

Exhibit I

SECTION 16-372
SUBSTATION BUS ASSEMBLIES
ERGLE SUBSTATION

1. GENERAL SPECIFICATIONS

The work of this Section includes furnishing all labor, equipment, materials (unless specifically identified as Owner-furnished) and necessary incidentals for assembly, erection, connection and testing of outdoor electrical substation structural steel, bus, minor equipment and materials, as required to provide a complete installation as specified herein and indicated on the Construction Drawings.

The work of this Section also includes furnishing all labor, equipment, materials and incidentals necessary to install buried ground grid additions and to install structure and equipment grounding connections per the Construction Drawings.

2. REFERENCES

The work shall conform to the applicable requirements of all Federal, State and local agencies and applicable provisions of the latest edition or revision of the following standards, except as modified herein.

- A. Institute of Electrical and Electronic Engineers (IEEE)
 - C2 National Electrical Safety Code (NEC)
 - 80 Guide for Safety in AC Substation Grounding
 - 142 Recommended Practice for Grounding of Industrial and Commercial Power Systems
 - 837 Qualifying Permanent Connections Used in Substation Grounding

- B. American Society for Testing and Materials (ASTM)
 - A36/A36M Carbon Structural Steel
 - A563 Carbon and Alloy Steel Nuts

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B8	Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
B30	Copper Alloys in Ingot Form
B584	Copper Alloy Sand Castings for General Applications
F436/F436M	Hardened Steel Washers
F1554	Anchor Bolts, Steel
F2329/F2329M	Zinc Coating, Hot-Dip, Requirements for Application to Carbon and Alloy Steel Bolts, Screws, Washers, Nuts, and Special Threaded Fasteners
C. Federal Specifications and Standards (FSS)	
TT-P-645C	Paint, Alkyd Type, Formula Number 84
D. National Fire Protection Association (NFPA)	
--	Handbook of Fire Protection Engineering
70	National Electrical Code (NEC)

3. DESIGN AND COORDINATION

It is imperative that all equipment and installations be fully coordinated. The establishment of detailed measurements or other information necessary for accurate alignment or fit shall be the responsibility of the Contractor. Work operations under the Contract shall be properly scheduled so that each item of work is accomplished in proper sequence.

- A. The substation modifications and additions have been designed for nominal voltages of 230 kV with 900 kV BIL and 69 kV with 350 kV BIL insulation level.
- B. Configuration of the substation shall be as specified herein and indicated on the Construction Drawings.
 - i. The minimum clearance between conductors and grounded metal parts, conductors of different phases, vertical clearance of unguarded parts and horizontal clearance of unguarded parts shall be as follows:

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Voltage	Clearance (inches)			
	Phase to Ground	Phase to Phase	Vertical to Grade	Horizontal to Fence
69 kV	29	60	132	120
230 kV	76	132	180	156

- ii. Provide electrical and mechanical clearances necessary to prevent interference with operating mechanisms or door opening on control cabinets.
- C. The Owner will furnish one set of approved shop drawings and installation instructions for the Owner-furnished circuit breaker equipment, after award.
- D. The Owner will furnish one set of approved switch assembly shop drawings and steel fabrication and assembly shop drawings, after award.

4. SUBMITTALS AND SHOP DRAWINGS

The Contractor shall submit a complete list of materials and equipment to be furnished and incorporated in the work to the Owner for review, within 30 days from the date of Notice of Award.

- A. All shop drawing submittals required to be delivered to the City of Ocala shall be mailed (three copies) or sent by e-mail to: Jeff Trauth, Project Manager, Ocala Electric Utility, 1805 NE 30th Avenue, Bldg 400, Ocala, FL 34470, JTrauth@Ocalafl.org.
- B. Materials and equipment list shall include catalog numbers and cut sheets. Partial lists will not be acceptable.
- C. The basis of acceptance shall be the manufacturer's published ratings for the equipment. Manufacturer shall be regularly engaged in manufacture of products submitted.

5. MATERIALS AND EQUIPMENT

- A. Materials will be furnished by the Owner or by the Contractor as identified on the Bills of Material included in the Construction Drawings.
 - i. Power and control cable, conduit, and junction box requirements are separately specified in Section 16-352 and in the Construction Drawings.
 - ii. Foundation materials and anchor bolt requirements are separately specified in Section 03-300 and in the Construction Drawings.
- B. The Contractor shall be responsible for receiving, offloading, storing, protecting, and installing the Owner-furnished equipment and materials, which will be shipped directly to the construction site. The Contractor shall inspect all materials upon receipt and notify the Owner immediately of any suspected damage or of defective materials.
- C. All material furnished by the Contractor shall be new, approved and labeled, where required, by UL. Only products by manufacturers regularly engaged in production of specified units will be acceptable.
 - i. The Engineer has established Bills of Material by description, manufacturer name and catalog number, as shown on Sheets BM and G2 of the Construction Drawings, which will satisfy the intent of these specifications. Principal items are listed but all components required for a complete and satisfactory installation shall be provided. Reference numbers are provided for general category identification even though not specifically identified on drawings. Reference numbers shall be used in Submittal preparation and shall be applied with other suffix as required to denote size or function variation under the same category. Alternates to the specified materials may be offered, if equal.
- D. Where two or more units are required which perform the same function or are of the same class of equipment or materials, provide all units from a single manufacturer.
- E. Provide materials of suitable composition to perform satisfactorily when exposed to environmental conditions of the project site.

6. DELIVERY, STORAGE AND HANDLING

Deliver materials and equipment with manufacturer's tags and labels and UL labels intact. Deliver packaged material items in manufacturer's original, unopened containers bearing manufacturer's name, brand and UL label. Items delivered in broken, damaged, rusted or unlabeled condition shall be removed from the project site and replaced with acceptable items. Handle and store materials and equipment so as to avoid damage.

7. WARRANTY

All equipment and materials supplied shall be warranted against defective design, materials and workmanship for a minimum period of one year, or as specified herein, against normal use. The warranty period shall begin once the total project is accepted by the Owner and shall cover replacement of equipment and/or repair, including labor, travel time, and miscellaneous expenses at no cost to the Owner for the full warranty period.

8. CONNECTORS AND SIMILAR ITEMS

All connectors, terminals and miscellaneous fittings furnished shall comply with the following:

- A. Bronze connectors shall be alloy C84400 per the requirements of ASTM B30, or alloy 4B per ASTM B584, tin-plated if required.
- B. Pad-type connectors shall be finished on the top surface to provide a smooth connection point for terminal connectors to transfer rated current, and shall have standard NEMA 2-hole or 4-hole drilling.
- C. Bolted connectors shall be designed for recessed hex head bolts. Bolts, nuts and lock washers shall be of proper size, strength and material composition for the application. Lock washers shall be ANSI standard split-spring type.

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- D. All splices, connectors or terminals where copper and aluminum are joined must be of a type specifically designed for bimetallic operation. Transition from one type of conductor material to another is permitted only at device terminals.
- E. Connectors shall be designed to carry the full load current of its associated conductor and for the maximum conductor size of the connector without exceeding a total temperature rise of 30 C above an ambient of 40 C.

9. EXECUTION AND SUPERVISION

The Contractor shall provide a person, thoroughly experienced in work required by this Section, to supervise the work involved. Such supervision shall be provided at all times when any contract work is being done. Supervisor shall provide necessary instruction to Owner's operating personnel and shall be available, upon reasonable request, during the warranty period.

10. LAYOUT OF STRUCTURES AND EQUIPMENT

The Contractor shall lay out the work and shall be responsible for all necessary lines, levels, elevations and measurements. The drawings indicate extent and general arrangement of the components. The Contractor shall become familiar with work of other trades engaged in the construction. The Contractor shall coordinate with the details of equipment shop drawings for connections to equipment to be installed under this project or as furnished by others. This is not to be construed to permit redesigning systems.

- A. Structural steel provided by the Packager will be pre-assembled to the extent practical for shipping.
- B. When it is necessary to weld, cut, drill or punch a structure for modification required as work of this contract, the protective coating shall be restored in a manner meeting the satisfaction of the Owner.

11. GROUNDING

- A. Existing copper grounding conductors and copper grounding conductors to be installed are bare, stranded, #4/0 AWG conforming to ASTM B8, unless otherwise indicated.
- B. Ground connections to structural steel columns and to equipment frames shall be grounding lugs or clamps intended for grounding purposes.
 - i. Each structural steel column shall have one connection to the ground grid.
 - ii. Each piece of major substation equipment shall have two connections to the ground grid.
 - iii. Each switch operator grounding pad shall have two connections to the ground grid.
- C. The Contractor shall install new ground rods as specified, at the locations shown on the Contract Drawings, by conventional methods using an air compressor and air hammer. No ground rod resistance testing is required.
- D. Connections to ground grid and ground rods shall be with compression connectors meeting the requirements of IEEE 837. The Contractor shall install connections using appropriate tools and methods per the instructions of the connector manufacturer.
- E. The Contractor shall also be responsible to modify and relocate portions of ground grid when location is in conflict with the foundation/s to be installed.

12. BUS WORK

- A. Tubular aluminum bus welds shall be performed by qualified individuals, using appropriate tools and equipment, and with appropriate methods including cleanliness of joints and protection from the elements.
- B. Damper cables shall be installed loosely inside all horizontal runs of tubular aluminum bus, as specified.

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- C. The Contractor shall drill weep holes in all bus risers, bends, A-frames, and horizontal runs at the lowest practical point to drain moisture accumulation. Unless otherwise noted on the Drawings, the size of weep holes shall be 3/16-inch diameter for 3-inch IPS and 4-inch IPS bus. All holes shall be reamed to remove sharp edges.
- D. Flexible jumpers shall be properly supported to insure adequate clearance. Buses shall be arranged to maintain phase rotation as shown on the drawings.

13. INSTALLATION

- A. Switches: The Contractor shall install switches and operating mechanisms in accordance with the assembly and adjustment instructions provided by the manufacturer.
- B. Connectors: All conductors and materials used in a splice, tap, or connection shall be thoroughly cleaned, dried and burnished with a wire brush prior to make-up to ensure proper electrical and mechanical connections. Approved inhibitor compounds shall be used to minimize oxidation. Copper to aluminum connections shall be installed in accordance with recommendations of the connector manufacturer.
- C. All metal surfaces to be in contact with mortar, concrete or other masonry materials shall be painted with alkali-resistant coatings such as heavy-bodied bituminous paint.
- D. Aluminum surfaces placed in contact with steel shall be given one coat of zinc molybdate primer complying with FSS TT-P-645C, or equivalent. Aluminum surfaces in contact with stainless, aluminized, hot-dip galvanized or electro-galvanized steel need not be treated.

14. SUBSTANTIAL COMPLETION AND CLEAN-UP

- A. Materials or workmanship discovered or determined during construction to be defective or otherwise not in compliance with the Construction Drawings or technical specifications shall be promptly repaired or replaced to the satisfaction of the Owner at the expense of the Contractor.

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- B. The Contractor shall notify the Owner when, in their opinion, the construction is ready to be declared substantially complete and to be turned over to the Owner. The Owner's representative will perform a final field review to determine general conformance with the Construction Drawings and technical specifications and to document any shortcomings in the form of a Punch List.
- C. The Contractor shall address the items contained in the Punch List and submit as-built project record documents. The Owner will determine when sufficient Punch List items have been addressed to declare the project substantially complete. All Punch List items shall be addressed to the satisfaction of the Owner before final Application for Payment can be processed.
- D. The Contractor shall remove waste materials and trash from the jobsite and shall repair (or cause to be repaired) any damage to paved and unpaved areas, survey markers, fences, and other improvements or utilities located within or adjacent to the jobsite, as directed by and to the satisfaction of the Owner and any permitting agencies. Clean-up and repairs must be completed before final Application for Payment can be processed.
- E. Construction observation and final field review by the Owner or waiving of inspections shall not relieve the Contractor from performing their obligations under the Contract, nor shall it invalidate any claim of the Owner at a later date because of defective or unsatisfactory materials or workmanship.

END OF SECTION