GENERAL SPECIFICATIONS

1. This Exhibit B – Technical Specifications supplements the Scope of Work for Relays and Relay Control Panels, as outlined in Exhibit A. It outlines the technical design requirements, associated control systems, and operating systems for relays and relay control panels.
2. The work shall conform to the applicable requirements of all Federal, State, and local agencies and the relevant provisions of the latest edition or revision of the standards outlined in Exhibit A — Scope of Work (Project Requirements), except as modified herein.

MATERIALS AND EQUIPMENT

1. All material and equipment shall be new, approved, and labeled. Only products by manufacturers regularly engaged in producing specified units will be acceptable.
2. Where two (2) 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 unless otherwise specified.
3. The selection of all accessories, materials, and fabrication methods not specified that are necessary to complete the fabrication of the units shall be left to the Contractor's discretion and shall be carried out in accordance with best engineering practices. All materials shall be new and of the type required for the application.

CONTROL PANEL DESIGN REQUIREMENTS

1. **Equipment:**
    - **a. The City of Ocala will provide the following equipment to the Contractor for integration into the relay panels before the final units are delivered to the City of Ocala:**
        - i. Dearmin Substation:
            1. SEL – 3530 125VDC
            2. SEL – 2440 125VDC
        - ii. Water Plant Substation:
            1. SEL – 3530 RTAC / 48VDC
            2. SEL – 2440 / 48VDC
    - **b. The following equipment must be included within the relay panels delivered to the City of Ocala:**
        - i. Dearmin Substation:
            1. ABB/ C129A539G01/ Test Switch FT-1 Clear Cover, 10 single poles, red handles
            2. ABB/ 1586C42G36/ Test Switch FT-1 CLEAR Cover / 10-Pole, Current Shorting 6P (3 dbl) / 4 Pole Potentials, with 19-20 Red Handle
            3. GE/ 116B6708G42 R52 R4/ Red Light Type ET-16, LED, Red Lens 125VDC
            4. GE/ 116B6708G42 G52 G4/ Green Light Type ET-16, LED, Green Lens 125VDC
            5. GE/ 116B6708G42 A52 A4/ Amber Light Type ET-16, LED, Amber Lens 125VDC
            6. GE/ 116B6708G42 A52 C4/ White Light Type ET-16, LED, Clear Lens 125VDC

7. GE/ 1166708G4-8-A73-C4/ White Light Type ET-16, LED, Clear Lens 130 VAC
8. Square D/ Type KA-3, Series G/ Reset Push Button, 30mm Class 9001
9. GE/ 957805C/ 95 LOR Oval Handle, 20 Contacts 10NO, 10NC
10. SEL/ 2810 MT/ Fiber Optic Transceiver
11. SEL/ 2810 MR/ Fiber Optic Transceiver
12. 4Re/ 6004-SCC/ Terminal Block / 4-Position Shorting
13. Penn Union/ 6012/ Terminal Block / 12-Position Shorting
14. Marathon/ F30A2S/ Fuse Holder / 30A 240Volt 9/16th 2X
15. Marathon/ F30A3S/ Fuse Holder / 30A 240Volt 9/16th 2X
16. OT20/ 20 AMP Fuses
17. OT30/ 30 AMP Fuses
18. OT3/ 3 AMP Fuses
19. OT5/ OT5 125VDC

b. Water Plant Substation:

1. ABB/ C129A539G01/ Test Switch FT-1 Clear Cover, 10 single poles, red handles
2. ABB/ 1586C42G36/ Test Switch FT-1 CLEAR Cover / 10-Pole, Current Shorting 6P (3 dbl) / 4 Pole Potentials, with 19-20 Red Handle
3. GE/ 116B6708G42 R52 R4/ Red Light Type ET-16, LED, Red Lens 48VDC
4. GE/ 116B6708G42 G52 G4/ Green Light Type ET-16, LED, Green Lens 48VDC
5. GE/ 116B6708G42 A52 A4/ Amber Light Type ET-16, LED, Amber Lens 48VDC
6. GE/ 116B6708G42 A52 C4/ White Light Type ET-16, LED, Clear Lens 48VDC
7. GE/ 1166708G4-8-A73-C4/ White Light Type ET-16, LED, Clear Lens 130 VAC
8. Square D/ Type KA-3, Series G/ Reset Push Button, 30mm Class 9001
9. GE/ 957805C/ 95 LOR Oval Handle, 20 Contacts 10NO, 10NC
10. SEL/ 2810 MT/ Fiber Optic Transceiver
11. SEL/ 2810 MR/ Fiber Optic transceiver
12. 4Re/ 6004-SCC/ Terminal Block / 4-Position Shorting
13. Penn Union/ 6012/ Terminal Block / 12-Position Shorting
14. Marathon/ F30A2S/ Fuse Holder / 30A 240Volt 9/16th 2X
15. F30A3S Fuse Holder / 30A 240Volt 9/16th 2X
16. OT20 20 Amp Fuses
17. OT30 30 Amp Fuses
18. OT3 3 Amp Fuses
19. OT5 5 Amp Fuses

2. Metal Work:

a. Each panel shall be a fixed vertical panel fabricated from no less than 11 USS gauge leveled steel sheets and reinforced as required to form a rigid self-supporting structure.

b. Each panel shall be formed with edges bent back, joints welded, and ground smooth. Finished panel surfaces shall be free of waves, bellies, and other imperfections. Exterior panel surfaces shall be sandblasted, ground smooth, filled, primed, and enamel finished.

c. Exterior enamel paint color shall be gray; Interior enamel paint color shall be white.

d. Nominal panel arrangements and dimensions shall be as per the drawings provided for each

substation. All panels shall be provided with nineteen-inch (19") rack mounting inserts in accordance with standard nineteen-inch (19") rack specification dimensions as defined in EIA-310.

e. Instruments, meters, control switches, test switches, and protective relays shall be mounted on the front of the panels where shown. Panel cutouts, mounting studs, and support brackets shall be accurately located as indicated on the drawings.

f. Mounting brackets, as required, shall be arranged for mounting and wiring auxiliary equipment, devices, and terminal blocks. Where needed, sub-panel plates may be added for mounting auxiliary devices inside the panels without the need for additional mounting screws showing on the front side of the panels.

g. Panel space not utilized by equipment shall remain clear for addition of possible future equipment or existing equipment relocation. Suitably sized 19" blank panel inserts (filler plates) shall be furnished as required for these areas.

3. Device Mounting:

a. The devices to be mounted shall be according to the materials list shown in ***Exhibit C — Price Proposal*** and in this ***Exhibit B's Control Panel Design Requirements,*** above. Any change to the listed material must have prior approval from the Ocala Project Engineer.

4. Device Arrangement:

a. The panel fabricator shall prepare fully dimensioned panel arrangement drawings and submit them for the engineer's review and approval. The Engineer may change the panel arrangement at any time before panel cutting and punching without incurring extra cost.

b. Auxiliary devices, such as fuses, resistors, and metering transducers, which will be mounted internally to the panel, shall be arranged for ease of access so as not to block access to other devices.

c. Overall arrangement shall provide free and unobstructed screwdriver access to all device and terminal block screws.

d. The manufacturer shall make allowances for possible additions of auxiliary relays that may be required during the design phases.

5. Device Identification:

a. Every device mounted on the front panels shall be identified by an engraved, white core, black surface, laminated plastic nameplate attached with stainless steel screws.

b. All devices, both front-mounted and internally mounted, shall be identified with engraved, white core, black surface, laminated plastic nameplates attached with suitable double-sided tape or adhesive on the inside of the panel shall bear the exact text as the exterior nameplates, plus identifiers that correspond to those used on the wiring drawings. All fuses shall have nameplates of a similar type identifying the protected circuit.

6. Wiring:

a. Inter-panel wiring shall originate and terminate on terminal blocks, not individual devices within the panel. Terminal blocks shall accommodate no more than two (2) cable terminal

points.

b. The City of Ocala is responsible for installing the external panel wiring, which will be performed on-site. The installation shall conform to schematic and interconnection drawings developed by an engineer.

c. The Engineer may be required to request wiring changes but will endeavor to keep them to a minimum. However, wiring changes may be made at any time before the commencement of panel wiring without incurring additional costs to the contract.

d. The sequence for current transformer secondary series wiring shall conform precisely to the sequence shown on the one-line drawings.

e. Not more than two wires shall be under any one terminal screw.

f. Each wye-connected CT secondary circuit shall have the neutral conductor grounded from the panel wiring side of the terminal block to which the Owner's external CT wiring will connect. Ground wire shall have a green insulation color.

g. Panel wire shall be rated for 600 volts, switchboard wire, and 19 strands at minimum. CT circuits, AC and DC supply circuits, and PT and control circuits shall be at minimum #12 AWG.

h. A wire label (black writing upon white label) shall be affixed to EACH Wire, identifying the location of the opposite end termination point. This Label shall be located approximately ¼ inch from each termination point on each end of the wire in question. An appropriate font size shall be used to make the label legible at arm's length.

7. Physical Arrangements (For Panel Field Installation):

a. The wiring shall be neat and workmanlike, bundled in harnesses.

b. Wiring outside wire ways shall be trained in bundles and secured with "Ty-raps." Wires in bundles shall be parallel and not intertwined, twisted, or kinked.

c. Screwdriver access to device and block terminals shall not be hindered by wire ways, wire bundles, or any other devices mounted in the panels.

8. Terminations/Terminal Blocks:

a. Terminal blocks shall be manufactured by Penn-Union, ***no exceptions***.

b. Terminal blocks shall be provided to terminate the Owner's wiring entering the panels plus those needed by the Panel Fabricator for internal wiring. Fifteen percent (15%) of the unused (Spare) terminal points distributed among the active points shall be provided.

c. Terminal blocks shall be installed in vertical channel brackets as indicated on the drawings and located to facilitate ease of connection for the Owner's wiring.

d. All termination lugs shall be of the un-insulated ring tongue type. The following lug types manufactured by Burndy shall be used with no exceptions: YAV10, YAV-10L36, and YAV-10T. "Y" or open-type terminations are not permitted. If devices require stranded or solid conductors are to be terminated without ring tongue lugs, and the stranded or solid conductors shall be furred before termination to protect the conductors from damage. See

section 5, paragraph G above, for possible exceptions to lug type YAV14L36 due to wiring to the SEL 2440.

9. Grounding:

a. Each panel shall be provided with a copper ground bus. The ground bus shall extend the entire panel width to connect to the adjacent panel's ground bus, providing a continuous bus for all panels. The ground bus shall be drilled and tapped to accommodate ground connections required from panel-mounted devices. Additional Drilled and Tapped "spare" holes shall be provided with spare Stainless-Steel screws inserted.

10. Nameplates:

a. Nameplates of laminated construction shall be provided with vertical capital letters. The completed nameplate shall have white letters on a black background. All units and circuit components shall be identified with nameplates. Nameplates shall be firmly attached as described in section 4 (Device Identification) paragraph B.

b. All switches, pushbuttons, indicating lamps, etc., shall be identified by nameplates.

c. All fuses, auxiliary relays, and other devices mounted inside the units shall be identified by nameplates.

11. Switchboard Components:

a. The major items of equipment to be mounted on the control and relay panels, for each substation project, are listed in ***Exhibit C – Price Proposal*** and in this ***Exhibit B's Control Panel Design Requirements***. Substitution of devices listed shall not be allowed unless approved by the City of Ocala in writing. Exhibits C & B identify the principal relays and devices to be used in connection with the work for each substation panel. Terminal blocks, fuse blocks, wire, nameplates, and miscellaneous items not specifically itemized in Exhibit C or B shall be provided as required.

i. All control switches and lockout relays shall be furnished for thick panels of one-eighth inch (1/8").

ii. All lock-out relays shall have a connection point between the two normally closed contacts in series with the operating coil.

iii. All light bulbs shall be LED-type bulbs.

12. Test Switches:

a. Relay and metering test switches (current short-circuiting switches and/or voltage disconnecting switches) shall be provided, as listed, to permit the removal of relays, meters, or other devices from service for calibration.

PROJECT EXECUTION

1. General:

a. The general arrangement shall follow the layout shown on the created drawings as closely as practical. The reason for deviation from the design shown on the drawings shall be submitted to the Project Manager for evaluation before manufacture. The installation shall

be neat and workmanlike.

2. Assemble:

a. Panel stiffeners shall be used to restore the stiffness to its original uncut rigidity where multiple equipment cutouts have reduced it.

b. All switchboard panels shall be electrically grounded individually, with provisions provided to bond each section solidly to the next and allow for connection with a #4 Copper to the outside Ground.

c. Others shall perform any required field assembly of the switchboard panels. The switchboard panels shall be structurally secured to the floor and set plumb and level.

d. During Transportation and Delivery, precautions shall be taken to ensure that Switchboards are covered and/or protected from any transportation hazards. Upon Delivery, Scratches or damage shall be restored to the original specified condition.

3. Shipping:

a. For transportation, each panel assembly shall be palletized on a 42" square minimum sized Pallet (not to exceed 48"). The Pallet shall be made of material that supports the weight and stresses involved in shipping the panels in the upright position. Panels shall be bolted to the pallet, and additional support shall be added to keep the pallets upright during shipping. A suitable substitution may be used, provided the Project Manager approves it.

b. The panel assemblies shall be covered with a 2-mil opaque plastic bag and then wrapped with shipping plastic wrap. Adequate foam and wooden protection shall be placed over the front-side components to protect them from hazards during shipping. A suitable substitution may be used if approved by the Ocala Engineer.

4. Testing:

a. **Factory Test** – Each switchboard or control panel shall be completely fabricated, assembled, and wire-checked against AC and DC schematics that the winning bidder will engineer. Testing shall include, but is not limited to:

i. Point-to-point wire continuity testing.

ii. Current and voltage input testing for each input.

iii. Insure proper current trace from each shorting block through each relay and its return path.

iv. General control testing of manual controls, shorting test switches, and trip disconnects.

v. Any discrepancies between engineered wiring diagrams and expected results shall be reported to the Project Manager for further design evaluation.

SUBMITTALS AND REVIEW

1. **Shop Drawings:** Shop drawings will be engineered, drawn, and submitted to the City along with a list of material and/or equipment supplemented, with descriptive bulletins, and/or other information necessary to completely describe the material and/or equipment's function and design. ***Shop drawings***

shall be submitted within 60 days from the date of Notice to Proceed (NTP). All test data required must be submitted to the City of Ocala for review before invoice submission for each material or equipment category.

a. All paper shop drawing submissions required to be delivered to Ocala Electric Utilities shall be mailed, and one electronic copy shall be furnished on a disc in a format compatible with AutoCAD Release 2024 to Ocala Utility Services, 1805 NE 30th Avenue, Building 400, Ocala, FL 34470. A minimum of three (3) paper copies are required. If the Contractor desires the return of more than one (1) paper copy, the appropriate number of additional copies must be submitted.

b. Certified copies of drawings, instruction books, material lists, and operations & maintenance manuals shall be provided for each category of equipment furnished.

2. Shop Drawing Review:

a. Failure by the City of Ocala for reasons other than actions or omissions on the part of the Contractor to return shop drawings within fifteen (15) days from the date of receipt thereof shall constitute the basis for a day-for-day extension in the proposed delivery schedule. Failure by the City of Ocala to return shop drawings within fifteen (15) days due to actions or omissions on the part of the Contractor shall not constitute grounds for an extension of the proposed delivery time.

b. A maximum of two reviews for each submittal will be allowed to establish conformance with the specification. In the event an item has been determined by the City of Ocala not to be in conformance with the contract requirements after two reviews, the Contractor shall pay the City of Ocala an amount equal to the cost incurred by the City to perform additional submittal reviews required to establish conformance with the specification. These costs will be deducted from the Contractor's retainage before final payment.