

## SECTION IV – SCHEDULE OF REQUIREMENTS

### **4.1 Scope of Work**

The Scope of Work covers the design, supply, deliver, installation, fixing, connection, testing, labeling, commissioning of works, cleaning, complete and working to every detail as described below and in the related specifications and /or on the drawings to the satisfaction of the Consulting Engineers (KPLC).

The Contractor shall carry out all the necessary works for successful installation of the electrical services as described and set out in this section of the Technical Specification, Bills of Quantities, other sections of the electrical documents and accompanying Drawings in accordance with the General Electrical Specification herewith.

The Works, the major elements of which are scheduled below, includes the supply of all labour, material, equipment, plant and components necessary for complete installation and setting out work in respect of the entire electrical services requirements within the proposed development and rendering it in complete working condition in respect of but not limited to the following installations:

New Installations: Supply, Installation, testing and commissioning of the following installations:

- Incoming electricity supply intake and metering;
- Individual tenant metering;
- Low Voltage Switchboards for common services;
- Sub mains and distribution;
- Standby generator power distribution;
- Electrical power distribution;
- Trunking and cable trays;
- Earthing and grounding systems.

In general, the installations shall be concealed in heavy gauge PVC conduits except in areas where surface installation is necessary. In such cases, installation will be carried out in trunking, galvanized steel conduit or cable tray as indicated on the Drawings.

## 4.2 Guarantee Specifications

### Lot 1: LV board requirements

S/N	ITEM	TECHNICAL REQUIREMENTS	BIDDERS COMPLIANCE / MODEL / COUNTRY OF ORIGIN
1.	Switchboard Panel	Free-standing purpose made front access Main LV Switchboard (Fully Type-Tested Assemblies – TTA), Form 3/4bi, modular, metal clad, dustproof cubicle type suitable for floor mounting, IP 54, manufactured in 12 SWG galvanised mild steel sheet and finished in cream (or appropriate colour) powder coating as shown on the schematic. The Low Voltage Switchboard should consist of a PLC section, allowing for priority switching.	
2.	1600 A TPN ACB EDO	Be draw out type ACB, adjustable with over current settings and having a short-circuit breaking capacity of 65KA at 415Vac, 50Hz, with shunt trip coil for fireman's switch. The ACB to be adjustable in 800-1600A range, set at 1000A. The ACBs to be motorized with both electrical and mechanical interlock with the Tie breaker/Coupler, with an automatic control system. Allow for manual override and remote monitored (I,V,Kwh), Modbus TCP/IP, Ethernet enabled.	
3.	Bypass switch	Set of Stabilizer Bypass Switch comprising of the following: 1600A 4P non-withdrawable ACB of type NW16H1 (to AVR stabilizer) 1600A 4P key interlocked non-withdrawable switch disconnecter of type NW16HA (from stabilizer and bypass)	
4.	1600Amp ACB	Be of type NW16H1 with adjustable over current settings and having a short-circuit breaking capacity of 65KA at 415Vac, 50Hz. The ACB to be adjustable in 1000-1600A range, set at 1000A. The ACB to be FE.	
5.	1200 A TPN ACBs	Draw out type ACB, Adjustable over current, time delay settings and having a short-circuit breaking capacity of 65KA at 415Vac, 50Hz. The ACB to be adjustable in 600-1200A range. The ACBs to be motorized. Be remote monitored, Modbus TCP/IP,	

		ethernet enabled. Enclosed in the Main switchboard Assembly																																				
6.	630Amp MCCB	Be of type NS 650N with adjustable over current settings and having a short-circuit breaking capacity of 65KA at 415Vac, 50Hz, with shunt trip coil for fireman's switch. The MCCB to be adjustable in 400-650A range, <u>set at 600A</u> .																																				
7.	650 A TPN ACB EDO	Be draw out type ACB, adjustable with over current settings and having a short-circuit breaking capacity of 65KA at 415Vac, 50Hz, with shunt trip coil for fireman's switch. The ACB to be adjustable in 400-650A range, set at 600A. The ACBs to be motorized with both electrical and mechanical inter-lock with the Tie breaker/Coupler, with an automatic control system. Allow for manual override and remote monitored (I,V,Kwh), Modbus TCP/IP, Ethernet enabled.																																				
8.	Change Over	<p>3No x 1600 A TPN draw out type ACB main incomer (for the existing 2 x 630KVA transformers and Genset) and 2No x 1600 A TPN draw out type ACB coupler; with adjustable over current settings and having a short-circuit breaking capacity of 65KA at 415Vac, 50Hz, with shunt trip coil for fireman's switch. The ACB to be adjustable in 800-1600A range, set at 1000A. The ACBs to be motorized with both electrical and mechanical inter-lock with the Tie breaker/Coupler, with an automatic control system. Allow for manual override and remote monitored, Modbus TCP/IP, Ethernet enabled.</p> <p>Operational Condition</p> <table border="1"> <thead> <tr> <th>ACB1-TX1</th> <th>COUPLER 1</th> <th>ACB2-G</th> <th>COUPLER 2</th> <th>ACB2-TX2</th> </tr> </thead> <tbody> <tr> <td>OFF</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> </tr> <tr> <td>ON</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> <td>ON</td> </tr> <tr> <td>ON</td> <td>ON</td> <td>OFF</td> <td>ON</td> <td>OFF</td> </tr> <tr> <td>OFF</td> <td>ON</td> <td>OFF</td> <td>ON</td> <td>ON</td> </tr> <tr> <td>OFF</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> <td>ON</td> </tr> <tr> <td>ON</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> </tr> </tbody> </table>	ACB1-TX1	COUPLER 1	ACB2-G	COUPLER 2	ACB2-TX2	OFF	OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF	ON	ON	ON	OFF	ON	OFF	OFF	ON	OFF	ON	ON	OFF	OFF	OFF	OFF	ON	ON	OFF	OFF	OFF	OFF	
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9.	415V three-phase surge diverter	Type Furse ESP 415, wired as shown, complete with enclosure with viewing window.																																				
10.	PFCU	150kVAR power factor correction capacitor bank each with the following parameters 2 x 50 KVAR's 415 V,50Hz, 3-Phase																																				



		<p>2 x 20 KVAR's 415 V,50Hz, 3-Phase  1 x 10 KVAR's 415 V,50Hz, 3-Phase  6 x Special contactors for capacitor switching  6 x Fuse bases and fuses for each capacitor protection  6 x Step indicator lamps  1 x Control circuit protection fuse/fuse holder  1 x 6-Step automatic control regulator for maintaining power factor at the set level and regulating the switching of capacitor steps  1 x 1500/5A Current transformer (to be mounted after the mains incoming circuit breaker)  The bank to be made from low-loss bio-degradable capacitive units, complete with earthed enclosure.</p>	
11.	CT three phase digital check meters	<p>Digital multimeter of type PM820/METSEPM5320 with CTs and fuse protection capable of measuring voltage in the range 0 – 1000V, 3-phase, current in the range 0-2000A, 3-phase, and all power system parameters (I, V, KW, KVA, KWHr, KVARs, Frequency, P.F., harmonics and all the parameters).</p> <p>The multimeter to have an accessible terminal for connecting an external printer, and should be complete with selector switches for viewing / displaying the various parameters.  Digital multimeter should be Ethernet enable, with Modbus TCP/IP port</p>	
12.	Automatic Voltage Regulator	<p>Rating: 1000KVA  Audible Noise : &lt;60dB  High Reliability : &gt;100,000 MTBF  Input operating voltages : 3 Phase, 415V/240V  Input Voltage Tolerance : 20% i.e. from 365-505V 3 Phase, from 192-288V 1 Phase;  Frequency 50/60Hz + 5%  Output Voltage Adjustment Range : from 210V- 255V (L-N) from 360V - 440V (L-L)  Admitted load variations: 300% for 2 mins – 150% for 10 mins  Input Power Factor at full linear load : &gt;0.9  Operation: Independent correction for each Phase  Total Harmonic Distortion THD under linear load : &lt; 5%  Coupling : Star connection  Input &amp; output multimeter</p>	

TENDER DOCUMENT FOR PROPOSED REPLACEMENT OF LOW VOLTAGE (LV) BOARD AND ASSOCIATED CIVIL WORKS FOR ELECTRICITY HOUSE NAIROBI

MB-S

		<p>Cooling : Natural air ventilation (Aided with fans &gt; 45oC)  Ambient temperature : -20 +45C°  Communication : Modbus TCP/IP, ethernet enable  IP21 rating  Product life span : 20 years  Warranty: Not less than 2 Years  State Dimensions/Weight of the AVR (WxDxH)  State Protection degree of the AVR.  State Make, country of origin and model of the AVR.</p>	
13.	Protection & Earthing requirement	<p>All ACBs and MCCB should have adjustable over current settings, selectivity observed.</p> <p>Comprehensive protective multiple earthing of the above board in 1200mm long 12mm diameter pure electrolytic copper earth rod deep driven to permanent moisture level, copper clamp. 50mm<sup>2</sup> green earth lead complete with all accessories.  (Note: Use parallel rods if effective earthing cannot be achieved with 1).</p>	
14.	Civil/Building works requirements	<p>Civil works to ensure good ventilation in both the LV Switchroom and transformer room</p> <p>Replace Existing doors with appropriate fire rated doors to ensure good aeration, enough natural light</p> <p>Allow for fabrication of partitions to house extensions for LV board.</p> <p>Supply and install Evacuations fans/units 2 in each room, with screens in LV Switchroom, transformer room and Synchroniser Room, Units auto control with temperature sensors i.e. temp &gt;30°C</p> <p>All cables to be secure on appropriate cable trays</p> <p>Supply and install Light units</p> <p>Paint the whole area with fire rated paints and ensure no dust</p> <p>Label of rooms with KPLC logo's</p>	
15.	Riser boards	<p>Replacement of existing Distribution boards, Fuses and tiding the risers, Painting</p>	

*TENDER DOCUMENT FOR PROPOSED REPLACEMENT OF LOW VOLTAGE (LV) BOARD AND ASSOCIATED CIVIL WORKS FOR ELECTRICITY HOUSE NAIROBI*

*MS*

		<p>Tracing of line and ensuring retouch of existing circuits</p> <p>Making good all electrical wiring and electrical fittings, Labelling of all circuits</p>	
16.	Communication	<p>All ACBs for incomers and AVRs to be remotely monitored (using appropriate branch circuit monitor)</p> <p>When generator kicks in a SMS alert is sent</p> <p>Monitoring software to be supplied.</p>	
17.	Layout drawings	<p>Bidders to provide proposed layout drawings</p> <p>Switchboard working drawings to be prepared with full site understanding as to how the existing cables will be terminated into the proposed positions of the various outgoing circuit breakers)</p>	
18.	Work schedule	<p>Bidders to provide work schedule detailing all activities</p>	
19.	Testing and commissioning	<p>Perform all the necessary testing and commissioning. All necessary integration test performed and operational before handing over. All reports to be provided.</p>	



**Lot 2: Riser board requirements**

S/N	ITEM	TECHNICAL REQUIREMENTS	BIDDERS COMPLIANCE / MODEL / COUNTRY OF ORIGIN
1.	Riser/Sub Main Distribution boards	<p>The riser/sub main boards shall be connected to a supply voltage system of 415/240V, 3 phase, 4 wire and 50 Hz.</p> <ul style="list-style-type: none"> <li>• Fully type tested conditional short circuit rating of 25kA to BS EN 61439-3 (Submit test certificate)</li> <li>• High performance MCB 10kA BS EN 60898 15kA BS EN 60947-2; 1, 2, 3 pole</li> <li>• 250A busbar rating</li> <li>• Interlocked switch disconnection to BS EN 60947-3 ensuring unused outgoing ways are isolated</li> <li>• Switching outgoing neutral on all boards using distributed neutral kit</li> <li>• Terminal block for feeding up to 100A</li> <li>• Incomer: mccb; padlockable in the off position only</li> <li>• Device accessories and auxiliaries: add-on earth leakage modules</li> <li>• Knockouts for cable gland and conduit mixed to suit the installation needs without loss of space</li> <li>• Removable insulated pan assembly</li> <li>• Fully shrouded neutral</li> <li>• Split neutral bars</li> <li>• Removable gland plates</li> <li>• IP 55</li> </ul>	
2.	3P AC-1 Contactors	Silent type	
3.	Layout drawings	<p>Bidders to provide proposed layout drawings</p> <p>Sub main board working drawings to be prepared with full site understanding as to how the existing cables will be terminated into the proposed positions of the various outgoing circuit breakers</p>	
4.	Work schedule	Bidders to provide work schedule detailing all activities	