



APK 11KV Medium Voltage Replacement of PILC Cable between Substation 2 to 9, Replacement of APK Substation 4 Low Voltage (400 Volts Switchgear), Replacement of PILC Cable Between COJ to UJ T Switch, also UJ T Switch to STH Building (APB 11KV MV), Replacement of 11KV T-Switch at APB, Replacement of 11KV to 400 Volts, Replacement 1MVA Transformer (6) at Jonh Orr Building East Wing,

## **Technical Specification for 11KV Medium Voltage Equipment Between APK, APB and DFC Campus**

### **Technical Standards**

The following standards are particularly relevant to the scope of works. This is not a fully comprehensive listing of all relative standards and normative references but rather a list of the more notable standards.

- IEC/TR 61439-0: Guidance to specifying assemblies
- IEC 61439-1: General rules
- IEC 61439-2: Power switchgear and control gear assemblies
- IEC 61439-3: Distribution boards intended to be operated by ordinary persons (DBO)
- IEC 61439-4: Particular requirements for assemblies for construction sites (ACS)
- IEC 61439-5: Assemblies for power distribution in public networks
- IEC 61439-6: Bus bar trunking systems (busways)
- IEC 60947: Low-voltage switchgear and control gear
- SANS 156: Moulded Case Circuit Breakers
- SANS 1019 : Standard voltages, currents and insulation levels for electricity supply
- SANS 1186-1: Symbolic safety signs Part 1: Standard signs and general requirements
- SANS 1195 : Bus bars
- SANS 10142: The wiring of premises (all parts)

**1. Replacement of Old and Faulty Paper Insulated Lead Cable Between Substation 2 to 9 (11KV HT)**

11KV HT Substation 2 and 9 is connected to the main substation through a ring network system as per drawings. The feeder cable is a 185 mm sq. paper insulated lead cable and is currently off due to being faulty and has many joints, recommendation is that it gets replaced with XLPE Copper cable of similar size (185 mm sq.).

**2. Cable Replacement Between City Power Intake and UJ Main Feed T Switch**

The cable between COJ and UJ is a 70mm sq PILC and has been problematic for quite some time and has had water ingress inside, this cable needs to be replaced by an XLPE, 3 Core Copper cable including terminations and excavation.

**3. Cable Replacement Between UJ Main Feed T Switch and STH Substation**

The cable between COJ and UJ is a 70mm sq PILC and has been problematic for quite some time and has had water ingress inside, this cable needs to be replaced by an XLPE, 3 copper Core cable including terminations and excavation.

**4. Replacement of Faulty 1MV, 11KV to 400 Volts Transformer at DFC John Orr Building (11KV MV)**

**5. APB Campus T Switch**

There is an old 11K T Switch at APB that has reached end of design life and there is no spares available, this switch needs to be replaced with a modern model switch that has remote switching and fit for purpose.

The transformer 6 of the JOB East Wing has failed beyond repairs and needs to be replaced, the transformer is located at the basement of John Orr Building, it will need to be disconnected, rigged out of the substation basement and a new 1MVA, 11KV to 400 Volts Copper windings transformer must be supplied, rigged into the place of the faulty transformer, and connected and energized.

## **6. Retrofit Installation at APK Substation 4 Low Voltage Switchgear**

The APK substation 4 has old, fused switches that are not in good condition and they cannot be operated, this switchgear needs to be replaced as a retrofit, replacing breakers with modern breakers and making modifications on the bus bars to accommodate the new system.

### **Cable Replacements ( APK and APB Campus)**

- Decommission, disconnect, and dismantle where applicable. The cable that is retrievable shall be removed on sight and transported to a designated area as advised by the client.
- Excavation of a depth of 500 mm deep, 500 mm wide must be dug in preparation for the laying of new cable where applicable.
- Provision and laying of a 110 mm sleeve for the new 185 XLPE cable, slabs and sand for the protection of underground cable where applicable.
- Provision of a tester to detect any underground structures in order to avoid damaging during excavation.
- Make provision for tar in order to re-instate after excavations.
- Supply and Installation of XLPE/SWA/PVC Cable 11kV 3C 185mm<sup>2</sup> IEC 60502-2, XLPE Insulated Cable as per BOQ.
- Pressure testing of cable.
- Working in a tunnel replacing faulty paper insulated lead cable.
- Make provision of working during weekends and after hours.

### **Replacement of a Faulty 1MV Transformer DFC John Orr East Wing**

- SUPPLY 1000kVA 11000/420V FREE BREATHING TRANSFORMER, COMPLETE WITH BUCHHOLZ & THERMAL PROTECTION, BOLT-ON CABLE HT & LT END BOXES, ROLLERSHAFTS, ETC. **(COPPER WINDINGS)**
- DISCONNECT THE HT AND LT BUSBARS (SUPPORT LT BUSBARS) OF TRANSFORMER 6
- DISCONNECT AND RIG TRANSFORMER NO. 8 OUT OF THE WAY (TRANSFORMER 6 INSTALLED BEHIND TRANSFORMER 8I)
- RIGGING OUT THE FAULTY 1000kVA TRANSFORMER NO. 6
- RIGGING IN THE NEW 1000kVA TRANSFORMER INTO THE CORRECT POSITION
- RIGGING BACK TRANSFORMER 8 AND CONNECT HT AND LT BUSBARS

- BREAK DOWN, REMOVE, REBUILD & PAINT THE BUNTING WALLS AROUND THE TRANSFORMERS
- SUPPLY & INSTALL 95mm<sup>2</sup> x 3c 11kV XLPE TERMINATION ON TRANSFORMER 6
- SUPPLY & INSTALL 185mm<sup>2</sup> SINGLE CORE TAILING FROM THE LT BUSBARS TO THE TRANSFORMER LT BUSHINGS
- SUPPLY & INSTALL 185mm<sup>2</sup> SINGLE CORE TERMINATIONS
- DESIGN, MANUFACTURE & INSTALL JUNCTION BOX BETWEEN NEW TRANSFORMER AND EXISTING BUSBARS CUT AND FIT THE CHECKER PLATES
- TESTING & COMMISSIONING OF THE BUCHHOLZ & THERMAL PROTECTION, ADJUST THE OVER CURRENT AND EARTH FAULT PROTECTION RELAY TO ACCOMMODATE NEW TRANSFORMER
- PRESSURE TESTING, SWITCHING PHASING & COMMISSIONING

### **Replacement of an Old 11KV T-Switch at APB Campus**

- Supply 11KV, 25kA T Switch, RMU complete with isolators and accessories on both the intake and out going feed section
  - Installation of the T-Switch/RMU into the place of the old T-Switch.
  - Disconnect and rig the existing T-Switch to a designated area as indicated by UJ personnel.
  - Rigging in the new 11kV T-Switch into the correct position.
  - Terminate the new T-Switch/RMU on both the 11KV section and the low voltage section.
  - Provision of 95mm sq. XLPE 3 C to join short lengths.
1. Achieving the plant process requirements.
  2. To meet equipment and personnel safety.
  3. To suit site facilities and environmental conditions.
  4. To meet the requirements of statutory approving authorities.
  5. To coordinate with other contractors and agencies involved at site for other activities and site work.

(i) Replacement of cable between Substation 2 and 9 Bill of Quantities (APK 11KV HT)

<b>University of Johannesburg</b>				
<b>Auckland Park</b>				
<b>SCHEDULE OF QUANTITIES</b>				
	<b>Unit</b>	<b>Qty</b>	<b>Rate</b>	<b>Amount</b>
<b>Bill No. 1</b>				
<b><u>Substation 2 to 9</u></b>				
<b><u>Cables</u></b>				
Removal, dismantling of existing paper led insulated cable.	m	600		
Supply and deliver of XLPE/SWA/PVC Cable 11kV 3C 185mm <sup>2</sup> IEC 60502-2, XLPE Insulated Cable	m	600		
Installation of new 185 mm sq. MV cable	m	600		
Pulling of cable inside a tunnel	m	400		
Trenching and backfill	m	150		
Terminations	No	2		
Remove and Re-Instate Paving	m	100		
Remove and Re-Instate tar	m	50		
Supply and Delivery of Tar	Sq.m	50		
Testing of Cable (VLF Pressure Test)	no	1		
<b>Total Electrical Installation (Excluding VAT)</b>				<b>R</b>

(ii) Replacement of 11KV Cable between COJ to UJ Main Switch

<b>University of Johannesburg</b>				
<b>Bunting Road Campus</b>				
<b>SCHEDULE OF QUANTITIES</b>				
	<b>Unit</b>	<b>Qty</b>	<b>Rate</b>	<b>Amount</b>
<b>Bill No. 2</b>				
<b><u>COJ to UJ Main Feed T Switch</u></b>				
<b><u>Cables</u></b>				

Supply and deliver of XLPE/SWA/PVC Cable 11kV 3C 185mm2 IEC 60502-2, XLPE Insulated Cable	m	30		
Installation of new 185 mm sq. MV cable	m	30		
Trenching and backfill	m	30		
Terminations	No	2		
Testing of Cable (VLF Pressure Test)	no	1		
<b>Total Electrical Installation (Excluding VAT)</b>				<b>R</b>

**(iii) Replacement of Cable between UJ Main Switch to STH Sub**

<b>University of Johannesburg</b>				
<b>Bunting Road Campus</b>				
<b>SCHEDULE OF QUANTITIES</b>				
	<b>Unit</b>	<b>Qty</b>	<b>Rate</b>	<b>Amount</b>
<b>Bill No. 3</b>				
<b><u>UJ Main Feed T Switch to STH HT</u></b>				
<b><u>Cables</u></b>				
Supply and deliver of XLPE/SWA/PVC Cable 11kV 3C 185mm2 IEC 60502-2, XLPE Insulated Cable	m	260		
Installation of new 185 mm sq. MV cable	m	260		
Trenching and backfill	m	260		
Terminations	No	2		
Remove and Re-Instate Paving	m	70		
Remove and Re-Instate tar	m	30		
Supply and Delivery of Tar	Sq.m	30		
Testing of Cable (VLF Pressure Test)	no	1		
<b>Total Electrical Installation (Excluding VAT)</b>				<b>R</b>

(iv) Replacement of Transformer 6 Bill of Quantities (DFC 11KV HT)

University of Johannesburg				
Doornfontein Campus				
<b>SCHEDULE OF QUANTITIES</b>				
	<b>Unit</b>	<b>Qty</b>	<b>Rate</b>	<b>Amount</b>
<b>Bill No. 4</b>				
<b><u>John Orr Building East Wing Transformer 6</u></b>				
<b><u>Replacement of Faulty 1000KVA, 11KV to 400 Volts Transformer</u></b>				
SUPPLY 1000kVA 11000/420V FREE BREATHING TRANSFORMER, COMPLETE WITH BUCHHOLZ & THERMAL PROTECTION, BOLT-ON CABLE HT & LT END BOXES, ROLLERSHAFTS, ETC. <b>(COPPER WINDINGS)</b>	No	1		
DISCONNECT THE HT AND LT BUSBARS (SUPPORT LT BUSBARS) OF TRANSFORMER 6	No	1		
DISCONNECT AND RIG TRANSFORMER NO. 8 OUT OF THE WAY (TRANSFORMER 6 INSTALLED BEHIND TRANSFORMER 8I)	No	1		
RIGGING OUT THE FAULTY 1000kVA TRANSFORMER NO. 6	No	1		
RIGGING IN THE NEW 1000kVA TRANSFORMER INTO THE CORRECT POSITION	No	1		
RIGGING BACK TRANSFORMER 8 AND CONNECT HT AND LT BUSBARS	No	1		
BREAK DOWN, REMOVE, REBUILD & PAINT THE BUNTING WALLS AROUND THE TRANSFORMERS	No	1		
SUPPLY & INSTALL 95mm <sup>2</sup> x 3c 11kV XLPE TERMINATION ON TRANSFORMER 6	No	1		
SUPPLY & INSTALL 185mm <sup>2</sup> SINGLE CORE TAILING FROM THE LT BUSBARS TO THE TRANSFORMER LT BUSHINGS	M	20		
SUPPLY & INSTALL 185mm <sup>2</sup> SINGLE CORE TERMINATIONS	Lot			
DESIGN, MANUFACTURE & INSTALL JUNCTION	Lot			

BOX BETWEEN NEW TRANSFORMER AND EXISTING BUSBARS CUT AND FIT THE CHECKER PLATES				
TESTING & COMMISSIONING OF THE BUCHHOLZ & THERMAL PROTECTION, ADJUST THE OVER CURRENT AND EARTH FAULT PROTECTION RELAY TO ACCOMMODATE NEW TRANSFORMER	No	1		
PRESSURE TESTING, SWITCHING PHASING & COMMISSIONING	No	1		
<b>Preliminaries and Generals</b>				
The contractor shall allow for preliminary items (health and Safety etc and contract conditions as set out in the JBCC contract that will be issued	Item	Lot	R	R
<b>Provision for Contingency</b>	Item	Lot	R	
Detailed design and drawings with end of job documentation	Item	Lot	R	
<b>Total Electrical Installation Excl. Vat</b>				

**(VI)) Replacement of the T-Switch at APB Campus**

<b>University of Johannesburg</b>				
<b>Doornfontein Campus</b>				
<b>SCHEDULE OF QUANTITIES</b>				
	<b>Unit</b>	<b>Qty</b>	<b>Rate</b>	<b>Amount</b>
<b>Bill No. 5</b>				
<b><u>APB Campus T-Switch Replacement: 11 KV, 25kA</u></b>				
Supply 11KV, 25kA T Switch, RMU complete with isolators and accessories on both the intake and out	No	1		



going feed section				
Installation of the T-Switch/RMU into the place of the old T-Switch.	No	1		
Disconnect and rig the existing T-Switch to a designated area as indicated by UJ personnel.	No	1		
Rigging in the new 11kV T-Switch into the correct position.	No	1		
Terminate the new T-Switch/RMU on both the 11KV section and the low voltage section.	No	1		
Provision of 95mm sq. XLPE 3 C to join short lengths.	m	10		
<b>Preliminaries and Generals</b>				
The contractor shall allow for preliminary items (health and Safety etc and contract conditions as set out in the JBCC contract that will be issued	Item	Lot	R	R
<b>Provision for Contingency</b>	Item	Lot	R	
Detailed design and drawings with end of job documentation	Item	Lot	R	
<b>Total Electrical Installation Excl. Vat</b>				

**(VI) Retrofit at Substation 4 Low Voltage Board Old Switches with Latest Circuit Breakers and (APK 400 Volts)**

To retrofit New Transformer and feeder Circuit Breakers for lower voltage power supply at Substation 4 APK. Circuit breaker cutout, Circuit breaker links bus bars and flexi cables, Circuit breaker brackets must be included in the Contingency price.					
<b>N o</b>	<b>Bill No 6</b>	<b>Unit</b>	<b>Quantit y</b>	<b>Unit Price</b>	<b>Amount</b>
	Transformer and Bus Coupler Schneider Master pack NW25 H1, ui 1000, uimp12kv	2500 A	3		
	Transformer one section				

	SRG D1-1.1, Schneider NSX 400N uimp 8kv	400A	1		
	DB-E-Less 202, Schneider NSX 400N uimp 8kv	400A	1		
	Spare Schneider NSX 100N uimp 8kv	100A	1		
	DB B-E Less2, Schneider NSX 160N uimp 8kv	160A	1		
	D3 LKN 1.1, Schneider NSX 500A uimp 8kv	500A	1		
	D3 LKS 1.2, Schneider NSX 500A uimp 8kv	500A	1		
	D2 LKS 2.2, Schneider NSX 400A UIMP 8kv	400A	1		
	D2 LKS 2.1, Schneider NSX 400A UIMP 8kv	400A	1		
	Transformer two section				
	D less L.V-D1, Schneider NSX 160N uimp 8kv	160A	1		
	SRG - D4-1.2, Schneider NSX 400A uimp 8kv	400A	1		
	D2 LKN-LV-VP(D2-AC-N), Schneider 250A uimp 8kv	250A	1		
	D3- AC -N, Schneider 250A uimp 8kv	250A	1		
	D3 LKS-LV-V.P, Schneider 160A uimp 8kv	160A	1		
	SRG D4-1.4, Schneider 160A uimp8kv	160A	1		
	SRG D4-1.3, Schneider 300A uimp 8kv	300A	1		
	D2 LKS-LV-V.P, Schneider 250A uimp 8kv	250A	1		
	D3 Lab glass house, Schneider 300A uimp8kv	300A	1		
	D2 Lab Dak glass house, Schneider 100A uimp 8kv	100A	1		
	SRG D2 Verhitting, Schneider 200A uimp 8kv	200A	1		
	D LS-10.1, Schneider 400A uimp 8kv	400A	1		
	SS 04L 4.1 1, Schneider 100A uimp 8kv	100A	1		
	Generator feeder, Schneider 400A uimp 8kv	400A	1		
	Labour		4days		
	Contingency				
				<b>Sub Total</b>	
<b>VAT @ 15%</b>					
<b>ESTIMATE VALUE</b>					

(VI)