

Procurement of EPC Contractor for: the completion of the Isiolo - Nanyuki 132 kV transmission line, Tender No.: KETRACO/PT/007/2021

Clarification List - 01

Sl. No.	Ref Clause	Provision as per Bidding Document	Clarification requested/ Query	Response/ Answer
1.	Section II – Bid Data Sheet Clause ITB 4.2 Section I – Instructions to Bidders Clause 4.2	This bid is open to domestic firms only. A firm will be considered domestic if it is duly incorporated in Kenya under the Companies Act and wholly owned by a Kenyan(s). A Bidder, and all partners constituting the Bidder, shall have a nationality that has not been declared ineligible in Kenya in accordance with Section V, Eligible Countries. A Bidder shall be deemed to have the nationality of a country if the Bidder is a national or is constituted, incorporated, or registered and operates in conformity with the provisions of the laws of that country. This criterion shall also apply to the determination of the nationality of proposed subcontractors or suppliers for any part of the Contract including related services.	However, our understanding is that the bid is classified as ICB, that is, an International Competitive Bid. Very kindly clarify whether the bid is reserved for domestic firms only or is open to international firms as well.	The bid is NCB (National Competitive Bid) hence the bid is open to Domestic firms only.
2.			Could you please also clarify whether a bidder may be a joint venture comprising an international firm and a local firm with the local firm as the Representative? That is to say, a joint venture of a local firm, backed by an international firm?	The bid is open to Domestic firms only. Any JVC should be domestic firms only.
3.	Vol 2 of 2 - Employer's Requirement Clause 9.2 Obtaining right of way and compensation Clause 9.4 Access trackswayleaves and access facilities (but not necessarily the actual transport routes and access tracks themselves) will be provided by KETRACO to enable the Contractor to carry out the erection of the lines..... The Contractor shall provide at his own cost, all necessary local transport routes and access tracks and all labour, plant and materials necessary for	Kindly confirm who will be responsible to clear wayleaves	KETRACO will be responsible for wayleave as per clause 9.2. It's the responsibility of the contractor for the access tracks as per clause 9.4 and bush clearing the entire line corridor.



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	Clause 1.6 Extent of Work	unloading and erection, and shall be entirely responsible for their efficient and correct operation... m) Bush clearing of the entire line corridor		
4.			Check, inspection and arrangement of the available material – Provide a list of all available materials.	The winning bidder will be required to check, inspect and arrange the available materials jointly with KETRACO. The list is not available currently.
5.			Construction of approximately 17 Tower Foundations - Please confirm as the Price schedule indicates 28 Tower foundations Line item 3.1 to 3.6 Schedule 4	The soil classification for different tower locations is unknown hence the price schedule covers for different soil classes. The price schedule quantity remains.
6.			Erection of the balance 18 Towers along the transmission line. - Please confirm as the Price schedule indicates 24 Tower Line item 4.1.1 to 4.2.25 Schedule 4	The tower type for different tower is unknown hence the price schedule covers for different tower type. The price schedule quantity remains.
7.			Conductor stringing works for approximately 40kms of the transmission line. - Please confirm as the Price schedule indicates 25km Line item 6.1 Schedule 4	The previous contractor had purchased some conductor drums. The actual conductor length will be determined after material inventory by the winning bidder and witnessed KETRACO.

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				The price schedule quantity remains.
8.			OPGW stringing works for approximately 47kms of the transmission line. - Please confirm as the Price schedule indicates 16km Line item 6.2 Schedule 4	The previous contractor had purchased some OPGW drums. The actual OPGW length will be determined after material inventory and testing by the winning bidder and witnessed by KETRACO. The price schedule quantity remains.
9.			Construction of approximately 500m of access road to Isiolo substation - Please confirm as the Price schedule indicates 0km Line item 6.8 Schedule 4	Replace the 0km in price schedule with 0.5km. Below are the Access road specifications
10.			Bush clearing of the entire line corridor – please provide the width of the corridor.	For the single circuit towers, the corridor is 30m in width while for the triple circuit towers, the corridor is 40m in width. Actual quantity will be remeasured against the unit price provided.
11.	Volume 2 of 2	Details of the general routing of the overhead lines	Please provide the general route drawing.	The Route maps is as provided.
	1.8 Details of transmission line routes	shall be provided as route maps and given in soft copy together with the bid documents as Appendix 1.		
12.			Price Schedule 4 repetition of line items for FAT please confirm? Section 9	Item 6.10 and 6.11 remains.

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			<table><tr><td>9,2</td><td>Factory Acceptance Tests (FAT) as per General Requirements, clause 15</td><td>lumpsum</td><td>1</td></tr></table> Section 6 <table><tr><td>6.10</td><td>Factory inspection and test witnessing of OPGW</td><td>per inspection</td><td>1</td></tr><tr><td>6.11</td><td>Factory inspection and test witnessing of Phase conductors</td><td>per inspection</td><td>1</td></tr></table>	9,2	Factory Acceptance Tests (FAT) as per General Requirements, clause 15	lumpsum	1	6.10	Factory inspection and test witnessing of OPGW	per inspection	1	6.11	Factory inspection and test witnessing of Phase conductors	per inspection	1	In addition, the price schedule is revised by changing Item 4.4.1 from 0 to 1 in quantity. Bidders to update the price schedule accordingly. Items 9.2 'unit' changes to 'each' and quantity changes from 1 to 5. This covers for any other FAT not covered under 6.10, 6.11 and is required as per clause 15.
9,2	Factory Acceptance Tests (FAT) as per General Requirements, clause 15	lumpsum	1													
6.10	Factory inspection and test witnessing of OPGW	per inspection	1													
6.11	Factory inspection and test witnessing of Phase conductors	per inspection	1													
13.			Kindly share the Geotechnical Survey report of the Ex-Contractor for better understanding for foundation of Towers	The report is as attached and foundation drawings.												
14.			Kindly share the Topographical Survey report of the Ex-Contractor for better understanding for foundation and erection of Towers	The line profile is as attached.												
15.			Kindly share the location of the available materials?	The available materials are at Isiolo substation.												
16.			Optical regenerative repeater inclusive of solar cells and batteries as required (Supply only) kindly provide technical specifications.	This shall not be supplied. However, in replacement to this, the bidder should upgrade the Isiolo UMUX to be compatible with Nanyuki multiplex equipment. The specifications are as below and drawings are attached.												
17.			Tower detailed drawings/Design including weights?	The detailed designs shall be shared with the winning bidder.												

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18.			Existing Earthing designs?	The tower earthing drawing is as attached.



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PERMANENT ACCESS ROAD

The Length shall be 0.5km width 7.3m including side drains. Concrete or interlocking paving block 80mm surfacing.

The permanent road is to be designed in accordance with accepted international standards that shall be proposed by the Contractor and agreed by the Project Manager on the basis of a 25 year design life with 50 commercial vehicles per day. Due account is required to be taken in the road design of abnormal loads during both the construction phase and during the operational life of the plant resulting from heavy maintenance.

All permanent roads are required to be of such geometrical alignments (longitudinal gradient, cross-fall, radius and width) to accommodate the movement of heavy goods vehicles at the design road speed of 15mph.

UPGRADE OF ISIOLO SUBSTATION MULTIPLEXER

The Isiolo substation currently has the UMUX 5600 installed under the Meru – Isiolo project. This multiplexer is not manageable remotely from the Network Management System at KPLC's National Control Center. This will require replacement with a Multiplexer compatible with the Nanyuki end substation multiplexer.

The scope shall include the design, procurement and installation of a multiplexer at Isiolo substation and all additional cards and interfaces required for the remote end station in Nanyuki. This shall include the transfer of all the teleprotection, SCADA, telephony and other optical services in the UMUX into the new multiplexer.

The link capacity shall be maintained at STM-1.

PDH/SDH optical multiplexer equipment

The PDH/SDH multiplexer equipment shall conform to the latest ITU-T and ETSI SDH standards and shall be based on up-to-date technology. The equipment shall support SFP technology with extra long haul for SDH optical interfaces and offer next Generation SDH features (Generic framing procedure GFP, virtual concatenation VCAT, link Capacity Adjustment Schema LCAS) PDH and SDH function up to STM-16 shall be supported in one equipment. For operational networks it shall be suitable for operation in substations with harsh environment with high electromagnetic interference, be highly reliable and provide secure communications for real time signals such as voice, SCADA, Teleprotection and status/control signals. For high availability following protection functionality has to be provided:

- a) Equipment protection based on redundant power supply and control unit;
- b) Traffic protection based on redundancy of optical interfaces using one of the following protection schemes:- Multiplex Section Protection MSP 1+1, Linear Trail Protection LTP or Sub-Network Connection Protection SNCP.



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The equipment shall provide means to loop signals on 64kBit/s level as well as on 2Mbit/s level. It shall indicate an alarm if a loop is activated.

The EI line impedance shall be selectable 75 ohms unbalanced or 120ohms balanced with +/- 5% tolerance. The control of jitter and wander, optical interfaces, Q-interface shall be in accordance with ITU-T. G.957, G.823.

The multiplexer shall be integrated into the existing Network Management System which shall provide the means to supervise, monitor, control and reconfigure the whole access network. All required software and licences shall be the responsibility of the Contractor. It shall also provide various views to the network such as geographical overview. Logical network structure, hierarchical view. The network management system shall optionally allow several users to access the NMS at the same time where change becomes visible to all users. Each network element shall be manageable from a control centre and there shall be means to supervise externally /existing equipment at will. The network management shall be based on OSI protocol or TCP-IP. It must be possible to access the platform over a common TCP-IP network.

Optical multiplexer equipment shall be housed in a rack and shall comprise, but not be limited to the following functional elements.

Optical line interface, Electrical line interface, Tributary module, Switching unit, Control and alarm function, Engineering order wire (EOW) on Voice over IP, Service data interface adequate to migrate the existing services to the new multiplexer.

The digital multiplexers shall have voice frequency (2-wire FXS & FXO, 4wire E&M, etc) and data interface unit (V.24/V.28, V.35, X.24/V.11, Ethernet, 64kbit/s G.703 codirectional, RS485, binary contacts, etc). Primary access multiplex equipment shall be provided and shall comply with the relevant ITU-T recommendations.

The digital interface of the multiplexing equipment shall be of a time division multiplex signal compliant with the ITU-T G.703 recommendation to enable direct connection to the SDH optical multiplexer equipment. It shall be possible to synchronize the equipment using an external clock source, derived from a network or with an internal oscillator. The synchronization shall be configurable and it shall be possible to distribute the synchronization to other equipment as well. The system shall have the means of switching to select the synchronization source as well as a means of preventing the system from creating synchronization loops. The equipment shall be capable of selecting the source of synchronization by means of the SSM (Synchronization Status Messaging) feature according to ITU-T G.704 or priority a based sequence.

The bidder shall describe in full details the proposed synchronization method. The proposal shall also include backup synchronization faculty to fallback in case the main synchronizing route fails.

The multiplexer shall be rack mounted and shall interface with the power station control system and the telephone branch exchange via suitable type of connections. The unit shall support voice and data simultaneously and independently. The same equipment shall be used as a terminal, for through connections



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(transit, repeater) and as add-drop multiplexer with integrated optical transmission modules. The equipment shall be of fully modular design, based on a single 19" shelf.

Teleprotection Interface shall be an integrated function of the PDH/SDH multiplexer. The teleprotection of the existing lines shall be transferred into the new multiplexer and tested for proper functioning during installation and commissioning.

The multiplex equipment shall operate at -48VDC (-40.5..-57VDC) and -60VDC (-50.5..-72VDC) with positive ground. The equipment shall support dual power feed i.e. that two power sources can be connected directly to the equipment (two connection points).

The contractor's scope shall also include the supply, installation, testing and commissioning of the associated cards in the remote stations in Nanyuki and Isiolo substations including optical interfaces and teleprotection cards including the terminal block.

Tele-Protection Interface Equipment

This interface shall provide means to transmit four bi-directional command channels based on IEC 834-1.

The Interface shall provide permissive under/over reach transfer tripping, direct transfer tripping, directional comparison for earth faults and breaker failure protection signal.

The signals shall be adjustable from 24 to 220 VDC by means of software.

All inputs and outputs shall be galvanically isolated and with EMC immunity for harsh environment. Security, Dependability and Transmission speed shall be selectable and programmable. It shall be able to drop and insert commands, transfer commands as a transit station; it shall be possible to have and- and or-connections between commands.

The interface shall support T-nodes.

The Teleprotection interface shall provide an integrated non-volatile event-recorder, which shall be synchronisable either internally or by GPS and a command counter, which counts trip commands.

The teleprotection interface shall provide means for signal delay measurement.

1+1 protection must be available; the switching shall be done within less than 10ms.

The interface shall do automatic loop test every 60s. Under no circumstances shall the interface cause trip-commands in case of power supply failure or when put in or out of service.



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It shall be possible to synchronize all teleprotection interfaces with one GPS in one station.

Means shall be used to prevent tripping if the signal is inadvertently re-routed through the telecommunication network.

VoIP Solution

The Contractor shall provide a VoIP solution and will be responsible for the interface to the existing and specified SDH network. Two (2) IP phones shall be provided for the Isiolo substation on the HMI desk.

Power Supplies

The Communication Equipment shall be supplied from 48 V, DC supplies. It shall be the responsibility of the Contractor to provide all cabling from and to the new equipment.

The Contractor shall be responsible for ensuring that the existing power source has adequate capacity to supply the load of the equipment they are installing, whilst also allowing for spare capacity.

Cables and cable Splice

The Contractor shall provide all cabling necessary for the correct functioning of all equipment supplied under this contract, including that between the Fiber Communication Equipment/ Teleprotection equipment and its associated power supply, distribution terminals and the interface cubicles at each site.

The requirements of this specification shall apply with regard to all power and control cables.

Testing

The multiplexer shall be tested at the factory in an FAT witnessed by the Client to confirm design and compliance with technical specifications. The Site acceptance Test shall be witnessed by the Employer.

Summary of Standards

The Equipment shall comply with the latest ITU-T recommendations for the plesiochronuous and synchronous hierarchies. The equipment shall be KEMA type tested or independent international test centers. In particular the mentioned recommendations shall be covered:

EN 55022	Limits and methods of measurement of radio interference characteristics of information technology equipment
IEC60825	Safety of laser products
IEC60834	Teleprotection equipment of power systems



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| IEC60870 | Telecontrol equipment and systems |
| IEC60874 | Connectors for optical fiber and cables |
| IEC61000 | Electromagnetic compatibility |
| IEC61300 | Fiber optic interconnecting devices and passive components |
| IEC62367 | Safety aspects for xDSL signal on circuits connected to telecommunication networks |
| International Telecommunications Union – Telecommunication (ITU-T) | |
| G.652 | Characteristics of a single-mode optical fiber cable |
| G.653 | Characteristics of a dispersion-shifted single-mode optical fiber cable |
| G.661 | Definition and test methods for the relevant generic parameters of optical amplifier devices and subsystems |
| G.662 | Generic characteristics of optical amplifier devices and subsystems |
| G.702 | Digital hierarchy bit rates |
| G.703 | Physical/electrical characteristics of hierarchical digital interfaces |
| G.704 | Synchronous frame structures used at 1544, 6312, 2048, 8448 and 44 736 kb/s hierarchical levels |
| G.707 | Network node interface for the synchronous digital hierarchy (SDH) |
| G.708 | Sub STM-0 network node interface for the synchronous digital hierarchy (SDH) |
| G.709 | Interfaces for the Optical Transport Network (OTN) |
| G.711 | Pulse code modulation (PCM) of voice frequencies |
| G.712 | Transmission performance characteristics of pulse code modulation |
| G.732 | Characteristics of primary PCM multiplex equipment operating at 2048 kb/s |
| G.736 | Characteristics of a synchronous digital multiplex equipment operating at 2048 kb/s |
| G.741 | General considerations on second order multiplex equipment |
| G.742 | Second order digital multiplex equipment operating at 8448 kb/s and using positive justification |
| G.744 | Second order PCM multiplex equipment operating at 8448 kb/s |
| G.745 | Second order digital multiplex equipment operating at 8448 kb/s and using positive/zero/negative justification |
| G.772 | Protected monitoring points provided on digital transmission systems |
| G.773 | Protocol suites for Q-interfaces for management of transmission systems |



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| G.774 | Synchronous digital hierarchy (SDH) - Management information model for the network element view |
| G.781 | Synchronization layer functions |
| G.783 | Characteristics of synchronous digital hierarchy (SDH) equipment functional blocks |
| G.784 | Synchronous digital hierarchy (SDH) management |
| G.803 | Architecture of transport networks based on the synchronous digital hierarchy (SDH) |
| G.813 | Timing characteristics of SDH equipment slave clocks (SEC) |
| G.823 | The control of jitter and wander within digital networks that are based on the 2048 kb/s hierarchy |
| G.825 | The control of jitter and wander within digital networks that are based on the synchronous digital hierarchy (SDH) |
| G.826 | End-to-end error performance parameters and objectives for international, constant bit-rate digital paths and connections |
| G.831 | Management capabilities of transport networks based on the synchronous digital hierarchy (SDH) |
| G.841 | Types and characteristics of SDH network protection architectures |
| G.842 | Inter-working of SDH network protection architectures |
| G.874 | Management aspects of the optical transport network element |
| G.957 | Optical interfaces for equipments and systems relating to the synchronous digital hierarchy |
| G.961 | Digital transmission system on metallic local lines for ISDN basic rate access |
| K.10 | Low frequency interference due to unbalance about earth of telecommunication equipment |
| K.11 | Principles of protection against over voltages and over currents |
| K.13 | Induced voltages in cables with plastic-insulated conductors |
| K.14 | Provision of a metallic screen in plastic-sheathed cables |
| M.2101 | Performance limits and objectives for bringing-into-service and maintenance of international SDH paths and multiplex sections |
| M.2110 | Bringing-into-service international multi-operator paths, sections and transmission systems |
| M.2120 | International multi-operator paths, sections and transmission systems fault detection and localization procedures |

