scope of work in the project, supplies, testing, safety equipment, PPE, consumables, personnel and tools transportation, vehicles, and all other pertinent items necessary for carrying out the full scope of this project.
- 1.2.2 The VENDOR is responsible for reviewing all scope of work documents and shall have a complete understanding of this project in its entirety. It is requested that the VENDOR submit a Request for Information (RFI) by the date outlined in the milestone schedule in Section 4.1. The RFI shall outline points of clarification which may include, but are not limited to, resource limitations, equipment limitations, transportation coordination issues, and test equipment lead-time concerns. The RFI shall be submitted to the OWNER's procurement department. RFI's will then be directed to the appropriate personnel.

- 1.2.3 It is OWNER's recommendation that the VENDOR conduct a field walk-down of the project to identify any/all scope items described herein prior to submitting a final proposal. The E&I Leader and Maintenance Supervisor will be available at the site-walk to address any concerns or questions that the VENDOR may have.
- 1.2.4 All work shall be performed in accordance with the VENDOR's and OWNER's Safe Work Practices. The Vendor shall be responsible for adhering to all site access policies; LOTO and de-energization policies and procedures; as well as all incident reporting standards.
- 1.2.5 The VENDOR shall comply with the scope requirements presented herein and deviations or substitutions are only permitted upon request to the VENDOR in writing, and if agreed to by the OWNER project manager in writing.

2 SCOPE OF WORK

The following services shall be provided by the VENDOR, applicable to the facility and scope outlined herein. These services shall include the following:

- 2.1 Engineered record "As Built" drawings shall be submitted to OWNER in a DWG file format compatible with Turbo CAD version 20 format upon completion of the project.
- 2.2 Materials Procurement – VENDOR shall procure, fabricate and assemble a new replacement door to meet the requirements outlined herein. The replacement door shall include equipment as documented in Appendix 2. These shall be factory assembled, prewired, labeled, and tested before installation.
 - 2.2.1 Proposed part numbers and quantities are listed in Appendix 2. These shall be utilized to estimate material cost for this project. No other equivalents shall be provided for the SEL relays, ABB FT-1 test switches and Crompton Integra meters.
 - 2.2.2 Additional detailed descriptions for the SEL relays, ABB test switches and Crompton meters are provided in Appendix 5.
 - 2.2.3 All other material required for this project not listed in this specification is responsibility of the OWNER. This includes material such as terminal blocks, wire, lugs, wire labels, mounting hardware, etc.
 - 2.2.4 VENDOR provided potential and control circuit wiring shall be minimum sized #14 AWG Cu/SIS with spade terminations. VENDOR provided secondary current circuit wiring shall be minimum sized #10 AWG Cu/SIS with ring terminations.
 - 2.2.5 VENDOR to supply all labeling for project.
- 2.3 Pre-installation quality checks for all procured and assembled components. VENDOR shall program the relays and complete pre-installation bench testing for relays and related components to verify settings and panel assembly functionality. VENDOR shall include provisions for OWNER oversight and witnessing at OWNER's discretion.

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- 2.4 Equipment removal, installation, testing and commissioning –VENDOR shall provide technical assistance for switchgear door and protective device relay removal and installation. VENDOR shall provide all labor and equipment to perform testing and commissioning. The VENDOR shall provide a complete and fully functional system. Field services shall include:
- 2.4.1 Technical assistance in the removal of existing switchgear door and associated protection relays (Generator Protection Panel), removal of meters in the Generator 1, Generator 2 and Outgoing Bus panel doors.
- 2.4.2 Technical assistance in the installation of new factory assembled, steel switchgear door (Generator Protection Panel) to match existing shall be provided by the VENDOR. Technical assistance for the installation of new panel meters in the Generator 1, Generator 2 and Outgoing Bus panel doors New devices include new protective relays, meters, test switches, and other material as shown in Appendix 2..
- 2.4.3 Field wiring and relay functional testing to include:
- Visual verification of wiring against wiring diagrams and schematics. Technicians to redline field installation drawings to reflect final equipment configuration.
 - Point-to-point testing for all new relay and control wiring.
 - Install grounding jumpers for all new switchgear and panel doors, frames, and panel faces (as required).
 - Perform wiring and device insulation resistance testing in accordance with NETA ATS and manufacturer's recommendations.
 - Apply voltage or current to all microprocessor relay analog inputs and verify correct registration of the device function.
 - Check all output contacts or SCR's, by operating the controlled device (circuit breaker, auxiliary relay, etc.)
 - Verify operation of all light-emitting diodes, displays, and targets.
 - Test the utilized protective functions for each new microprocessor relay provided by VENDOR.
 - Perform microprocessor relay system functional testing on the overall and new relay protection scheme.
 - Check all internal logic functions for new microprocessor relays provided by VENDOR.
 - Upon completion of testing, reset all min/max recorders, communications statistics, fault counters, sequence of events recorders, and all other events recorders.
 - After the facility equipment is initially energized, measure magnitude and phase angle for all inputs and compare to expected values.
- 2.5 PG&E Rule 21 Testing
- 2.5.1 Develop a test plan and coordinate with PG&E personnel to accommodate witness testing requirements in accordance with PG&E Rule 21 requirements.
- 2.5.2 Provide protective relay test reports in accordance with PG&E Rule 21 test procedures and requirements.
- 2.5.3 Perform protective relay and functional testing during the PG&E pre-parallel inspection, and provide all required test results and documentation.

2.6 Project Closeout – The VENDOR shall deliver a final report and supporting documentation to include the following:

- As Built drawings in a DWG file format compatible with Turbo CAD version 20.
- Relay acceptance testing datasheets
- Rule 21 relay testing and functional test data sheets
- Commissioning data sheets
- In Service readings of all newly installed relays and meters
- “As Left” Electronic relay files, SEL format (.rdb)
- Construction summary report

3 PROJECT REQUIREMENTS AND CLARIFICATIONS

3.1 Contractor Qualifications - VENDOR shall be a NETA Accredited Company, whose employees meet the minimum qualifications by the accreditation organization

3.2 Project Lead Engineer Qualifications – The VENDOR’S senior project manager shall be a NETA Level 4 accredited Testing Technician

3.3 Safety - VENDOR shall follow all OWNER safe work practices and standards as specified in the contract agreement. In addition, the VENDOR shall also fully adhere to their company policies.

3.3.1 VENDOR shall have an OSHA incident rate less than 2.8, the industry average.

3.3.2 VENDOR shall provide all PPE required to perform this work safely and in compliance of OWNER and VENDOR safety policies.

3.4 Quotation Deliverables - VENDOR shall provide the following deliverables in response to this scope of work in accordance with these requirements:

- Provide a lump sum estimate for all tasks encompassed in this scope of work.
- Provide a proposed project schedule with key engineering, procurement, and installation milestones with projected completion dates
- Name and qualifications for key and supervising personnel. VENDOR shall provide one Senior Project Manager for overall project oversight.
- VENDOR’s safe work program and policy
- VENDOR’s hazard recognition program
- Verification of NETA Accreditation
- If Sub-vendors are specified:
 - Sub-vendor safe work program and policy
 - Sub-vendor hazard recognition program
 - Name and qualifications sub-vendor for key personnel
- Site access requirements and accommodations.

- 3.5 All material shall be provided by the OWNER. In order to facilitate this project the OWNER shall provide the following:
- On-site 120VAC power to facilitate testing.
 - Onsite parking
 - Bathroom facilities
- 3.6 **VENDOR Supplied Tools** - VENDOR shall provide all tools required to complete the tasks outlined in Section 2 of this scope of work document. The VENDOR shall notify OWNER of the tool and vehicle requirements for on-site work, including requirements for power to operate powered tools, work lighting, etc. The VENDOR shall provide all cables and cords required to operate VENDOR supplied equipment and tools.
- 3.7 If storage is required for this project, the VENDOR shall be responsible for coordinating and installing any portable storage facilities.
- 3.8 Where possible, the VENDOR may utilize existing terminal blocks, control wiring, and other existing material in the existing switchgear.
- 3.9 **Labor rates and execution strategy** – All engineering, project management, and preparation work performed before the demolition and installation for this project shall be based on straight time rates. The installation shall be performed in three phases.
- 3.9.1 **Pre-shutdown** – Testing of all new components and point to point verifications of new door shall be performed ahead of scheduled outage.
- 3.9.2 **Shutdown** – Technical assistance with the removal of the existing equipment and install the new relays and meters shall occur during a 5 day shutdown (week 1). Labor rates for this work shall be based on completing all necessary work during this period.
- 3.9.3 **Pre-Parallel** – Work performed to test, commission and perform the pre-parallel requirements on the new relays and meters shall occur during a 5-day shutdown (week 2). Labor rates for this work shall be based on completing all necessary work during this period.
- 3.9.4 **Prevailing wages** – Work performed onsite is subject to the prevailing wage requirements in effect in the state of California. VENDOR shall pay all workers employed on public works projects the prevailing wage determined by the Director of the Department of Industrial Relations.
- 3.10 **Performance Tracking and Deliverables** - Additional deliverables are required from the VENDOR during the project execution phases:
- Progress updates on a weekly basis. Progress updates via conference call bimonthly for the duration of the project
 - Progress updates on daily basis during onsite work.
 - Submitting invoices for all work performed in a timely manner. Invoices shall be submitted electronically by email or other approved method by OWNER. Invoicing must be compliant within OWNER's invoicing guidelines.

- Payment requests will be made upon receipt, and review and approval of a current schedule. of values

3.11 Scope Revisions

Revisions as recommended by the VENDOR shall be submitted in writing to OWNER for review and consideration.

3.12 Out of Scope

Out of scope work shall be added through use of OWNER's change control process. VENDOR shall include the cost and schedule impact associated with the change. VENDOR shall not perform requested changes without written approval from OWNER. Additional supporting documentation may be required to approve out of scope changes.

3.13 Additional Requirements

Upon issuance of the notice to proceed order, a final schedule for the work described herein will be provided to the owner for review and approval.

4 PROJECT CONTROLS

4.1 Change Order Process

Change control shall be performed in accordance with OWNER change management procedures. Procedure will be provided at award of contract.

- For additional work, both OWNER and the VENDOR must agree to changes and committed to by authorized representatives of both parties prior to execution of said work.
- OWNER is the authorized commitment authority; a revised purchase order will reflect approved work changes requiring an increase in hours our value, or an increase or reduction in scope.

4.2 Interfaces:

In addition to the preceding, the VENDOR shall comply and adhere to the following:

- Report work progress to the OWNER scheduler, as required, to assist in the coordination of dependent activities.
- The Electrical Engineer will assist the VENDOR's interactions with Operations in the event there are any questions, comments or concerns from Operations regarding the execution of work in the field.
- The VENDOR will assist and support OWNER switchgear switching, isolation, grounding, and LOTO. VENDOR shall prep equipment in order to complete work. VENDOR is responsible for ensuring the equipment is safe to work on and de-energized.



Appendix 1 – Relay & Metering One-line Diagram

Appendix 2 – Relay and Meter Replacement Scope Outline Drawings

Appendix 3 – Demo Drawings

Appendix 4 - Installation Drawings

Appendix 5 – Bill of Material