

Naval Radio Station Jim Creek, WA
Area 45 Substation Replacement



**Naval Facilities Engineering Command – Northwest
Public Works Department - Everett**

Naval Radio Station Jim Creek, WA

Area 45 Substation Replacement and Switchyard Upgrades

PART 2B - Design and Analysis Requirements

(Final – 29 Dec 2016)

1. Project Specific Design Requirements:

- a. Refer to Part 3 Project Program Design, Technical and Construction Requirements for specific Technical and Design requirements for each element of work.
- b. A summary of the anticipated professional services required are identified as follows:
 - 1) Electrical Engineer Power Systems and Harmonics
 - 2) AUTOCAD Drafting Services
 - 3) HV Electricians
 - 4) Data Collection

2. Quality Control Field Survey and Data Collection: Refer to Part 3 and Part 2A Section 01450 for Quality Control Requirements.

Site Data Collection and the Quality Control Program shall include the following:

- a) Technical support at the work site during field survey.
 - (1) Field data collection shall be scheduled and organized to gather data in a manner that results in the most effective use of time for all parties. Durations shall be shown in preliminary schedules and mutually agreed to by both parties for overall durations shown.
- b) QC technical personnel provided by competent High Voltage Electricians performing field survey work.

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- c) Designated individual to record field data
- d) Government PWD HVE will only provide access to areas and equipment.
- e) Joint Contractor/PWD LO/TO will be required for data collection activities.

3. Data Collection Tasks and Deliverables:

- a. An outline of the execution tasks are provided below for use in planning and scheduling work.
 - i. Coordination Meetings for On-Site Field Surveys:
 - a. Initial Coordination Meeting: Schedule an initial coordination meeting at Naval Station Everett with the Contracting Officer's Representative to review project work plan, scope tasks and procedures.
 - (1) Determine if any outages are required and submit outage requests.
 - (2) Scheduling execution of work: Establish a mutually agreeable sequence of work, milestones and timelines from start to finish of work.
 - (3) Minimum attendees for Meetings: Project execution team (includes Site Supervisor and Foreman as applicable to contractor's execution team), Contracting Officer's Representative, PWD Utility Supervisor, and Transmitter representative.
 - (4) Following the meeting, submit meeting minutes.
 - ii. Following the meeting, conduct necessary field surveys to collect data and verify data furnished by the Contracting Officer's Representative or other organizations.
 - iii. The field surveys must be scheduled and coordinated with the QA Representative.
 - iv. Draft Report:
 - a. Prepare a draft report including the results of all analyses. The draft report must include an executive summary of study recommendations.
 - b. Provide all SKM software files as a backup project on a CD or DVD.
 - c. Submit two electronic copies and five hard copies to the Contracting Officer's Representative. Incorporate any comments provided by the Government Reviewers.
 - v. Final Report:
 - a. Prepare the final report incorporating the government's comments on the draft report.
 - b. Submit two electronic copies and five hard copies to the Contracting Officer's Representative.
 - c. Format and Content of Final Report. Include at a minimum the following:
 - (1) Documentation must be submitted in hardcopy, printed on 8 1/2" x 11" paper, and as Microsoft Word files on CD or DVD. CAD files where created, shall be included.

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- (2) SKM Modeling: The electrical model and associated analyses must be performed using SKM®. Documentation of the electrical model must be provided by SKM® printouts and key analyses must include SKM® tabular and one-line printouts. All copies must also be submitted in Microsoft word for future edits as necessary for government and also in Adobe PDF format on CD or DVD.
- d. Provide all final SKM software files as a backup project on a CD or DVD.
- vi. Software, Hardware:
 - a. Furnish all SKM software files included in the project folder and all SKM library files that are not included in the default library.
 - b. The copy of SKM files must be saved as a backup project and turned over to the Contracting Officers Representative for distribution to the NAVFAC Utility Program Manager or Production Director.
- 4. **General Design Requirements:**
 - a. The recommended design shall be the highest efficiency liquid immersed distribution transformer sized to the most steady-state load range (mode not mean) the substation will experience, without compromising robustness, and required Basic Insulation Level (BIL) as per Part 3.
 - b. The new system shall be designed for and shall not exceed the applicable limits as set forth in IEEE Standard 519-2014. Requirements indicated as recommendations within the Standard or associated references shall be interpreted as being mandatory requirements with respect to this contract.
 - c. Evaluate for impact and design modifications as necessary for associated systems/equipment such as but not limited to AMI and SCADA systems.
 - d. Prepare attached Project Drawing Coordination Matrix for requirements to provide new drawings and reuse and/or modify existing facility drawings.
- 5. **Design Codes, Regulations and Standards:**
 - a. This Scope of Work and its attachments periodically reference 2012 standards, however the most recent standards at the time of Award shall be used. Provide work in compliance with the latest revision/edition of the design standards and applicable codes listed herein. The term "Latest Revision/Edition" is defined as the version as of the proposal date for the solicitation. Refer to Part 3 for specific guidance pertaining to transformer design.
 - b. Codes and standards listed in this RFP take precedence over industry standards and those standards when used by reference. When discrepancies in the referenced standards and the contract requirements occur, the more stringent requirements shall govern.
 - c. Advisory provisions of all codes, requirements, and standards shall be interpreted as mandatory. Substitute the word "shall" for words such as; "must", "required", "should", "may" or "recommended," wherever they appear. Reference to the "authority having jurisdiction" shall be interpreted to mean "Contracting Officer". Comply with the required and advisory portions of the current edition of the standard at the time of contract solicitation.

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- d. The following list of criteria, codes and standards apply and is not considered a comprehensive and complete list. These requirements maybe augmented by other codes and standards referenced in the RFP.
- 1) UFC 1-200-01 General Building Requirements
 - This document extensively lists codes, regulations and criteria adopted by the Navy.
 - Where known, applicable and specific criteria has been stated in this Statement of Work document.
 - Guidance on precedence and applicability.
 - 2) UFC 1-300-09N, Design Procedures
 - This document provides design procedure guidance, unless requirements are modified or specified otherwise herein.
 - 3) Other Codes and Criteria applicable are listed below for
 - IEEE Standard 519-2014, Requirements for Harmonic Control in Electric Power Systems
 - IEC Standard 61000-4-7, Guide on Harmonics Measurement
 - IEC Standard 61000-4-30, Power Quality Measurement Methods
 - IEC Standard 61000-4-15, Testing and Measurement Techniques
 - 2016 DOE Standard- 10 CFR Part 431 Energy Conservation Program: Energy Conservation Standards for Distribution Transformers; Final Rule
 - UFC 3-250-04 Standard Practice for Concrete Pavements
 - UFC 3-201-01 Civil Engineering
 - UFC 3-301-01 - Structural Engineering
 - UFGS 09 97 13.27
 - ASCE Minimum Design Loads for Buildings and Other Structures, ASCE-7
 - International Building Code
 - International Mechanical Code
 - International Plumbing Code
 - NFPA-101, Life Safety Code
 - NFPA-70, National Electric Code
 - Safety and Accident Prevention – OSHA & ACOE EM-385-1- 1 (**Latest Edition**)
- e. The above UFC's and UFGS specifications maybe download at whole building design guide website (<http://www.wbdg.org/>).

6. Drawing Deliverables – General Requirements:

- a. A complete set of coordinated up-to-date existing facility as-built drawings do not exist.
- b. Refer to Part 6 Project Drawing Coordination Matrix. AEDOR to review available documents and shall prepare a Project Drawing Coordination Matrix of project specific electronic CADD deliverables for approval. This document also provides direction on requirements for new individual drawings and for the re-use of existing facility drawings.
- c. All design and construction drawings shall generated or re-utilized shall be numbered sequentially to fit into the existing set of facility record or as-built drawings.

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- d. Reutilize existing facilities drawings when available to show new work. Additional drawings required to be prepared shall be titled and numbered so as to start an initial as-built record set.
- e. CADD Deliverables will be required at each RFP submittal phase and will be prepared in accordance with the requirements of UFC 1-300-09N on the WBDG, unless stipulated otherwise herein.
- f. NO External Reference (XREFS) shall be attached to any drawing being submitted. All drawings shall be stand alone and not require reference drawings to be complete. Bind all external references and attach all images to the drawing before submission.
- g. Do not include multiple drawings within a single electronic .DWG file or .PDF file. Each drawing shall have its own unique .DWG file name within the existing set. Drawings shall be named in the following format: E-01 Electrical Legend – 2014. If the drawing is a revision to an existing drawing than the name shall reflect the revision number: E-0R1 Electrical Site Plan – 2014. Names will directly reflect the name on the drawing title block.
- h. All CAD files shall be accompanied with a plot of the associated PDF drawing shall be printed to the appropriate drawing sheet size (D or larger). Lines associated with the PDF must be legible and professional in nature.
- i. Registration: Provide professional registration and design signing and stamping requirements per requirements of UFC 1-300-09N Design Procedures for all new sheets, details, and/or information. Details added to an existing master drawing shall be clouded as well as the signed stamp and annotated linking the stamp to the specific detail. Existing as-built information simply transferred to the master set shall NOT be re-stamped.

7. Submittal Deliverable Requirements:

- a. Provide to the Government submittals as listed. See below for specific design and construction submittal format and approval and surveillance requirements. The Contractor is encouraged to prepare and submit with the design drawings, appropriate connection, fabrication, layout, and product specific drawings.
- b. Construction Submittals: Provide construction phase submittals during the design phase where feasible. Refer to Part 2A for additional submittal requirements and procedures prior to, during and after construction.
- c. Design Submittals:
 - 1) General: Provide required Administrative and Technical design submittals to the Contracting Officer's Representative in the prescribed format. Submittals shall be approved by the Government prior to commencement of work.
 - 2) The AEDOR shall identify the CSI specification sections that are applicable to each submittal. Naval Station Everett Public Works uses the 5-character 16-division CSI numbering system to facilitate integration of new submittal records into the existing submittal files.
- d. Transmittal Sheet: Provide a completed NAVFAC Form 4355 "Submittal Transmittal Form" (Document D) as the coversheet and presented as the first page for each submittal required. Additional guidance is provided as follows:
 - 1) Completely fill out all items in Part I – "For Contractor Use" on Form 4355.

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- 2) Submittal Transmittal Number: Numerically sequence submittals by filling in the "submittal no." block, starting with "01". For resubmittals, use "01-R1", etc.
 - 3) Each of the submittals identified shall be provided with a PDF file of the Transmittal cover sheet form 4355.
 - e. **Submittal Log:** During the design phase, a submittal log is to be prepared to identify the submittals that will be provided.
 - f. **Testing Log:** Testing log is required to be developed as well for critical tests during the design phase period. Contractor's quality control process is to verify compliance to the most recent code, regulation or industry standard that meets or exceeds the original buildings standards.
 - g. **Submittals - Record:** Submittals identified to be provided during the design phase may be submitted by the contractor to the AEDOR for review, or reviewed by the contractor. Following designer or contractor review, a record copy is to be provided to the Government.
8. **Required Submittals:** The following is a partial list of required submittals. This list is not all-inclusive and must be built upon by the designer and incorporated into a complete submittal register.

a. **CONCEPT DESIGN**

1) SYSTEMS COORDINATION AND VERIFICATION:

- a) 15010 – AMI System Update
 - Narrative of Impact/Non-Impact
 - Narrative of Modifications Required (as applicable)
 - Data to be collected
 - Magnitude and Duration of power interruptions during data collection/meter functionality tests
- b) 15010 – SCADA Interface
 - List of tests to be performed
 - Draft remote monitoring/control checklist

2) DRAWING CONSOLIDATION & AS-BUILT PHASE SUBMITTALS:

- a) 01330 – Drawing Consolidation
 - Concept consolidation on one master drawing per SOW and post award concept discussion
 - Submit master drawing and associated drawings
 - ½ size hard copy

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- Submit modified AUTOCAD DWG and PDF files

3) ELECTRICAL DISTRIBUTION SYSTEM DESIGN

- a) Design Engineer qualifications
- b) Relevant reference experience

B. PRE-CONSTRUCTION SUBMITTAL

1) DATA COLLECTION & ANALYSIS PHASE SUBMITTALS:

- a) 16403 – Electrical Distribution System Modeling
 - Final report
 - In compliance with SOW
- b) 16460 – Arc Flash Analysis
 - Complete update per Part 3

2) SYSTEMS COORDINATION AND VERIFICATION:

- a) 15010 – AMI System Update
 - 100% design modification narrative and detail drawings
 - Pre-construction test report
 - Final reading prior to de-energizing
- b) 15010 – SCADA Interface
 - Pre-construction test report
 - Remote monitoring/control completed checklist

3) DRAWING CONSOLIDATION & AS-BUILT PHASE SUBMITTALS:

- a) 01330 – Drawing Consolidation
 - Complete consolidation of all existing data onto master drawing set
 - Submit master drawings and associated drawings
 - Five ½ size hard copies
 - Submit modified AUTOCAD DWG and PDF files

4) ELECTRICAL DISTRIBUTION SYSTEM DESIGN:

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- a) IEEE Standard 519-2014 Compliance
 - Modeling to demonstrate designed to meet standard
 - Signed by appropriate Professional Electrical Engineer

5) COMMISSIONING:

- a) 17100 – Commissioning Plan
 - Narrative, key components per ANSI/NETA 2013
 - Test/Certification list:
 - (a.) Component
 - (b.) Reference standard
 - (c.) Personnel qualifications

C. POST CONSTRUCTION SUBMITTAL (100%)

1) DATA COLLECTION & ANALYSIS PHASE SUBMITTALS:

- a) 16403 – Electrical Distribution System Modeling
 - Updated for any changes during construction

2) SYSTEMS COORDINATION AND VERIFICATION:

- a) 15010 – AMI System Update
 - Post-construction test report
 - Field verification CT submittal

- b) 15010 – SCADA Interface
 - Post-construction test report
 - Remote monitoring/control completed checklist

3) DRAWING CONSOLIDATION & AS-BUILT PHASE SUBMITTALS:

- a) 01330 – Drawing Consolidation
 - Resubmission of any elements not approved at the pre-construction submittal and/or changed during construction
 - Submit master drawing set (As-Built) and associated drawings
 - Five 1/2 size hard copies
 - Submit modified AUTOCAD DWG and PDF files

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D. FINAL REPORT(S)

1) ALL SUBMITTALS:

- a) Same submission requirements as the post-construction submission.
- b) Should 100 percent submittal be complete and result in no review comments or with few comments diminutive in nature, the Contracting Officer may consider the 100-percent submission to be the final submission.

-- End of Section --