FIJI ELECTRICITYAUTHORITY

BIDDING DOCUMENT

MR 267/2017

DESIGN, BUILD, SUPPLY, TEST and COMMISSION OF 132kV MIMIC PANEL, HMI SYSTEM AND ANNUNCIATION PANEL FOR 132kV VUDA NCC SUBSTATION

Section 1 Instruction to Bidders

1. Scope of Bid

The Fiji Electricity Authority (hereinafter referred to as "the Employer"),wishes to receive bids for full DESIGN, BUILD, SUPPLY, TEST and COMMISSION OF 132kV MIMIC PANEL, HMI SYSTEM AND ANNUNCIATION PANEL FOR 132kV VUDA NCC –SUBSTATION as defined in these bidding documents (hereinafter referred to as "the Works").

The successful bidder will be expected to complete the Works within 12 Months from the date of commencement of the Works.

2. Eligible Bidders

This Invitation to Bid is open to bidders who have sound financial background and have previous experience in handling such projects.

Bidders shall provide such evidence of their continued eligibility satisfactory to the Employer as the Employer shall reasonably request.

Bidders shall not be under a declaration of ineligibility for corrupt or fraudulent.

2. Eligible Materials, Equipment and Services

The materials, equipment, and services to be supplied under the Contract shall have their origin from reputable companies from various countries and all expenditures made under the Contract will be limited to such materials, equipment, and services. At the Employer's request, bidders may be required to provide evidence of the origin of materials, equipment, and services.

3. Qualification of the Bidder

To be qualified for award of Contract, bidders shall submit proposals regarding:

1. Work methods
2. Work scheduling and
3. resourcing

This shall be provided in sufficient detail to confirm the bidder's capability to complete the works in accordance with the specifications and the time for completion.

4. Cost of Bidding

The bidder shall bear all costs associated with the preparation and submission of its bid and the Employer will in no case be responsible or liable for those costs.

5. Site Visit

The bidder is advised to visit and examine the Site of Works and its surroundings and obtain for itself on its own responsibility all information that may be necessary for preparing the bid and entering into a contract for the design-build and completion of the Works. The costs of visiting the Site shall be at the bidder's own expense. The pre-bid meeting is scheduled on the **Thursday 10am**, 12th **October** at **VUDA NCC Substation, Suva, Fiji.**

6. Sealing and Marking of Bids

The bidder shall seal the original copy of the technical proposal, the original copy of the price proposal and each copy of the technical proposal and each copy of the price proposal in separate envelopes clearly marking each one as: "ORIGINAL-PROPOSAL", and “COPY PROPOSAL", etc. as appropriate.

The bidder shall seal the original bids and each copy of the bids in an inner and an outer envelope, duly marking the envelopes as "ORIGINAL" and "COPY".

The inner and outer envelopes shall

be addressed to the Employer at the following address:

Tuvitu Delairewa
General Manager Corporate Services
2 Marlow Street,
Suva,
FIJI.
Phone: 679 3224 185 Facsimile: 679 331 1882
Email: TDelairewa@fea.com.fj
And

bear the following identification:

- Bid for: **Design, Build and Supply of Mimic Panel, HMI System and Annunciation Panel for 132kV VUDA NCC Substation**
- Bid Tender Number: MR 267/2017
- DO NOT OPEN BEFORE – **26th October, 2017**

7. Deadline for Submission of Bids

Bids must be received by the Employer at the address specified above no later than Wednesday, 1600 hours (Fiji Time), 25th October, 2017.

The Employer may, at its discretion, extend the deadline for submission of bids by issuing an addendum, in which case all rights and obligations of the Employer and the bidders previously subject to the original deadline will thereafter be subject to the deadlines extended.

8. Late Bids

Any bid received by the Employer after the deadline for submission of bids prescribed in Clause 23 will be rejected and returned unopened to the bidder.

9. Modification and Withdrawal of Bids

The bidder may modify or withdraw its bid after bid submission, provided that written notice of the modification or withdrawal is received by the Employer prior to the deadline for submission of bids.

The bidder's modification or withdrawal notice shall be prepared, sealed, marked and delivered in accordance with the provisions of Clause 22, with the outer and inner envelopes additionally marked "MODIFICATION" or "WITHDRAWAL", as appropriate. A withdrawal notice may also be sent by fax but must be followed by a signed confirmation copy.

No bid may be modified by the bidder after the deadline for submission of bids.

10. Employer's Right to Accept any Bid and to Reject any or all Bids

Notwithstanding Clause 34, the Employer reserves the right to accept or reject any bid, and to annul the bidding process and reject all bids, at any time prior to award of Contract, without thereby incurring any liability to the affected bidder or bidders or any obligation to inform the affected bidder or bidders of the grounds for the Employer's action.

11. Notification of Award

Prior to expiration of the period of bid validity prescribed by the Employer, the Employer will notify the successful bidder by fax, confirmed by registered letter, that its bid has been accepted. This letter (hereinafter and in the Conditions of Contract called the "Letter of Acceptance") shall name the sum which the Employer will pay the Contractor in consideration of the execution, completion and maintenance of the Works by the Contractor as prescribed by the Contract (hereinafter and in the Conditions of Contract called "the Contract Price").

The notification of award will constitute the formation of the Contract.

Upon the furnishing by the successful bidder of a performance security, the Employer will promptly notify the other bidders that their bids have been unsuccessful

12. Signing of Contract Agreement

At the same time that he notifies the successful bidder that its bid has been accepted, the Employer will send the bidder the Form of Contract Agreement provided in the bidding documents, incorporating all agreements between the parties.

Within 7 days of receipt of the Form of Agreement, the successful bidder shall sign the Form and return it to the Employer.

13. Corruptor Fraudulent Practices

The Employer requires that the Contractor observe the highest standard of ethics during the procurement and execution of such contracts. In Pursuance of this policy, the Employer:

(a) defines, for the purposes of this provision, the terms set forth below as follows:

(i) "corrupt practice" means behavior on the part of officials in the public or private sectors by which they improperly and unlawfully enrich themselves and/or those close to them, or induce others to do so, by misusing the position in which they are placed, and it includes the offering, giving, receiving or soliciting of anything of value to influence the action of any such official in the procurement process or in contract execution; and

(ii) "fraudulent practice" means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of the Employer, and includes collusive practice among bidders (prior to or after bid submission) designed to establish bid prices at artificial non-competitive levels and to deprive the Employer of the benefits of free and open competition;

(b) will reject a proposal for award if it determines that the bidder recommended for award has engaged in corrupt or fraudulent practices in competing for the contract in question;

Furthermore, bidders shall be aware of the provision stated in Sub-Clause 1.16 and Sub-Clause 15.5 of the Conditions of Contract, Part II - Conditions of Particular Application.

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Scope of Work

1. General Description

This specification covers the technical requirements for the upgrading of Vuda Substation in which a Mimic panel, Human Machine Interface (HMI) module and an Annunciation Panel is to be installed complete with all accessories for efficient and trouble free operation.

The required equipment shall be manufactured as per the specifications listed in this specification document. In case of any deviation from the mentioned, the vendor shall bring into notice the same along with its offer. In absence of such deviation, it will be presumes that equipment offered is exactly similar to the specification.

The bidder(s) will be evaluated based on the features, quality, technicality and durability of the design.

2. General Scope

It is the complete responsibility of the bidder to:

a) Design
b) Build
c) Transport, Supply and Deliver
d) Insurance to site
e) Install
f) Test
g) Provide training
h) And commission; the Mimic Panel, HMI system and the annunciation panel.

3. The Mimic Panel

3.1. Construction

3.1.1. The panel shall be metal enclosed, free standing type suitable for indoor installation. The panel shall be dust and vermin proof and the enclosure shall provide a degree of protection of not less than IP-65. The height of the panel shall not be more than 2200mm and the depth shall not exceed 800mm. the length of the panel shall be kept at least 13.2m long. The Mimic Panel shall be sized large enough so that the components on the Single Line Diagram are clear, each sectional feeder, Transformers, bus Section shall be allocated to 600mm spacing. Also, the switches, indications and meters shall be properly spaced and correctly placed to avoid confusion.

3.1.2. The panel shall be fabricated and properly supported using C-Channel or Angle Line metal, so the frame does not deteriorate from its shape in due time. The whole panel shall be mounted on a base frame made out of hot dip galvanized structure. Joints of any kind in sheet shall be seam welded, all welding slag grounded off and welding pit wiped smooth with plumber metal. All panels and covers shall be properly fitted and made square with frames. All the holes in the panels shall be correctly positioned. Self-threading screws shall NOT be used in any construction works. The metal sheet, for the construction of the panel, shall be of at least 1.5mm of thickness.

3.1.3. Each cable chamber shall have cable entry from the bottom, suitable removable gland plates, of 6mm Aluminum, shall be provided for this purpose. The cable chamber shall be provided with suitable supporting arrangement between gland plate and terminals, in the middle.

3.1.4. A horizontal wire-way with screwed cover shall be provided at the top/ bottom to take inter-connecting control wiring between different vertical sections. Separate and adequate compartments shall be provided for accommodating instruments, indicating lamps, control fuses etc. These shall be accessible for testing and maintenance without any danger of an electrical hazard.

3.1.5. All similar materials and removable parts of the panel shall be interchangeable. The panel shall be filled with the same family of switches for various ratings with a view to ensure uniformity of design, maintenance and replacements.

3.1.6. Painting shall be done by surface coating comprising pre-treatment and curing. The surfaces shall be chemically de-rusted and degreased prior to painting. White colored paint shall be applied as the finishing paint.

3.2. Switches

3.2.1. A **Three (3) position rotary cam changeover** switch shall be installed on the Mimic Panel which shall be used to select on which type of control the user will use. Whichever one (1) of the three (3) are selected shall be the only control option functional, the remaining two (2) controls shall be disabled. The 3 options of the selector switch shall be:

a) Remote
b) Mimic Panel
c) Human Machine Interface (HMI); respectively
d) Remote/Local from plant to field for each individual breaker

All switches shall have steel glands.

3.2.2. The plant which are to be controlled include:

a) 132kV motorized Isolators
b) 132kV motorized Earth Switches
c) 132kV Feeder Breaker
d) 33kV Feeder Breakers
e) 33kV Incoming Transformer Breakers
f) 33kV Bus Section Breakers
g) 132kV – 33kV Synchronizer controls

3.2.3. When the selector switch is on **"remote",** our National Control Centre (NCC) shall be able to control the system remotely through our SCADA system. Selecting "Remote" on the switch shall disable the "Mimic Panel" and "HMI" Controls, however, the indications shall be active on all.

3.2.4. When the selector switch is on the **"Mimic Panel",** the controls shall entirely be on the hardwired Mimic Panel. Selecting "Mimic Panel" on the switch shall disable the "Remote" and "HMI" Controls, however, the indications shall be active on all.

3.2.5. When the selector switch is on "***HMI"*** selection, the controls shall entirely be on the HMI System where the user shall easily control the automated system with a computer I/O peripherals. Selecting "HMI" on the switch shall disable the "Remote" and "Mimic Panel" Controls, however, the indications shall be active on all.

3.2.6. **Spring return illuminated push button** switches shall be used for control operations on the Mimic Panel. Red colored switch shall be used for Close and Green colored switch shall be used for open. These switches shall control the operations of the 132kV and 33kV Earth switches, isolators and circuit breakers located at the Vuda NCC substation.

3.2.7. A yellow colored spring return illuminated push button switch shall also be used as the **Indication test** switch. Upon pressing the button all the indication lights must turn on and must turn off upon release, this switch must not interfere with any other controls.

3.2.8. A white colored spring return switch shall be used for the trip circuit healthy indication. Upon pressing the switch an illumination would represent that the trip circuit is healthy, otherwise, if defective the light will not turn on.

3.2.9. **Four (4) position rotary cam changeover** switches shall be used as the phase selection tool for all the Ammeters in the Mimic panels. The positioning shall be labelled as follows:

a) Top Position – OFF
b) Right Position – Red Phase
c) Bottom Position – Blue Phase
d) Left Position – Yellow Phase

3.3. Indications

3.3.1. All indicating lights shall be Bright LED (Light Emitting Diode) type and all shall be replaceable and interchangeable. All indications shall be with steel glands.

3.3.2. Semaphores indicators shall be used for indicate if the plant is open or close. In case of a vertical line on the SLD, A bright red vertical stripe shall represent "close" and bright green horizontal stripe shall represent "open" whereas for a horizontal line on the SLD, A bright red horizontal stripe shall represent "close" and bright green vertical stripe shall represent "open". The indicators shall directly be placed in the Single Line Diagram on the Mimic Panel to show system continuity information. The light on the spring return illuminated push button control of each circuit breaker shall also indicate the status of the plant.

3.3.3. Amber colored lights for **Status Alarm Indication** shall be placed on the Mimic Panel for all switchgears. The indicator will be interconnected with the respective protection relay modules of the circuit breakers. Upon the detection of a fault the alarm shall be triggered and the Amber light shall blink. The indicating lights shall be placed close to the respective switchgear controls.

3.4. Single Line Diagram on Panel

The single line diagram shall be made with respect to the existing system at Vuda NCC Substation.

3.4.1. The Colors associated with the voltage levels on the diagram should be as follows:

a) Color black shall be used to represent 132kV Circuits
b) Color red shall be used to represent 33kV Circuits

3.4.2. The single line diagrams on the Mimic panel shall be:

a) 20mm for 132kV and 33kV circuits
b) 10mm for auxiliary transformers and Neutral Earthing Resistor circuits
c) 10mm for the earth circuits

3.5. Earthing

3.5.1. All the metal parts of all equipment supplied within the panel (including doors and gland plates) other than those forming part of all electric circuit, shall be connected by means of two independent earth conductors to copper earth bar.

3.5.2. The Panel shall be provided with two brass earthing stud terminals, with suitable nuts, washers etc. for connection to ground bus.

3.6. Labels

3.6.1. Labels shall be provided to describe the duty of or otherwise identify every Instrument, or other item of equipment mounted internally and externally. Switch positions shall be fully identified. Wording shall be clear, concise and unambiguous

3.6.2. Each label shall be permanently secured to the panel surface below the item to which it refers.

3.6.3. The labels shall be engraved plastic (4 mm thick) with bold black letters in white background.

3.7. Metering on the Panel

3.7.1. For metering, meters shall be of **GMW (GOSSEN MULLER & WEIGERT**) Brand.

3.7.2. All meters for metering shall be **Analog Panel Meters and shall be Pointer Quadrant types.** All meters shall be covered with an Anti-glare glass in the front window.

3.7.3. The front dimension of all meters shall be 48mm x 48mm. The scale plate shall be of aluminum material colored in white and all the readings shall be in color black.

3.7.4. The ideal operation of these meters shall be at -25°C to +55°C.

3.7.5. The following table shows the meters required for the Mimic Panel.

No.	Meter Type
1	Frequency Meter
2	Ammeter
3	Voltmeter
4	Megawatt Meter
5	Mvar Meter
6	Dial Tap-changer Meter
7	Synchroscope

3.7.6. All the meters shall be placed accordingly where it is proposed in the drawings.

3.7.7. All these meters shall be hard wired to its respective transformers (Voltage Transformer and Current Transformer) for direct reading, via a transducer. **These transducers shall be provided with each meter respectively.**

The breakdown list, for the metering, is in the **Appendix Section, in Table 4**. It determines the type and range of meters it requires.

3.8. Synchronizer

There shall be a synchronizing hardware in the Mimic Panel. This Synchronizer shall synchronize between the 132kV Line Circuit Breaker and 132/33kV Transformer Feeder Circuit Breaker. It shall synchronize from comparing the secondary voltages, **which shall be 110V**, of the Voltage Transformer:

a) From the 33kV and 132kV Busbar to Energize Transformer from 132kV end.
This shall be for, when the 132/33kV transformer is already energized at the 33kV end and both the Transformer Breaker is opened at the 132kV end, Upon comparing the secondary voltages, of both 33kV Busbar and 132kV busbar VT's, **zero difference between these two values** shall synchronize the transformer from the both sides by closing the breaker at 132kV end.

b) From the 33kV and 132kV Busbar to Energize Transformer from 33kV end.
This shall be for, when the 132/33kV transformer is already energized from the 132kV end and both the Transformer Breaker is opened at the 33kV end, Upon comparing the secondary voltages, of both 33kV Busbar and 132kV busbar VT's, **zero difference between these two values** shall synchronize the transformer from both side by closing the breaker at 33kV end.

c) Also, the 132/33kV transformer shall also be able to synchronize its 132kV end **from the 33kV Feeders.** This shall be when the transformer breaker is opened at the 132kV end and the transformer is energized at the 33kV end and it shall synchronize upon getting the **zero difference** comparing one of the feeder's secondary voltage, of the Voltage Transformer, and the 132kV Busbars secondary voltage, of the Voltage Transformer. Upon zero difference, the 132kV breakers shall get the closing signal to full energize the transformer from both the ends.

d) There shall be a provision for **Dead Bar Close** in the synchronizing hardware.

e) The synchronizing shall be done with any of the three 132/33kV transformer breakers at the 33kV side. This shall be wired accordingly at the breaker as well as the mimic panel.

For the comparison of the two secondary voltages, of the voltage transformer, the comparison shall be made with **single same phase wires** of any phase.

For the synchronizing hardware, there shall be:

a) A toggle switch which shall be used to switch "ON" and "OFF" the Synchronizing Hardware. The switch should read as "SYNCHROSCOPE". This shall enable or disable the functions of the synchronizing hardware.
b) A push button for dead bar close option and the label shall read as "PUSH FOR DEAD BAR CLOSE".
c) A two push button switch, which should read as "ON" and "OFF" for automatic synchronizing. Above the push Button, the label shall read as "SYSTEM SYNCHRONIZER".
d) Two (2) separate LED lights, which should indicate the synchronizing process. If the synchronizing is in process, then one of the LED light shall switch on and its label shall read as "SYNCHRONIZING IN PROCESS" and if the synchronizing fails, then the other LED should light up and its label shall read as "NO SYNCHRONISM".

3.9. Transformer Tap Change Indication

3.9.1. There shall be a Dial Analog Meter in the Mimic panel, at the proposed location as per the drawings, for indicating the Tap Position of the 132/33kV Transformer.
3.9.2. The position indicator shall be **Quadrant Scale** from positions 1 to 19.
3.9.3. Preferred position indicator to be used shall be of **ABB's 1ZSE 5492-161** model.

3. HMI System

A HMI system shall be implemented along with the Mimic Panel. HMI system shall be housed in a **Rital Panel** with maximum width of 600mm. This shall be a separate panel which should only account for the HMI system hardware. The HMI system shall use a single **SEL3555** relay for the inputs from all the indications from breakers, isolators, earth switches and protections.

3.1. Display Screen

3.1.1. The HMI system shall have an at least a **26" Touch Screen** to display and control the entire Single Line Diagram clearly in one screen. The screen shall also have a suitable screen guard which shall make the screen free from any scratched of minor damages.

3.1.2. The HMI display screen shall be at a reasonable height for a standard user to see it directly without any discomfort.

3.2. Mounting Panel

3.2.1. The HMI system shall be in a separate panel. This panel shall only have the SEL3555relay, a display screen and the necessary hardware to wire to the SEL for communications. The panel shall have a see-through door in front of the panel, which shall allow the user to view the HMI Display Touch Screen clearly without opening the door. Also, the SEL3555 shall be Rack Mounted and it shall also be visible from outside the panel.

3.2.2. The panel shall also have a **rack mounted extendable tray** to place a keyboard and a mouse for the Control Inputs or the HMI System. It tray shall have rollers for easy retracting of the tray and shall have enough space to put both the keyboard and he mouse side by side.

3.3. Input Peripherals

3.3.1. There shall be two input devices, a keyboard and a mouse, provided for the HMI system input. It shall **not be a wireless device** and the mouse shall be functional on any surface type.

3.3.2. The input device rack shall be placed on a standard height of a user whereby the user shall be able to use to promptly.

3.4. Panel Protection

3.4.1. The main AC and DC incoming wires shall have an appropriate MCB. The devices on the panel shall also each have an appropriate MCB each.

3.4.2. There shall be an earth bar mounted in the bottom of the panel which shall only connect the earthing of all the required devices in this panel.

3.5. Inputs for HMI

3.5.1. The HMI system shall account for the following number of 33kV Breakers, Isolator and Earth Switches for indication, monitoring and controls.

List of Hardware
33kV Breakers
33kV Isolators
33kV Earth Switches

The breakdown list is in the **Appendix Section as Table 1**. The HMI shall account for all these inputs to show its indication of whether it is "OPEN" or "CLOSE". Also, it shall be able to send the single to the breaker to "OPEN" and "CLOSE" from the HMI as well.

All the inputs for the SEL3555, from 33kV side, shall be picked from its SEL Relay via serial connections. These SEL relays include, SEL351S, SEL311L, SEL587Z, etc.

Since for the Breaker/Isolator indications are taken directly from its respective SEL Relay via serial, its protection indications, faults, alarms or trips shall also be read from the same serial connection.

3.5.2. The HMI system shall account for the following number of 132kV Breakers, Isolators and Earth Switches for indication and controls.

List of Hardware
132kV Breakers
132kV Isolators
3132kV Earth Switches

The breakdown list is in the **Appendix Section as Table 2.** The HMI shall account for all these inputs to show its indication of whether it is "OPEN" or "CLOSE". Also, it shall be able to send the single to the breaker to "OPEN" and "CLOSE" from the HMI as well.

All the inputs for the SEL3555, from 132kV side, shall be picked from a SEL3530 RTU relay. All the control cables from the 132kV side shall be plugged to an SEL RTU where it shall easily communicate with SEL3555 via serial connection. A SEL3530 RTU relay shall be mounted with the HMI system where only the control wires from the 132kV side shall only need to be terminated.

3.5.3. The HMI system shall also indicate the alarms or protection flags or any faults that has occurred in the outside 132kV and 33kV system. This communication shall be carried through the same procedure as picking the protection signals from the protection relays, SEL351S, SEL587Z and SEL311L, through serial wires and connecting it to the inputs of SEL3555.

The display screen in the HMI shall display any protection indication on the screen and there shall be an indicator, a bright LED with a beeper along the screen, to initiate as the fault is displayed on the screen. As the fault clears, the LED and the beeper shall go off.

Since the 132kV side does not have SEL Relays, the connection from the 132kV side Breakers/Isolators/Earth Switches shall be transmitted through a separate SEL RTU Relay to the HMI SEL3555 Relay for communication. The HMI shall account for the following number of indications from 132/33kV Transformers through SEL RTU Relay via serial connection.

Indications/Alarms/Faults
132/33kV T1A
132/33kV T2A
132/33kV T2A

There shall be 10 protection indications, for 132/33kV transformer, each. For this, HMI SEL3555 shall communicate with SEL RTU, since all transformer protection indication have to go through the RTU. The break down list is in the **Appendix Section in Table 3.**

3.5.4. **Since SEL3555 has very limited number of input ports, an extended serial switch shall be used to expand the capability of ports.**

4. Annunciation Panel

4.1. Design of Panel

The Annunciation Panel shall have the following provisions

4.1.1. **The Annunciator shall be of SEL2523.**

4.1.2. 80 Window annunciators suitable for the visual and audible alarm annunciation shall be provided on the control panel. These shall be microprocessor based units using bright LEDs.

4.1.3. Annunciator facia units shall have translucent plastic windows for each alarm point.

4.1.4. Annunciator facia plate shall be engraved in black lettering with respective alarm inscription as specified. Alarm inscriptions shall be engraved on each window in not more than three lines and size of the lettering shall be about 5 mm. The inscriptions shall be visible only when the respective facia LED is glow.

4.1.5. Annunciator facia units shall be suitable for flush mounting on panels. Replacement of individual facia inscription plate and LED shall be possible from front of the panel.

4.1.6. Each annunciator shall be provided with 'Accept', 'Reset' and 'Test' push buttons.

4.1.7. Special precaution shall be taken by the supplier to ensure that false alarm conditions do not appear due to influence of external magnetic fields on the annunciator wiring and switching disturbances from the neighboring circuits within the panels.

4.1.8. In case 'RESET' push button is pressed before abnormality is cleared, the LEDs shall continue to glow steady and shall go out only when normal condition is restored.

4.1.9. Any new annunciation appearing after the operation of 'Accept' for previous annunciation, shall provide a fresh audible alarm with accompanied visual, even if the process of "acknowledging" or "resetting" of previous alarm is going on or is yet to be carried out.

4.1.10. Provision for testing healthiness of visual and audible alarm circuits of annunciator shall be available.

4.1.11. It shall be of Rital Panel not more than 600mm of width.

4.2. Panel Protection

4.2.1. The Annunciator panel shall have a suitable MCB to protect its main DC supply and AC Supply to the panel. There shall also be separate MCB protection for the power supply to each Annunciator used.

4.2.2. The MCB's shall be mounted inside the Annunciation Panel and also, its switches shall be easily seen and accessed from outside the panel.

4.2.3. All front mounted as well as internally mounted items including MCBs shall be provided with individual identification labels. Labels shall be mounted directly below the respective equipment and shall clearly indicate the equipment designation. Labeling shall be on aluminum-anodized plates of 1mm thickness, letters are to be properly engraved.

4.3. Lists of Indications

The Annunciator Panel shall account for all the following indications. Preferable a bright Red LED to flash upon any indication.

4.3.1. T1A, T2Aand T3A Indications

For 132/33kV Transformer, the lists of indications are in the **Table 3 of Appendix Section.**

4.3.2. 132kV Bus Indications

For the 132kV Bus, the lists of indications are in the **Table 2 of Appendix Section.**

4.3.3. 33kV Breakers and Isolators/Earth switch Indications

For the 33kV feeder's breakers and isolators/earth switch, the list of indications are in the **Table 1 of Appendix Section.**

4.4. Panel Structure

3.9.4. Rittal Panel shall be used for the Annunciation Panel. There shall be provision for each cable chamber, where it shall have cable entry from both top and bottom, suitable removable gland plates shall be provided for this purpose. The cable chamber shall be provided with suitable supporting arrangement between gland plate and terminals, in the middle.

5. Control Wiring

5.1. It shall be the responsibility of the bidder to do the 132kV and 33kV control wiring from Mimic Panel, HMI System and Annunciation Panel to the respective input points such as circuit breakers, protection relays, isolators, earth switches etc.

5.2. It shall be the responsibility of the bidder to do all the internal control wirings of the Mimic Panel, HMI system and Annunciation panel. Supply of all types of the cables (control, serial etc) shall be the bidder's responsibility.

5.3. Panel shall be supplied with all wiring comprising of PVC insulated 1.1 KV grade, multi-strand flexible copper conductor of 2.5 Sq.mm cross section.

5.4. Wiring associated with a particular phase shall be the color of that phase. Red/ Yellow, or Blue. Wiring associated with earthing shall be with green color insulation and for neutral it shall be with black color insulation

5.5. Wiring shall be neatly laid and run on insulated cleats of limited compression type insulated straps.

5.6. All cables shall have crimped terminations and shall be identified by means of glossy plastic ferrules at both ends, showing the wire number as indicated in the schematic diagrams. The ferrules shall be indelibly marked.

5.7. Wiring to items mounted on hinged doors or wiring that is subject to movement shall run in helical binding. The binding shall be securely anchored at both ends and sufficient slack provided to prevent any strain being imposed of wiring.

5.8. It shall be contractors responsibility to carry out and lay new control cables for all mimic panel wiring and remove and discard all old control cables.

6. Using of Lugs for Wiring

6.1. **1.5mm Fork Lugs** shall be used for all trip indications wiring for SEL Relays as well as inputs and outputs.

6.2. **2.5mm Ring Lugs** shall be used for all Current Transformer and Voltage Transformer wiring to the SEL Relay.

6.3. All lugs shall be provided for terminations with 10% spare.

6.4. Lugs shall be insulated type.

This shall be done accordingly when wiring the Annunciation Panel and HMI Panel. For the HMI Panel, the lugs shall be used where ever necessary.

7. Terminal Block

7.1. Terminal blocks shall preferably be grouped according to circuit functions and each terminal block group shall have at least 10% spare terminals. Terminal blocks for control circuit shall be of 650V grade with contact ratings not less than 10A.

7.2. Not more than two wires shall be connected to any terminal block. All terminal blocks shall be mounted on a rail and shall be at a place easy to access.

7.3. Clip-on terminals of at least 650 V grade shall be provided for the cables up to 35 mm^2.

7.4. Preferable terminal blocks which shall be used are DIN-rail Clip-On Screw Connection, product of Klemsan.

9. General Indication of Alarms or Events

All the indications shall work simultaneously among Remote, HMI and Mimic Panel control and Annunciation Panel. This shall be in real time without any significant delays.

10. Training

    The bidder shall provide rigorous hands-on and theoretical training to the Engineers and technicians on operations, troubleshooting and maintenance of the Mimic Panel, HMI system and Annunciation Panel. The Training shall be 5 days in Western and 5 days ion central for 20 participants. Bidder to provide all training materials and manuals.

11. User Manual for operations

    The bidder shall provide a comprehensive user manual, which has complete instructions of operating the Mimic Panel, HMI system and Annunciation Panel. The user manual shall be in simple straight forward English and shall be unambiguous.

12. Drawings – 6 Hard copies and USB (6 copies)

    The bidder shall also provide ALL the in-build drawings, schematics and single line drawings of the controls wiring done inside the panels and the control wirings done outside the panels i.e. switchgear – panel, Relay – Panel etc.

    The drawings shall be provided in A2 or A1 size, clearly visible and filed properly.

13. Automation Design and Compatibility

    The IEC 68150 (Design of Electrical Substation Automation) standard and DNP 3.0 Protocol shall be used to design the automation systems. The system shall be able to operate in both; however, the system shall be taken over by DNP 3.0 protocol.

    All hardware in the designs shall be compatible to these protocols.

14. Outages

    The bidder shall propose the number of outages required to complete the entire cutover. One outage shall not be more than ten (10) hours of duration. Also, the outages can only take place on a Sunday, excluding any festival celebrations namely Easter, Fiji Day, Diwali and Christmas etc.

Appendix

1. The following table shows the list of Indications for the 33kV side. In the HMI, if the following component opens or closes, the diagram in the HMI's SLD should change accordingly.

List of Indication for 33kV side					
1	4F10 Waqadra D Breaker	1 no.	38	4F11 and 4F12 Waqadra D Isolators	
2	4D40 T3 Breaker	1 no.	39	4D43 T3 Isolator	
3	4D10 Waqadra B Breaker	1 no.	40	4D11 and 4D13 Waqadra B Isolators	
4	4B40 T1A Breaker	1 no.	41	4B41 and 4B43 T1A Isolators	
5	4B10 Pineapple Corner Breaker	1 no.	42	4B11 and 4B13 Pineapple Corner Isolators	
6	4A20 Bus Section Breaker	1 no.	43	4A21 and 4A22 Bus Section Isolators	
7	4C40 T2A Breaker	1 no.	44	4C41 and 4C43 T2A Isolators	
8	4C10 Spare Breaker	1 no.	45	4C11 and 4C13 Spare Isolators	
9	4E40 T2 Breaker	1 no.	46	4E43 T2 Isolator	
10	4E10 Sabeto Breaker	1 no.	47	4E11 and 4E13 Sabeto Isolators	
11	4G20 Bus Section Breaker	1 no.	48	4G22 and 4G23 Bus Section Isolators	
12	4J40 T1 Breaker	1 no.	49	4J40 T1 Isolator	
13	4J10 Rarawai Breaker	1 no.	50	4J11 and 4J13 Rarawai Isolators	
14	4L10 Waqadra C Breaker	1 no.	51	4L11 and 4L13 Waqadra C Isolators	
15	4H20 Bus Section Breaker	1 no.	52	4H21 and 4H22 Bus Section Isolators	
16	4K40 T4 Breaker	1 no.	53	4K41 and 4K43 T4 Isolators	
17	4P10 Spare Breaker	1 no.	54	4P11 and 4P13 Spare Isolators	
18	4N20 Bus Section Breaker	1 no.	55	4N21 and 4N22 Bus Section Isolators	
19	4Q40 T5 Breaker	1 no.	56	4Q41 and 4Q43 T5 Isolators	
20	4S40 T3A Breaker	1 no.	57	4S41 and 4S43 T3A Isolators	
21	4F12 Waqadra D Earth Switch	1 no.			
22	4D12 Waqadra B Earth Switch	1 no.			
23	4B42 T1A Earth Switch	1 no.			
24	4B12 Pineapple Corner Earth Switch	1 no.			
25	4A24 Bus Section Breaker Earth Switch	1 no.			
26	4A25 Bus Section Breaker Earth Switch	1 no.			
27	4C42 T2A Earth Switch	1 no.			
28	4C12 Spare Earth Switch	1 no.			
29	4E12 Sabeto Earth Switch	1 no.			
30	4J12 Rarawai Earth Switch	1 no.			
31	4L12 Waqadra C Earth Switch	1 no.			
32	4K42 T4 Earth Switch				
33	4H24 Bus Section Earth Switch	1 no.			
34	4P12 Spare Earth Switch	1 no.			
35	4N24 Bus Section Earth Switch	1 no.			
36	4Q42 T5 Earth Switch				
37	4S42 T3A Earth Switch	1 no.			

Table 1: List of Indication from 33kV Side

2. The table below shows the list of Indications for the 132kV side. In the HMI, if the following component opens or closes, the diagram in the HMI's SLD should change accordingly.

List of Indication and Controls for 132kV side		
1	5D10 Breaker	1 no.
2	5B40 T1A Breaker	1 no.
3	5C40 T2A Breaker	1 no.
4	5G40 T3A Breaker	1 no.
5	5D11 Isolator	1 no.
6	5D13 Isolator	1 no.
7	5B43 Isolator	1 no.
8	5B44 Isolator	1 no.
9	5A21 Isolator	1 no.
10	5A22 Isolator	1 no.
11	5C43 Isolator	1 no.
12	5C44 Isolator	1 no.
13	5E21 Isolator	1 no.
14	5E22 Isolator	1 no.
15	5D43 Isolator	1 no.
16	5D44 Isolator	
17	5D12 Earth Switch	1 no.
18	5B42 Earth Switch	1 no.
19	5A24 Earth Switch	1 no.
20	5A25 Earth Switch	1 no.
21	5C43 Earth Switch	1 no.
22	5E22 Earth Switch	1 no.
23	5G42 Earth Switch	1 no.

Table2: List of Indications for 132kV side

3. The table below shows the list of indications for the Transformer Alarms and Trips. The HMI shall clearly display if the flowing alarms/trips initiates. **Theses alarms are for T1A, T2A and T3A each.**

Transformer Protections		
1	Differential Protection Operated	1 no.
2	Over Current-Earth Fault Protection Operated	1 no.
3	Oil Temperature Alarm for Transformer	1 no.
4	Oil Temperature Trip for Transformer	1 no.
5	Winding Temperature Alarm for Transformer	1 no.
6	Winding Temperature Trip for Transformer	1 no.
7	Buchholz Alarm for Transformer	1 no.
8	Buchholz Trip for Transformer	1 no.
9	OLTC Buchholz Alarm for Transformer	1 no.
10	OLTC Buchholz Trip for Transformer	1 no.

Table 3: List of Transformer Protections

4. The table below show the list of different types and ranges of meters required for the Mimic Panel.

	Metering for Mimic Panel	
1	Frequency meter	Frequency meter shall be in the range of at least 47 to 54 Hz
2	Voltmeter for 132kV systems	This shall be in the range of at least 0 to 150kV with the interval of 10
3	Ammeter for 132kV system	This shall be in the range of at least 0 to 1500 Amps
4	Megawatt meter for 132kV system	This shall be In the range of at least 0 to 200MW
5	Mvar meter for 132kV system	This shall be from the range of at least 0 to 100Mvar
6	Voltmeter for 33kV systems	This shall be in the range of at least 0 to 60kV
7	Ammeter for 33kV system	This shall be in the range of at least 0 to 2000A
8	Megawatt meter for 33kV system	This shall be in the range of at least 0 to 100MW
9	Mvar meter for 33kV system	This shall be in the range of at least 0 to 200Mvar
10	Dial Meter	This shall be in the range of 1 to 19 in the interval of 1. This shall be used for determining the tap position of the transformer.

Table 4: Details for the Metering for Mimic Panel

PREFERRED MATERIAL SUPPLIER LIST

S.NO	PRODUCT	MANFACTURER	Manufacturers	PART NUMBER
1	INDICATION LIGHTS	DOMO	Italy	HD22/48ML31V130VAC/DCTR(3LED-RED,RED,YELLOW)
2	SEAMPHORE	DOMO	Italy	HD22/48ACRQRGV130VAC/DCNC
3	HEATER-SWITCH	KRAUS NAIMER	Vienna, Austria	CA10-A201
4	THERMOSTAT	RITTAL	Germany	3110
5	HEATER	RITTAL	Germany	3105.370
6	MCB-10A AC	SCHNEIDER ELECTRIC	France	A9F54110
7	MCB-10A DC	SCHNEIDER ELECTRIC	France	A9N61528
8	VT SELECTION SWITCH	CROMPTON GREAVES	Italy	SW6-VOLT
9	CT SELECTION SWITCH	CROMPTON GREAVES	Italy	SW3-AMPS
10	DOOR SWITCH	RITTAL	Germany	SZ 4315.710
11	SYNCHROSCOPE	ISKRA	Europe	SQ214L110ROSNSP0
12	DINRAIL	WEIDMULLER	Germany	TS35
13	MEASURIND DISCONNECTING TERMINAL	WEIDMULLER	Germany	6/1/STB
14	TERMINAL	PHOENIX	US	UK2.5B
15	ANALOG METER-CURRENT MEASURING	GOSSEN MUELLER,	Germany	0-2500A ,48*48mm
16	ANALOG METER-VOLTAGE MEASURING	GOSSEN MUELLER	Germany	0-50KV ,48*48mm
17	ANALOG METER-CURRENT MEASURING	GOSSEN MUELLER	Germany	0-1400A ,48*48mm
18	ANALOG METER-VOLTAGE MEASURING	GOSSEN MUELLER	Germany	0-170KV ,48*48mm
19	ANALOG METER-FREQUENCY MEASURING	GOSSEN MUELLER	Germany	0-60HZ ,48*48mm
20	ANALOG METER-MEGA WATT MEASURING	GOSSEN MUELLER	Germany	0-100MW ,48*48mm
21	ANALOG METER-MEGA VAR MEASURING	GOSSEN MUELLER	Germany	0-100MVAR ,48*48mm
22	PUSH BUTTONS(GREEN)	OMRON	Japan	A22NN-RNM-NG5G111-NN
23	PUSH BUTTONS(RED)	OMRON	Japan	A22NN-RNM-NR5G111-NN
24	PANEL LED LIGHT	RITTAL	Germany	5W-9790698
25	MIMIC/HMI/REMOTE	KRAUS NAIMER	Vienna, Austria	CA10-A212-622
26	AUXILARY CONTACT MULTIPLIER	SIEMENS	Germany	3RH1140-1BF40 & 3RH1911-1FA22
27	TAP POSITION INDICATOR	ABB	Germany	1ZSE 5492-161
28	INDICATION LIGHTS	DOMO	Italy	HD22/48ML31V130VAC/DCTR(3LED-RED,RED,RED)
29	INDICATION LIGHTS	DOMO	Italy	HD22/48ML31V130VAC/DCTR(3LED-YELLOW,YELLOW,YELLOW)
30	INDICATION LIGHTS	DOMO	Italy	HD22/48ML41V130VAC/DCTR(4LED-GREEN,GREEN,GREEN,RED)
31	LED STRIP(GREEN/RED)	SOLAN	Switzerland	LED STRIP BE MOUNTED IN 15 MM TRANSPERENT FIBER GLASS
32	LED STRIP(GREEN/RED)	SOLAN	Switzerland	LED STRIP BE MOUNTED IN 10 MM TRANSPERENT FIBER GLASS

Tender Submission - Instruction to bidders

It is mandatory for Bidders to upload a copy of their bid in the **TENDER LINK** Electronic Tender Box no later than **4:00pm, on Wednesday 25th October, 2017**

To register your interest and tender a response, view 'Current Tenders' at:
https://www.tenderlink.com/fea

For further information contact The Secretary Tender Committee, by e-mail
TDelairewa@fea.com.fj

In additional, hard copies of the tender, one original and one copy must be deposited in the tender box located at the FEA Head Office, 2 Marlow Street, Suva, Fiji no later than **4:00pm, on Wednesday 25th October, 2017-** Addressed as

Tender – MR 267/2017 Design, Manufacture, Supply, Installation & Commissioning of New 132kV MIMIC Panel at FEA's Vuda Substation.

The Secretary Tender Committee
Fiji Electricity Authority
Head Office
Suva
Fiji

- **Hard copies of the Tender bid will also be accepted after the closing date and time provided a soft copy is uploaded in the e-Tender Box and it is dispatched before the closing date and time.**

Tenders received after **4:00pm** on the closing date of **Wednesday 25th October, 2017**

- will not be considered.
- Lowest bid will not necessarily be accepted as successful bid
- **It is the responsibility of the bidder to pay courier chargers and all other cost associated with the delivery of the hard copy of the Tender submission including any Duties/Taxes. Hard copies of the Tender submission via Post Box will not be considered.**

TENDER SUBMISSION CHECK LIST

The Bidders must ensure that the details and documentation mention below must submitted as part of their tender Bid

Tender Number _____

Tender Name_____

1. Full Company Name:_____
   (Attach copy of Registration Certificate)
2. Director/Owner(s):_____
3. Postal Address:_____
4. Phone Contact:_____
5. Fax Number:_____
6. Email address:_____
7. Office Location:_____
8. TIN Number:_____
   (Attach copy of the VAT Registration Certificate – Local Bidders Only)
9. Company Registration Number:_____
   (Attach copy of the Business License)
10. FNPF Employer Registration Number:_____
    (For Local Bidders only)
11. Contact Person:_____

I declare that all the above information is correct.

Name: _____ Position: _____ Sign: _____

Date: _____