



**Alabama State Port Authority**  
***Specification Booklet***

**Project Name**          **Stacker Reclaimer 2 & 3 Procurement - Electrical Transformer Supply**  
**Location**                **Mobile, AL**  
**Project #**    11367    **TASK#**    3     **March 2025**

# **SPECIFICATIONS AND CONTRACT DOCUMENTS**



**PORT OF MOBILE**  
ALABAMA PORT AUTHORITY

**John C. Driscoll, Director & CEO**

**Kay Ivey, Governor of Alabama**

**ISSUED BY**

**Engineering Services Department**



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## **BID DOCUMENTS**

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**IMPORTANT NOTICE TO CONTRACTORS REGARDING EMPLOYMENT PRACTICES:** Effective October 1, 2011, the Beason-Hammon Alabama Taxpayer and Citizen Protection Act (“the Act”) requires that any business entity contracting with or providing any grant or incentives to the state, including the Alabama State Port Authority, certify compliance with the Act. All Contractors must certify such compliance by executing the enclosed “Certificate of Compliance” and returning it to the Alabama State Port Authority with your proposal. In addition, the company shall submit with their proposal evidence that the company is enrolled in the E-Verify system. The following E-Verify website link is provided for convenience: [http://www.dhs.gov/files/programs/gc\\_1185221678150.shtm](http://www.dhs.gov/files/programs/gc_1185221678150.shtm).

**IMPORTANT NOTICE TO CONTRACTORS REGARDING ACCESS TO ASPA RESTRICTED FACILITIES:**

All individuals performing any work in McDuffie Terminal must have a valid Transportation Worker Identification Credential (TWIC) card, ASPA badge and an ASPA vehicle decal with no exceptions. Information regarding ASPA’s access policy is provided on the ASPA website at the link below.

<https://www.alports.com/port-access>

Time is an essential element in the Contract. Therefore, for each day the equipment delivery is delayed beyond the delivery date specified in the schedule provided with the bid, \$1,200.00 shall be paid by the Contractor to ASPA as liquidated damages for the loss sustained by the State because of failure of the Contractor to complete the work within the specified time.

Subsequent to the final acceptance of this project by the Engineer, the following requirements must be satisfied by the Contractor before final payment can be made.

The Contractor must execute copies of CONTRACTOR’S AFFIDAVIT OF PAYMENT OF CLAIMS AND DEBTS on the form furnished by the Engineer.

- a) The Contractor must furnish a letter on his letterhead acknowledging that acceptance of final payment by the Contractor constitutes a waiver of all claims, present or future, in connection with this project.
- b) The Contractor must furnish a written guarantee on his letterhead covering all defects in material and workmanship for a period of not less than two (2) years commencing on the date of final acceptance.
- c) If any purchased items have been incorporated in the work, the Contractor must furnish a letter on his letterhead assigning those warranties to the OWNER. Copies of said warranties shall be bound in one binder and submitted along with the letter assignment.



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## INSTRUCTIONS TO BIDDERS

### 1.0 ADDENDA AND INTERPRETATIONS

All questions about the meaning or intent of the Contract Documents shall be submitted to the Engineer in writing. Replies will be issued by Addenda emailed to all parties recorded as having received the bidding documents. All addenda so issued shall become part of the Contract Documents. Only questions answered by formal written Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect. Deadline to submit questions is seven (7) calendar days prior to the bid opening.

### 2.0 SUBMISSION OF PROPOSALS

Before submitting his proposal, the Contractor shall comply with the following:

- (a) The Proposals, including the acknowledgement of addenda, shall be filled in ink on the form provided herein and all blank spaces in the form shall be fully filled. The signature shall be in long hand and the complete form shall be without interlineations, alteration or erasure.
- (b) Attach a certified check or Bid Bond in the amount of 5% of the Proposal, but not more than \$10,000 made payable to the Alabama State Port Authority.
- (c) Certificate of Compliance with the Beason-Hammon Alabama Taxpayer and Citizen Protection Act (see page I-9)
- (d) Delivery schedule

One copy of Item (a) through (d) should be placed in a sealed envelope with the bidder's name, the project name and number, and the time and date of bid opening shown on the outside.

All submissions, including hand-delivered packages, US Postal Service express mail, or private delivery service must be delivered to the following individual at the following address in accordance with the Invitation to Bid.

Alabama Port Authority

Attn: Matthew Thomas, P.E., Facilities Engineer

1400 Alabama State Docks Boulevard, Suite 216

Mobile, AL 36602

(251) 441-7242

Neither fax nor email submissions will be accepted. Respondents are responsible for effective delivery by the above deadline, and late submissions will be rejected without opening and returned to the sender. APA accepts no responsibility for misdirected or lost proposals.



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Proposal of:

Address:

Date:

To: STATE OF ALABAMA, Alabama State Port Authority, Mobile, Alabama

Gentlemen:

The undersigned, as Bidder, hereby declares that he has examined the plans and specifications for the work and contractual documents relative thereto, and has read all Specifications furnished; and that he has satisfied himself relative to all aspects of the work to be performed and especially to those factors affecting cost, progress, or performance.

The Bidder proposes and agrees, if this bid is accepted, to contract with the Owner in the form of contract specified, to furnish all necessary materials, equipment, tools, apparatus, means of transportation, labor and incidentals to perform in a satisfactory manner, the work described in the Contract Specifications and Drawings for the Alabama State Port Authority, for the prices listed below to complete:

**Stacker Reclaimer 2 & 3 Procurement - Electrical Transformer Supply**  
**Mobile, Alabama**

In full and complete accordance with the shown, noted, described and reasonable intended requirements of the plans, specifications and contract documents to the full and entire satisfaction of the Owner with a definite understanding that no money will be allowed for extra work except as set forth in the attached contract documents.

It is agreed that the description under each item, being briefly stated, implies, although it does not mention, all incidentals and that the prices stated are intended to cover all such work materials and incidentals as constitute Bidder’s obligation as described in the specifications and any details not specifically mentioned, but evidently included in the contract shall be compensated for the item which most logically includes it.

Bidder agrees that he will commence the work within the time allotted by the Contract Documents with adequate force, plant, and equipment and that the work will be completed within the time schedule which the Bidder provides. Bidder accepts the provisions of the Contract Documents so as to liquidated damages in the event of failure to complete the work on time.

The Bidder further agrees that, in case of failure on his part to execute the Contract and required bonds within ten (10) calendar days from the date written notice of award if mailed or otherwise delivered to the Bidder, the certified check or bid bond accompanying this bid and the monies payable thereon shall be paid into the funds of the Owner not as penalty, but as a liquidation of a reasonable portion of the damages incurred by the Owner due to the Bidder’s failure to execute the Contract.



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Each of the following items within the Schedule of Prices shall be completed in accordance with this Specification Booklet. **Items not specifically noted in the schedule of prices shall be considered ancillary to the project and be absorbed in the bid items.**

**SCHEDULE OF PRICES**

ITEM	DESCRIPTION	UNIT PRICE	LEAD TIME (weeks)	VALUE
1	Insurance	Lump Sum		\$
2	7500kVA Transformer	Lump Sum		\$
3	10MVA Transformer	Lump Sum		\$
4	12MVA Transformer	Lump Sum		\$
5	15MVA Transformer	Lump Sum		\$
6	Delivery, Commissioning & Training Support (See Specifications, Part 3, 11.0-12.6)	Lump Sum		\$



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I, the undersigned bidder, hereby acknowledge receipt of the following addenda:

ADDENDUM NO. \_\_\_\_\_

ADDENDUM NO. \_\_\_\_\_

ADDENDUM NO. \_\_\_\_\_

ADDENDUM NO. \_\_\_\_\_

**Contractor's Signature:**

**Contractor Company** \_\_\_\_\_

\_\_\_\_\_

**Name**

\_\_\_\_\_

**Title**

\_\_\_\_\_

**Date**







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**CERTIFICATE OF COMPLIANCE WITH THE BEASON-HAMMON ALABAMA TAXPAYER AND CITIZEN PROTECTION ACT (ACT 2011-535, as amended by Act 2012-491)**

DATE: \_\_\_\_\_

RE Contract/Grant/Incentive (describe by number or subject):

\_\_\_\_\_ by and between  
 \_\_\_\_\_ (Contractor/Grantee) and  
 \_\_\_\_\_ (State Agency, Department or Public Entity)

The undersigned hereby certifies to the State of Alabama as follows:

1. The undersigned holds the position of \_\_\_\_\_ with the Contractor/Grantee named above, and is authorized to provide representations set out in this Certificate as the official and binding act of that entity, and has knowledge of the provisions of THE BEASON-HAMMON ALABAMA TAXPAYER AND CITIZEN PROTECTION ACT (ACT 2011-535 of the Alabama Legislature, as amended by Act 2012-491) which is described herein as "the Act".
2. Using the following definitions from Section 3 of the Act, select and initial either (a) or (b), below, to describe the Contractor/Grantee's business structure.

**BUSINESS ENTITY.** Any person or group of persons employing one or more persons performing or engaging in any activity, enterprise, profession, or occupation for gain, benefit, advantage, or livelihood, whether for profit or not for profit. "Business entity" shall include, but not be limited to the following:

- a.* Self-employed individuals, business entities filing articles of incorporation, partnerships, limited partnerships, limited liability companies, foreign corporations, foreign limited partnerships, foreign limited liability companies authorized to transact business in this state, business trusts, and any business entity that registers with the Secretary of State.
- b.* Any business entity that possesses a business license, permit, certificate, approval, registration, charter, or similar form of authorization issued by the state, any business entity that is exempt by law from obtaining such a business license and any business entity that is operating unlawfully without a business license.

**EMPLOYER.** Any person, firm, corporation, partnership, joint stock association, agent, manager, representative, foreman, or other person having control or custody of any employment, place of employment, or of any employee, including any person or entity employing any person for hire within the State of Alabama, including a public employer. This term shall not include the occupant of a household contracting with another person to perform casual domestic labor within the household.

- \_\_\_\_\_ *(a)* The Contractor/Grantee is a business entity or employer as those terms are defined in Section 3 of the Act.
- \_\_\_\_\_ *(b)* The Contractor/Grantee is not a business entity or employer as those terms are defined in Section 3 of the Act.

3. As of the date of this Certificate, Contractor/Grantee does not knowingly employ an unauthorized alien within the State of Alabama and hereafter it will not knowingly employ, hire for employment, or continue to employ an unauthorized alien within the State of Alabama;
4. Contractor/Grantee is enrolled in E-Verify unless it is not eligible to enroll because of the rules of that program or other factors beyond its control.



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Certified this \_\_\_\_\_ day of \_\_\_\_\_ 2021

\_\_\_\_\_  
Name of Contractor/Grantee/Recipient

By: \_\_\_\_\_

Its \_\_\_\_\_

The above Certification was signed in my presence by the person whose name appears above, on

this \_\_\_\_\_ day of \_\_\_\_\_ 20\_\_\_\_.

WITNESS: \_\_\_\_\_  
\_\_\_\_\_

## **ALABAMA STATE PORT AUTHORITY** **INSURANCE REQUIREMENTS FOR CONTRACT WORK**

### **INDEMNIFICATION**

The Contractor shall assume all liability for and shall indemnify and save harmless the State of Alabama and the Alabama State Port Authority, doing business as Alabama State Docks (ASD), and its officers and employees from all damages and liability for injury to any person or persons, and injury to or destruction of property, including the loss of use thereof, by reason of an accident or occurrence arising from operations under the contract, whether such operations are performed by himself or by any subcontractor or by anyone directly or indirectly employed by either of them occurring on or about the premises, or the ways and means adjacent during the term of the contract, or any extension thereof, and shall also assume the liability for injury and/or damages to adjacent or neighboring property by reason of work done under the contract.

### **INSURANCE REQUIREMENTS**

The Contractor shall not commence work under the contract until he has obtained all insurance required under the following paragraphs and until such insurance has been approved by ASD, nor shall the Contractor allow any subcontractor to commence work until all similar applicable insurance has been obtained by the subcontractor or the Contractor has provided coverage for the subcontractor. The Contractor shall provide, at his expense, insurance in accordance with the following:

#### **General Requirements (applicable to all policies)**

All policies of insurance must be written with companies acceptable to ASD. The Contractor shall furnish to ASD certificates of insurance, signed by the licensed agent, evidencing required coverages. ASD reserves the right to require certified copies of any and all policies. Each policy of insurance shall provide, either in body of the policy or by endorsement, that such policy cannot be substantially altered or cancelled without thirty (30) days' written notice to ASD and to the insured. **Except for Workers Compensation, said policies will identify Alabama State Port Authority, its officers, officials, agents, servants and employees as Primary and Non-contributory Additional Insureds in connection with work performed for, on behalf of, or on the property of ASD.**

#### **Commercial General Liability**

The Contractor shall take out and maintain during the life of the contract Commercial General Liability insurance, including Blanket Contractual and Completed Operations coverages, in an amount not less than \$3,000,000 for any one occurrence for bodily injury, including death, and property damage liability.

#### **Business Automobile Liability**

The Contractor shall take out and maintain during the life of the contract Business Automobile Liability insurance covering any auto in an amount not less than \$1,000,000 for any one occurrence for bodily injury, including death, and property damage liability.

#### **Workers Compensation**

The Contractor shall take out and maintain during the life of the contract Workers Compensation and Employers Liability insurance providing coverage under the Alabama Workers Compensation Act in an amount not less than that required by Alabama law.

Where applicable, Contractor shall take out and maintain during the life of the contract insurance providing coverage as required by Federal statute, including but not limited to U.S. Longshoremen and Harborworkers' Compensation Act (USL&H), Jones Act, and Railroad Federal Employers Liability Act (FELA).

## **SECTION 16322 – SUBSTATION TRANSFORMERS**

### **PART 1 - GENERAL**

#### **1.0 SCOPE OF WORK**

- 1.1. The SUPPLIER shall furnish 23.0kV/4.16kV, DELTA-WYE unit-substation transformer with neutral resistor (grounding impedance device) on the load side as required by NEC 2023-250.187 and NEC 2023-250.188 as specified herein and as shown on the contract drawings. Substation transformer kVA rating to be as shown on the contract drawings and SECTION 9.3 of this Specification.
- 1.2. The OWNER shall be responsible for offloading the transformer when it is delivered to McDuffie Coal Terminal. A two (2) week notice of delivery shall be given by the SUPPLIER before transformer delivery to the McDuffie Coal Terminal.

#### **2.0 REFERENCES**

- 2.1. The unit substation transformer shall be designed, manufactured, and tested in accordance with the latest applicable standards of NEMA, ANSI and IEEE.

#### **3.0 DOCUMENTATION**

##### **3.1. Submittals – For Review/Approval**

- 3.1.1 A submittal review by the ENGINEER is required prior to fabrication to ensure compliance with the specifications. All items in the documents must comply with the specifications and variance will not be accepted unless these items are specifically called out in the documents as a variation from the specifications. If items in the documentation do not meet specifications or design requirements and are not specifically called out as non-compliant but make it through the Review/Approval process and fabrication has started, the SUPPLIER/manufacture will still be required make these items compliant at no additional cost to the OWNER.
- 3.1.2 All information listed for review should be submitted in one package. A designated SUPPLIER/manufacture's representative that is familiar with this project should be readily available by telephone, during business hours, during the review period to answer all questions.
- 3.1.3 The following information shall be submitted to the ENGINEER:
  - a. Master drawing index
  - b. Front view elevation and weight

- c. Plan view
  - d. Schematic diagrams
  - e. Nameplate diagram
  - f. Component list
  - g. Conduit entry/exit locations
  - h. Ratings including:
    - (i) kVA
    - (ii) Primary and secondary voltage
    - (iii) Taps
    - (iv) Primary and secondary continuous current
    - (v) Basic Impulse Level
    - (vi) Impedance
    - (vii) Insulation class and temperature rise
    - (viii) Sound level
  - i. Cable terminal sizes
  - j. Product data sheets.
  - k. Busway connection
- 3.1.4 After the return of approval drawings or after any change made to previously approved drawings, the manufacturer shall submit a record copy of any and all drawings that contained revisions.
- 3.1.5 Each revision of any drawing/document must have a revision number/letter and the date the revision was issued.
- 3.1.6 After completion of the inspection and testing procedures, the manufacturer shall submit a complete set of "as built" drawings. These drawings shall function as a record of the final construction of the equipment at the time it left the factory.
- 3.1.7 Each drawing prepared by manufacturer shall show, at a minimum, the name, jobsite location, purchase order or contract number, and equipment

identification number in addition to any information required by manufacturer.

3.2. Submittals – for Close-Out

3.2.1 The following information shall be submitted for record purposes:

- a. Final as-built drawings
- b. Wiring diagrams
- c. Certified production test reports
- d. Installation information
- e. Seismic certification.

3.2.2 The final (as-built) drawings shall include the same drawings as the construction drawings and shall incorporate all changes made during the manufacturing process.

3.3. Test Documentation

3.3.1 Certified production test reports indicating satisfactory completion of all inspection and test procedures shall be provided.

3.4. Operating and Maintenance Manuals

3.4.1 At time of shipment the manufacturer shall provide four (4) copies of the operating and maintenance instructions for all major components.

3.4.2 Operation and maintenance manuals shall include the following information:

- a. Instruction books and/or leaflets
- b. Recommended renewal parts list
- c. As-built drawings of the equipment.

3.4.3 Each complete set of manuals shall be bound and shall contain a table of contents to allow for easy reference.

3.5. For all transmittals, submit five (5) hard copies of all documentation unless otherwise stated herein. In addition to paper copies, all drawings shall be supplied on a CD in AutoCAD 2024 format.

#### 4.0 QUALIFICATIONS

4.1. The manufacturer of this equipment shall have produced similar electrical equipment for a minimum period of five (5) years. When requested by the ENGINEER, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.

#### 5.0 WARRANTY

5.1. The SUPPLIER/manufacturer warrants that the equipment specified within this specification will be free from all defects in design, materials, equipment and workmanship, for a period of not less than two (2) years from the Project Acceptance date. This warranty shall include all structures, mechanisms and components that are manufactured or provided by the manufacturer. In the event that any part of the equipment appears to be defective in design, manufacture, materials, fabrication, or workmanship within the period of warranty, the OWNER will immediately notify the SUPPLIER/manufacturer in writing of the alleged defect or failure. The SUPPLIER/manufacturer will thereupon promptly correct any defect or failure without cost to the OWNER, or it will authorize the OWNER to make, for the manufacturer's account, such repairs or replacements as may be necessary to correct the defect or failure. No allowance will be made for any repairs made by the OWNER, or others, unless and until the OWNER has given the manufacturer notice of the alleged defect or failure prior to the commencement of such repairs or replacements. However, if the defect is such as to interfere with the OWNER's operation, the OWNER may, after notification, proceed forthwith to repair the same at the expense of the manufacturer.

#### 6.0 REGULATORY REQUIREMENTS

6.1. UL label required.

#### 7.0 DELIVERY, STORAGE AND HANDLING

7.1. Equipment shall be handled and stored in accordance with manufacturer's instructions. One (1) copy of these instructions shall be included with the equipment at time of shipment.

#### 8.0 SERVICE AND ENVIRONMENTAL CONDITIONS

8.1. Unless otherwise specified, this equipment is intended for use in ambient temperatures that do not exceed a maximum of 45 degrees C (113 degrees F) or a minimum of -30 degrees C (-22 degrees F).



**PART 2 - PRODUCTS**

9.0 LIQUID TRANSFORMERS

9.1. Manufacturers

- 9.1.1 Siemens
- 9.1.2 Cutler-Hammer
- 9.1.3 ABB

9.2. The listing of specific manufacturers above does not imply acceptance of their products that do not meet the specified ratings, features and functions. Manufacturers listed above are not relieved from meeting these specifications in their entirety. All other manufacturers will require approval by the OWNER and the ENGINEER.

9.3. Ratings

9.3.1 The ratings of the transformer shall be as follows or as shown on the drawings:

- a. kVA Rating (\*\*) kVA [OA]
- b. Impedance [ANSI Standard Tolerance]
- c. HV 23.0kV [DELTA]
- d. HV BIL 150kV
- e. HV De-energized Taps +/- 2 - 2-1/2% full capacity
- f. LV 4.16kV [WYE]

\*\*\* 7500kVA, 10,000kVA, 12,000kVA, 15,000Kva ratings shall be provided in the proposal, the OWNER intends to purchase one (1) or two (2) of these units as part of this project.

9.4. Construction

- 9.4.1 The unit shall be filled with Biotemp or any listed “less flammable liquid” similar to Biotemp as required by 2023 NEC 450-23.
- 9.4.2 The transformer shall carry its continuous rating with average winding temperature rise by resistance that shall not exceed 65 degrees C, based

on an average ambient of 30 degrees C over 24 hours with a maximum of 40 degrees C.

- 9.4.3 Transformer shall include provisions for devices, wiring, fans, and auxiliary equipment necessary for automatic temperature controlled forced air cooling to obtain an additional 25% capacity. Control power for fans shall be 230 VAC, single phase furnished from a separate control power source.
- 9.4.4 The transformer shall be designed to carry short time emergency overloads in accordance with ANSI C57.12.92 as applicable. Duration and magnitude of designed withstand capability shall be as outlined in ANSI C57.12.90 and the latest draft of the IEEE short-circuit test code.
- 9.4.5 The transformer shall be designed to meet the sound level standards for liquid transformers as defined in NEMA TR1. The measurement procedure shall be as specified in ANSI C.57.12.90.
- 9.4.6 High-voltage and low-voltage windings shall be aluminum. Insulation between layers of the windings shall be by Insuldur paper or equal.
- 9.4.7 The main transformer tank and attached components shall be designed to withstand pressures 25% greater than the required operating design value without permanent deformation. Construction shall consist of carbon steel plate reinforced with external sidewall braces. All seams and joints shall be continuously welded.
- 9.4.8 Each radiator assembly shall be removable with valves and receive a quality control pressurized check for leaks. The entire tank assembly shall receive a similar leak test before tanking. A final six-hour leak test shall be performed after the transformer is tanked, welded and completed to ensure that there are no leaks before shipment.
- 9.4.9 All equipment shall be of the type normally furnished for unit substation applications, shall be designed for satisfactory operation under conditions of heavy exposure to sand, dust and salt laden moisture, and shall be adequately treated or protected against corrosion, moisture, salt, mold, dust, sand, and other destructive elements to which it may be exposed during operation. The equipment shall be suitable for tropical environments.

## 9.5. Accessories

Transformer features and accessories shall include:

- 9.5.1 De-energized tap changer with cover mounted, externally operated, pad lockable handle.

- 9.5.2 Combination drain and filter valve and sampling device
- 9.5.3 Manual gas pressure test connection
- 9.5.4 Filling plug and filter press connection in cover
- 9.5.5 Dial-type top liquid thermometer
- 9.5.6 Magnetic liquid level gauge
- 9.5.7 Provisions for lifting, provisions for jacking, base designed for skidding or rolling in two directions.
- 9.5.8 Ground pad – stainless steel
- 9.5.9 Instruction nameplate – stainless steel
- 9.5.10 Pressure vacuum gauge
- 9.5.11 Welded-on main tank cover and handhole in cover
- 9.5.12 Pressure relief device
- 9.5.13 Neutral resistor with controls on the high side as required by NEC 2023-250.186 and NEC 2023-250.188 for this application.
  - a. Neutral resistor shall be rated for (TBD) amps at 4.16kv for 10 seconds. (23.2 +/- 10% ohms @ 25 Degrees C)
  - b. Shall include a ground current monitor with adjustable trip settings and will have a contact that will be used to trip the main MV breaker.
  - c. The resistors shall be installed in a suitable, stainless steel, well-ventilated, weather-protecting enclosure (NEMA 3R). The resistors should be cooled by means of natural convection. The resistors shall be suitable for outdoor service and storage in salty environmental conditions including 100% humidity. The enclosure shall provide protection from rainfall, adequate heat dissipation and shall not require opening of louvers for operation. All resistors shall consist of stainless steel grid elements. The resistor banks shall be designed to provide satisfactory continuous duty operation in an ambient temperature of 45°C.
  - d. The controls shall be installed in a suitable, stainless steel, weather-protecting enclosure (NEMA 4X). The external controls shall be suitable for outdoor service and storage in salty environmental conditions including 100% humidity.

- e. Conduit entry shall be bottom feed.
  - f. System shall include the following as a minimum:
    - (i) Current sensing ground fault detection
    - (ii) Ground current ammeter
    - (iii) Indicating lights: Red (ground fault), Green (Normal)
    - (iv) Ground Fault Contacts (1-NO/1-NC)
    - (v) Shorting Terminal block for ground current CT's
    - (vi) UL Label
    - (vii) Wire Markers
- 9.6. Finish – The paint shall be applied using an air spray with air dry acrylic topcoat system to a minimum of three mils average thickness. Outdoor liquid transformer units shall include suitable outdoor paint finish for installation in a high humidity, salt corrosive environment.
- 9.7. Terminal Compartments/Flange Connections – The transformer shall have no exposed electrical parts and its design shall meet the requirements of 2023 NEC 110.31 in the fact that no additional guarding or fencing shall be required for this equipment for the protection of personnel. The unit supplied shall include a completely enclosed HV and LV cable termination compartment that connects directly to the medium voltage switchgear. Refer to the contract drawings for connection requirements.

### **PART 3 - EXECUTION**

#### **10.0 FACTORY TESTING**

- 10.1. The following standard factory tests shall be performed on all equipment provided under this section. All tests shall be in accordance with the latest version of ANSI and NEMA standards.
- 10.1.1 Resistance measurements of all windings on the rated voltage connection of each unit and at the tap extremes of one unit only of a given rating on this project
  - 10.1.2 Ratio tests on the rated voltage connection and on all tap connections
  - 10.1.3 Polarity and phase-relation tests on the rated voltage connections

- 10.1.4 No-load loss at rated voltage on the rated voltage connection
- 10.1.5 Exciting current at rated voltage on the rated voltage connection
- 10.1.6 Impedance and load loss at rated current on the rated voltage connection of each unit and on the tap extremes of one unit only of a given rating on this project.
- 10.1.7 Applied potential test.
- 10.1.8 Induced potential tests.

10.2. The manufacturer shall provide three (3) certified copies of factory test reports.

#### 11.0 FIELD QUALITY CONTROL

11.1. SUPPLIER to provide the services of a qualified factory-trained manufacturer's representative to assist the OWNER with installation and start-up of the equipment specified under this section. The manufacturer's representative shall provide technical direction and assistance to the OWNER regarding the general assembly of the equipment, connections and adjustments, and testing of the assembly and components contained herein.

11.2. The SUPPLIER shall provide three (3) copies of the manufacturer's field start-up report.

#### 12.0 MANUFACTURER'S CERTIFICATION

12.1. A qualified factory-trained manufacturer's representative shall certify in writing that the equipment has been installed, adjusted and tested in accordance with the manufacturer's recommendations.

12.2. The SUPPLIER shall provide three (3) copies of the manufacturer's representative's certification.

#### 12.3. TRAINING

12.3.1 The SUPPLIER shall provide a training session for up to five (5) OWNER's representatives for one normal workday at a jobsite location determined by the OWNER.

12.3.2 The training session shall be conducted by a manufacturer's qualified representative. Training program shall include instructions on the transformer, auxiliary devices and other major components.

12.4. INSTALLATION

12.4.1 The OWNER shall install all equipment per the manufacturer's recommendations and the contract drawings.

12.4.2 All necessary hardware to secure the assembly in place shall be provided by the SUPPLIER.

12.5. FIELD MEASUREMENTS

12.5.1 Measure primary and secondary voltages and make appropriate Tap adjustments following installation and start-up.

12.6. FIELD TESTING

12.6.1 The following tests shall be performed:

- a. Measure primary and secondary voltages for proper tap settings.
- b. Megger primary and secondary windings
- c. Test oil for dielectric strength.

12.6.2 The SUPPLIER shall provide three (3) copies of the manufacturer's field-testing reports.

END OF SPECIFICATION