

## **051-18 APPENDIX A - TECHNICAL SPECIFICATIONS**

### **BBGS ST4 Iso-Phase Bus (IPB) Cleaning, Inspection and Repair**

#### **Scope of Work**

Bidder shall furnish all equipment, supervision, labor, transportation, tools and expendables to complete the scope of work that includes cryogenically cleaning, inspecting, and repairing issues discovered during inspection of the iso-phase bus (IPB) duct systems for BBGS Unit ST4. The contractor shall clean to remove all foreign matter, inspect and make repair recommendations for the existing iso-phase bus duct. The purpose is to ensure that the iso-phase insulators and ducts are sufficiently clean, that the duct is properly sealed against moisture intrusion, and that issues due to inadequate grounding are resolved. ST4 IPB currently has an air pressure issue. The contractor is to identify the cause and repair. If any equipment is found to be damaged, it will be up to the JEA Project Manager to decide if the equipment is to be left as-is, repaired or replaced. Any damaged insulators, or other material will be supplied by the contractor on a unit price basis as identified in the extra work section of this document. All gasketing will be replaced (supplied by contractor). All hardware will be replaced with 316 stainless steel (supplied by contractor). No testing shall take place without JEA personnel present.

#### **Before commencement of work:**

**The awarded vendor will provide their current Qualifications or Certifications relating to Utility or Iso-phase.**

**Contractor shall update the JEA Project Manager daily, providing a complete summary of the day's activities. The contractor shall immediately alert the JEA Project Manager to any changes in schedule and present a remedy for completing the work on or before the contract completion dates of TBD.**

#### **Project Schedule**

The BBGS outage for Unit 4 is scheduled for February 26<sup>th</sup> 2018, and the **work must complete by end of business on March 6<sup>th</sup> 2018.** No extensions will be granted.

The contractor shall not commence any work until a notice to proceed is received. A project schedule for this contract shall be prepared and maintained by the contractor to provide coordination, to establish the basis for measuring and monitoring contractor progress and to detect problems for the purpose of taking corrective action(s). Contractor shall provide JEA with daily updates. These updates shall include the following:

- Current status of the job progress
- One day Look-Ahead Schedule
- Report the planned and actual progress of the current day
- Report all planned work that is to be accomplished during the following day
- Changes in the Work
- Safety and Quality Control issues
- Problem areas or concerns

The contractor will not be responsible for any work beyond the generator flex links or beyond conductor entry in the transition houses on the transformers. The contractor will be responsible for cleaning and inspecting the upper and lower insulators on the PTs.

**\*\*Prior to any testing the flex links at the Generator and all transformers must be removed\*\***

The testing below will be completed pre and post cleaning, inspection, and repairs. All information and data collected will be provided in the final report.

**IPB Testing to be performed:**

**Megger Testing**

1. Upon verifying complete system isolation and PT grounding a Megger test will be performed on the main iso-phase bus conductor
2. A one minute 5kV megger test will be completed for each of the three phases.
3. Both the 30 second and 1 minute resistance values will be recorded.
4. The megger test will insure complete isolation of the IPB prior to DC Hi-Pot testing.
5. Receive approval from JEA Engineer prior to proceeding to DC Hi-Pot Testing.

**Dielectric Testing - DC High Potential Procedure**

6. Determine proper DC Hi-Pot Test Voltage from Basic Insulation Rating (BIL) requirements of the IPB.
  - a. Reference IEEE Std. C37.23-2015 JEA specified threshold for testing is
$$DC\ Hi - Pot\ Test\ Voltage\ for\ IPB = \{V_{RMS} * 0.75 * \sqrt{2}\}V_{DC}$$
7. Only DC Hi-Pot testing will be performed (AC testing IS NOT in the scope of work).
8. The DC Hi-Pot test will be performed at the predetermined test voltage for one minute.
9. Record leakage current results and final one minute values for each phase.
10. Ensure kill switch is removed and each phase is discharged to ground following each test.
11. Verify JEA High Potential Procedure is followed with Engineer or Project Manager.

**DLRO (digital low resistance ohm) Testing – Flexible Shunt Braids**

12. The flex braids will need to be removed and a DLRO test completed if the link appears to be salvageable. If the link shows signs of corrosion or overheating, it should be replaced without a test.
  - a. When removing ensure braids are reinstalled in the exact location and orientation they are removed from by labeling before removal.
  - b. When reinstalling braids use new 316 hardware including SS conical washers.
13. Make sure all flex braids are within 1% resistance of each other to ensure no selectivity is occurring
14. All results will be recorded.
15. If any found to exceed the average by more than 1% then the braid must be marked and replaced prior to bringing the IPB back online.
16. JEA Project Manager will be notified with any issues discovered ASAP.

**Inspection** – Inspection is to be done both before and after cleaning. All access hatch covers shall be removed to allow for visual inspection of the iso-phase bus duct interior, gaskets, insulators, connections and bushings.

All seals, insulators and connections shall be visually inspected using a bore scope and documented with both a video log and a still photograph log both before and after cleaning. The photographs will be edited (adding pointer, circles, notes and location references) to show any found deficiencies and imperfections. A copy of both the video log and the photo log will be included in the final report. All videos and photos must be provided digitally and as hard copies.

**Equipment List** – The equipment list is intended to be a partial list with special notes on what to look for. It is not intended to provide an exhaustive list.

1. Access hatches and gaskets - All access hatches are to be removed and re-installed by contractor. It is expected that many of the gaskets and bolts are damaged and will be replaced by contractor. All hatch hardware will be replaced with 316 stainless supplied by the contractor.
2. Insulators and bushings – All insulators (180), bushings and mounting hardware must be inspected for any damage (use borescope if needed). Visual inspection must be done 360 degrees around each insulator (including insulator hardware). Repairs/Replacements shall be discussed with Project

Manager prior to moving forward. All issues must to be documented with pictures and included in the final report. All hardware replacement will be 316 stainless supplied by the contractor.

#### Discovery Work Additional Pricing:

This is an additional list of items than may need to be repaired in an Iso-phase cleaning. However, none or all of the items may be required to be replaced. Bidders shall price the items listed in the extra work section at the end of this document, which will be included in the Total Bid Price for comparison purposes.

3. Replace any/all flex link braids, and silver plating surfaces found to be defective upon agreement with JEA to proceed.
4. Iso-phase Bus – The current carrying conductor is painted aluminum pipe. In places, the painted surface has foreign matter and may have started to flake. This inner pipe and the inside of the surrounding grounded pipe is to be thoroughly cleaned with cryogenic blasting media. Any hand wiping must be done using lint free rags. Mops and vacuum cleaners can also be used if necessary to remove all foreign matter where accessible from the access hatches. No water based cleaning solvents are to be used. The pipe is not expected to need to be repainted as part of this scope.
5. Flexible shunts braids - All of the flexible shunts (flex braids) internal to the iso-phase bus duct need to be disconnected and visually inspected for discoloration, broken strands, pits and hot spots. Replace any flex braids that are discolored deformed or expanded-defective or fall outside the 1% resistance tolerance. All hardware is to be replaced is to be 316 stainless steel. (contractor supplied)
6. Grounding connections – All bolted grounding connections external to the iso-phase bus duct are to be megged and inspected to insure good grounding of the iso-phase bus duct. All bolts that are used for grounding connections shall be re-torqued to manufacturer recommendations (a.k.a. tighten all the bolts).
7. 18 kV Connections – All 18 kV electrical bolted connections in the iso-phase bus duct are believed to be silver plated copper or copper clad silver plated aluminum. If damaged, it will be up the JEA Project Manager to decide if the stab/connector is to be repaired (re-silver plated) or cut out and replaced with a new silver plated connector. All hardware will be replaced with stainless steel. (contractor supplied)
8. Enclosures and Seals – The Generator and transformer termination enclosures/seals on both sides of the iso-phase bus duct seals.
9. Torque all Bolts – After inspection and upon reassembly, all bolts that are used for the 18kV electrical connections will be re-torqued to manufacturer recommendations (a.k.a. tighten all the bolts). All hardware will be replaced with 316 stainless steel. Manufacturer torque values are available and will be provided. In the absence of any manufacture torque recommendations consult with JEA Engineer.
10. Cryogenic Cleaning – Cryogenic Blast Media shall be used to clean all insulators, bushings and connections. The bus duct and all components must receive 360 degree exposure to the cleaning media to ensure complete cleaning.
11. Hand Cleaning - Any components with remaining FME (foreign material) following the Cryo blasting shall be wiped down and cleaned by hand. Any portion of the iso-phase bus duct that will not be Cryo blasted lasted then must be cleaned by hand or with mops from the nearest access points. The cleaning solvent/agent used must be approved prior to contractor usage. A Safety Data Sheet (SDS) for the cleaning solvent being used by the contractor must be sent to JEA with the Bid Package for JEA Approval. The SDS must also be kept on site during the project in case of

spills or injury.

12. The contractor shall inspect all heaters to ensure that they are working as designed and make recommendations to repair/replace heaters found to be damaged.

For any Cryogenic blast follow up cleaning, the contractor shall supply and use the following product to wipe down the insulators and bushings:

JEA PART NUMBER: ADCCL024

**JEA DESCRIPTION:**

CLEANER, DIELECTRIC SOLVENT & DEGREASER, 5 OR 6 GALLON PAIL DIELECTRIC, MIN 28 KV NON-HAZARDOUS, COMPLETE EVAPORIZATION LEAVING NO FILM OR RESIDUE

\*\*\*NO SUBSTITUTE WILL BE USED WITHOUT PRIOR JEA APPROVAL\*\*\*

**MANUFACTURER:**

SELIG CHEMICAL INDUSTRIES (p/n 2231, ZONE DEFENSE-5 GALLON) ECOLINK (p/n 0296)

**SUPPLIERS:** IRB & HD Supply

If contractor has an existing standard cleaning solvent standard, the Brand, Part #, and MSDS must be provided with the bid. Contractor recommended cleaning solvents must be approved by JEA Project Manager prior to use on JEA equipment. This also includes the Cryogenic Blast Media.

**Preliminary Reports-** during the cleaning and inspection, the contractor will keep JEA informed of any damaged equipment along with recommendations on their disposition, including how to repair or replace damaged equipment. Each phase of testing will require the recording and reporting of the results from the Megger, DC Leakage, and Hi-Pot Testing upon completion.

**Final Report-** The contractor shall prepare a final written report that includes a copy of the video log (if bore scope equipment is used) and a picture log. The pictures shall include typical insulators as found, and all equipment identified as having flaws before and after repair of all work done. Any parts replaced shall be listed with the respective manufacture(s), part number(s) and supplier(s). This report will also include any welding certifications for completed work.

**Extra work-** It is anticipated that repair work may be necessary. The contractor shall provide unit costs for each of the following items based on the following estimated quantities. These quantities are no guarantees and may vary in magnitude.

JEA will supply the contractor with 120V and 480V power source, plant air and will scaffold the project per the contractor's specifications. All other items and facilities will be supplied by the contractor.