

## APPENDIX II

**TENDER NO. KP1/9A.2/OT/045/SS/24-25**

PROPOSED SUPPLY, INSTALLATION, TESTING AND COMMISSIONING OF ELECTRIC FENCES FOR KEY SUBSTATIONS AND SECURITY MANAGEMENT & CONTROL SYSTEM

### SECTION VI – SPECIFICATIONS & BILLS OF QUANTITIES

#### SECTION VI (A) – SCHEDULE OF REQUIREMENT

SUMMARY OF LOTS	
LOT	STATION/DESCRIPTION
LOT 1	Electric Fences & Intruder Alarms – Coast, Nairobi, Central Rift & North Eastern Region
LOT 2	Design, Supply, Installation & Commissioning of Pilot Implementation of Acoustic Intruder Fiber Optic Solution
LOT 3	Security Management and Control

INSTALLATION OF INTRUSION DETECTION SYSTEM - INTRUDER ALARMS AND ELECTRIC FENCES SYSTEMS FOR KEY INFRASTRUCTURE			
LOT 1: ELECTRIC FENCES & INTRUDER ALARMS – COAST, NAIROBI, CENTRAL RIFT & NER REGION			
NO	STATION/DESCRIPTION	SYSTEMS	LOCATION
1.	Kipevu SS	Electric Fence& intrusion detection	Mombasa
2.	Malindi Depot	Electric Fence& intrusion detection	Malindi
3.	Mbaraki Depot	Electric Fence& intrusion detection	Mombasa
4.	Voi Depot	Electric Fence& intrusion detection	Voi
5.	Kiboko Substation	Electric Fence& intrusion detection	Kiboko
6.	Nairobi North SS	Electric Fence& intrusion detection	Ndenderu
7.	Thika Depot	Electric Fence& intrusion detection	Thika
8.	Lanet Pole Yard	Electric Fence& intrusion detection	Nakuru

**SECTION VIII (F)–BILLS OF QUANTITIES**

(See specifications in a separate section)

**LOT 1: INSTALLATION OF ELECTRIC FENCES & INTRUDER ALARMS SYSTEMS**

**KIPEVU SUBSTATION ELECTRIC FENCE**

Bill of Quantities Kipevu Substation Page 1							
No	Item Description	Unit	Qty	Country of origin	Unit Price (PPCBL Incl.) & VAT Excl. (Kes)	Total Price (PPCBL Incl.) & VAT Excl. (Kes)	Part Numbers
<p><b>ELECTRIC FENCE ABOVE MASONRY WALLING</b>                      The following in electric fence to cover 262m Perimeter comprising 8 strands spaced 100mm centers above the walling and comprising necessary accessories in conformity with relevant standards and general good practice and allow for works to be installed, tested and commissioned to client's satisfaction with the following:</p>							
A	Adequate mains energizer DRUID 15Nemtek 4.6J Output or equal and approved complete with back-up battery and Keypad as per the specifications.	No.	1				
B	GSM/IP Module as per detailed specifications.	No	1				
C	Lead out under gate cable including excavating in road works with necessary ducting and making good No.	M	300				
<b>Total Carried to Collection Kipevu Substation page 1</b>							

**Bill of Quantities Kipevu Substation Page 2**

No	Item Description	Unit	Qty	Country of origin	Unit Price (PPCBL Incl.) & VAT Excl. (Kes)	Total Price (PPCBL Incl.) & VAT Excl. (Kes)	Part Numbers
A	<b>High tensile 1.6mm fence wire (HT)</b>	M	2550				
B	<b>Fence Poles</b> Double Galvanized Electroplated, double galvanized square tube 25 x 25 x 1.5mm thick steel Hollow Square Tube for W and S insulators posts with plastic top caps. Apply Metal primer before installing and 2 finishing coats of 1st quality gloss paint "Crown" including embedding 200mm deep in the reinforced columns and walls Complete with metal lugs and approved by the client.	No.	100				
C	<b>Siren Kit complete with box, sounder and strobe</b> 12VDC Security sounder and strobe with a range of 1 km as per detailed specifications.	No.	1				
D	<b>W-Insulators</b> High density porcelain UV stabilized plastic polythene insulators to adequately cover the installations as per IEE standards	Item	1				
<b>Total Carried to Collection Kipevu Substation page 2</b>							

**Bill of Quantities Kipevu Substation Page 3**

No	Item Description	Unit	Qty	Country of origin	Unit Price (PPCBL Incl.) & VAT Excl. (Kes)	Total Price (PPCBL Incl.) & VAT Excl. (Kes)	Part Numbers
A	<b>Strain –S-insulators</b> STF Black-High density porcelain UV stabilized plastic polythene insulators to adequately cover the installations as per IEE standards	Item	1				
B	Earthing of the Electric fence as per the IEE regulations and to be done at intervals of 30M	Item	1				
C	Hatari signs	No	30				
D	Provide for power and Alarm cable as per IEE Standards	Item	1				
E	Supply and fix Razor wire at the top of the boundary wall conforming to the following specifications: - coil size - 450mm diameter, Blade profile - Ripper Razor Wire, Stretch factor - maximum of 10M per coil and secured with steel plates at 1M centers (Galvanized)	M	301				
<b>Total Carried to Collection Kipevu Substation page 3</b>							

**Bill of Quantities Kipevu Substation Page 4**

No	Item Description	Unit	Qty	Country of origin	Unit Price (PPCBL Incl.) & VAT Excl. (Kes)	Total Price (PPCBL Incl.) & VAT Excl. (Kes)	Part Numbers
A	<b>Energizer Cabinet with following specs:</b> Energizer steel cabinet 500x500x250mm fabricated from 25x25x3mm angle line framing and 3mm thick plain sheet with lockable door including painting and mounting to Client's approval.	No.	1				
B	AVS 30A voltage guard	No.	1				
C	Allow for installation, configurations, Training, Testing and Commissioning to client's satisfaction. Installation to include all necessary civil and electrical works. Contractor to submit 3no identical handover box files will all correspondences of works and including drawings, layouts, manuals. To be done in consultation with the client for more details and format.	Item	1				
D	Allow for the integration of the Alarm Systems to existing Genetec or hikcentral security Management system in Liaison with the supporting Kplc Genetec or hikcentral integrator. Include cost for all necessary Genetec or hikcentral Licenses and related costs to allow full integration and allowing full operationalization in Genetec or hikcentral mission control ,both at Regional and central security control room.	Lot	1				
<b>Total Carried to Collection Kipevu Substation page 4</b>							

	<b>SUMMARY PAGE KIPEVU SUBSTATION ELECTRIC FENCE BILL OF QUANTITIES</b>		
	<b>Total Carried to Collection Kipevu Substation page 1</b>		
	<b>Total Carried to Collection Kipevu Substation page 2</b>		
	<b>Total Carried to Collection Kipevu Substation page 3</b>		
	<b>Total Carried to Collection Kipevu Substation page 4</b>		
	<b>SUB- TOTAL (PPCBL Incl.) &amp; VAT Excl. (Kes) - KIPEVU SUBSTATION ELECTRIC FENCE</b>		

**LOT 1: INSTALLATION OF ELECTRIC FENCES & INTRUDER ALARMS SYSTEMS**  
**MALINDI DEPOT ELECTRIC FENCE**

<b>Bill of Quantities Malindi Depot Page 1</b>							
<b>No</b>	<b>Item Description</b>	<b>Unit</b>	<b>Qty</b>	<b>Country of origin</b>	<b>Unit Price (PPCBL Incl.) &amp; VAT Excl. (Kes)</b>	<b>Total Price (PPCBL Incl.) &amp; VAT Excl. (Kes)</b>	<b>Part Numbers</b>
<p><b>ELECTRIC FENCE ABOVE MASONRY WALLING</b>  <b>The following in electric fence to cover 1200m Perimeter comprising 8 strands spaced 100mm centers above the walling and comprising necessary accessories in conformity with relevant standards and general good practice and allow for works to be installed, tested and commissioned to client's satisfaction with the following:</b></p>							
A	Adequate mains energizer DRUID 15 Nemtek 4.6J Output or equal and approved complete with back-up battery and Keypad as per the specifications.	No.	2				
B	GSM/IP Module as per detailed specifications.	No	1				
C	Lead out under gate cable including excavating in road works with necessary ducting and making good No.	M	600				
<b>Total Carried to Collection Malindi Depot page 1</b>							

**Bill of Quantities Malindi Depot Page 2**

No	Item Description	Unit	Qty	Country of origin	Unit Price (PPCBL Incl.) & VAT Excl. (Kes)	Total Price (PPCBL Incl.) & VAT Excl. (Kes)	Part Numbers
A	<b>High tensile 1.6mm fence wire (HT)</b>	M	11500				
B	<b>Fence Poles</b> Double Galvanized Electroplated, double galvanized square tube 25 x 25 x 1.5mm thick steel Hollow Square Tube for W and S insulators posts with plastic top caps. Apply Metal primer before installing and 2 finishing coats of 1st quality gloss paint "Crown" including embedding 200mm deep in the reinforced columns and walls Complete with metal lugs and approved by the client.	No.	500				
C	<b>Siren Kit complete with box, sounder and strobe</b> 12VDC Security sounder and strobe with a range of 1 km as per detailed specifications.	No.	1				
D	<b>W-Insulators</b> High density porcelain UV stabilized plastic polythene insulators to adequately cover the installations as per IEE standards	Item	1				
<b>Total Carried to Collection Malindi Depot page 2</b>							



**Bill of Quantities Malindi Depot Page 3**

No	Item Description	Unit	Qty	Country of origin	Unit Price (PPCBL Incl.) & VAT Excl. (Kes)	Total Price (PPCBL Incl.) & VAT Excl. (Kes)	Part Numbers
A	<b>Strain –S-insulators</b> STF Black-High density porcelain UV stabilized plastic polythene insulators to adequately cover the installations as per IEE standards	Item	1				
B	Earthing of the Electric fence as per the IEE regulations and to be done at intervals of 30M	Item	1				
C	Hatari signs	No	50				
D	Provide for power and Alarm cable as per IEE Standards	Item	1				
E	Supply and fix Razor wire at the top of the boundary wall conforming to the following specifications: - coil size - 450mm diameter, Blade profile - Ripper Razor Wire, Stretch factor - maximum of 10M per coil and secured with steel plates at 1M centers (Galvanized)	M	1200				
<b>Total Carried to Collection Malindi Depot page 3</b>							

**Bill of Quantities Malindi Depot Page 4**

No	Item Description	Unit	Qty	Country of origin	Unit Price (PPCBL Incl.) & VAT Excl. (Kes)	Total Price (PPCBL Incl.) & VAT Excl. (Kes)	Part Numbers
A	<b>Energizer Cabinet with following specs:</b> Energizer steel cabinet 500x500x250mm fabricated from 25x25x3mm angle line framing and 3mm thick plain sheet with lockable door including painting and mounting to Client's approval.	No.	1				
B	AVS 30A voltage guard	No.	1				
C	Allow for installation, configurations, Training, Testing and Commissioning to client's satisfaction. Installation to include all necessary civil and electrical works. Contractor to submit 3no identical handover box files will all correspondences of works and including drawings, layouts, manuals. To be done in consultation with the client for more details and format.	Item	1				
D	Allow for the integration of the Alarm Systems to existing Genetec or hikcentral security Management system in Liaison with the supporting Kplc Genetec or hikcentral integrator. Include cost for all necessary Genetec or hikcentral Licenses and related costs to allow full integration and allowing full operationalization in Genetec or hikcentral mission control, both at Regional and central security control room.	Lot	1				
<b>Total Carried to Collection Malindi Depot page 4</b>							

	<b>SUMMARY PAGE MALINDI DEPOT ELECTRIC FENCE BILL OF QUANTITIES</b>		
	<b>Total Carried to Collection Malindi Depot page 1</b>		
	<b>Total Carried to Collection Malindi Depot page 2</b>		
	<b>Total Carried to Collection Malindi Depot page 3</b>		
	<b>Total Carried to Collection Malindi Depot page 4</b>		
	<b>SUB-TOTAL (PPCBL Incl.) &amp; VAT Excl. (Kes) - MALINDI DEPOT ELECTRIC FENCE</b>		

**LOT 1: INSTALLATION OF ELECTRIC FENCES & INTRUDER ALARMS SYSTEMS**  
**MBARAKI DEPOT ELECTRIC FENCE**

<b>Bill of Quantities Mbaraki Depot Page 1</b>									
<b>No</b>	<b>Item Description</b>	<b>Unit</b>	<b>Qty</b>	<b>Country of origin</b>	<b>Unit Price (PPCBL Incl.) &amp; VAT Excl. (Kes)</b>	<b>Total Price (PPCBL Incl.) &amp; VAT Excl. (Kes)</b>		<b>Part Numbers</b>	
	<b>ELECTRIC FENCE ABOVE MASONRY WALLING</b> <b>The following in electric fence to cover 1600m Perimeter comprising 8 strands spaced 100mm centers above the walling and comprising necessary accessories in conformity with relevant standards and general good practice and allow for works to be installed, tested and commissioned to client's satisfaction with the following:</b>								
A	Adequate mains energizer DRUID 15 Nemtek 4.6J Output or equal and approved complete with back-up battery and Keypad as per the specifications.	No.	3						
B	GSM/IP Module as per detailed specifications.	No	1						
C	Lead out under gate cable including excavating in road works with necessary ducting and making good No.	M	600						
	<b>Total Carried to Collection Mbaraki Depot page 1</b>								

**Bill of Quantities Mbaraki Depot Page 2**

No	Item Description	Unit	Qty	Country of origin	Unit Price (PPCBL Incl.) & VAT Excl. (Kes)	Total Price (PPCBL Incl.) & VAT Excl. (Kes)	Part Numbers
A	<b>High tensile 1.6mm fence wire (HT)</b>	M	13000				
B	<b>Fence Poles</b> Double Galvanized Electroplated, double galvanized square tube 25 x 25 x 1.5mm thick steel Hollow Square Tube for W and S insulators posts with plastic top caps. Apply Metal primer before installing and 2 finishing coats of 1st quality gloss paint "Crown" including embedding 200mm deep in the reinforced columns and walls Complete with metal lugs and approved by the client.	No.	650				
C	<b>Siren Kit complete with box, sounder and strobe</b> 12VDC Security sounder and strobe with a range of 1 km as per detailed specifications.	No.	2				
D	<b>W-Insulators</b> High density porcelain UV stabilized plastic polythene insulators to adequately cover the installations as per IEE standards	Item	1				
<b>Total Carried to Collection Mbaraki Depot page 2</b>							

**Bill of Quantities Mbaraki Depot Page 3**

No	Item Description	Unit	Qty	Country of origin	Unit Price (PPCBL Incl.) & VAT Excl. (Kes)	Total Price (PPCBL Incl.) & VAT Excl. (Kes)	Part Numbers
A	<b>Strain –S-insulators</b> STF Black-High density porcelain UV stabilized plastic polythene insulators to adequately cover the installations as per IEE standards	Item	1				
B	Earthing of the Electric fence as per the IEE regulations and to be done at intervals of 30M	Item	1				
C	Hatari signs	No	100				
D	Provide for power and Alarm cable as per IEE Standards	Item	1				
E	Supply and fix Razor wire at the top of the boundary wall conforming to the following specifications: - coil size - 450mm diameter, Blade profile - Ripper Razor Wire, Stretch factor - maximum of 10M per coil and secured with steel plates at 1M centers (Galvanized)	M	1600				
<b>Total Carried to Collection Mbaraki Depot page 3</b>							

**Bill of Quantities Mbaraki Depot Page 4**

No	Item Description	Unit	Qty	Country of origin	Unit Price (PPCBL Incl.) & VAT Excl. (Kes)	Total Price (PPCBL Incl.) & VAT Excl. (Kes)	Part Numbers
A	<b>Energizer Cabinet with following specs:</b> Energizer steel cabinet 500x500x250mm fabricated from 25x25x3mm angle line framing and 3mm thick plain sheet with lockable door including painting and mounting to Client's approval.	No.	1				
B	AVS 30A voltage guard	No.	1				
C	Allow for installation, configurations, Training, Testing and Commissioning to client's satisfaction. Installation to include all necessary civil and electrical works. Contractor to submit 3no identical handover box files will all correspondences of works and including drawings, layouts, manuals. To be done in consultation with the client for more details and format.	Item	1				
D	Allow for the integration of the Systems to existing Genetec or hikcentral security Management system in Liaison with the supporting Kplc Genetec or hikcentral integrator. Include cost for all necessary Genetec or hikcentral Licenses and related costs to allow full integration and allowing full operationalization in Genetec or hikcentral mission control, both at Regional and central security control room.	Lot	1				
<b>Total Carried to Collection Mbaraki Depot page 4</b>							

	<b>SUMMARY PAGE MBARAKI DEPOT ELECTRIC FENCE BILL OF QUANTITIES</b>		
	<b>Total Carried to Collection Mbaraki Depot page 1</b>		
	<b>Total Carried to Collection Mbaraki Depot page 2</b>		
	<b>Total Carried to Collection Mbaraki Depot page 3</b>		
	<b>Total Carried to Collection Mbaraki Depot page 4</b>		
	<b>SUB-TOTAL (PPCBL Incl.) &amp; VAT Excl. (Kes) - MBARAKI DEPOT ELECTRIC FENCE</b>		



**LOT 1: INSTALLATION OF ELECTRIC FENCES & INTRUDER ALARMS SYSTEMS**  
**VOI DEPOT ELECTRIC FENCE**

Bill of Quantities Voi Depot Page 1								
No	Item Description	Unit	Qty	Country of origin	Unit Price (PPCBL Incl.) & VAT Excl. (Kes)	Total Price (PPCBL Incl.) & VAT Excl. (Kes)		Part Numbers
<b>ELECTRIC FENCE ABOVE MASONRY WALLING</b> <b>The following in electric fence to cover 1400m Perimeter comprising 8 strands spaced 100mm centers above the walling and comprising necessary accessories in conformity with relevant standards and general good practice and allow for works to be installed, tested and commissioned to client's satisfaction with the following:</b>								
A	Adequate mains energizer DRUID 15 Nemtek 4.6J Output or equal and approved complete with back-up battery and Keypad as per the specifications.	No.	2					
B	GSM/IP Module as per detailed specifications.	No	1					
C	Lead out under gate cable including excavating in road works with necessary ducting and making good No.	M	600					
<b>Total Carried to Collection Voi Depot page 1</b>								

**Bill of Quantities Voi Depot Page 2**

No	Item Description	Unit	Qty	Country of origin	Unit Price (PPCBL Incl.) & VAT Excl. (Kes)	Total Price (PPCBL Incl.) & VAT Excl. (Kes)	Part Numbers
A	<b>High tensile 1.6mm fence wire (HT)</b>	M	12800				
B	<b>Fence Poles</b> Double Galvanized Electroplated, double galvanized square tube 25 x 25 x 1.5mm thick steel Hollow Square Tube for W and S insulators posts with plastic top caps. Apply Metal primer before installing and 2 finishing coats of 1st quality gloss paint "Crown" including embedding 200mm deep in the reinforced columns and walls Complete with metal lugs and approved by the client.	No.	559				
C	<b>Siren Kit completes with box, sounder and strobe</b> 12VDC Security sounder and strobe with a range of 1 km as per detailed specifications.	No.	1				
D	<b>W-Insulators</b> High density porcelain UV stabilized plastic polythene insulators to adequately cover the installations as per IEE standards	Item	1				
<b>Total Carried to Collection Voi Depot page 2</b>							

**Bill of Quantities Voi Depot Page 3**

No	Item Description	Unit	Qty	Country of origin	Unit Price (PPCBL Incl.) & VAT Excl. (Kes)	Total Price (PPCBL Incl.) & VAT Excl. (Kes)	Part Numbers
A	<b>Strain –S-insulators</b> STF Black-High density porcelain UV stabilized plastic polythene insulators to adequately cover the installations as per IEE standards	Item	1				
B	Earthing of the Electric fence as per the IEE regulations and to be done at intervals of 30M	Item	1				
C	Hatari signs	No	90				
D	Provide for power and Alarm cable as per IEE Standards	Item	1				
E	Supply and fix Razor wire at the top of the boundary wall conforming to the following specifications: - coil size - 450mm diameter, Blade profile - Ripper Razor Wire, Stretch factor - maximum of 10M per coil and secured with steel plates at 1M centers (Galvanized)	M	1400				
<b>Total Carried to Collection Voi Depot page 3</b>							

**Bill of Quantities Voi Depot Page 4**

No	Item Description	Unit	Qty	Country of origin	Unit Price (PPCBL Incl.) & VAT Excl. (Kes)	Total Price (PPCBL Incl.) & VAT Excl. (Kes)	Part Numbers
A	<b>Energizer Cabinet with following specs:</b> Energizer steel cabinet 500x500x250mm fabricated from 25x25x3mm angle line framing and 3mm thick plain sheet with lockable door including painting and mounting to Client's approval.	No.	1				
B	AVS 30A voltage guard	No.	1				
C	Allow for installation, configurations, Training, Testing and Commissioning to client's satisfaction. Installation to include all necessary civil and electrical works. Contractor to submit 3no identical handover box files will all correspondences of works and including drawings, layouts, manuals. To be done in consultation with the client for more details and format.	Item	1				
D	Allow for the integration of the Systems to existing Genetec or hikcentral security Management system in Liaison with the supporting Kplc Genetec or hikcentral integrator. Include cost for all necessary Genetec or hikcentral Licenses and related costs to allow full integration and allowing full operationalization in Genetec or hikcentral mission control, both at Regional and central security control room.	Lot	1				
<b>Total Carried to Collection Voi Depot page 4</b>							

	<b>SUMMARY PAGE VOI DEPOT ELECTRIC FENCE BILL OF QUANTITIES</b>		
	<b>Total Carried to Collection Voi Depot page 1</b>		
	<b>Total Carried to Collection Voi Depot page 2</b>		
	<b>Total Carried to Collection Voi Depot page 3</b>		
	<b>Total Carried to Collection Voi Depot page 4</b>		
	<b>SUB-TOTAL (PPCBL Incl.) &amp; VAT Excl. (Kes) - VOI DEPOT ELECTRIC FENCE</b>		

**LOT 1: INSTALLATION OF ELECTRIC FENCES & INTRUDER ALARMS SYSTEMS**  
**KIBOKO SUBSTATION ELECTRIC FENCE**

Bill of Quantities Kiboko Substation Page 1							
No	Item Description	Unit	Qty	Country of origin	Unit Price (PPCBL Incl.) & VAT Excl. (Kes)	Total Price (PPCBL Incl.) & VAT Excl. (Kes)	Part Numbers
<b>FREE-STANDING 16 -Lines elephant protection Electric Fence to cover 423m Perimeter comprising 16 strands spaced 100mm comprising of Well treated Wooden Poles and with necessary accessories in conformity with relevant standards and general good practice and allow for works to be installed, tested and commissioned to client's satisfaction with the following:</b>							
A	Adequate mains energizer Nemtek minimum 10J Output or equivalent and approved complete with back-up battery and Keypad as per the specifications.	No.	2				
B	GSM/IP Module as per detailed specifications.	No	1				
C	Lead out under gate cable including excavating in road works with necessary ducting and making good disturbed surfaces	M	500				
D	Allow for redesigning while repairing and replacing damaged Concrete Poles up to 30% of existing Poles						
<b>Total Carried to Collection Kiboko Substation page 1</b>							

**Bill of Quantities Kiboko Substation Page 2**

<b>No</b>	<b>Item Description</b>	<b>Unit</b>	<b>Qty</b>	<b>Country of origin</b>	<b>Unit Price (PPCBL Incl.) &amp; VAT Excl. (Kes)</b>	<b>Total Price (PPCBL Incl.) &amp; VAT Excl. (Kes)</b>	<b>Part Numbers</b>
A	<b>High tensile 2.5mm fence wire (HT)</b>	M	6598				
B	<b>Fence Poles</b> Allow for well treated Elephant wooden poles as per Elephant protection Electric fence standards	No.	183				
C	<b>Siren Kit complete with box, sounder and strobe</b> 12VDC Security sounder and strobe with a range of 1 km as per detailed specifications.	No.	1				
D	<b>W-Insulators</b> High density porcelain UV stabilized plastic polythene insulators to adequately cover the installations as per IEE standards	Item	1				
E	<b>Chain Link</b> Allow for redesigning and reconstructing existing Chain Link with new one while utilizing up to 50% of existing.	Item	1				
<b>Total Carried to Collection Kiboko Substation page 2</b>							

**Bill of Quantities Kiboko Substation Page 3**

No	Item Description	Unit	Qty	Country of origin	Unit Price (PPCBL Incl.) & VAT Excl. (Kes)	Total Price (PPCBL Incl.) & VAT Excl. (Kes)	Part Numbers
A	<b>Strain –S-insulators</b> STF Black-High density porcelain UV stabilized plastic polythene insulators to adequately cover the installations as per IEE standards	Item	1				
B	Earthing of the Electric fence as per the IEE regulations and to be done at intervals of 30M	Item	1				
C	Hatari signs	No	40				
D	Provide for power and Alarm cable as per IEE Standards	Item	1				
E	Supply and fix Razor wire along the free- stranding electric fence, conforming to the following specifications: - 980mm diameter coil size Double Galvanized Razor wire; Blade profile - Ripper Razor Wire; Stretch factor - maximum of 10M per coil and secured with steel plates at 1M centers and with two coatings to prevent rust.	M	550				
<b>Total Carried to Collection Kiboko Substation page 3</b>							



**Bill of Quantities Kiboko Substation Page 4**

No	Item Description	Unit	Qty	Country of origin	Unit Price (PPCBL Incl.) & VAT Excl. (Kes)	Total Price (PPCBL Incl.) & VAT Excl. (Kes)	Part Numbers
A	<b>Energizer Cabinet with following specs:</b> Energizer steel cabinet 500x500x250mm fabricated from 25x25x3mm angle line framing and 3mm thick plain sheet with lockable door including painting and mounting to Client's approval.	No.	1				
B	AVS 30A voltage guard	No.	1				
C	Allow for installation, configurations, Training, Testing and Commissioning to client's satisfaction. Installation to include all necessary civil and electrical works. Contractor to submit 3no identical handover box files will all correspondences of works and including drawings, layouts, manuals. To be done in consultation with the client for more details and format.	Item	1				
D	Allow for the integration of the Systems to existing Genetec or hikcentral security Management system in Liaison with the supporting Kplc Genetec or hikcentral integrator. Include cost for all necessary Genetec or hikcentral Licenses and related costs to allow full integration and allowing full operationalization in Genetec or hikcentral mission control, both at Regional and central security control room.	Lot	1				
<b>Total Carried to Collection Kiboko Substation page 4</b>							

	<b>SUMMARY PAGE KIBOKO SUBSTATION ELECTRIC FENCE BILL OF QUANTITIES</b>		
	<b>Total Carried to Collection Kiboko Substation page 1</b>		
	<b>Total Carried to Collection Kiboko Substation page 2</b>		
	<b>Total Carried to Collection Kiboko Substation page 3</b>		
	<b>Total Carried to Collection Kiboko Substation page 4</b>		
	<b>SUB-TOTAL (PPCBL Incl.) &amp; VAT Excl. (Kes) - KIBOKO SUBSTATION ELECTRIC FENCE</b>		

**LOT 1: INSTALLATION OF ELECTRIC FENCES & INTRUDER ALARMS SYSTEMS  
NAIROBI NORTH SUBSTATION ELECTRIC FENCE**

Bill of Quantities Nairobi North Substation Page 1								
No	Item Description	Unit	Qty	Country of origin	Unit Price (PPCBL Incl.) & VAT Excl. (Kes)	Total Price (PPCBL Incl.) & VAT Excl. (Kes)		Part Numbers
<b>ELECTRIC FENCE ABOVE MASONRY WALLING</b> <b>The following in electric fence to cover 922m Perimeter comprising 8 strands spaced 100mm centers above the walling and comprising necessary accessories in conformity with relevant standards and general good practice and allow for works to be installed, tested and commissioned to client's satisfaction with the following</b>								
A	Adequate mains energizer DRUID Nemtek 8J Output or equal and approved complete with back-up battery and Keypad as per the specifications.	No.	2					
B	GSM/IP Module as per detailed specifications.	No	1					
C	Lead out under gate cable including excavating in road works with necessary ducting and making good No.	M	800					
<b>Total Carried to Collection Nairobi North Substation page 1</b>								

**Bill of Quantities Nairobi North Substation Page 2**

No	Item Description	Unit	Qty	Country of origin	Unit Price (PPCBL Incl.) & VAT Excl. (Kes)	Total Price (PPCBL Incl.) & VAT Excl. (Kes)	Part Numbers
A	<b>High tensile 1.6mm fence wire (HT)</b>	M	36,666				
B	<b>Fence Poles</b> Double Galvanized Electroplated, double galvanized square tube 25 x 25 x 1.5mm thick steel Hollow Square Tube for W and S insulators posts with plastic top caps. Apply Metal primer before installing and 2 finishing coats of 1st quality gloss paint "Crown" including embedding 200mm deep in the reinforced columns and walls Complete with metal lugs and approved by the client.	No.	430				
C	<b>Siren Kit complete with box, sounder and strobe</b> 12VDC Security sounder and strobe with a range of 1 km as per detailed specifications.	No.	1				
D	<b>W-Insulators</b> High density porcelain UV stabilized plastic polythene insulators to adequately cover the installations as per IEE standards	Item	1				
<b>Total Carried to Collection Nairobi North Substation page 2</b>							

**Bill of Quantities Nairobi North Substation Page 3**

No	Item Description	Unit	Qty	Country of origin	Unit Price (PPCBL Incl.) & VAT Excl. (Kes)	Total Price (PPCBL Incl.) & VAT Excl. (Kes)	Part Numbers
A	<b>Strain –S-insulators</b> STF Black-High density porcelain UV stabilized plastic polythene insulators to adequately cover the installations as per IEE standards	Item	1				
B	Earthing of the Electric fence as per the IEE regulations and to be done at intervals of 30M	Item	1				
C	Hatari signs	No	40				
D	Provide for power and Alarm cable as per IEE Standards	Item	1				
E	Supply and fix Razor wire at the top of the boundary wall conforming to the following specifications: - coil size - 450mm diameter, Blade profile - Ripper Razor Wire, Stretch factor - maximum of 10M per coil and secured with steel plates at 1M centers (Galvanized)	M	430				
<b>Total Carried to Collection Nairobi North Substation page 3</b>							

**Bill of Quantities Nairobi North Substation Page 4**

No	Item Description	Unit	Qty	Country of origin	Unit Price (PPCBL Incl.) & VAT Excl. (Kes)	Total Price (PPCBL Incl.) & VAT Excl. (Kes)	Part Numbers
A	<b>Energizer Cabinet with following specs:</b> Energizer steel cabinet 500x500x250mm fabricated from 25x25x3mm angle line framing and 3mm thick plain sheet with lockable door including painting and mounting to Client's approval.	No.	1				
B	AVS 30A voltage guard	No.	1				
C	Allow for installation, configurations, Training, Testing and Commissioning to client's satisfaction. Installation to include all necessary civil and electrical works. Contractor to submit 3no identical handover box files will all correspondences of works and including drawings, layouts, manuals. To be done in consultation with the client for more details and format.	Item	1				
D	Allow for the integration of the Systems to existing Genetec or hikcentral security Management system in Liaison with the supporting Kplc Genetec or hikcentral integrator. Include cost for all necessary Genetec or hikcentral Licenses and related costs to allow full integration and allowing full operationalization in Genetec or hikcentral mission control, both at Regional and central security control room.	Lot	1				
<b>Total Carried to Collection Nairobi North Substation page 4</b>							

	<b>SUMMARY PAGE NAIROBI NORTH SUBSTATION ELECTRIC FENCE BILL OF QUANTITIES</b>		
	<b>Total Carried to Collection Nairobi North Substation page 1</b>		
	<b>Total Carried to Collection Nairobi North Substation page 2</b>		
	<b>Total Carried to Collection Nairobi North Substation page 3</b>		
	<b>Total Carried to Collection Nairobi North Substation page 4</b>		
	<b>SUB-TOTAL (PPCBL Incl.) &amp; VAT Excl. (Kes) - NAIROBI NORTH SUBSTATION ELECTRIC FENCE</b>		

**LOT 1: INSTALLATION OF ELECTRIC FENCES & INTRUDER ALARMS SYSTEMS**

***THIKA DEPOT ELECTRIC FENCE***

<b>Bill of Quantities Thika Depot Page 1</b>							
<b>No</b>	<b>Item Description</b>	<b>Unit</b>	<b>Qty</b>	<b>Country of origin</b>	<b>Unit Price (PPCBL Incl.) &amp; VAT Excl. (Kes)</b>	<b>Total Price (PPCBL Incl.) &amp; VAT Excl. (Kes)</b>	<b>Part Numbers</b>
	<b>ELECTRIC FENCE ABOVE MASONRY WALLING</b> <b>The following in electric fence to cover 900m Perimeter comprising 8 strands spaced 100mm centers above the walling and comprising necessary accessories in conformity with relevant standards and general good practice and allow for works to be installed, tested and commissioned to client's satisfaction with the following:</b>						
A	Adequate mains energizer DRUID 15 Nemtek 4.6J Output or equal and approved complete with back-up battery and Keypad as per the specifications.	No.	1				
B	GSM/IP Module as per detailed specifications.	No	1				
C	Lead out under gate cable including excavating in road works with necessary ducting and making good No.	M	400				
	<b>Total Carried to Collection Thika Depot page 1</b>						



**Bill of Quantities Thika Depot Page 2**

No	Item Description	Unit	Qty	Country of origin	Unit Price (PPCBL Incl.) & VAT Excl. (Kes)	Total Price (PPCBL Incl.) & VAT Excl. (Kes)	Part Numbers
A	<b>High tensile 1.6mm fence wire (HT)</b>	M	9088				
B	<b>Fence Poles</b> Double Galvanized Electroplated, double galvanized square tube 25 x 25 x 1.5mm thick steel Hollow Square Tube for W and S insulators posts with plastic top caps. Apply Metal primer before installing and 2 finishing coats of 1st quality gloss paint "Crown" including embedding 200mm deep in the reinforced columns and walls Complete with metal lugs and approved by the client.	No.	730				
C	<b>Siren Kit complete with box, sounder and strobe</b> 12VDC Security sounder and strobe with a range of 1 km as per detailed specifications.	No.	1				
D	<b>W-Insulators</b> High density porcelain UV stabilized plastic polythene insulators to adequately cover the installations as per IEE standards	Item	1				
<b>Total Carried to Collection Thika Depot page 2</b>							

**Bill of Quantities Thika Depot Page 3**

No	Item Description	Unit	Qty	Country of origin	Unit Price (PPCBL Incl.) & VAT Excl. (Kes)	Total Price (PPCBL Incl.) & VAT Excl. (Kes)	Part Numbers
A	<b>Strain –S-insulators</b> STF Black-High density porcelain UV stabilized plastic polythene insulators to adequately cover the installations as per IEE standards	Item	1				
B	Earthing of the Electric fence as per the IEE regulations and to be done at intervals of 30M	Item	1				
C	Hatari signs	No	50				
D	Provide for power and Alarm cable as per IEE Standards	Item	1				
E	Supply and fix Razor wire at the top of the boundary wall conforming to the following specifications: - coil size - 450mm diameter, Blade profile - Ripper Razor Wire, Stretch factor - maximum of 10M per coil and secured with steel plates at 1M centers (Galvanized)	M	900				
<b>Total Carried to Collection Thika Depot page 3</b>							

**Bill of Quantities Thika Depot Page 4**

No	Item Description	Unit	Qty	Country of origin	Unit Price (PPCBL Incl.) & VAT Excl. (Kes)	Total Price (PPCBL Incl.) & VAT Excl. (Kes)	Part Numbers
A	<b>Energizer Cabinet with following specs:</b> Energizer steel cabinet 500x500x250mm fabricated from 25x25x3mm angle line framing and 3mm thick plain sheet with lockable door including painting and mounting to Client's approval.	No.	1				
B	AVS 30A voltage guard	No.	1				
C	Allow for installation, configurations, Training, Testing and Commissioning to client's satisfaction. Installation to include all necessary civil and electrical works. Contractor to submit 3no identical handover box files will all correspondences of works and including drawings, layouts, manuals. To be done in consultation with the client for more details and format.	Item	1				
D	Allow for the integration of the Systems to existing Genetec or hikcentral security Management system in Liaison with the supporting Kplc Genetec or hikcentral integrator. Include cost for all necessary Genetec or hikcentral Licenses and related costs to allow full integration and allowing full operationalization in Genetec or hikcentral mission control, both at Regional and central security control room.	Lot	1				
<b>Total Carried to Collection Thika Depot page 4</b>							

	<b>SUMMARY PAGE THIKA DEPOT ELECTRIC FENCE BILL OF QUANTITIES</b>		
	<b>Total Carried to Collection Thika Depot page 1</b>		
	<b>Total Carried to Collection Thika Depot page 2</b>		
	<b>Total Carried to Collection Thika Depot page 3</b>		
	<b>Total Carried to Collection Thika Depot page 4</b>		
	<b>SUB- TOTAL (PPCBL Incl.) &amp; VAT Excl. (Kes) - THIKA DEPOT ELECTRIC FENCE</b>		

**LOT 1: INSTALLATION OF ELECTRIC FENCES & INTRUDER ALARMS SYSTEMS**  
**LANET POLE YARD ELECTRIC FENCE**

Bill of Quantities Lanet Pole Yard Page 1								
No	Item Description	Unit	Qty	Country of origin	Unit Price (PPCBL Incl.) & VAT Excl. (Kes)	Total Price (PPCBL Incl.) & VAT Excl. (Kes)		Part Numbers
<b>ELECTRIC FENCE ABOVE MASONRY WALLING</b> <b>The following in electric fence to cover 499m Perimeter comprising 8 strands spaced 100mm centers above the walling and comprising necessary accessories in conformity with relevant standards and general good practice and allow for works to be installed, tested and commissioned to client's satisfaction with the following:</b>								
A	Adequate mains energizer DRUID 15 Nemtek 4.6J Output or equal and approved complete with back-up battery and Keypad as per the specifications.	No.	1					
B	GSM/IP Module as per detailed specifications.	No	1					
C	Lead out under gate cable including excavating in road works with necessary ducting and making good No.	M	600					
<b>Total Carried to Collection Lanet Pole yard page 1</b>								

**Bill of Quantities Lanet Pole yard Page 2**

No	Item Description	Unit	Qty	Country of origin	Unit Price (PPCBL Incl.) & VAT Excl. (Kes)	Total Price (PPCBL Incl.) & VAT Excl. (Kes)	Part Numbers
A	<b>High tensile 1.6mm fence wire (HT)</b>	M	12800				
B	<b>Fence Poles</b> Double Galvanized Electroplated, double galvanized square tube 25 x 25 x 1.5mm thick steel Hollow Square Tube for W and S insulators posts with plastic top caps. Apply Metal primer before installing and 2 finishing coats of 1st quality gloss paint "Crown" including embedding 200mm deep in the reinforced columns and walls Complete with metal lugs and approved by the client.	No.	559				
C	<b>Siren Kit completes with box, sounder and strobe</b> 12VDC Security sounder and strobe with a range of 1 km as per detailed specifications.	No.	1				
D	<b>W-Insulators</b> High density porcelain UV stabilized plastic polythene insulators to adequately cover the installations as per IEE standards	Item	1				
<b>Total Carried to Collection Lanet pole yard page 2</b>							

**Bill of Quantities Lanet Pole yard Page 3**

No	Item Description	Unit	Qty	Country of origin	Unit Price (PPCBL Incl.) & VAT Excl. (Kes)	Total Price (PPCBL Incl.) & VAT Excl. (Kes)	Part Numbers
A	<b>Strain –S-insulators</b> STF Black-High density porcelain UV stabilized plastic polythene insulators to adequately cover the installations as per IEE standards	Item	1				
B	Earthing of the Electric fence as per the IEE regulations and to be done at intervals of 30M	Item	1				
C	Hatari signs	No	90				
D	Provide for power and Alarm cable as per IEE Standards	Item	1				
E	Supply and fix Razor wire at the top of the boundary wall conforming to the following specifications: - coil size - 450mm diameter, Blade profile - Ripper Razor Wire, Stretch factor - maximum of 10M per coil and secured with steel plates at 1M centers (Galvanized)	M	1400				
<b>Total Carried to Collection Lanet Pole yard page 3</b>							

**Bill of Quantities Lanet Pole yard Page 4**

No	Item Description	Unit	Qty	Country of origin	Unit Price (PPCBL Incl.) & VAT Excl. (Kes)	Total Price (PPCBL Incl.) & VAT Excl. (Kes)	Part Numbers
A	<b>Energizer Cabinet with following specs:</b> Energizer steel cabinet 500x500x250mm fabricated from 25x25x3mm angle line framing and 3mm thick plain sheet with lockable door including painting and mounting to Client's approval.	No.	1				
B	AVS 30A voltage guard	No.	1				
C	Allow for installation, configurations, Training, Testing and Commissioning to client's satisfaction. Installation to include all necessary civil and electrical works. Contractor to submit 3no identical handover box files will all correspondences of works and including drawings, layouts, manuals. To be done in consultation with the client for more details and format.	Item	1				
D	Allow for the integration of the Systems to existing Genetec or hikcentral security Management system in Liaison with the supporting Kplc Genetec or hikcentral integrator. Include cost for all necessary Genetec or hikcentral Licenses and related costs to allow full integration and allowing full operationalization in Genetec or hikcentral mission control, both at Regional and central security control room.	Lot	1				
<b>Total Carried to Collection Lanet Pole yard page 4</b>							



	<b>SUMMARY PAGE LANET POLE YARD ELECTRIC FENCE BILL OF QUANTITIES</b>		
	<b>Total Carried to Collection Lanet Pole yard page 1</b>		
	<b>Total Carried to Collection Lanet Pole yard page 2</b>		
	<b>Total Carried to Collection Lanet Pole yard page 3</b>		
	<b>Total Carried to Collection Lanet Pole yard page 4</b>		
	<b>Sub-Total (PPCBL Incl.) &amp; VAT Excl. (KES) - Lanet Pole Yard Electric Fence</b>		

<b>SUMMARY OF QUANTITIES LOT 1 ELECTRIC FENCES &amp; INTRUDER ALARMS</b>			
<b>No</b>	<b>Item Description</b>	<b>Unit Price (PPCBL Incl.) &amp; VAT Excl. (Kes)</b>	<b>Total Price (PPCBL Incl.) &amp; VAT Excl. (Kes)</b>
<b>1.</b>	<b>Total Carried to Collection</b> Kipevu SS		
<b>2.</b>	<b>Total Carried to Collection</b> Malindi Depot		
<b>3.</b>	<b>Total Carried to Collection</b> Mbaraki Depot		
<b>4.</b>	<b>Total Carried to Collection</b> Voi Depot		
<b>5.</b>	<b>Total Carried to Collection</b> Kiboko Substation		
<b>6.</b>	<b>Total Carried to Collection</b> Nairobi North SS		
<b>7.</b>	<b>Total Carried to Collection</b> Thika Depot		
<b>8.</b>	<b>Total Carried to Collection</b> Lanet Pole Yard		
	<b>Sub-Total Lot 1: Electric Fences &amp; Intruder Alarms</b>		
	<b>Add 16% Vat</b>		
	<b>Grand Total PPCBL Incl. &amp; VAT Incl. Lot 1: Electric Fences &amp; Intruder Alarms (To Summary)</b>		

**LOT 2: DESIGN, SUPPLY, INSTALLATION & COMMISSIONING OF PILOT IMPLEMENTATION OF ACOUSTIC INTRUDER FIBER OPTIC SOLUTION**

<b>Bill of Quantity Lot 2: DESIGN, SUPPLY, INSTALLATION &amp; COMMISSIONING OF PILOT IMPLEMENTATION OF ACOUSTIC INTRUDER FIBER OPTIC SOLUTION</b>						
<b>No</b>	<b>Item Description</b>	<b>Unit</b>	<b>Qty</b>	<b>Country of origin</b>	<b>Unit Price (PPCBL Incl.) &amp; VAT Excl. (Kes)</b>	<b>Total Price (PPCBL Incl.) &amp; VAT Excl. (Kes)</b>
A	Vibration Fiber Optical Sensing Terminal	No.	1			
B	Vibration Fiber Optical Sensing Terminal Management Software Licence	No	1			
C	3 Kva UPS	No	1			
D	Commissioning and Integration and Training	No	1			
<b>Sub-Total Lot 2: Acoustic Intruder Fiber Optic Solution</b>						
<b>Add 16% VAT</b>						
<b>Grand Total PPCBL Incl. &amp; VAT Incl. Lot 2: Design, Supply, Installation &amp; Commissioning of Pilot Implementation of Acoustic Intruder Fiber Optic Solution (To Summary)</b>						

**LOT 3: SECURITY MANAGEMENT AND CONTROL SYSTEMS**

**BILL OF QUANTITY SECURITY MANAGEMENT CONTROL**

<b>Bill Of Quantity Security Management Control System</b>						
<b>No</b>	<b>Item Description</b>	<b>Unit</b>	<b>Qty</b>	<b>Country of origin</b>	<b>Unit Price (PPCBL Incl.) &amp; VAT Excl. (Kes)</b>	<b>Total Price (PPCBL Incl.) &amp; VAT Excl. (Kes)</b>
A.	Security Management Control Software	No.	1			
B.	Core Switch	No.	1			
C.	Client Workstation	No.	4			
D.	Mobile communication devices with Security management software	No.	20			
E.	Allow for cabling, ducting, brackets, and necessary accessories fabrications	No.	1			
F.	Allow for integration of the system to existing with field devices	No.	1			
G.	Installation, Testing and Commissioning to client satisfaction	No.	1			
H.	Provisional Sum for Project Management				<b>3,000,000.00</b>	<b>3,000,000.00</b>
I.	<b>Sub-Total Lot 3: Security Management Control System</b>					
J.	<b>Add 16% VAT</b>					
	<b>Grand Total PPCBL Incl. &amp; VAT Incl. Lot 3: Security Management Control System (To Summary)</b>					

## GRAND TOTAL SUMMARY

<b>No</b>	<b>Description</b>	<b>Total Price Local Currency (KSHS. PPCBL Incl. &amp; VAT Incl.)</b>
<b>1</b>	<b>Total Lot 1: Installation of Electric Fences &amp; Intruder Alarms Coast Region</b>	
<b>2</b>	<b>Total Lot 2: Design, Supply, Installation &amp; Commissioning of Pilot Implementation of Acoustic Intruder Fiber Optic Solution</b>	
<b>3</b>	<b>Total Lot 3: Security Management and Control</b>	
<b>Grand Total Carried Forward to Form of Tender</b>		

## SECTION VI – TECHNICAL SPECIFICATIONS

### INTRUSION DETECTION, ELECTRIC FENCE AND SECURITY MANAGEMENT AND CONTROL SYSTEM SPECIFICATIONS

#### i) ELECTRIC FENCE SPECIFICATIONS

No	Description	Bidders Response (Yes/No)
<b>A</b>	<p><b>ENERGIZER</b> Nemtek output/Specs as existing or equal and approved</p> <ul style="list-style-type: none"> <li>•Built-in alarm monitors tampering or faults on the high voltage and earth fence wires</li> <li>•Connectable to armed response radio or GSM module</li> <li>•Lightning and power surge protection</li> <li>•Intelligent power saving to extend battery life</li> <li>•Easy-to-use tag included for controlling the energizer</li> <li>•Walk test mode for easy fence testing</li> <li>•The LCD background color changes to easily identify the fence condition</li> <li>•Powered by 230V mains and includes built-in battery for backup power</li> <li>•Built-in gate alarm inputs to monitor if the gate is open or closed</li> <li>•Optional keypad for controlling and programming the energizer. This allows the user to control the energizer remotely, with up to two keypads</li> </ul>	
<b>B</b>	<p><b>HT GALVANIZED HT FENCE WIRE</b> High Tensile 1.6mm Double galvanized</p>	
<b>C-</b>	<p><b>FENCE POLES</b> Electroplated, double galvanized square tube 25 x 25 x 1.5mm thick steel Hollow Square Tube for W and S insulators posts with plastic top caps. Apply Metal primer before installing and 2 finishing coats of 1st quality gloss paint "Crown" including embedding 200mm deep in the reinforced columns and walls Complete with metal lugs and approved by the client.</p>	
<b>D</b>	<p><b>RAZOR WIRE</b> (Double Galvanised) Coil size - 450mm diameter, Blade profile - Ripper Razor Wire, Stretch factor - coil and secured with steel plates at 1M centres</p>	
<b>E</b>	<p><b>SIREN KIT (BOX, SIREN AND STROBE)</b> 12VDC Security sounder and strobe with a range of 1 km Galvanized box and mount to avoid rusting/corrosion. Well, protected from environmental hazards like rain water leakages, hostile/extreme weather conditions like temperatures, strong winds etc.</p>	
<b>F</b>	<p><b>EARTHING</b> Earthing of the Electric fence as per the IEE regulations and to be done at intervals of 30M</p>	
<b>G</b>	<p><b>INSULATION</b> W and S insulators - High density porcelain insulators UV stabilised plastic polythene insulators for fastening the HT wire to the posts.</p>	
<b>H</b>	<p><b>ENERGIZER CABINET</b> Energizer steel cabinet 500x500x250mm fabricated from 25x25x3mm angle</p>	

	line framing and 3mm thick m.s plain sheet with lockable door including painting and mounting to Client's approval.	
<b>I</b>	<b>WALL AND GATE REPAIRS</b> Repair of any damaged walls and gates including painting works.	
<b>J</b>	<b>FENCE LINKING TO GENETEC OR HIKCENTRAL</b> Interface module, required licenses, update/upgrades which can be done locally by the customer without or with minimum support by the manufacturer with back-to-back SMA with the manufacturer at no additional cost.	

## ii)Vibration Fiber Optical Sensing Terminal

Item	Description	Bidders Response (Yes/No)
Sensing Principle	Distributed Acoustic Sensing	
Single-Channel Detection Range	50km	
Channel	2	
Fiber Type	Single mode (ITU-T G.652D)	
Positioning Accuracy	±5m	
Frequency Response	0.1Hz to 5kHz	
Unit	Configurable. Configure according to fiber length and unit interval.	
Alarm Response Time	≤ 1s	
<b>Storage</b>		
HDD Storage	Support 1 256G SSD and 1 1T Mechanical HDD	
<b>Network</b>		
Network Protocol	Support ISAPI、OTAP、TCP	
<b>Interface</b>		
Audio Out	1 audio out interface	
Power Interface	1 power input interface with 100~240V AC power input	
Function Interface	6 USB 3.0 interfaces,	
	2 1000M network interface,	
	1 VGA interface,	
	1 HDMI interface,	
	1 DVI interface,	
	2 RS-232 interface,	
	3 SMA interface	

Event and alarm		
Fiber cut alarm	When fiber cut occurs, the system shall output fiber cut alarm signal within 1s, and indicate the nearest break location relative to fiber starting end through server interface.	
Tamper alarm	The distributed positioning vibration fiber system enclosure shall have tamper-proof protection. When opened to access internal components, the system shall output distinct tamper alarm signal.	
Alarm classification	The system supports 3-level alarm classification (3 to 1 indicating increasing urgency/importance) with independent threshold parameter settings for each level.	
Linkage	System supports camera linkage and enables image/video analysis for alarm verification. System enables linking to third party systems response	
System stability		
Positioning accuracy	Simultaneous positioning and monitoring of multiple vibration points with high positioning accuracy of $\pm 5$ m.	
Fixed vibration excitation	Under fixed vibration excitation (constant amplitude/frequency), system detection amplitude deviation shall remain within $\pm 10\%$ .	
Fixed audio source excitation	Under fixed audio source excitation, system supports audio signal restoration and playback.	
Wind resistance	Wind resistance: No false/missed alarms under level III wind conditions (17.1-20.7m/s). System shall meet required wind interference standards.	
Rain resistance	Rain resistance: No false/missed alarms under level III rain conditions (100mm/24h). System shall meet required precipitation resistance standards.	
System Test		
Intrusion alarms	When simulating intrusion alarms using 10Hz-5kHz fixed frequency vibrations, client shall trigger alarms and demodulate corresponding frequencies (test points: 2.0km & 5.0km).	
High temperature test	Host (55 $\pm$ 2) $^{\circ}$ C/2h; Sensor (70 $\pm$ 2) $^{\circ}$ C/2h - normal operation maintained.	
Low temperature test	Host (-15 $\pm$ 3) $^{\circ}$ C/2h; Sensor (-40 $\pm$ 3) $^{\circ}$ C/2h - normal operation maintained.	
Damp heat test	(40 $\pm$ 2) $^{\circ}$ C, RH (93 $\pm$ 2)%, 48h - normal operation maintained.	



<b>Vibration Fiber Optical Sensing Terminal Management</b>			
<b>Item</b>	<b>Description</b>	<b>Bidders (Yes/No)</b>	<b>Response</b>
CCTV Integration	The software platform supports calibration operation. PTZ cameras support preview, rotation, preset point configuration; Bullet cameras support preview; Support configuration of optical fiber unit number, alarm enable, primary camera name and IP, preset point, secondary camera name and IP, preset point, latitude and longitude.		
Camera calibration management	The software platform controls device linkage, and displays and manages the calibrated table information. Support camera calibration relationship table (.CSV) import and export; After import, the table of calibration display page can be edited, including the unit latitude and longitude information, primary camera and secondary camera configuration, capture linkage delay configuration; Support automatic filling configuration, input two unit numbers, automatically fill the middle of the unit number latitude and longitude.		
E-map	<input type="checkbox"/> The optical fiber unit after the figure above, automatically move the unit to the corresponding latitude and longitude, support a single unit drag, and the whole cable drag; <input type="checkbox"/> The corresponding perimeter lines are automatically generated on the map, the starting point and direction are indicated by arrows, and the end point is indicated by circles; In the editing state, the direction of the optical fiber is marked by the way of flow;  <input type="checkbox"/> One map supports the management and display of up to 2 sets of vibrating fiber hosts (up to 4 channels); <input type="checkbox"/> Support restore change operation, in the editing state, you can restore the operation to the last save or initial state; <input type="checkbox"/> Support updating linkage information, in the editing state, you can update the latest linkage information from the linkage configuration interface of device management;		
Event display and linkage	Fiber cut alarm display:		
	<input type="checkbox"/> Add a red exclamation mark to the corresponding fiber cut point on the map to remind the fiber cut alarm, and the underlined part behind the display becomes gray.		
Evan upload	<input type="checkbox"/> Upon alarm detection, the system generates security events (including perimeter intrusion and fiber cut alerts), displays corresponding records in the event center, and automatically logs all incident details?		
Alarm Processing	<input type="checkbox"/> Click on the alarm details on the E-map, you can process the alarm for true and false alarms, and then send it to the device. After the alarm processing, cancel the red alarm flashing on the map. <input type="checkbox"/> Arm/Disarm the vibration fiber terminal		

Alarm linkage review	When the vibration fiber alarm is triggered, the software platform links the associated camera at the position to capture the picture, sends it to the Deepin Mind NVR for analysis, and feedback the analysis results to the platform. Verified false alarms are excluded from E-map but it will be recorded in the event center.	
Configuration	Support time synchronization with PC (vibration fiber terminal, cameras, PC);	
	Supports firmware upgrades of vibration fiber terminal via software platform (redirect to web portal)	

iii) SECURITY MANAGEMENT AND CONTROL SYSTEM  
**CENTRALIZED REPORTING AND DEVICE MANAGERMENTS SOFTWARE PLATFORM.**

**Introduction**

The essential part central reporting and device management engine is a core component of a systems intelligence or data analytics system. The primary function is to collect, process, and present data from various sources in a coherent and meaningful way to support decision-making and operational activities within an organization. Below are the proposed key aspects and functionalities of our central reporting engine and device Management platform.

The bidder shall be expected to demonstrate functionality of the requirement by submitting the following:

Technical specifications of the proposed software and proposed modules, clearly indicating their functionality and inter-operability.

Logical representation of the proposed software/modules with clear diagrams of the architecture

Sample graphic user interface (GUI)

The proposes solution shall have a minimum of the following modules as described in the detailed technical specifications:

1. Electronic Device Management software
2. Ticketing module for service providers
3. Service providers’ management module
4. Alerts Module (SMS and Email)
5. Reports and analytics
6. Inventory Module
7. Integration Module (Data source)
8. Device Management
9. Guard Monitoring
10. Case Management System
11. IoT Module
12. Call Centre and Access Control
13. Help desk reports
14. Bussiness Intelligence

**CENTRALIZED REPORTING**

A central reporting and engine is a core component of a business intelligence (BI) or data analytics system. Its primary function is to collect, process, and present data from various sources in a coherent and meaningful way to support decision-making and operational activities within an organization.

Below are proposed key aspects and functionalities of our central reporting engine:

- i. **Data Integration:** It integrates data from multiple sources such as databases, data warehouses, spreadsheets, and cloud services. This ensures that all relevant data is accessible for reporting purposes.
- ii. **Data Transformation:** It transforms raw data into a structured format suitable for reporting. This may involve data cleans, normalization, and aggregation to ensure accuracy and consistency
- iii. **Data Modelling:** It may involve data modelling activities to create a logical representation of the data that supports efficient querying and reporting.
- iv. **Report Design and Generation:** It provides tools and capabilities to design and generate reports based on the integrated and transformed data. Reports can include various formats such as tables, charts, graphs, and dashboards.
- v. **Customization and Interactivity:** Users can customize reports according to their specific requirements, such as selecting data dimensions, applying filters, and choosing visualization types. Interactivity features allow users to drill down into details and explore data further.
- vi. **Scheduled and On-Demand Reporting:** It supports both scheduled (automated) and on-demand (ad-hoc) report generation. Scheduled reports ensure that stakeholders receive timely updates without manual intervention.
- vii. **Security and Access Control:** It enforces security measures to ensure that sensitive data is protected and that users have appropriate access permissions. This includes authentication, authorization, and encryption mechanisms.
- viii. **Performance Optimization:** It optimizes report generation and data retrieval processes to ensure efficient performance, especially when dealing with large volumes of data.
- ix. **Integration with Other Systems:** It integrates with other systems and applications within the organization's IT infrastructure, facilitating seamless data flow and interoperability.
- x. **Compliance and Audit:** It may include features for compliance with regulatory requirements and audit trails to track user activities related to data access and reporting.
- xi. **Support for Advanced Analytics:** In addition to basic reporting, some central reporting engines support advanced analytics capabilities such as predictive analytics, data mining, and statistical analysis.

#### **Centralized reporting software modules**

The Centralised reporting platform will have the following modules

1. Administrator web portal(HQ)
2. Users web portal (HQ and other regions)
3. Mobile application to be used in the field
4. Ticketing module for service providers
5. Service providers management module

6. Web portal for service providers
7. Alerts Module (SMS and Email)
8. Reports and analytics
9. Inventory Module
  - a. Device management module
  - b. Device assignment module
  - c. Device location tracking module
  - d. Device replacement tracking
  - e. Device Maintenance tracking
  - f. Device Expiry Tracking module
10. Integration Module (Data source)
  - a. CCTV integration
  - b. Intruder alarm system integration
  - c. Access control system integration
  - d. Visitors' management system integration
  - e. Fire alarms system integration
  - f. Mail server integration
  - g. SMS gateway integration
11. Documents/Reports Management(Folder based)

**Project Scope**

- Design and develop a user-friendly and intuitive centralized reporting platform that offers seamless experience to users.
- Integrate with existing KPLC and third-party systems
- Implement robust features and functionalities within the Solution
- Ensure compliance with regulatory requirements, data privacy laws, and security standards to safeguard customer information and transactional data.
- Empower businesses with tools and insights to improve their productivity, and sustainability
- Robust security measures to protect customer data

***Operational Requirements of the Platform***

A central reporting engine will typically serves as the backbone for generating, managing, and distributing reports within an organization.

The following are the operational requirements for the proposed solution.

**Data Aggregation:** Gathering data from various sources across the organization, such as databases, applications, and files.

**Data Transformation:** Converting raw data into a format suitable for reporting, which may involve cleansing, filtering, and structuring data.

**Report Generation:** Creating reports based on predefined templates or user-defined criteria. This involves organizing data into tables, charts, graphs, and other visualizations.

**Customization:** Allowing users to customize reports according to their specific needs, such as selecting data fields, applying filters, and choosing visualization types.

**Scheduled Reporting:** Automating the generation and distribution of reports on a scheduled basis (daily, weekly, monthly, etc.).

**Real-time Reporting:** Providing capabilities for generating reports based on real-time data for immediate insights and decision-making.

**Security and Access Control:** Ensuring that only authorized users have access to sensitive data and reports, often through role-based access controls (RBAC) and encryption.

**Integration:** Connecting with other systems and applications within the organization's IT ecosystem to fetch data and distribute reports seamlessly.

**Analytics and Insights:** Beyond basic reporting, providing advanced analytics capabilities such as predictive analytics, trend analysis, and data mining to derive meaningful insights from the data.

**Audit Trails:** Maintaining a record of report generation activities, including who accessed which reports and when, to ensure compliance and accountability.

Overall, a central reporting engine will play a crucial role in enabling data-driven decision-making by providing timely, accurate, and actionable information to stakeholders across the organization.

## **ELECTRONIC DEVICES MANAGEMENT SOFTWARE**

The Device Management network monitoring software will give you comprehensive insight into how well your servers, virtual machines, printers, storage devices, routers, switches, firewalls, load balancers, and wireless LAN controllers are performing. It will be a user-friendly and reasonably priced network monitoring tool that enables you to identify and fix problems at their source.

### **SOFTWARE FEATURES**

#### **NETWORK PERFORMANCE MONITORING**

Network monitoring tools help prevent outages and fix issues before they occur. Maintaining a congestion-free network ensures your systems remain operational. Network monitor software enables remote monitoring of IP-based devices, including network services, bandwidth utilization, switches, routers, and traffic flow. Identifying network faults and optimizing them and improve performance to desirable levels.

Network performance monitor parameters

- i. Availability
- ii. CPU and memory
- iii. Traffic
- iv. Errors and discards
- v. WAN performance

#### ***Availability***

Device Manager Network software pings all monitored devices at defined monitoring intervals, and if any device is down or if the response time or packet loss is huge, it notifies you immediately by sending

an email or text message.

#### ***CPU and memory***

High CPU or memory usage on a physical server, virtual machine, or network device can considerably affect the performance of devices and, in turn, affect the end user. Device Manager, the advanced server performance monitoring software shall monitor devices using SNMP, WMI, Telnet, SSH, and VMware native API. With Device Manager as a network monitoring software, you can detect and troubleshoot CPU and server bottlenecks before they affect the end user. It shall also monitor important CPU metrics like utilization, speed, idle time, and processor time, and set independent alarm thresholds for each monitored device.

#### ***Traffic***

Network performance monitoring tools shall identify bandwidth hogs so you can optimize your network traffic before it affects your network. Take control of your network performance by monitoring, analyzing network bandwidth and traffic patterns with SNMP-based Device Manager traffic monitoring. You can view interface traffic, filter traffic by time interval, and view the last polled traffic value. .

#### ***Errors and discards***

Depending on their memory, all network devices trash packets, which might have an impact on performance. Device Manager monitor and lessen packet loss from faults and discards.

#### ***WAN performance***

Device Manager, will monitor WAN connections, check WAN latency, and identify network traffic across your WAN network. This is to allocate resources accordingly to prioritize traffic and react proactively to any issues affecting your WAN network.

The Device Manager shall utilize Cisco's IP-SLA for monitoring the WAN, while Device Manager WAN Round Trip Time monitor provides details on WAN link latency, bandwidth utilization, the round-trip time, and other performance factors for completely diagnose and resolve poor WAN performance before you can think of upgrading WAN bandwidth capacity.

#### ***Multi-vendor performance monitors***

Device Manager supports the most commonly used devices in the market like Cisco, and Juniper.

### **SERVER MONITORING**

**Server monitoring** is the process of monitoring a server's system resources like CPU Usage, Memory Consumption, I/O, Network, Disk Usage, Process etc. Server Monitoring metrics also helps in capacity planning by understanding the server's system resource usage.

The **server monitoring tool** shall help in automating the process of server monitoring. The tool shall identify other performance related issues like resource utilization, app downtime and response time.

#### ***Device Manger Server performance monitoring***

Device Manager provides multi-vendor support to monitor network, server and all their critical applications continuously along with their services and processes. It periodically monitors servers via SNMP and WMI protocols to ensure that they are up and running at their optimum performance level, 24x7. It stores all the data for historical performance tracking and troubleshooting, thus eliminating the need for multiple server monitoring tool.

#### ***Real-time-server performance monitor dashboard***

Device Manager, the trusted server performance monitor, shall monitor features such as CPU monitoring, memory monitoring, Disk monitoring up to a minute interval. The performance metrics listed below will be monitored.

- i. CPU Utilization
- ii. Memory Utilization
- iii. Process Monitoring

- iv. Services Monitoring
- v. Windows Services Monitoring
- vi. Event Log Monitoring
- vii. File/Folders Monitoring
- viii. Script Monitoring
- ix. URL Monitoring

#### ***Monitoring server availability and health***

The Device Management software shall have features such as server availability monitoring and more than 300 performance metrics such as page read/write, processor queue length, free physical memory, disk I/O, process queue length through SNMP and WMI protocols. The software should be able to monitor critical performance metrics every minute and detect performance issue at its early stage by using powerful features like server monitoring dashboards. Apart from the default monitors, the manager shall also create your own custom monitors using server monitoring dashboard template. All the collected data of the server performance metrics are stored in the database for detailed analysis and for creating monthly and yearly performance reports.

#### ***Proactive server monitoring with multi-level thresholds***

The device management **Server monitor** should identify any performance related issue at the early stages and notify the Security systems Technical Team. The program will use several criteria to monitor servers proactively. It enables you to monitor performance at different levels and send out notifications to make sure your server is operational around-the-clock.

#### ***Web server monitoring and application performance***

Device Management software shall detect attempted security break-ins over your application servers (login failures due to bad passwords, account lockouts, failed attempts to access secure files, etc.) by processing Windows Event logs & syslog monitoring.

#### ***Monitor VMware servers and Guest OS performance***

Device Manager includes support for virtual server monitoring. It shall provide an exclusive server monitoring dashboard for each ESX server, showing the CPU, memory and disk utilization for each guest VM instance on the server. Device Manager shall also provide options to Start, Stop and Suspend the VM instances on the server. Get instant alerts on VMs using excessive resources and even remotely stop the VMs before they cause problems in the ESX server.

#### ***Services monitoring***

At the time of device discovery, Device Manager shall discover all the services running on your Windows & Linux servers and associates' availability and response time monitors to these.

#### ***Windows services monitoring***

Apart from monitoring system level services like HTTP, LDAP, SMTP etc., Device Manager shall also monitor Windows Services e.g. Alerter, FTP, Net Logon, DHCP Server, IAS, Print Spooler etc. Once a monitored service is found to have failed, Device Manager can be configured to automatically restart the Windows Service or even the server.

#### ***Server process monitoring***

Device Manager shall be able to discover all the processes running on your servers and lists details such as Process ID, Process Name, Process Path and Process Argument. 'Process Templates' allow users to discover, manage and set thresholds easily across multiple servers, from a single window. The Remote

#### ***Windows event log monitoring***

Device Manager shall help you detect failed logins due to bad passwords, account lockouts, failed

attempts to access secure files, security log tampering etc. by processing Windows security Event logs. Besides security logs, Device Manager can also monitor application logs (out of the box rules for Exchange, IIS, MS–SQL and ISA servers), system logs and other event logs.

#### ***URL and website monitoring***

Simply relying on availability and response time (TCP Port) checks won't help you know if your website has been compromised. Device Manager allows you to monitor a URL and search for a specific text on the page. When the text is missing you can be immediately alerted and you get to know in real time that your website has been compromised. Device Manager website monitoring supports HTTP/HTTPS and NTLM Authenticated sites.

#### **WAN MONITORING**

Device Manager shall ensure that all your distributed mission critical applications are highly available. The WAN monitoring feature in Device Manager shall be responsible for monitors the availability of all your WAN links, the Round-Trip Time (RTT) and the traffic details. Detailed WAN performance dashboard reports are provided and you can quickly navigate the dashboard to see the root cause of poor WAN availability.

#### **BEST STORAGE MONITORING SOFTWARE**

Dedicated storage solutions call for a dedicated storage management software. Device Manager shall integrate storage monitoring solution to give the freedom of managing all your network storage devices from a single pane. The Device Manager shall have features such as 'Disk Read/Write' stats, capacity utilization monitors and storage growth trend graphs to efficiently manage and monitor your storage devices round-the-clock. It shall be able to enable users to monitor SAN components such as Fiber channel switches

#### **NETWORK VISUALIZATION**

The **network visualization software** module shall have Graphs and charts representing networks in the form of topology maps, dependency maps, layer 2 maps and data center visualization diagrams are all key to managing networks at scale.

#### ***Mapping –***

Physical mapping of networks, this module will monitor network devices for their status and availability. With network visualization tool, we can discover elements of the network that were previously unknown and we can communicate with them effectively.

#### ***Layout –***

The device management software shall show the high number of nodes in an optimum arrangement such that minimum number of crossing points is maintained.

#### ***Control Room Network Operation –***

The software shall ensure that the security control room use network visualization solutions to display network maps and other security systems critical information.

#### ***Alerts and alarms***

The software shall send alerts to security control room when network conditions deviate from the baseline. Alerts are overlaid on top of the topology, site, and summary views for cross-team notifications so can engage in incident response together with the same information. These alerts should present information with the severity level of the issue, the trigger, or the cause, for which a network visualization software is required.



### ***Site views***

- Site-level insights shall be show in into a specific site and to better understand and manage data interconnections and service provider performance.

## **FAULT MONITORING**

This module shall be able to Identify, locate and prevent network faults proactively with Device Management software.

### ***The swift fault monitoring system***

The Device Management fault monitoring software, shall constantly monitors faults in the network devices by network device monitoring and simplifies the process of network alert management. like

### ***Gain visibility into network faults with event-alarm correlation***

Device Manager fault monitoring performs intelligent event processing in the case of network monitoring alerts. It correlates raw network events, filters unwanted events, and presents only meaningful alarms to the operator. It supports color-coded alarms which are presented in a user-friendly format. You can view the event history associated with an alarm and manually clear or delete alarms.

### ***Establish escalation rules to follow critical or undetected alarms automatically.***

Device Manager fault monitoring software shall allow IT administrators and managers to set up automatic alarm escalation rules.

## **GENERAL TECHNICAL SPECIFICATION**

### **General**

This Section defines the General Technical Specifications applicable to the equipment and works specified in this document.

### **Proven Equipment**

The equipment which will be supplied and installed at Customer sites must be fully tested and proven in operation under severe weather conditions that exist or are expected to happen at the location of installation.

### **Environmental Conditions**

The equipment which will be supplied and installed at Customer sites must be designed for successful operation at the following conditions

#### **Indoor Equipment**

- i. Operating temperature: 5° - 50°C
- ii. Storage Temperature: 0° - 70°C
- iii. Humidity: 90% (non - condensing)

#### **Control Room Environment**

- i. Operating temperature: 5° - 35°c
- ii. Humidity: 60% (noncondensing)

#### **Outdoor Equipment**

- i. Operating temperature: 0° - 70°c
- ii. Humidity: 100% (noncondensing)

### **Electricity**

- i. The main power supply provided by the Customer will be 240 VAC with maximal deviation of  $\pm 10\%$ , nominal frequency of 50 Hz with maximal deviation of  $\pm 10\%$ .
- ii. The KPLC shall provide the power at the Electrical Main Boards. The Contractor shall supply and install the required power cabling from the Electrical Main Boards to the location (indoor and outdoor) of his equipment.
- iii. The Contractor shall supply all "low voltage" power supplies (240V to 12/24 V) and power cables required for his equipment..
- iv. The equipment supplied by the Contractor shall be compatible with the power supply provided by the Customer. Should the supplied equipment require dedicated power supplies or transformers for its operation, they will be included as integral part of such equipment offered prices.
- v. The Contractor must take into consideration that at the location of equipment installation there is a large number of interruptions in power supply and power failures. The system to be supplied by the Contractor must be protected against such cases and be equipped with full UPS system to avoid any interruption of its operation

#### **Uninterruptible Power Supply (UPS)**

- i. Every element of ISS must be electrically backed up by an UPS system that shall provide continuous and un-interruptible operation to ISS equipment or a minimal period of 8 hours.
- ii. The required UPS system must include voltage stabilizer, adapted to the instability of the local voltage, The Contractor shall gather the existing patterns of behavior of the local 220V power supply and resolve the problem by using proper voltage stabilizers
- iii. The UPS systems shall allow report of system's failures to the SMS and filtering of the mains transients, spikes ad surges.

#### **Equipment Protection**

- i. The Contractor shall provide for the supplied equipment satisfactory protection against lightening, (intensity and frequency), which exist at all the locations where Contractor's equipment will be installed.
- ii. The systems shall be protected against lightning induced power surges according to the relevant Kenya Bureau of Standards Code of Practice or its equivalent.
- iii. All metal frames of the consoles of the system shall be effectively grounded and all their mono-phase power supplies shall be protected by surge arrestors.
- iv. Signal circuits (where applicable) shall be protected by a combination of gas discharge devices, arrestors and Zener diodes. The multi-stage surge arrestor specially designed for this purpose shall be suitable for signaling protocols and must have at least 10 kA of surge arresting capacity.
- v. The contractor will take into account that some of the equipment will be installed in Substation facilities therefore must be adopted to high voltage environment (EMI / RFI protection), using fiber optics instead of CAT 7 cables, using grounded housing and suitable equipment for the environment.

#### **Reliability and Maintainability**

- i. The equipment which will be supplied and installed at Customer sites must operate with, at least, the following conditions for reliability and maintainability:
  - a) MTBF (for the entire system failure) – More than 4000 hours.
  - b) MTBF (single item) – More than 10,000 hours.

- c) MTBF (for thermal equipment) – More than 4000 hours
- d) MTBF for IR cameras should be calculated separately for more than 5000 hours.
- e) MTTR – Lower than 2 hours (not including logistic time)
- ii. The System shall function properly during at least 10 years with no degradation of performance, provided proper maintenance, and manufacturer's guidance.
- iii. All the elements of each subsystem shall be inter-changeable.
- iv. Plug-in elements can be removed and installed without switching off of the mains power.

#### **Quality of Materials**

- i. All the materials to be provided under this Technical Specifications shall be new, of the best quality and of the most suited class for operation under the specified conditions like withstanding variations in temperature and other atmospheric conditions, likely to be encountered at the installed sites.
- ii. Materials shall not in any way be of lower quality than the specified in the requirements of the latest relevant Standards.
- iii. Items that are not mentioned in the specification or shown in the drawings, but are required by the relevant standard specification, by Codes of Practice or by Local Codes governing the requirements of the installation, then the Contractor shall provide and install such items as part of his works.
- iv. Where materials and fittings are specified to be 'approved', samples shall be submitted for approval as soon as possible after notification of acceptance of the Contractor's bid and before any supply of orders or bulk delivery to the site. All approved samples will indicate the standard to be maintained in the execution of Works and shall be marked accordingly and retained by KPLC until the completion of Works. In case of rejection, further samples shall be submitted until duly approved. KPLC may reject any materials or workmanship which in its opinion does not comply with the approved standard. All submitted samples shall be free of charge.
- v. All the equipment supplied under this Contract shall conform to the best current engineering practices and
- vi. All the equipment supplied under this contract must fulfill the following requirement/design criteria:
  - a) Comply with the electricity conditions on the sites of installations
  - b) Comply with environmental conditions on the sites of installations
  - c) Fully protected against corrosion resulting from the salted environment condition at the proximity of the ocean
  - d) Fully protected against lightning strikes and the consequent electric surge arresting
  - e) Where necessary, stainless steel, brass or gun metal should be used in the construction of mechanisms to prevent sticking caused by rust or corrosion.
  - f) All similar parts must be interchangeable
  - g) All the components of the system must operate smoothly, without vibration and at the lowest possible level of noise.
  - h) Assure minimized risk for causing fire and of damage resulting from the fire
  - i) Prevent access from vermin, from dust and accidental contact with live parts.

#### **Design and Standardization**

- i. The design of the system shall ensure satisfactory plant operation, continuity of supply, safety in operation and comfortable maintenance; repairs and inspection are of primary consideration.
- ii. All mechanisms shall be of robust design to handle heavy duty tasks. Where necessary, components shall be made stainless steel, brass or gunmetal to prevent sticking caused by rust or corrosion.
- iii. Electrical contacts shall be of large cross-section and surface area to carry continuously the specified currents without overheating any electrical components where necessary contact surfaces shall be silvered for improved conductivity. Connections shall be properly secured using bolt or set screws and provided with lock nuts or lock washers. Lock nuts shall be used on all conducting connections. Any other proposed methods of securing connections shall be subjected to the approval of the Customer.
- iv. Nuts, bolts, studs, washers etc. shall be of standard metric sizes and sizable dimensions. Material used for nuts, bolts, studs, washers etc. shall have proper electric conductivity, mechanical strength and rusting and corrosion resistant.
- v. Cast iron is specifically excluded for any part of the site under mechanical stress.
- vi. All pipes and flanges shall comply to specified Standards regarding dimensions and cross section, unless otherwise approved by KPLC
- vii. All metallic surfaces of articulations of moving, or of rubbing parts shall be machined or ground.
- viii. The design of the system shall prevent exposure to the risk or short circuits between phases or phase to earth resulting from vermin or any other contamination.
- ix. The design of the system shall ensure total and easy interchangeability of spare parts involving a minimal number of components. System spares shall be made to gauge and must be interchangeable without any further adaptation.

#### **General Mechanical Requirements**

- i. All outdoor equipment shall comply, at least, with the IP66 Standard
- ii. Galvanizing for all components other than steel wires shall consist of a thickness of zinc coating specified in the relevant National Standards and shall be done by hot dipped process. Zinc coating shall be smooth, clean and of uniform thickness, free from any defects. The processes of surface preparation and galvanization shall not in any way adversely affect the mechanical properties of any coated material.
- iii. Drilling, punching, cutting and bending parts shall be completed and burrs removed before galvanizing. Shredding or other similar process shall not be used unless otherwise specifically approved. Surfaces in contact with oil shall not be galvanized.
- iv. Before painting all no galvanized surfaces shall be thoroughly cleaned from grease, rust, scale, moisture, etc. and rough surfaces of castings shall be filled.
- v. Interior surfaces of mechanism chambers or kiosks, with the exception of those with anti-corrosion treatment shall be painted applying at least three coats of paint, the final coat consisting of an anti-condensation mixture.
- vi. On exterior surfaces, except nuts, bolts and washers that would be removed during maintenance, one coat of zinc chromate primer, two coats of phenolic-alkyd resin type under-coating, and a final coat of paint, shall be applied to the clean and dry surface.
- vii. The Customer will approve the colors of the final layers of paint.

- viii. Aluminum alloys shall be of approved composition. The Contractor shall submit certificates of analysis if required by KPLC.

#### **Labeling and Tagging**

- i. All equipment shall be supplied with proper labels indicating the purpose of the different components. "ON" and "OFF" positions of all switches, "Service", "Test" and "Isolated" positions of withdrawal circuit breakers, phase marking, circuit breakers, relays and instrument functions etc. shall be clearly labeled in a manner approved by KPLC.
- ii. Labels shall be of an approved material to ensure permanence of the lettering. Sizes of labels and lettering shall ensure clarity. Lettering shall be of a contrasting color to the color of label background. "Danger" plates shall be in red lettering on a white background. (Labeling for all cables/cable support system is required).

#### **Raceway Infrastructure**

- i. The electronic equipment at operational and technical centers shall be connected by cable trays and conduits with segregated space allocated for the different subsystems.
- ii. The Contractor shall provide and install conduits to the individual field devices, as required. The location of the conduit to the field devices shall be field routed by the Contractor and have to coexist with other installed equipment. The Contractor shall provide and install all systems, cable trunks, conduits, conduit fittings, communication system outlet boxes and structural penetrations and penetration scales, to provide a complete raceway system.
- iii. All required infrastructures materials and works are listed in the Bill of Materials but shall be quotes as "lump sum" and not paid by meters length. During the site visit, the Contractor shall be required to gather all required data for estimating of the required materials and works quantities.

#### **Cables**

- i. All cables provided by the Contractor shall comply with subsystems manufacturers' requirements and specifications.
- ii. The Contractor shall install cables only in the allocated tray or conduit. Cable trays may be used by other systems and all space allocation shall be coordinated with the Customer.
- iii. Wherever applicable, the following types of cables will be used in the system:
  - a) Data cables, STP Category 6.
  - b) Signal cables, untwisted or twisted pairs.
  - c) Coaxial video cables, RG-59, RG-11.
  - d) Fiber Optic cables, Single and Multimode.
  - e) Power cables.
- i. All cables will be according to subsystems manufacturers' requirements and the specifications in this document.
- ii. Color coding – cables color coding shall be in accordance with the applicable standards.

#### **Servers and High Availability Array**

##### **General**

- i. The Management system described in this document contains several subsystems such as Access Control subsystem, CCTV subsystem, PIDS subsystem etc. each one of those

subsystems has dedicated server software responsible for managing the subsystem components and integrating it into the SMS software.

- ii. The integration of the subsystems is implemented via the subsystems servers and in such a high security environment it is needed to have a high availability (HA) configuration for all system servers.
- iii. In order to implement the HA environment, the contractor is required to establish physical (Servers and Storage devices) and virtual (Virtual Machines) environments to be set at the Stima Plaza and National Control Centre (NCC) equipment rooms.
- iv. The contractor shall be fully responsible for assuring that all subsystems proposed by him under his proposal will have a suitable architecture for operating under the virtual environment described in this chapter.
- v. In addition the contractor will assure that under his design there will not be any critical single points of failure causing a failure of entire subsystem.

### **HA environment Architecture**

#### ***Physical Architecture***

- a) The HA environment Physical Server's array will include the following components:
  - i. Two (2) separated physical servers (from a leading manufacture such as IBM or Dell)
  - ii. External storage device supporting two independent controllers
- b) Each one of the servers will be separately connected to the storage via optical connection or iSCSI connection.
- c) The two servers will be internally connected with each other via dedicated network connection.
- d) The following scheme describes the physical server's connection:

#### ***Virtual Architecture***

- i. Under the HA environment physical servers array described above the contractor shall establish a virtual array such as VMWare FT or Hyper-V or compatible products approved by the client.
- ii. The system servers will constantly communicate with each other (Heart beat), if one of the servers will be found offline the other server will be instantly online (the time interval for the server to be online will be very short, few hundredths of seconds, short enough for the subsystems not to notice at all the downtime and continue full operation with no need to user intervention)
- iii. The virtual servers will create a copy of the active server which will constantly run on the second server while being updated online with each change to the system.
- iv. The virtual servers array will support a continuous availability with zero downtime and zero data loss.
- v. The virtual servers array will be supplied with all needed licenses for its full operation as described under this document.
- vi. The virtual server array shall support at least 4 CPU's and without any restrictions regarding cores.
- vii. Under the virtual array the contractor will configure separated virtual machines for each subsystem, for each virtual machine responsible for a subsystem the recommended parameters

(as recommended by the relevant subsystem provider) will be configured including the following parameters:

- a) CPU and cores usage
  - b) RAM usage
  - c) Storage usage
  - d) IP address \ Machine address
- viii. Configuration of licenses for all subsystems in the proposed contractor proposal will be compatible for use under virtual environment (license will be based on software key and not on hardware key such as USB dongles)
- ix. The virtual array will support manual load balance for best utilization of the physical servers' resources. (There is no requirement for dynamic load balance only for static \ manual load balance)

### *Specifications of Servers and High Availability Array*

#### **General**

- a) The contractor shall be fully responsible for the design of the HA array including the hardware, software and configuration in order to comply with all requirements for availability and performance described in this document.
- b) In order for the contractor to define the hardware requirement for this array, the contractor shall take into account the following points:
  - i. Performance requirements described in this chapter and in other parts of the document must be met or exceeded by the designed system.
  - ii. The contractor should calculate the expected load for the system under the assumption that all subsystem will work under full load (as was calculated by the contractor) at the same time.
  - iii. The contractor should take into account at least 30% additional spare load as result of future growth without the need to upgrade the existing configuration.
- c) The following technical specifications for servers and storage described under this chapter are only a recommendation and should be treated as minimal specs; the full responsibility for selecting the correct hardware is on the contractor. System performance will be fully tested. Claims for down performance of the subsystems due to server array capabilities will not be accepted.

#### **Server specs**

- a) The servers will be of a well-known brand such as IBM or Dell
- b) The servers will support at least the following specs:
  - i. 3.5" Chassis with up to 12 SAS/SATA Drives, 2 x Intel® Xeon® Gold 6426Y 2.5G, 16C/32T, 16GT/s, 37.5M Cache, Turbo, HT (185W) DDR5-4800 , 4 x 64GB RDIMM, 2 x 960GB SSD SATA Read Intensive 6Gbps 512 2.5in Hot-plug AG Drive, 3.5in HYB CARR, 1 DWPD, 5600MT/s, Dual Rank, PERC H355 Adapter LP, Dual, Hot-Plug, Power Supply Fault Tolerant Redundant (1+1), 800W, Mixed Mode, iDRAC9, Enterprise 15G, Riser Config 0, No Riser, 1x16 + 1x8 (1 CPU), without OCP, Express 16G, Broadcom 57414 Dual Port 10/25GbE SFP28, OCP NIC 3.0, PowerEdge 2U LCD Bezel,
  - ii. 3 Year ProSupport Next Business Day Onsite

## **Storage Specs**

- i. The Storage will be of a well-known brand such as IBM or Dell
- ii. The Storage will support at least the following specs:
  - The storage will support double iSCSI/Optical connection for connecting the two servers
  - 6\*300GB SAS HDD (RAID 5)
  - Dual Controllers capable of backing up each other
  - Dual power supply hot swappable

## **Pre-installed server software's**

- i. MS SQL Server 2022 Standard Edition
- ii. VM Production Support VMware v Center Server 8 Standard for vSphere 8 P-SSS-C)
- iii. Latest windows server for each machine.

### ***Remote Access and Management***

- i. The proposed HA array and virtual environment shall include tools for Remote Access and Management.
- ii. The tools for Remote Access and Management shall allow system administrators to remotely monitor, configure and manage all parts of the proposed solution as if they were sitting in front of the equipment.
- iii. The proposed Remote Access and Management tools shall be integrated with the contractor supplied firewall hardware and software solution allowing users with sufficient permission to access the IT resources from any point in the KPLC WAN as well as from the outside of the organization (depending on KPLC policy for remote access).
- iv. The Remote Access and Management tools shall support actions such as:
  - a) Restarting virtual machines
  - b) Monitoring CPU and other server and IT equipment performance key factors.
  - c) Managing windows configuration for each server (both virtual servers and actual machines.
  - d) Managing DB tools
  - e) Monitoring and configuring any other subsystems installed on the servers.
  - f) Monitoring the Firewall performance.
  - g) Monitoring network performance and allowing network configuration.
  - h) Starting or shutting down any individual service
- v. The Remote Access and management tools will be supplied as part of the Device managements Software with no extra cost.