<u>ITN – 81995</u>

RELAY PANEL SPECIFICATIONS FOR BRANDY BRANCH 230 and 26 kV SUBSTATIONS

System Protection & Control (SP&C) Projects 20413

SP&C Projects Manager/Lead: Brandy Branch JEA Project No. : Darrell D. Hamilton 8003167

Note #1:

All Schweitzer Engineering Laboratories (SEL) equipment will be supplied by JEA via JEA's internal Contract Purchase Agreement (CPA) with SEL. The contractor (also referred as successful bidder / panel manufacturer) shall procure all of the remaining equipment referenced within this specification.

Note #2:

As part of this informal bid/solicitation, the contractor shall provide pricing as a separate line item for delivery <u>and</u> installation of the relay panels upon delivery to prevent damage via double-handling of the panels.

Note #3:

As part of this bid the contractor shall visit the site to make field measurements to verify how to replace Panel Front Door and modify Panel Rear for existing Panels 9 & 18.

Note #4:

If there are any comments/questions, please contact SP&C Projects 20413 Manager.

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ATTACHMENTS:

Panel Layouts Panel Material List Typical Panel Fabrication Drawings

1 SCOPE

This section covers the detailed specifications and JEA's requirements for the equipment to be supplied under this purchase. The control panels (referred to as switchboards or panels in these specifications) will be used to provide control and protection of the substation equipment at the Brandy Branch 230 and 26 kV (BB) Substations. The contractor (also referred as successful bidder / panel manufacturer) is expected to supply all equipment in strict accordance with the Panel Material List, see the JEA BB Relaybm R3 document for further details, for this document (excluding any SEL equipment). The contractor shall furnish all the miscellaneous items and equipment not specifically mentioned in these specifications but is required to obtain intended functionality. The following person is designated as project manager and will perform all of their functions stipulated here after:

Darrell Hamilton JEA 21 West Church Street, T10 Jacksonville, FL 32202 Email: hamidd@jea.com Phone: (904) 665-7137

2 SPECIFICATION DRAWINGS/DOCUMENTS

The drawing(s)/document(s) accompanying this document are considered to be a component for the panel specifications. As a result, when the terms "as-shown," "as indicated," "as detailed" or similar words are used, it shall be understood that it's referencing these drawing(s)/document(s) unless otherwise stated. Drawing(s)/document(s) are the property of JEA and shall not be used for any purpose other than what was described by these specifications. The following drawing(s)/document(s) are attached with this panel specification:

2.1. Panel Layout Drawings	Various
2.2. Panel Material List	JEA BB Relaybm R3
2.3. Open Rack Panel Fabrication and Internal Details	TYP_OR_FAB_PNL
2.4. Dual Panel Fabrication and Internal Details	TYP_DU_FAB_PNL

3 DRAWINGS PROVIDED BY JEA

JEA shall provide the following drawings to the successful bidder (contractor) to help manufacture the panels with all devices mounted and completely wired as required by JEA:

- 3.1. All drawings listed under section 2 above
- 3.2. AC Schematics
- 3.3. DC Schematics
- **3.4**. Nameplate Schedule provided with various Panel Layout
- 3.5. Panel Wiring Diagram

4 DRAWINGS PROVIDED BY CONTRACTOR

The contractor shall provide the following drawings to JEA according to <u>section 12</u>. These drawings shall be developed and completed by the contractor based on the drawings provided by JEA.

4.1. Panel Structure Prints

5 DETAILS OF SWITCHBOARD PANELS

- 5.1. The control panels (switchboards) shall consist of sheet metal fabricated panels with major devices and accessories as specified in the Panel Material List mounted in it. The details of the selected devices and the accessories can also be viewed in the Panel Material List. The switchboard shall be of rigid dead front safety construction and modern appearance. All equipment shall be of the latest design and shall be arranged for greatest accessibility and best appearance. The switchboards shall be in accordance with the layout drawings included in this specification.
- 5.2. The switchboards shall have all metering, relaying, and controls as specified herein or indicated on the attached drawings. Regardless of failure by JEA to specify in this document or to indicate it in the attached drawings, all the essential parts required, the contractor shall furnish the completed, fully functional and operational product required for the intended functions as decided by the project manager. It is the responsibility of the contractor to contact the project manager to seek information to resolve such deficiencies. Any discrepancy in the drawings shall be brought to the notice of project manager who will provide the right clarification which shall be final.
- 5.3. All panels shall be mounted on sills made from inverted structural steel channel of suitable size. The panels mounted on the same sill shall be properly aligned with each other. All shipping sections shall be wired per JEA supplied wiring diagram and will be bolted together at the site to form one completely rigid assemblage. No more than two panels along with panel-to-panel interconnections shall be shipped together on a sill as a unit or a shipping section.
- 5.4. All control panels shall be constructed from 1/8" especially smooth cold rolled steel or 11 gauge hot rolled, pickled and oiled sheet steel. Panels shall be 90" high (not including the base channel), with other dimensions as specified in Panel Material List and on the attached drawings. The edges of the panels shall be rounded. All corners shall be welded and ground smooth to increase the rigidity and to improve the appearance. End plates shall be provided as necessary to cover all bolts and screws. Sufficient care will be taken in designing the panel door. Liberal stiffeners will be used to make the door strong and rigid. The door and hinges design shall take into account the existing load on the door with 100% margin for future additions. This design will ensure years of smooth operations of the door without any sagging, buckling, deformation and its ability to close and seal without any gap. The door operation shall be extra smooth to avoid missoperation of sensitive relays due to vibrations and jerks. The doors shall be equipped with a mechanical latch to prevent accidental closure. All of these aspects of strength, rigidity and appearance shall be quality checked before shipping the equipment. Any structural modifications needed to any panels, after shipment to JEA sites, shall be made at the contractor's expense. The contractor shall reimburse JEA for all such modification/rectification expenses, as soon as JEA has incurred them. Panel doors shall open as specified in the Panel Layout Drawings.
- **5.5.** The steel panels shall be thoroughly cleaned, given a rust prohibitive treatment, painted with a suitable rust-resistant primer followed by suitable numbers of light gray A.S.A. No. 61 (Munsell notation 8.3G6.10/0,54) finish coats.
- 5.6. All panels shall be provided with internal PVC wiring channels with covers. All internal wiring shall be routed through these wiring channels. A 4 in. X 6 in. opening with gasket and a removable cover-plate shall be provided on each side of every panel at the top for inter-panel wiring. A 4 in. x 3 in. wiring channel with cover shall be provided next to the terminal blocks on both sides of each panel for internal cable wiring. For the control cable containment, metal braces shall be welded to the sides of the panel to create a 4 in. X 12 in. space (for incoming wires), as shown on drawing TYP_DU_PAN_FAB / TYP_OR_PAN_FAB. For top / bottom cable entry two 4 in. X 24 in. openings with cover plates and rubber gaskets shall be provided on the left and right sides of the top/bottom panel of the switchboard. This panel will be reinforced to support the weight of the cables entering the panels. The top panel shall have welded supports for attachment of the inter-panel wiring. Cables will be entering from the top of the relay panels. All wires including wires to the door mounted equipment and sub-panel mounted equipment, which cannot be routed through the wiring channels, shall be neatly bundled into braded expandable sleeves with details in section 8.13.

- **5.7.** All sub-panels shall be hinged at one end and will be constructed using 1/8 in. especially smooth cold rolled steel. It shall have welded stiffeners, per section 5.4 above to provide rigidity and improve appearance.
- **5.8.** The switchboards provided shall be constructed so that all meters, relays and control switches shall be located as per attached drawings. Where there is a conflict between locations of devices due to JEA drawings not being to scale or any other reason the contractor shall consult the project manager for clarification.
- **5.9.** Shrink fit rubber sleeves (minimum 2 layers) will be used to protect the delicate wires of a device running between the faceplate mounted outside of the panel to the part of device mounted inside of the panel. The sleeve will cover the portion of wires passing through the hole in the metallic door of the control panel. Care will be taken to locate these delicate wires so that the hard thick wires do not crush them.
- 5.10. The contractor will provide name / designation plates of the devices mounted outside of the panel. The size of the plate and its engraving will be as per the specifications from JEA. These will be fixed to the panel at the indicated place adjacent to the device using non-hazardous industrial glue. Care will be taken to keep these plates leveled horizontally. Wherever a recommended location is not provided by JEA, the contractor will locate them in consultation with the project manager. All the devices and terminal blocks will also have a designation plate each mounted by non-hazardous industrial glue at the inside of the control panel. The engraving on these plates shall be provided in the returned panel wiring diagrams that were provided by JEA.
- 5.11. No electrical devices or any part of the wiring shall be located and mounted on the bottom panel of the switchboard.

6 DETAILS OF RELAYS AND METERS

- 6.1. Unless otherwise specified, all the relays, manual control devices and indicating devices of the switchboard shall be semiflush mounted on the door and back panels only.
- **6.2.** PT and CT connections going to the protective relays, meters and transducers mounted in the panels shall be wired through suitable test switches. This will ensure the continuity of CT and PT connections shared by other devices when working on or replacing any protective relay / meter / transducer. Wherever free terminals are available on the connector blocks, the spare contacts of the lockout relay will be terminated on those terminals.
- 6.3. All protective relays equipped with targets shall have suitably rated target coils.
- 6.4. To avoid undesired operation, none of the auxiliary trip relays (94, 62, 62X) shall be mounted on <u>moveable panels or</u> <u>adjacent to fuse blocks</u>. All fuses shall be mounted vertically with incoming supply on the upper terminals. For accessibility and clear visibility of the fuse details, all the fuses shall be mounted on the rear of panels/sub-panels, with enough clearance space for removing the fuses during maintenance.

7 DETAILS OF TEST SWITCHES

- 7.1. All test switches shall be ABB type FT-1 rack-mounted. These switches shall have an acrylic transparent cover to allow an inside view unless otherwise specified.
- 7.2. To permit removal of the relays / meter / transducer from service without interrupting operation of other devices in the same current or potential circuits, each of these devices shall be furnished with shorting switches for current circuits and disconnecting switches for potential circuits.
- **7.3.** All the (CT & PT circuit) test switches shall be mounted horizontally (moving blades vertical when the switch is in closed position) with moving contact hinged on the lower side.

8 DETAILS OF WIRING

- 8.1. The control panels shall be furnished completely wired.
- 8.2. No external connection (except fiber connections and communication cable connections) shall terminate directly to a panel mounted device. Panels should be wired in such a way that all the external connections are brought to the terminal blocks of the panel. These terminals will then be connected to outside devices and other panels.
- 8.3. No splicing of wire used in panel wiring is permissible.
- 8.4. All panel wire, except #18 AWG shielded transducer wiring, shall be AWG #12, tinned copper, 65 strand, G.E. Co., type Vulkene switchboard wire S1-57275, rated for 600 volt, with gray colored insulation. An equivalent wire, after the approval of the project manager, can also be used.
- **8.5.** The switchboard wiring shall be furnished complete for all relays, meters and any other equipment shown on the drawings and/or specified in this section.
- **8.6.** DC control buses, ground bus, and potential buses shall be provided in accordance with good engineering practice and standards.
- **8.7.** The DC supply for all circuit breaker controls shall be obtained from the switchboard DC control bus and fused with cartridge fuse sizes as indicated on the drawings. All fuse blocks shall be heavy-duty porcelain type. Fuses shall be rigidly mounted to panel frame. Fuses shall be labeled to show circuit protected.
- 8.8. AC voltage supply to circuit breaker mechanisms will be provided by a source independent of these control panels.
- 8.9. All wiring termination shall be made with <u>ring-type</u> un-insulated lugs only. Lug manufacturer's recommendation will be used to select the termination lug to match the size of the terminal screw and the size of the wire. All lugs will be crimped using a lug-crimping tool recommended by the lug manufacturer. Care will be taken to avoid under and over crimping. Each crimp will be inspected for good connection visually and by applying appropriate tension to the joint.
- **8.10.** All current transformer cables terminating in the control panel shall be terminated on shorting-type, four point terminal blocks. The C.T.'s neutral conductor shall be grounded in the panel.
- **8.11.** All switchboard wires shall have two sleeves or tags on each end. The tag nearest the terminal shall indicate the terminal number to which this end of wire is attached. The second adjacent tag shall indicate the terminal number to which the remote end of the wire is connected.
- **8.12.** No more than two (2) wire lugs shall be terminated on any one terminal or stud of a device.
- 8.13. All the cables / wires connecting the devices on the door of the panel shall be protected by "flame retardant, Polyethylene Terephthalate (PET) braded expandable sleeve." The sizes of these sleeves will be selected liberally to provide 50% space for future cables / wires. A minimum of one sleeve will be used for each protective relay and each lockout relay. To avoid any tension in the wire / cables and the terminals of the device on the door, enough slack will be provided in the wires. The two ends of the sleeve will be anchored to the panel fixed portion / panel door. To do a proper and clean job, the sleeves will be cut and sealed by the special tools provided by the manufacturer. (The recommended manufacturer: MS Pearson Industries, P.O. Box 36, Prattville, AL 36067. Phone (334) 365-5416).
- **8.14.** Care will be exercised in routing the panel wiring so that it does not pass near or over a heat emitting device like current limiting resistors, space heaters, incandescent lamp, etc.

9 DETAILS OF TERMINAL BLOCKS

- 9.1. All terminal blocks referred to shall be Buchanan type B-112, or equivalent approved by the project manager. Terminal blocks mounted vertically at the sides of the panel shall be offset at a 45-degree angle to facilitate accessibility for wiring. There shall be two rows of terminal blocks on each side of the panel. See attached drawing TYP_DU_PAN_FAB / TYP_OR_PAN_FAB.
- **9.2.** There shall be twenty-nine (29) 12-point terminal blocks and nine (9) 4-point CT switching blocks in each panel (the actual numbers may vary and will be shown on the wiring diagram of the panel). These will be placed and named as shown in the respected wiring diagram.
- 9.3. The terminal block TB17R shall be used for AC and DC power connections. The terminal blocks marked as "SH" (two in each panel, see details in attached drawing TYP_DU_FAB_PAN / TYP_OR_FAB_PAN) are to be used for the termination and grounding of all the incoming cable shields.

10 MISCELLANEOUS DETAILS

- **10.1.** Miscellaneous items, such as fuses, test blocks, and nameplates and other identification means shall be provided in accordance with good industry practice and as required to build the circuitry as given in the AC and DC schematic diagrams to be supplied by JEA to the successful bidder.
- **10.2.** Indicating lights for each circuit breaker shall be provided as follows:
 - 10.2.1. Red to indicate closed position and monitor trip coils (one for each trip coil).
 - **10.2.2.** Green to indicate open position.
 - 10.2.3. Blue to indicate low air / breaker trouble.
 - **10.2.4**. White to indicate an alarm on relay
- **10.3.** The minimum size of the ground bus will be 1 in. X 3/16 in. copper. Each panel will have a 30 in. long horizontal ground bus mounted near the bottom. All panels will have an opening on the two sides so that when panels are assembled in the control room, the ground buses of all the panels of a row (attached control room layout shows the number of rows) can be connected by copper links using anodized nut bolts and spring washers. Plates with rubber gaskets will be used to block the sidewall openings of the end panels (two in each row). Each panel will be supplied with its ground bus joining copper links and the required hardware. The joining links should have slotted holes to overcome any variation at the site. The ground bus of each panel will have 30 equally spaced taped holes of size 5/16 in. The supplies will include hardware (plated screw, washer spring washer etc.) for each hole. The ground bus will be used to provide grounding to the devices mounted in the panel.
- **10.4.** Two additional ground buses shall be provided, one on each side of the panel (top left and top right), near the opening for incoming wires. These ground busses will be connected to the bottom ground bus (10.3) and will be used by JEA to ground the shields of the incoming cables.
- **10.5.** All switches shall be provided with spacers on mounting screws so that the switches are flush with the panels. All switches shall have engraved escutcheon plates or labels showing function (i.e., Trip, Close, On, Off, etc.) and device and/or breaker number. These labels shall be in accordance with "System Relay Standards" drawing TYP_CS.
- **10.6.** The contractor shall provide a copy of the completely filled "GE Specification form GED-3934-Part1" for all GE SB-1, SB-9, & SB-10 switches along with the Bill of Material as stated in <u>section 12.3</u>.
- 10.7. Except at 25 kV, the control switches for the circuit breakers, circuit switchers, and motor operated switches shall

be equipped with pistol-grip handles and shall be of the pullout type (switches shall pull straight out from normal). The control switches' escutcheon plates shall have red and green flags to indicate the last operation of the control switches. In the operating position, they shall provide for local control and indications of the equipment. In the pullout position, they shall provide for supervisory control of the equipment served. In the supervisory position, local indication shall be in operation, but local control shall be disconnected. Unless otherwise stated, General Electric Company type SB-I0, or Westinghouse Electric Corporation type "W" control switches shall be used.

- **10.8.** Space heaters shall be furnished within each switchboard cubicle of sufficient capacity to prevent condensation. Heaters shall be mounted at least 10 inches from the floor and away from wiring or electrical equipment, so the heaters will have no adverse effect on the life and ratings of wiring and equipment of the switchboard. Space heaters shall be mechanically and electrically protected and thermostatically controlled. Space heaters shall be provided with grid guards to prevent wiring from getting close to the heating surfaces. In no case shall the space heater be mounted on the floor of panel.
- **10.9.** Indicating lights for each overreaching transfer trip test switch shall be provided as follows:
 - **10.9.1.** White to indicate guard received.
 - 10.9.2. Amber to indicate trip received.
 - **10.9.3**. Blue to indicate test tripping of breaker.
- **10.10.** Indicating lights for each direct transfer trip switch shall be provided as follows:

10.10.1. Red to indicate trip received.

10.10.2. White to indicate test tripping of breaker.

- **10.11.** All indicating lights shall be General Electric Co. type ET-16 or equivalent with LED bulb and the required accessories.
- **10.12.** For a substation with one battery bank, each panel shall be wired to accept only one single point incoming supply at 125VDC and one single point supply of 120VAC. For a substation with 2 battery banks, a panel may have two sets of DC input terminals. This will be clearly indicated in the wiring drawings to be supplied by JEA.

11 STANDARDS AND TESTS

All equipment shall be designed, manufactured and tested in accordance with the latest published Standards of the IEEE and NEMA.

The panel manufacturer will study the information contained:

- In "Schematic" drawings to be supplied by JEA
- In "Wiring" drawings
- In the documents attached with this specification, and in manufacturers' instructions for items purchased for this spec.
- In any other document related to these panels and supplied by JEA

The contractor will also evaluate the related equipment for correct and safe controlled operation. The JEA project manager will be informed if there is any discrepancy in the information or shortfall in meeting the functional requirement.

In addition to the tests conducted by the contractor during the process of manufacturing, a final test will be conducted by the contractor, which may be witnessed by JEA. Before the start of final testing, the contractor shall submit to the project manager the details of all the tests to be conducted on the control panels. The contractor is required to conduct the final tests on the control panels as per the approved/amended details received from the project manager. A test report will be prepared by the

contractor containing all the results of the final test, and copy of this will be submitted to the project manager. The final testing shall, at minimum, include the following tests:

- 11.1. Insulation Test
- 11.2. Power on test: This test will subject rated voltages and currents to all continuous rated electrical items (such as aux.-relays, indicating lamps, meters, transducers, protective relays, communication modules, switches, etc.) mounted in the panel or supplied as loose items, for at least one continuous 24 hour period. In this test the PT and CT circuits will also be energized with equivalent voltages and currents for the said continuous 24 hour period.
- 11.3. Functional test: This includes functional check of each circuit.

In case of a failure, the contractor shall replace/modify/repair the items that have failed to pass the test. In case of wiring mistake, the contractor shall make any necessary changes in the wiring of the circuit. The test under which the equipment/item has failed will be repeated and the final test results will be submitted to JEA.

12 SUBMITTALS AND MANUFACTURING SCHEDULE

Here, the term "drawings" shall be interpreted to mean that data in the form of drawings, diagrams, illustrations, schedules, or any other form deemed best to convey or illustrate the equipment, process, type, materials of construction, etc., to enable JEA to properly and completely review the data without unnecessary delays. The following schedule shall be followed for completing the work involved in this specification:

12.1. Specification Drawings:

> All the specific drawings as listed earlier in this section shall be furnished by JEA and are made part of the requirements of this specification. The drawings will be on 11 in. X 17 in. bond sheet. "Typical" drawings are attached to facilitate bid preparation by the bidder. TIME: Panel Layout will be included with this document and the rest will be

given at later date

12.2. Drawings Furnished by JEA:

JEA shall submit the following drawings to the successful bidder, referred to as the contractor hereafter. These drawings will be prepared by JEA and two copies will be submitted to the contractor on 36 in. X 24 in. bond paper. If the contractor desires, the CAD file of these drawings compatible to Intergraph's MicroStation V8 and I/ RAS B. with file extensions "DGN" & "CIT" will be furnished by JEA.

12.2.1. Brandy Branch Schematic and wiring TIME:

12.3. Information Furnished by Contractor:

The contractor shall review the drawings submitted by JEA, for the desired overall control functionality, and for any other discrepancies that may be present. Discrepancies shall be brought to the attention of the project manager for resolution. If necessary, the contractor shall submit drawing copies, with proposed changes, and return one copy to JEA. The contractor shall also make and submit two copies of a detailed "Bill of Materials" for approval by JEA.

12.3.1.	For "Bill of Materials"	TIME:
12.3.2.	For panel structure print approval	TIME:

12.4. <u>Approval from JEA:</u>

JEA will review all changes recommended by the contractor and will send the corrected final drawings and a copy of the Bill of Materials to the contractor. JEA will review all wiring diagrams furnished by the contractor and return any drawings requiring changes. The contractor shall use these final approved drawings in their actual wiring of the control panel and associated equipment.

12.4.1.	For "Bill of Materials"	TIME:

12.4.2. For panel structure approval TIME:

12.5. <u>Testing Details from Contractor:</u>

The contractor shall prepare list of the proposed tests as per the requirement indicated in <u>section 11</u>, and submit it to JEA for its approval. TIME:

12.6. Approval of Testing Details by JEA:

JEA will review the list of proposed tests and send the final approved test list to the contractor, for its use in the final testing of furnished equipment. TIME:

12.7. <u>Test Report from Contractor:</u>

The contractor shall conduct the final test on the equipment and items prior to shipment of any equipment. The contractor shall replace/modify/change any items that have failed to pass the test. The contractor shall submit to JEA a report containing the test results, and will ship the equipment after final approval from JEA.

TIME:

12.8. As Built Drawings:

The contractor shall submit a set of all the final drawings showing "As Built Equipment" and clearly mark these with any necessary changes required during the final testing. TIME: With panels

12.9. Final Panel Delivery:

Brandy Branch 230 and 69 kV Substation TIME: 13701 Waterworks Street Jacksonville, FL 32221

13 INSTRUCTION MANUALS

Four copies of instruction and operating manuals of all the items of furnished equipment, will be furnished by the contractor, and are considered an essential part of the requirements of this specification.

14 JEA STANDARDS FOR WIRING DIAGRAMS

The following standards and procedures have been adopted in preparing the diagrams, furnished to the contractor by JEA with the exception of panel wiring diagrams, for the purpose of manufacturing the control panel. As an example, drawing TYP-W1 and TYP-W2 are attached.

14.1. <u>PROCEDURES FOR DEVICE DESIGNATION</u>

- **14.1.1.** List termination as shown on the example drawings provided.
- 14.1.2. Label devices by levels.
 - Ex.: Level 1: "AB," "AC," "AD"... Level 2: "BA," "BC," "BD" ...and so on.....Letter "R" as first character are reserved for resistors
- **14.1.3.** Do not use double letters for devices.
 - Ex: Do not use "AA," "BB," "CC," "DD" etc...
- 14.1.4. Do not use "I," "O," or "Z" as a letter to designate the devices.Ex: Do not use "AI," "AO," "OA," "ZA" etc...
- 14.1.5. Delete the device label "GB" (it is reserved for Ground Bus).
- 14.1.6. List each termination on a device separately.

Ex.: <u>AB</u> 1-AC1 1-AC2 1-AC3 And not like <u>AB</u>

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1-AC1, AC2, AC3
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- 14.1.7. Fuses shall begin with FU1.....FU16
- **14.1.8.** Devices on sub-panels shall be labeled with the next available letter and shall be designated with dotted lines.
- 14.1.9. Resistors shall begin with "R" Delete "RI," "RO," "RZ."
- 14.1.10. Each pot light shall be given a separate device label. All other lights associated with devices shall share the devices' label and be designated by the light's color. (See "CA,""DA" and "HA" on TYP-W1).
- 14.1.11. Devices on the sides of panels shall be labeled in such a way as to continue the sequence of the device labels around the panel, so that no label is repeated. On dual panels the same procedure shall be followed for devices on the back panel.
- 14.1.12. Ground Bus shall be designated as "GND BUS" (see TYP-W2). Terminal blocks for landing control cable shields shall be identified as "shield wire bus."
- **14.1.13.** Panel to panel wires shall go from terminal blocks only and not directly from devices and shall be listed by the destination's panel number/terminal block number.
- 14.1.14. When a device such as annunciator contains terminal blocks, the terminal blocks shall be labeled by position, starting with "TB1." All terminal blocks of this device shall share the same device name. (See

"BA" of TYP_W1.)

- 14.1.15. List all the jumpers within the same device next to the termination listings. (See "CA" & "DA" on TYP-W1.)
- 14.1.16. List all light-device and light-light connections along with termination listing. (See "HA" on TYP-W1.)

14.2. PROCEDURES FOR TERMINAL BLOCKS

See section 9 for details.

14.3. PROCEDURE FOR ASSIGNING DRAWING NUMBERS:

All drawings concerning this project shall be named as per the following standard practices.

14.3.1. The drawing numbers will comprise of 3 upper case characters followed by two digit numbers written in the following style.

AAXNN

The first two characters (AA) of the drawing number designate the substation and will be "BB" for Brandy Branch Substation. The third character (X) will be selected from the following list:

- A For AC Schematic Diagrams, Three Line Power Diagrams
- D For DC Schematic Diagrams
- I For Interconnection Diagrams
- L For Layout and General Arrangement Drawings
- M For Equipment (excluding control panels) Manufacturer's Drawings
- S For Single Line Diagrams
- W For Wiring Diagrams
- E For EMS Drawings
- C For Conduit Plans

The project manager will sequentially allot a two digit number (NN). The practice of using sheet numbers with same drawing number will not be adopted under any circumstance.

15 PACKING

For handling at the destination site:

- 15.1 A maximum of one control panel will be shipped assembled in a single crate
- 15.2 Loose items will always be packed in a separate crate
- 15.3 Each crate will be marked boldly in <u>red</u> with the following label:
 - 15.3.1 The crates for the Panels and their associated loose items will be labeled "FOR BRANDY BRANCH 230kV-26kV SUBSTATION"

Notes / Clarifications on Technical Specification and Proposal form from Previous Bid.

JEA has standardized on two (3) types of panel designs: Enclosed Panel Design, Open Rack Panel Design and Sub-Panel Module designs. This project will only incorporate the Enclosed Panel Design and and Open Rack Panel Design. For this project JEA expects the following:

- a. The 230kV control house transformer T1 230kV line differential panel (PNL 1) will be enclosed panel design as per BBL04.pdf.
- b. The new 26kV control house panels (1, 2, 3, 4, 5 & 10) will be open rack panel design. Open rack panel shall be designed as per a panel similar to JEA's Neptune beach line metering panel. During the initial site visit to Jacksonville, Florida, JEA SP&C Projects engineers will accompany the panel manufacturer to JEA's Brandy Branch substation <u>and</u> Neptune Beach substation to make reference to both Enclosed Panels and Open Rack panel to make appropriate field assessment. It is JEA's expectation that these newly fabricated open rack panels and enclosed panels be exactly similar to existing panel designs at Neptune beach and Brandy Branch substation.

c. This project will also require manufacturing of panel doors (mounted front) and panel backs (mounted rear) to modify existing 230kV North and South bus panels (existing panels 9 & 18). Assignment of responsibility will be as follows:

- i. JEA's System Protection and Control (SPC) technicians will determinate the existing wiring from the front panel door and rear panel back. JEA SPC technicians will terminate new wiring from the new panel door and new panel back.
- ii. Wiring diagrams for all panels to be developed by JEA and issued to panel manufacturer for wiring.
- iii. Panel manufacturer shall be responsible for the following:
- i. Removal of existing panel door and panel back.
- ii. Installation of newly fabricated panel door and panel back and ensuring complete functional operability of the modified panel.
- iii. Provide JEA with wire tags for both ends showing end to end terminations.
- iv. Pigtail wiring length shall be determined and confirmed with JEA upon initial site visit.
- 2. The panel manufacturer at a <u>minimum</u> shall include the following trips to Jacksonville, Florida (see bid form Page 2 of 3 & Page 3 of 3).
 - a. Initial site visit to take field panel measurements at Brandy Branch substation bus panels and Neptune beach open rack panel.
 - b. Trip for delivery and installation of 230kV line differential panel and 26kV panels and *delivery only* of <u>North and South bus</u> panel front doors and panel backs.
 - c. Trip for removal and installation of the modified <u>North bus</u> panel, panel front and panel back. This installation is outage dependent which is determined by many factors such as: weather, system load and other factors. Therefore, it is not practical for JEA to provide a long advance notice of bus outage at Brandy Branch substation. JEA at a minimum will provide one work week notice to the panel manufacturer. JEA will try to inform the panel manufacturer of the outage date as soon as this information becomes available.
 - d. Trip for removal and installation of the modified <u>South bus</u> panel, panel front and panel back. This installation is outage dependent which is determined by many factors such as: weather, system load and other factors. Therefore, it is not practical for JEA to provide a long advance notice of bus outage at Brandy Branch substation. JEA at a minimum will provide one work week notice to the panel manufacturer. JEA will try to inform the panel manufacturer of the outage date as soon as this information becomes available.

- 3. The engineering and manufacturing of 230kV panels 9 and 18 modifications will require precise engineering and field measurements. The panel manufacturer shall be responsible for providing detailed drawings for these modified panel front door, panel back including modifications to existing hinges, bolting and mounting systems as part of the final deliverable.
- 4. The panel manufacturer shall ensure that the manufacturing of panel door and panel back is precise and should match the original equipment manufacturing and existing condition of the panel. The panel manufacturer shall ensure initial site measurements are precise and accurate in order to ensure efficient installation time, and future operation of the control panel. <u>JEA will not accept</u> <u>delivery of the modified panel doors and back as result of inadequate assessment or wrong</u> <u>measurements taken during the initial site visit.</u>
- 5. The panel manufacturer shall note that Brandy Branch substation is a NERC CIP site, and may require panel manufacturer's personnel visiting Brandy Branch substation to accomplish tasks in <u>item 3</u> to go through a seven (7) year background check and NERC/CIP training.
- 6. It shall be the responsibility of the panel manufacturer to ensure that personnel visiting Brandy Branch, and Neptune substation have completed JEA's substation safety training. It shall be panel manufacturer's responsibility to coordinate this training prior to making this initial site visit as listed in item 3. Below is the contact to setup Substation Safety training class:

Roger Allen Parker Safety & Health Specialist Phone: 904-665-8894 Cellular: 904-949-6108 Email: parkra@jea.com

- 7. Panel manufacturer shall manufacture all relay panels at their manufacturing facility located within the United States of America.
- 8. All field services/installation work as listed in items 3.1, 3.2, 3.3 & 3.4 shall be performed by the full-time employees of the panel manufacturer.
- 9. The panel manufacturer shall be responsible for providing JEA with the following:
 - a. SEL relay Part Number.
 - b. SEL relay Serial Number and what equipment it is being demarked for.
 - c. SEL relay FID string
 - d. Default factory settings file retrieved from each relay. The settings filename shall make reference to equipment it will be used for. The settings filename shall follow the following scheme (*JEA*'s substation name, Equipment, Relay Type. For example, SJ954SEL411L.rdb)

SJ = SJRPP substation

954 = Transmission line 954

SEL411L = SEL411L relay

- 10. JEA will use default settings files and will create engineered settings file. JEA will provide these engineered settings files to the panel manufacturer. The panel manufacturer shall be responsible to download these engineered settings file to the relay. Once, all the engineered settings files have been downloaded to the relays, the panel manufacturer shall retrieve these "As-Left" settings files from the relay, and provide them back to JEA. JEA will perform settings comparisons between "As-Engineered" and "As-Left" settings files.
- 11. JEA will provide panel manufacturer with a functional testing document to check all the relay input, output wiring and panel wiring. The panel manufacturer shall be responsible for testing newly fabricated panels as per this functional testing document and provide a completed document back to JEA prior to panel delivery.