

REPUBLIC OF KENYA



MINISTRY OF TRANSPORT, INFRASTRUCTURE, HOUSING, URBAN
DEVELOPMENT AND PUBLIC WORKS

STATE DEPARTMENT OF PUBLIC WORKS

PROPOSED OFFICE SPACE AT NSSF ANNEX HOUSE 10TH FLOOR FOR
PRIVATISATION COMMISSION

W. P. ITEM No. D107 NB/NB/1902 JOB No. 10759 A

VOLUME 5 (ELECTRICAL INSTALLATION WORKS)

*TENDER SPECIFICATIONS & BILLS OF QUANTITIES FOR SUPPLY, INSTALLATION, TESTING
AND COMMISSIONING OF ELECTRICAL INSTALLATION WORKS*

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DEFINITIONS

The following terms and expressions used in the contract document shall have the following meanings:

The Employer	Government of the Republic of Kenya
Represented by:	Chief Executive Officer Privatization Commission P.O. BOX 34542-00100 <u>NAIROBI</u>
Architect	Chief Architect Ministry of Transport, Infrastructure, Housing, Urban Development and Public Works P.O. Box 30743 – 00100 <u>NAIROBI</u>
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Structural Engineer	Chief Engineer (Structural) Ministry of Transport, Infrastructure, Housing, Urban Development and Public Works P.O. Box 30743 - 00100 <u>NAIROBI</u>
Employer's representative	This shall mean the Project Manager and shall be The Works Secretary, Ministry of Transport, Infrastructure, Housing, Urban Development and Public Works P.O. Box 30743 – 00100 <u>NAIROBI</u>
Contractor	The firm appointed to carry out Builders Works.
Sub-contractor	The firm appointed to carry out Electrical Installation Works.
Site location	The Site is Located at 10th Floor, NSSF Annex House – Nairobi County

SECTION B

GENERAL SPECIFICATIONS

OF

MATERIALS AND WORKS

GENERAL SPECIFICATIONS OF MATERIALS AND WORKS

- 2.1 General
- 2.2 Standard of Materials
- 2.3 Workmanship
- 2.4 Procurement of Materials
- 2.5 Shop Drawings
- 2.6 Record Drawings
- 2.7 Regulations and Standards
- 2.8 Setting out Works
- 2.9 Position of Electrical Plant and Apparatus
- 2.10 M.C.B Distribution Panels and Consumer Units
- 2.11 Fused Switchgear and Isolators
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- 2.42 Steel Conduits and Steel Trunking
- 2.43 Testing on Site

2.1 GENERAL

This specification is to be read in conjunction with the drawings which are issued with it. Bills of quantities shall be the basis of all additions and omissions during the progress of the works.

2.2 STANDARD OF MATERIALS

Where the material and equipment are specifically described and named in the Specification followed by approved equal, they are so named or described for the purpose of establishing a standard to which the sub-contractor shall adhere.

Should the Sub-contractor install any material not specified herein before receiving approval from the proper authorities, the Engineer shall direct the Sub-contractor to remove the material in question immediately. The fact that this material has been installed shall have no bearing or influence on the decision by the Engineer.

All materials condemned by the Engineer as not approved for use, are to be removed from the premises and suitable materials delivered and installed in their place at the expense of the Sub-contractor. All materials required for the works shall be new and the best of the respective kind and shall be of a uniform pattern.

2.3 WORKMANSHIP

The workmanship and method of installation shall conform to the best standard practice. All work shall be performed by a skilled tradesman and to the satisfaction of the Engineer. Helpers shall have qualified supervision.

Any work that does not in the opinion of the Engineer conform to the best standard practice will be removed and reinstated at the Sub-contractor's expense.

Permits, Certificates or Licenses must be held by all tradesmen for the type of work; in which they are involved where such permits, certificates or licenses exist under Government legislation.

2.4 PROCUREMENT OF MATERIALS

The sub-contractor is advised that no assistance can be given in the procurement or allotment of any materials or products to be used in and necessary for the construction and completion of the work.

Sub-contractors are warned that they must make their own arrangements for the supply of materials and/or products specified or required.

2.5 SHOP DRAWINGS

Before manufacture or Fabrication is commenced the sub-contractor shall submit Two copies of detailed drawings of all control pillars, meter cubicles, medium voltage switchboards including their components showing all pertinent information including sizes, capacities, construction details, etc., as may be required to determine the suitability of the equipment for the approval of the Engineer. Approval of the detailed drawings shall not relieve the sub-contractor of the full responsibility of errors or the necessity of checking the drawings himself or of furnishing the materials and equipment and performing the work required by the plans and specifications.

2.6 RECORD DRAWINGS

These diagrams and drawings shall show the completed installation including sizes, runs and arrangements of the installation. The drawings shall be to scale not less than 1:50 and shall include plan views and section.

The drawings shall include all the details which may be useful in the operation, maintenance or subsequent modifications or extensions to the installation.

Three sets of diagrams and drawings shall be provided, all to the approval of the Engineer.

One coloured set of line diagrams relating to operating and maintenance instructions shall be framed and, mounted in a suitable location.

2.7 REGULATIONS AND STANDARDS

All work executed by the Sub-contractor shall comply with the current edition of the "Regulations" for the Electrical Equipment of Buildings, issued by the Institution of Electrical Engineers, and with the Regulations of the Local Electricity Authority.

Where the two sets of regulations appear to conflict, they shall be clarified with the Engineers. All materials used shall comply with relevant Kenya Bureau of Standards Specification.

2.8 SETTING OUT WORK

The sub-contractor at his own expenses; is to set out works and take all measurements and dimensions required for the erection of his materials on site; making any modifications in details as may be found necessary during the progress of the works, submitting any such modifications or alterations in detail to the Engineer before proceeding and must allow in his Tender for all such modifications and for the provision of any such sketches or drawings related thereto.

2.9 POSITIONS OF ELECTRICAL PLANT AND APPARATUS

The routes of cables and approximate positions of switchboards etc, as shown on the drawings shall be assumed to be correct for purpose of Tendering, but exact positions of all electrical Equipment and routes of cables must be agreed on site with the Engineer before any work is carried out.

2.10 MCB DISTRIBUTION PANELS AND CONSUMER UNITS

All cases of MCB Panels and consumer units shall be constructed in heavy gauge sheet with hinged covers.

Removable undrilled gland plates shall be provided on the top and bottom of the cases. Miniature circuit breakers shall be enclosed in moulded plastic with the tripping mechanism and arc chambers separated and sealed from the cable terminals.

The operating dolly shall be tripfree with a positive movement in both make and break position. Clear indication of the position of the handle shall be incorporated.

The tripping mechanism shall be on inverse characteristic to prevent tripping in temporary overloads and shall not be affected by normal variation in ambient temperature.

A locking plate shall be provided for each size of breaker; A complete list of circuit details on typed cartridge paper glued to stiff cardboards and covered with a sheet of Perspex, and held in position with four suitable fixings, shall be fitted to the inner face of the lids of each distribution panel. The appropriate MCB ratings shall be stated on the circuit chart against each circuit in use: Ivorine labels shall be secured to the insulation barriers in such a manner as to indicate the number of the circuits shown on the circuit chart.

Insulated barriers shall be fitted between phases, and neutrals in all boards, and to shroud live parts.

Neutral cables shall be connected to the neutral bar in the same sequence as the phase cables are connected to the MCB's. This shall also apply to earth bars when installed.

2.11 FUSED SWITCHGEAR AND ISOLATORS

All fused switchgear and isolators whether mounted on machinery, walls or industrial panels shall conform to the requirements of KS 04 – 226 PART: 1: 1985.

All contacts are to be fully shrouded and are to have a breaking capacity on manual operations as required by KS 04 – 182: 1980.

Fuse links for fused switches are to be of high rupturing capacity cartridge type, conforming to KS 04 – 183: 1978.

Isolators shall be load breaking/fault making isolators.

Fused switches and isolators are to have separate metal enclosures. Mechanical interlocks are to be provided between the door and main switch operating mechanism so arranged that the door may not be opened with the switch in the 'ON' position. Similarly; it shall not be possible to close the switch with the door open except that provision to defeat the mechanical interlock and close the switch with the door in the open position for test purposes. The 'ON' and 'OFF' positions of all switches and isolators shall be clearly indicated by a mechanical flag indicator or similar device. In T.P & N fused switch units, bolted neutral links are to be fitted.

2.12 CONDUITS AND CONDUIT RUNS

Conduit systems are to be installed so as to allow the loop-in system of wiring:

All conduits shall be black rigid super high impact heavy gauge class 'A' PVC in accordance with KS 04 – 179: 1988 and IEE Regulations. No conduit less than 20mm in diameter shall be used anywhere in this installation.

Conduit shall be installed buried in plaster work and floor screed except when run on wooden or metal surface when they will be installed surface supported with saddles every 600mm. Conduit run in chases shall be firmly held in position by means of substantial pipe hooks driven into wooden plugs.

The Sub-contractor's attention is drawn to the necessity of keeping all conduits entirely separate from other piping services such as water and no circuit connections will be permitted between conduits and such pipes.

All conduits systems shall be arranged wherever possible to be self-draining to switch boxes and conduit outlet points for fittings:

The systems, when installed and before wiring shall be kept plugged with well fitting plugs and when short conduit pieces are used as plugs, they shall be doubled over and tied firmly together with steel wire; before wiring all conduit systems shall be carried out until the particular section of the conduit installation is complete in every respect.

The sets and bends in conduit runs are to be formed on site using appropriate size bending springs and all radii of bends must not be less than 2.5 times the outside diameter of the conduit. No solid or inspection bends, tees or elbows will be used.

Conduit connections shall either be by a demountable (screwed up) assembly or adhesive fixed and water tight by solution. The tube and fittings must be clean and free of all grease before applying the adhesive. When connections are made between the conduit and switch boxes, circular or non-screwed boxes, care shall be taken that no rough edges of conduit stick out into the boxes.

Runs between draw in boxes are not to have more than two right angle bends or their equivalent. The sub-contractor may be required to demonstrate to the Engineers that wiring in any particular run is easily withdrawable and the sub-contractor may, at no extra cost to the contract; be required to install additional draw-in boxes required. If conduit is installed in straight runs in excess of 6000mm, expansion couplings as manufactured by Egatube shall be used at intervals of 6000mm.

Where conduit runs are to be concealed in pillars and beams, the approval of the Structural Engineer, shall be obtained. The sub-contractor shall be responsible for marking the accurate position of all holes chases etc, on site, or if the Engineer so directs, shall provide the Main Contractor with dimensional drawings to enable him to mark out and form all holes and chases. Should the sub-contractor fail to inform the main contractor of any inaccuracies in this respect they shall be rectified at the sub-contractor's expense.

It will be the Sub-contractor's responsibility to ascertain from site, the details of reinforced concrete or structural steelwork and check from the builder's drawings the positions of walls, structural concrete and finishes. No reinforced concrete or steelwork may be drilled without first obtaining the written permission of the Structural Engineer.

The drawings provided with these specifications indicate the appropriate positions only of points and switches, and it shall be the Sub-Contractors responsibility to mark out and centre on site the accurate positions where necessary in consultation with the Architect and the Engineer. The sub-contractor alone shall be responsible for the accuracy of the final position.

2.13 CONDUIT BOXES AND ACCESSORIES

All conduit outlets and junction boxes are to be either malleable iron and of standard circular pattern of the appropriate type to suit saddles being used or super high impact PVC manufactured to KS 04 – 179 : 1983.

Small circular pattern boxes are to be used with conduits up to and including 25mm outside diameter. Rectangular pattern adaptable boxes are to be used for conduits of 32mm outside diameter and larger. For drawing in of cables in exposed runs of conduit, standard pattern through boxes are to be used:

Boxes are to be not less than 50mm deep and of such dimensions as will enable the largest appropriate number of cables for the conduit sizes to be drawn in without excessive bending.

Outlet boxes for lighting fittings are to be of the loop-in type where conduit installation is concealed and the sub-contractor shall allow one such box per fitting, except where fluorescent fittings are specified when two such boxes per fitting shall be fitted flush with ceiling and if necessary fitted with break joint rings. Pattresses shall be fitted where required to outlets on surface conduit runs.

Adaptable boxes are two of PVC or mild steel (of not less than 12swg) and black enamelled or galvanised finish according to location. They shall be of square or oblong shape location. They shall be of square or oblong shape complete with lids secured by four 2 BA brass roundhead screws; No adaptable box shall be less than 75mm x 75mm x 50mm or larger than 300mm x 300mm x 75mm and shall be adequate in depth in relation to the size of conduit entering it. Conduits shall only enter boxes by means of conduit bushes.

2.14 LABELS

Labels fitted to switches and fuse boards; -

- (i) Shall be Ivorine engraved black on white.
- (ii) Shall be secured by R.H brass screws of same manufacturing throughout.
- (iii) Shall be indicated on switches: -
 - a) Reference number of switch
 - b) Special current rating
 - c) Item of equipment controlled
- (iv) Shall indicate on MCB panels
 - a) Reference number
 - b) Type of board, i.e.; lighting, sockets, etc.
 - c) Size of cable supplying panel
 - d) where to isolate feeder cable
- (v) Shall be generally not less than 75mm x 50mm.

2.15 EARTHING

The earthing of the installation shall comply with the following requirements; -

- (i) It shall be carried out in accordance with the appropriate sections of the current edition of the Regulations, for the Electrical Equipment of Buildings issued by Institute of Electrical Engineers of Great Britain.

- (ii) At all main distribution panels and main service positions a 25mm x 3mm minimum cross sectional area Copper tape shall be provided and all equipment including the lead sheath and armouring of cables, distribution boards and metal frames shall be bonded thereto.
- (iii) The earth tape in Sub-clause (ii) shall be connected by means of a copper tape or cable of suitable cross sectional area to an earth electrode which shall be a copper earth rod (see later sub-clause).
- (iv) All tapes to be soft high conductivity copper, untinned except where otherwise specified and where run underground on or through walls, floors, etc., it shall be served with corrosion resisting tape or coated with corrosion compound and braided
- (v) Where the earth electrode is located outside the building a removable test link shall be provided inside the building as near as possible to the point of entry to the tape, for isolating the earth electrode for testing purposes.
- (vi) Earthing of sub-main equipment shall be deemed to be satisfactory where the sub-main cables are M.I.C.S. or conduit with separate earth wire, and installation is carried out in accordance with the figures stated in the current edition of the I.E.E Regulations.
- (vii) Where an earth rod is specified (see Sub-clause (iii) it shall be proprietary manufacture, solid hand drawn copper of 15mm diameter driven into the ground to a minimum depth of 3.6M. It shall be made up to 1.2m sections with internal screw and socket joints and fitted with hardened steel tip and driving cap.
- (viii) Earth plates will not be permitted
- (ix) Where an earth rod is used the earth resistance shall be tested in the manner described in the current edition of the IEE Regulations, by the Sub-Contractor in the presence of the Engineer and the Sub-Contractor shall be responsible for the supply of all test equipment.
- (x) Where copper tape is fixed to the building structure it shall be by means of purpose made non-ferrous saddles which space the conductor away from the structure a minimum distance of 20mm. Fixings, shall be made using purpose made plugs; No fixings requiring holes to be drilled through the tape will be accepted.
- (xi) Joints in copper tape shall be tinned before assembly riveted with a minimum of two copper rivets and seated solid.
- (xii) Where holes are drilled in the earth tape for connection to items of equipment the effective cross-sectional area must not be less than required to comply with the IEE regulations.
- (xiii) Bolts, nuts and washers for any fixing to the earth tape must be of non-ferrous material.
- (xiv) Attention is drawn to the need for the earthing metal parts of lighting fittings and for bonding ball joint suspension in lighting fittings.

2.16 CABLES AND FLEXIBLE CORDS

All cables used in this Sub-Contract shall be manufactured in accordance with the current appropriate Kenya standard Specification which are as follows: -

P.V.C. Insulated Cables and Flexible Cords	---	Ks 04-192:1988
P.V.C Insulated Armoured Cables	---	Ks 04-194:1990
Armouring of Electric cables	---	Ks 04-290:1987

The successful Sub-Contractor will, at the Engineers discretion be required to submit samples of cables for the Engineers approval; the Engineer reserves the right to call for the cables of an alternative manufacture without any extra cost being incurred.

P.V.C. insulated cables shall be 500/1000-volt grade. No cables smaller than 1.5mm² shall be used unless otherwise specified. The installation and the finish of cables shall be as detailed in later clauses. The colour of cables shall conform to the details stated in the "Cable Braid and insulation Colours" Clause.

2.17 ARMoured P.V.C. INSULATED AND SHEATHED CABLES:

Shall be 600/1000-volt grade manufactured to Ks 04-194:1988 and Ks 04-187/188 with copper stranded conductors.

The wire armour of the cable shall be used wholly as an earth continuity conductor and the resistance of the wire armour shall have a resistance not more than twice of the largest current carrying conductor of the cable.

P.V.C./S.W.A./P.V.C. cables shall be terminated using "Telecom" "B" type or approved equal or approved equal glands and a P.V.C. tapered sleeve shall be provided to shroud each gland.

2.18 CABLE SUPPORTS, MARKERS AND TILES

All PVC/SWA/PVC cables run inside the building shall be fixed in rising ducts or on ceilings by means of die cast cable hooks or clamps, of appropriate size to suit cables, fixed by studs and back nuts to their channel sections.

Alternatively, fixing shall be by BICC claw type cleating system with die-cast cleats and galvanised mild steel back straps or similar approved equal method. For one or two cables run together the cleats shall be fixed a special channel section supports or backstraps described above which shall in turn be secured to walls or ceilings of ducts by rawbolts.

In excessively damp or corrosive atmospheric conditions special finishes may be required and the Sub-contractor shall apply to the Engineer for further instructions before ordering cleats and channels for such areas.

The above type of hooks and clamps and channels or cleats and blackstraps shall also be used for securing cables in vertical ducts.

Cables supports shall be fixed at 600mm maximum intervals, the supports being supplied and erected under this Sub-contract. Saddles shall not be used for supporting cables nor any other type of fixing other than one of the two methods described above or other system which has received prior approval of the Engineer;

Cables are to be kept clear of all pipe work and the Sub-contractor shall work in close liaison with other services Sub-contractors.

The Sub-Contractor shall include for the provision of fixing of approved type coloured slip on cables end markers to indicate permanently the correct phase and neutral colours on all ends.

Provision shall be made for supplying and fixing approved non-corrosive metal cable markers to be attached to the outside of all PVC/SWA/PVC cables at 15mm intervals indicating cable size and distinction.

Where PVC/SWA/PVC cables are outside the building they shall be laid underground 750mm deep with protecting concrete interlocking cover tiles laid over which shall be provided and laid under this Sub-contract.

All necessary excavations and reinstatement of ground including sanding or trenches will be carried out by the Sub-Contractor, unless otherwise stated.

2.19 PVC INSULATED CABLES

Shall be of non-braided type as CMA reference 6491 x 600/1000/1000-volt grade cables, or equal approved.

PVC cables shall conform to the details of the “Cables and Flexible cords” and “Cable Braid and Insulation Colours” clauses.

2.20 HEAT RESISTING CABLES

Final connections to cookers, water heaters, etc., shall be made using butyl rubber insulated cable as CMA reference 610 butyl (Single core 600/1000 Volt).

This type of cable shall be used in all instances where a temperature exceeding 100°F, but not exceeding 150°F is likely to be experienced. Final connections to all lighting fittings (and other equipment where a temperature in excess of 150°C likely to be experienced) shall be made using silicon rubber insulated cable or equal and approved.

2.21 FLEXIBLE CORDS

Shall be in accordance with the “Cable and Flexible Cords” clause. No cord shall be less than 24/0.2mm in size unless otherwise specified.

Circular white twin TRS flex shall be used for plain pendant fittings up to 100 watts. For all other types of lighting fittings, the flexible cable shall be silicone rubber insulated.

No polythene insulated flexible cable shall be used in any lighting fitting or other appliance (see “Heat Resisting Cables” Clause 30).

2.22 CABLE ENDS AND PHASE COLOURS

All cable ends connected up in switchgear, MCB panels etc, shall have the insulation carefully cut back and the ends sealed with Hellerman rubber slip on cable end markers.

The markers shall be of appropriate phase colour for switch and all other live feeds to the details of the “Cable Insulation Colours” clause. Black cable with black end markers shall only be used for neutral cables.

2.23 CABLE INSULATION COLOURS

Unless otherwise stated in later clauses the insulation colours shall be in accordance with the following table.

Where other systems are installed the cable colours shall be in accordance with the details stated in the appropriate clause.

<u>SYSTEM</u>	<u>INSULATION COLOUR</u>	<u>CABLE END MARKER</u>
1) Main and Sub-Main		
a) Phase	Red	Red
b) Neutral	Black	Black
2) Sub-Circuits Single Phase		
a) Phase	Red	Red
b) Neutral	Black	Black

2.24 SUB-CIRCUIT WIRING

For all lighting and sockets wiring shall be carried out in the “looping in” system and there shall be no joints whatsoever. No lighting circuits shall comprise more than 20 points when protected by 10A MCB. Cables with different cross-section area of copper shall not be used in combination.

Lighting circuits P.V.C. cable.

- (i) 1.5mm² for all lighting circuits indicated on the drawing.

Power circuits P.V.C cable (minimum sizes).

- (ii) 2.5mm² for one, two or three 5Amp sockets wired in parallel.

- (iii) 2.5mm² for one 15Amp socket.

- (iv) 2.5mm² for maximum of ten switched 13 Amp sockets wired from 30 Amp MCB.

The wiring sizes for lighting circuits and sockets are shown on the drawings. In such cases, the sizes shown on the drawings shall prevail over the sizes specified.

Wiring sizes for other appliances shall be shown on the drawing or specified in later clauses of this specification.

2.25 SPACE FACTOR

The maximum number of cables that may be accommodated in a given size of conduit or trunking or duct is not to exceed the number in Tables B.5 and B.6 or as stated in Regulation B.91, B.117 and B.118 of the I.E.E Regulations whichever is appropriate.

2.26 INSULATION

The insulation resistance to earth and between poles of the whole wiring system, fittings and lumps, shall not be less than the requirements of the latest edition of the I.E.E Regulations. Complete tests shall be made on all circuits by the Sub-contractor before the installations are handed over.

A report of all tests shall be furnished by the Sub-Contractor to the Engineer. The Engineer will then check test with his own instruments if necessary.

2.27 LIGHTING SWITCHES

These shall be mounted flush with the walls, shall be contained in steel or alloy boxes and shall be of the gangs' ratings and type shown in the drawings. They shall be as manufactured by M.K. Electrical Ltd., or other equal and approved to KS 04 – 247: 1988

2.28 SOCKETS AND SWITCHED SOCKETS

These shall be flush pattern in steel/pvc box and shall be of the gangs and type specified in the drawings.

They shall be 13- Amp, 3-pin, shuttered, switched and as manufactured by "M.K. Electrical Co. Ltd.", or other approved equal to KS 04 – 246: 1987

2.29 FUSED SPUR BOXES

These shall be flush, D.P switched as in steel/pvc box and of type and make specified in the drawings complete with pilot light and as manufactured by "M. K. Electrical Company Ltd", or other approved equal. KS 04 – 247: 1988

2.30 COOKER OUTLETS

These shall be flush mounted with 13-A switched socket outlet and neon indicator Lamps.

The cooker control units shall be as manufactured by "M.K. Electrical Company Ltd", or other approved equal KS 04 – 247: 1988

2.31 CONNECTORS

Shall be specified in the drawings and appropriate rating. These shall be fitted at all conduit box lighting point outlets for jointing of looped P.V.C cables with flexible cables of specified quality.

2.32 LAMPHOLDERS

Shall be of extra heavy H.O skirted and shall be provided for every specified lighting fitting and shall be B.C., E.S., or G.E.S as required. All E.S. and G.E.S. holders shall be heavy brass type (except for plain pendants where the reinforced bakelite type shall be used). The screwed cap of the E.S and G.E.S. holders shall be connected to the neutral.

Where lampholders are supported by flexible cable, the holders shall have “cord grip” arrangements and in the case of metal shades earthing screws shall be provided on each of the holders.

The Sub-Contractor must order the appropriate type of holder when ordering lighting fittings, to ensure that the correct types of holders are provided irrespective of the type normally supplied by the manufacturers.

2.33 LAMPS

All lamps shall be suitable for normal stated supply voltage and the number and sizes of lamps detailed on the drawings shall be supplied and fixed. The Sub-Contractor must verify the actual supply voltage with the supply authority before ordering the lamps.

Tungsten filament lamps shall be manufactured in accordance with KS 04 – 112:1978 for general service lamps and KS 04 – 307:1985 for lamps other than general services. Tubular fluorescent lamps shall comply with KS 04 – 464:1982

Pearl lamps shall be used in all fittings unless otherwise specified.

2.34 LIGHTING FITTINGS AND STREET LIGHTING LANTERNS

This Sub-Contract shall include for the provision, handling charges, taking the delivery, safe storage, wiring (including internal wiring) assembling and erecting of all lighting fittings shown on the drawings.

All fittings and pendants shall be fixed to the conduit boxes with brass R/H screws. These to be in line with metal finish of fittings. The lighting fittings are detailed for the purpose of establishing a high standard of finish and under no circumstances will substitute fittings be permitted.

In case of rectangular shaped ceiling fittings, the extreme ends of the fittings shall be secured to suitable support in addition to the central conduit box fittings. Supports shall be provided and fixed by the Sub-Contractor.

The whole of the metal work of each lighting fittings shall be effectively bonded to earth. In the case of ball and/or knuckle joints short lengths of flexible cable shall be provided, bonded to the metal work on either side of the joints. If the above provisions are not made by the manufacturers -, the Sub-contractor shall include cost of additional work necessary in his tender. See “Flexible Cords” clause for details of internal wiring of lighting fittings.

Minimum size of internal wiring shall be 20/0.20mm (23/0067). Each lighting fitting shall be provided with number type and size of lamps as detailed on the drawings. It is to be noted that some fittings are suspended as shown on the drawings.

Where two or more points are shown adjacent to each other on the drawings, e.g. socket outlet and telephone outlet, they shall be lined up vertically or horizontally on the centre lines of the units concerned.

Normally, the units shall be lined up on vertical centre lines, but where it is necessary to mount units at low level they shall be lined up horizontally.

2.35 POSITIONS OF POINTS AND SWITCHES

Although the approximate positions of all points are shown on the drawings, enquiry shall be made as to the exact positions of all M.C.B panels, lighting points, socket outlets etc, before work is actually commenced. The Sub-contractor must approach the Architect with regard to the final layout of all lights on the ceiling and walls.

The Sub-contractor must consult with the Engineer in liaison with the Clerk of Works, or the General Foreman on site regarding the positions of all points before fixing any conduit etc. The Sub-Contractor shall be responsible for all alterations made necessary by the non-compliance with the clause.

2.36 STREET/SECURITY OUTDOOR LIGHTING COLUMNS:

The column shall be at a minimum of 225mm in the ground on 75mm thick concrete foundations and the pole up to 150mm shall be surrounded with concrete. The top bracket and plain section of the columns shall be common to and interchangeable with all brackets with maximum mismatching tolerance of 3mm between any pole and bracket. After manufacture and before erection the columns shall be treated with an approved mordant solution which shall be washed off and the whole allowed to dry. Thereafter, the columns shall be painted with one undercoat and two coats of gloss paint to an approved colour. All columns shall be complete with fused cut-outs.

2.37 TIMING CONTROL SWITCH

These shall be installed where shown on the drawings. Photocell timing control circuits which will operate 'on' with a specified level of darkness and 'off' with a given level of light. The initial adjustment will be done with approval of the Electrical Engineer.

2.38 WIRING SYSTEM FOR STREET LIGHTING

Cables shall be as indicated on the drawings, and shall be laid in a cable trench 450mm deep along the road sides and 600mm deep across the roads and 900mm away from the road kerb or 1500mm away from the edges of the road. 'Loop-in' and 'Loop-out' arrangement shall be used at every pole. Wiring to the lanterns on each pole shall be with 1.5mm² PVC twin insulated and sheathed cable with earth wire shall be laid at least 600mm below the finished road level on a compact bed of murram at least 50mm thick and covered with a concrete surrounded 150mm thick.

2.39 METAL CONTROL PILLAR

These shall be metal clad and fabricated as per contract drawings and specification. The Sub-Contractor shall supply, install, test and commission control pillars including supplying, fixing connecting switchgears as detailed on the appropriate drawings.

2.40 CURRENT OPERATED EARTH LEAKAGE CIRCUIT BREAKER

Current operated earth leakage circuit breaker shall conform to B.S.S. 4293:68 rated at 240 volts D.P. 50 cycles A.C. Mains.

The breaker shall be provided with test switch and fitted in weather proof enclosure for surface mounting. The rated load current and earth fault operating current shall be as specified in the drawings. These shall be as manufactured by Crabtree, Siemens or other equal and approved.

2.41 M.V. SWITCHBOARD AND SWITCHGEAR

The switchboard shall be manufactured in accordance with KS04-226 which co-ordinates the requirements for electrical power switchgear and associated apparatus. It is not intended that this K.S. should cover the requirements for specified apparatus for which separate Kenyan Standard exist. All equipment and material used in the switchboard shall be in accordance with the appropriate Kenya Standard.

The switchboard shall comprise the equipment shown on the drawings together with all current transformers, auxiliary fuses, labels, small wiring and interconnections necessary for the satisfactory operation of the switchboard.

The Switchboard shall be of the flush fronted, enclosed, metal clad type with full front or rear access as called for in the particular specifications, suitable for indoor use, sectionalized as necessary to facilitate transport and erection. The maximum height of the switchboard is to be approximately 2.0 metres. A suitable connection chamber containing all field terminals shall be provided at the top or bottom of the switchboard as appropriate.

Before manufacture, the Sub-Contractor shall submit to the consulting Engineer for approval of detailed drawings showing the layout, construction and connection of the switchboard.

All bus-bars and bus-bar connections shall consist of high conductivity copper and be provided in accordance with KS 04-226: 1985. The bus-bars shall be clearly marked with the appropriate phase and neutral colours which should be red, yellow, blue for the phases and black for neutral. The bus-bars shall be so arranged in the switchboard that the extensions to the left and right may be made in the future with ease should the need arise.

Small wiring, which will be neatly arranged and cleated, shall be executed in accordance with B.S. 158 and the insulation of the wiring shall be coloured according to the phase or neutral connection.

Switches and fuse switches, shall be in strict accordance with KS04-183:1978 Class 2 switches. Means of locking the switch in the "OFF" position shall be provided.

All fuse switches shall comply with KS04-183:1978, PARTS 2 and 3 a fault rating at least equal to the fault rating of the switchboard in which they are installed. Cartridge fuse links to KS 04-183:1978 category A.C. 46, class Q1 and fusing factor not exceeding 1.5 shall be supplied with each fused switch.

Mounting arrangements shall be such that individual complete fuse switches may be disconnected and withdrawn when necessary without extensive dismantling work.

When switches are arranged in their formation all necessary horizontal and vertical barriers shall be provided to ensure segregation from adjacent units. Means of locking the switch in the "OFF" position shall be provided.

2.42 STEEL CONDUITS AND STEEL TRUNKING

Conduits shall be of heavy gauge class "B" welded to Standard specification KS 04-180:1985. In no case will conduit smaller than 20mm diameter be used on the works. Conduits installed within buildings shall be black enamelled finish except where specified otherwise. Where installed externally or in damp conditions they shall be galvanised. Conduit fittings, accessories or equipment used in conjunction with galvanised conduits shall also be galvanised or otherwise as approved by the service engineer.

Metal trunking shall be fabricated from mild steel of not less than 18 swg. All sections of trunking shall be rigidly fixed together and attached to the framework or fabric or the building at intervals of not less than 1.2m. Joint trunking shall not overhang fixing points by more than 0.5m.

All trunking shall be made electrically continuous by means of 25 x 3mm copper links across each joint and where the trunking is galvanised, the links shall be made by galvanised flat iron strips.

All trunking fittings (i.e. Bends, tees, etc) shall leave the main through completely clear of obstructions and continuously open except through walls and floors at which points suitable fire resisting barriers shall be provided as may be necessary. The inner edge of bends and tees shall be chamfered where cables larger than 35mm² are employed.

Where trunking passes through ceilings and walls the cover shall be solidly fixed to 150mm either side of ceilings and floors and 50mm either side of walls.

Screws and bolts securing covers to trunking or sections of covers together shall be arranged so that damage to cables cannot occur either when fixing covers or when installing cables in the trough.

Where trunking is used to connect switchgear or fuseboards, such connections shall be made by trunking fittings manufactured for this purpose and not by multiple conduit couplings.

Where vertical sections of trunking are used which exceed 4.5m in length, staggered tie off points shall be provided at 4.5m intervals to support the weight of cables.

Unless otherwise stated, all trunking systems shall be painted as for conduit.

Where a wiring system incorporates galvanised conduit and trunking, the trunking shall be deemed to be galvanised unless specified otherwise.

The number of cables to be installed in trunking shall be such as to permit easy drawing in without damage to the cables, and shall in no circumstances be such that a space factor of 45% is exceeded.

Conduit and trunking shall be mechanically and electrically continuous. Conduit shall be tightly screwed between the various lengths so that they butt at the socketed joints. The internal edges of conduit and all fittings shall be smooth, free from burrs and other defects.

Oil and any other insulating substance shall be removed from the screw threads; where conduits terminate in fuse-gear, distribution boards, adaptable boxes, non-spouted switchboxes, etc., they shall, unless otherwise stated, be connected thereto by means of smooth bore male brass bushes, compression washers and sockets. All exposed threads and abrasions shall be painted using an oil paint for black enameled tubing and galvanizing paint for galvanised tubing immediately after the conduits are erected. All bends and sets shall be made cold without altering the section of the conduit.

The inner radius of the bend shall not be less than four (4) times the outside diameter of the conduit. Not more than two right angle bends will be permitted without the inter-position of a draw-in-box. Where straight runs of conduit are installed, draw-in-boxes shall be provided at distances not exceeding 15m. No tees, elbows, sleeves, either of inspection or solid type, will be permitted.

Conduit shall be swabbed out prior to drawing in cables, and they shall be laid so as to drain of all condensed moisture without injury to end connections.

Conduits and trunking shall be run at least 150mm clear of hot water and steam pipes, and at least 75mm clear of cold water and other services unless otherwise approved by the services engineer.

All boxes shall conform to KS 04 – 668: 1986, to be of malleable iron, and black enamelled or galvanized according to the type of conduit specified. All accessory boxes shall have threaded brass inserts.

Box lids where required shall be heavy gauge metal, secured by means of zinc plated or cadmium plated steel screws.

All adaptable boxes and lids of the same size shall be interchangeable.

Boxes used on surface work are to be tapped or drilled to line up with the conduit fixed in distance type saddles allowing clearance between the conduit and wall without the need for setting the conduit.

Where used in conjunction with mineral insulated copper sheathed cable, galvanized boxes shall be used and painted after erection.

Draw-in boxes in the floors are generally to be avoided but where they are essential they must be grouped in positions approved by the services engineer and covered and by the suitable floor traps, with non-ferrous trays and covers.

The floor trap covers are to be recessed and filled in with a material to match the floor surface.

The Sub-contractor must take full responsibility for the filling in of all covers, but the filling in material will be supplied and the filling carried out by the main building contractor.

Where buried in the ground outside the building the whole of the buried conduit is to be painted with two coats of approved bitumastic composition before covering up.

Where run on the surface, unpainted fittings and joints shall be painted with two coats of oil bound enamel applied to rust and grease free metalwork.

2.43 TESTING ON SITE

The Sub-contractor shall conduct during and at the completion of the installation and, if required, again at the expiration of the maintenance period, tests in accordance with the relevant section of the current edition of the Regulations for the electrical equipment of buildings issued by the I.E.E of Great Britain, the Government Electrical Specification and the Electric Supply Company's By-Laws.

- (a) Tests shall be carried out to prove that all single pole switches are installed in the 'live' conductor.
- (c) Tests shall be carried out to prove that all socket outlets and switched socket outlets are connected to the 'live' conductor in the terminal marked as such, and that each earth pin is effectively bonded to the earth continuity system. Tests shall be carried out to verify the continuity of all conductors of each 'ring' circuit.
- (d) Phase tests shall be carried out on completion of the installation to ensure that correct phase sequence is maintained throughout the installation. Triplicate copies of the results of the above tests shall be provided within 14 days of the witnessed tests and the Sub-contractor will be required to issue to the service engineer the requisite certificate upon completion as required by the regulations referred to above.
- (e) Any faults, defects or omissions or faulty workmanship, incorrectly positioned or installed parts of the installation made apparently by such inspections or tests shall be rectified by the Sub-contractor at his own expense.
- (f) The Sub-contractor shall provide accurate instruments and apparatus and all labour required to carry out the above tests. The instruments and apparatus shall be made available to the services engineer to enable him to carry out such tests as he may require.
- (g) The Sub-contractor shall generally attend on other contractors employed on the project and carry out such electrical tests as may be necessary.
- (h) The Sub-contractor shall test to the services engineer's approval and as specified elsewhere in this specification or in standards and regulations already referred to, all equipment, plant and apparatus forming part of the works and before connecting to any power or other supply and setting to work.
- (i) Where such equipment, etc., forms part of or is connected to a system whether primarily or of an electrical nature or otherwise (e.g. air conditioning system) the Sub-contractor shall attend on and assist in balancing, regulating testing and commissioning, or if primarily an electrical or other system forming part of works, shall balance, regulate, test and commission the system to the service engineer's approval.

APPENDIX TO GENERAL SPECIFICATIONS OF MATERIALS AND WORKS

The electrical sub-contractor shall comply with the following: -

1. Government Electrical Specifications No. 1 and No. 2.
2. All requirements of Kenya Power and Lighting Company Limited, and Communications Authority of Kenya (CAK).

SECTION C

SCHEDULE OF CONTRACT DRAWINGS

SCHEDULE OF CONTRACT DRAWINGS

DRAWING NO.	DRAWING TITLE
As shall be issued by the Chief Engineer (Electrical)	

NOTE:

Tenderers are advised to inspect the electrical drawings at the office of the **Chief Engineer (Electrical) – Ministry of Transport, Infrastructure, Housing, Urban Development and Public Works , State Department of Public Works**, at Chief Engineer’s (Electrical) office, Hill Plaza Building, Community area, Nairobi along Ngong road, during normal working hours.

The drawings shall however be availed, on award of the tender, to the domestic sub-contractor.

SECTION D
PARTICULAR SPECIFICATIONS
OF
MATERIALS AND WORKS

PARTICULAR SPECIFICATIONS

1.00 SITE LOCATION

The Site is Located at 10th Floor, NSSF Annex House – Nairobi County

2.00 SCOPE OF WORKS

The works to be carried out under this sub-contract comprise supply, installation, testing and commissioning of the following: -

a) **Electrical Works**

This shall include conduiting, cabling, fittings and accessories.

b) **Telephone and data installation**

This shall include conduiting, Trunking and telephone outlet plates.
Telephone block-wiring, instruments and IP.P.B.X shall be done by others.

c) **Lightning Protection**

This shall include air terminations, copper tape, junction clamps, test clamps and earthing.

3.00 MATERIALS FOR THE WORKS

Materials shall be as specified in Section D and in the Bills of Quantities of this document which shall be read in conjunction with contract drawings. Alternative materials shall be accepted only after approval by the Project Manager.

4.00 BROCHURES FOR FIRE ALARM PANEL & ANY ELECTRICAL EQUIPMENT AND FITTINGS

For consideration and qualification tenderers shall, at their own cost, provide coloured manufacturer's brochures detailing technical literature and specifications where applicable.

5.00 MINIMUM SPECIFICATIONS FOR LED LIGHTING FITTINGS

- 1) Power Factor: ≥ 0.9
- 2) Operating freq. range: 45-55Hz
- 3) Operating Voltage Range: 130-300Vac
- 4) Operating hours: $\geq 50,000$ Hrs
- 5) Correlated Colour Temperature (CCT): ≥ 6000 K
- 6) Total Harmonic Distortion (THD): $< 15\%$

Bidders must provide technical brochures

5.00 ENERGY EFFICIENT SOLAR POWERED LED LIGHTING SPECIFICATIONS

The Contractor shall furnish and install the complete SOLAR LED lighting system as described in the Tender Specifications. The specific wattages of the LED luminaires, solar panels, battery subsystems etc. are to be indicated in individual luminaire specifications.

SOLAR LED Streetlight Luminaire

1. Housing

The luminaire shall have a full die cast housing to provide adequate rigidity and strength and also ensure proper heat dissipation. The luminaire housing shall have separate Driver and LED lamp cavity to ensure cooler operation of LED lamps and good electrical separation.

The optical LED compartment shall have a thermally hardened glass cover and high-quality silicon gasket system. The glass cover shall be tightly secured with the housing. The complete luminaire shall be rated for IP 66 (Ingress Protection).

The housing shall feature highly reflective components and films to increase light output.

The weight of the luminaire shall not be more than stipulated below: -

- 1) Up to 9,500 lumens < 7 kg
- 2) Up to 15,000 lumens < 9 kg
- 3) Up to 28,000 lumens < 15 kg

2. Optics

The luminaire shall have flexible optical system to achieve lighting parameters, as stipulated by CUSTOMER NAME for various kinds of road from M1 to M6. The luminaire shall offer a composite system efficiency of at least 90 Lumen/Watt and a lumen package of up to 11,000 lumens. The luminaire shall use high efficiency LED and optics system to achieve max energy savings. Specially designed lens system with unique inner and outer profile for high efficiency LED to ensure maximum spacing between the poles and cover higher road widths. Multi-layer optics design to ensure adequate luminance and illuminance uniformity in the unlikely event of individual LED failure.

The luminaire should offer choice of narrow beam, medium beam and wide beam light distribution.

The optical lens system should ensure:

- 1) Long life with no discoloration (UV Protection)
- 2) White painted circuit board to have high reflectivity for maximum light output.

3 Future Compatibility

The luminaire shall be fully compatible with future LED upgrades when they become available. It shall have a modular design to upgrade / replace with new LED modules or LED drivers at site. All electronic components/drivers shall be mounted on a separate gear tray with tool-less access and replacement. The luminaire shall have space available inside for communications antenna or equipment to be integrated into the luminaire for future tele-management control system implementation. Evidence showing tele-management capability shall be provided.

4 Surge Protection

The proposed luminaire shall have an in-built surge protection system to protect the electronic driver and the LED module with a minimum surge protection rating of 2KV.

5 Ingress Protection (IP) & Impact Resistance

The luminaire shall have Full IP 66 protection to ensure long reliable performance and to minimize maintenance requirement and an Impact resistance of IK 08. No chemical glue is to be used as that may cause breakdown of water-proof and dust-proof seal.

6 Maintenance

Tool-less maintenance of the LED modules and gears shall be provided for easy upgrade of LED modules on the pole

7 Mounting

The mounting of the luminaire will be in axial orientation through Ø 48-60mm sidearm.

8 Thermal Management

Managing thermal properties in LED luminaires are most critical to ensure optimum performance of LEDs and reliability of the system. The housing shell under the circuit board should be specially designed to ensure perfect contact between the board and the luminaire housing for efficient heat dissipation. The housing over the Driver compartment cavity shall have adequate surface area to ensure fast heat dissipation.

9 Color Rendering Index and Color Temperature

The luminaire should have a minimum color rendering index (Ra) of 75+/- 5 and a color temperature of up to 5700K for maximum efficiency. The LED shall have a color consistency within 5 SDCM (standard deviation of color matching) as defined by McAdam. The color temperature variation of the LEDs should be restricted as per ANSI C78.377A with CCT variation limiting within 500K for nominal CCT of 4000K.

10 Useful Life Hours

The LED luminaire shall be designed for lumen maintenance of L70 or 70% at the end of useful life at ambient temperature of 35 deg C. The complete luminaire shall have a useful life of 50,000 burning hours. The luminaire including the driver will include a warranty of 3 years against manufacturing defects and complete Solar Lighting System 2 years.

11 Standards Conformity

The luminaire should fully conform to following Specifications: -

- 1) IEC 62471:2006, IEC/TR 62471-2:2009, EN 62471:2008, Photo biological safety of lamps and lamp systems IEC 62471 – Photo-biological safety of lamps and lamp systems.
- 2) IEC 60598-1:2008, EN 60598-1:2008 + A11:2009, General requirements and tests for Luminaires

- 3) IEC 60598-2-3:2012, EN 60598-2-3:2003 + A1:2011, Luminaires, Part 2: Particular requirements: Section Three – Luminaires for road and street lighting
- 4) IEC 62493:2009, EN 62493:2010, Assessment of lighting equipment related to human exposure to electromagnetic fields
- 5) EN 55015: 2006/+A1:2007+A2:2009, Limits and methods of measurement of radio disturbance of electrical lighting and similar equipment.
- 6) EN 61547:2009, Equipment for general lighting purposes — EMC immunity requirements.
- 7) EN 61000-3-2:2006+A1:2009+A2:2009, Limits for harmonic currents emissions.
- 8) EN 61000-3-3:2008, Limitation of voltage fluctuations and flicker.

12 LED Driver Specifications

The solar LED luminaire's LED module and electrical components should be embedded in separated chamber. The solar LED luminaire input voltage / or system voltage should be 12V or 24V.

13 LED Chip Specifications

Solar LED luminaire should use 1st tier brand LED chips, and LED efficiency should be $\geq 125\text{lm/W}$ for NW/CW, $\geq 105\text{lm/W}$ for WW; the 1st tier LED manufacturers should be Cree, LumiLEDs, Osram or Nichia.

14 Ambient Temperature

The luminaire shall be suitable for ambient temperature range of between -40 to 45 degrees Celsius.

15 Controls

Dimming function and customization should be available for example programmable multistep dimming profile

16 Materials and Finishing

- Housing: Die-cast aluminum;
- Gasket: Heat resistant silicone rubber
- Glass: Tempered Glass with higher transmittance
- Frame: Gray Paint RAL7040 or different on request
- Tool-less maintenance of the LED modules and gears shall be provided for easy upgrade of LED modules on the pole.

17 Photo biological Safety

Light without blue and no photo biological risk; have been tested according to the IEC 62471(first edition, 2006-07) and been classified as Exempt group.

18 Wiring

The connector and cable should be attached with luminaire, ensuring IP67 protection.

PV Panels (Photovoltaic Solar Panels)

1. Power Output (Pmax)

PV Panel sub-system should include panel and connectors. Solar Panel utilizes poly-crystalline and mono-crystalline silicon solar cells that combine high Wp (Watts Peak) output, affordability and efficiency. PV output peak wattage should be between 35Wp and 295Wp \pm 3% (depends on configuration). PV Panel subsystem should have IP65 protection junction box for wiring.

2. Ambient temperature / operating temperature

PV panel shall be able to work / operate at -40°C to $+85^{\circ}\text{C}$.

3. Encapsulation Material

Encapsulation Material Ethylene Vinyl Acetate (EVA)

4. Lamination

PV panel shall be laminate with tempered safety glass which provide safety and best possible transmittance.

5. Wiring

PV panel shall be equipped with plug-and-play connector allowing easy connection and maintenance.

6. Lifetime

The panel shall be with 25-year designed lifetime, with power decrease less than 20%.

7. Standards Conformity

Solar Panels shall meet the following standards:

- 1) EN 61730-1:2007, Photovoltaic (PV) module safety qualification-Part 1 Requirements for construction.
- 2) EN 61730-2:2007, Photovoltaic (PV) module safety qualification - Part 2 Requirements for testing.
- 3) EN 61215:2005, IEC 61215:2005, crystalline silicon terrestrial photovoltaic (PV) modules – Design qualification and type approval.

Charge Controller

1. The system should have protection against battery overcharge and deep discharge conditions.
2. Charge controller should be High-quality, 4-stage PWM-charging (4 Stage Battery Charging (Main, Float, Boost, Equalization),

3. Charge controller should provide:

- Automatic System Voltage Recognition (12 V/24 V)
- Reverse polarity protection
- Short circuit protection: for panel and load terminals
- Over discharging protection
- Over voltage disconnection
- Automatic electronic fuse protection
- Over current protection: for load terminal
- Reverse current protection: for panel terminal
- Over temperature protection: reduce the charging current by WM until switch off the load

Battery Subsystem

Battery sub system should be Valve Regulated Lead Acid (VRLA) Battery integrates gel electrolyte technology with long service lifetime, high performance in deep discharging; it can be used in wide range of ambient temperature and keep good performance of constant power input. The battery shall be equipped in dedicated designed box with following features:

- Water-proof — Battery box housing IP68, against from water or humidity underground; 0.6m water-resistant by 1 week underwater; housing of plastic ensures good performance of stability with non-chapping at -20°C.
- Conform to requirements of lead-acid utilization — pipeline from box and lighting pole antrum, to keep balance of air pressure inside box. The pipe is made of low temperature resistant nylon, stable quality without distortion at -40°C.
- The battery shall provide following features and functions, Gelatin electrolyte, 12 years lifespan in float service without acidification at 77°F (25°C) owes to a good recycle capability
- all plug and play connection
- Working Temperature Range

Charge (-22 °C to 55 °C)

Discharge (-10 °C to 55 °C)

Storage (-22 °C to 55 °C)

Standards Conformity

Battery shall meet the following standards:

1. EN 61427:2005, IEC 61427:2005, Secondary cells and batteries for renewable energy storage – General requirements and methods of test

Battery box shall meet the following standards:

2. IEC 60598-1:2008, General requirements and tests for Luminaires, IPX8 rating.

QUALITY AND WARRANTEE:

- i) All the components and parts used in the solar street lighting systems should conform to the latest BIS or IEC specifications, wherever such specifications are available and applicable.

- ii) The street lighting system including the battery will be warranted for a period of five years from the date of supply.
- iii) The PV module(s) will be warranted for a minimum period of 5 years from the date of supply. The PV modules must be warranted for their output peak watt capacity, which should not be less than 90% at the end of five (10) years and 80% at the end of Ten (10) years.
- iv) The Warranty Card to be supplied with the system must contain the details of the system.

OPERATION AND MAINTENANCE MANUAL:

An Operation, Instruction and Maintenance Manual, in English and/or the National Language - Kiswahili, should be provided with the Solar Street Lighting System. The following minimum details must be provided in the Manual:

- Basic principles of Photovoltaic.
- A small write-up (with a block diagram) on Solar Street Lighting System - its components, PV module, battery, electronics and luminaire and expected performance.
- Type, Model number, Voltage & capacity of the battery, used in the system.
- The make and wattage of the CFL LED used in the lighting system.
- About Charging and Significance of indicators.
- Clear instructions about erection of pole and mounting of PV module (s) and lamp housing assembly on the pole or underground
- Clear instructions on regular maintenance and troubleshooting of the Solar Street Lighting System.
- Name and address of the contact person for repair and maintenance, in case of non-functionality of the solar street lighting system.

SOLAR LIGHTING LED DETAIL PARAMETERS

Item No.	Parameters	Values	Comments
1.	Input Voltage	12V	
2.	LED Efficiency (Lumens/watt)	140 Lumens/Watt	Certificate from LED manufacturer needs to be provided with Datasheet of LED LED used must be of make CREE/Nichia/Osram/ Lumileds

Item No.	Parameters	Values	Comments
3.	Life Expectancy	Above 60,000 Hours with 70 lumens	LED model should have LM80 certificate to prove the LED life is guaranteed for > 75,000. LED manufacturer should provide T21 –Life test report
4.	Color Temperature	5500-6500K	
5.	Working Humidity	10 to 90% RH6	
6.	Working Temperature	5 to 50 degree	
7.	Average Lighting Angle (Beam Angle)	120 Degree	
8.	Make of LED	PHILIPS/ CREE/LUMILEDS/ OSRAM/NICHIA	
9.	Total System Power Consumption (includes LED & drive part) in watts.	Total wattage =15W	
10.	Lamp Starting Time	Instantaneous, Less than 2 Seconds	
11.	System Efficacy (%)	Greater than 90%	
12.	Ingress Protection	IP65	NABL accredited certificate must be provided for IP65
13.	Light Output	Minimum 20 Lux when measured at the periphery of 4 meter diameter from a height of 4 meter. The illumination should be uniform without dark bands or abrupt variations, and soothing to the eye. Higher Light Output will be preferred	
14.	Power Factor	>0.95	
15.	Protection Function	Open and Short Circuits	

6.03) SPECIFICATIONS FOR LIGHT DUTY UPS

ITEM	DESCRIPTION	MINIMUM REQUIREMENTS	BIDDER'S SPECIFICATIONS
A	GENERAL SPECIFICATIONS		
1	Make	BRANDED	
2	Model		
3	Country of Origin		
4	Manufacturer's brochure and specification	Must be supplied	
B	TECHNICAL SPECIFICATIONS		
5	Rating	650VA	
6	Input voltage swing	220 – 270V ac	
7	Output voltage	220-240V ac	
8	Output frequency	50-60HZ auto-sensing	
9	Protection	❖ Output overload ❖ Input/output short circuit	
10	Communication Interface	Serial port communication support	
11	Design	❖ Automatic voltage regulation ❖ Mains isolation ❖ User replaceable batteries ❖ Static-automatic bypass ❖ Maintenance bypass	
12	Battery Module	❖ 25 minute backup time ❖ 3 year lifetime ❖ Sealed lead acid type preferred ❖ Automatic periodic battery tests ❖ Short recharge time (maximum 5 hours for 100% run time) ❖ Protection against excessive discharge	

Other Items to be supplied:

- 1) Power Supply extension cable complete with 13A 3pin plug and 4x13A switched socket outlets panel which is complete with inbuilt overcurrent/overvoltage/surge protection

SECTION E

SCHEDULE OF UNIT RATES

SCHEDULE OF UNIT RATES

1. The tenderer shall insert unit rates against the items in the following schedules and may add such other items as he considers appropriate.
2. The unit rates shall include for supply, transport, insurance, delivery to site, storage as necessary, assembling, cleaning, installing, connecting, profit and maintenance in defects liability and any other obligation under this contract.
3. The unit rates will be used to assess the value of additions or omissions arising from authorised variations to the contract works.
4. Where trade names or manufacturer's catalogue numbers are mentioned in the specification, the reference is intended as a guide to the type of article or quality of material required. Alternative brands of **equal** and **approved** quality will be accepted.
5. The prices quoted shall be deemed to include for all obligations under the sub-contract including but not limited to supply of materials, labour, delivery to site, storage on site, installation, testing, commissioning and all taxes (including **16% V.A.T, 3 % Withholding tax and all other taxes applicable at the time of tender**).

SCHEDULE OF UNIT RATES

(To be completed by the Tenderer)

NO	DESCRIPTION	QTY	UNIT	UNIT RATE	
				(KSHS)	(CTS)
1.	PVC/SWA/PVC Copper cables per metre				
	a) 10.0mm sq. 2 core	1	M		
	b) 10.0 mm sq. 4 core	1	M		
	c) 50.0 mm sq. 4core	1	M		
	d) 95.0 mm sq. 4 core	1	M		
	e) 240.0 mm sq. 4 core	1	M		
2.	IP 65 rated Isolators as KATKO, 3 Phase	1	No		
	a) 20A	1	No		
	b) 63A	1	No		
	c) 100A	1	No		
3.	IP 65 rated Isolators as KATKO, single phase	1	No		
	a) 32A	1	No		
	b) 63A	1	No		
	c) 100A	1	No		
4.	Industrial socket outlets, 5 pin	1	No		
	a) 32A	1	No		
	b) 45A	1	No		
5.	Industrial socket outlets, 3 pin	1	No		
	a) 20A	1	No		
	b) 32A	1	No		
6.	Cables:				
	a) Single Core PVC Cables				
	i) 25mm ²	1	M		
	ii) 50mm ²	1	M		
	iii) 70mm ²	1	M		
	iv) 95mm ²	1	M		
	v) 120mm ²	1	M		
	vi) 150mm ²	1	M		
7.	Bus Bars:				
	a) 150A TPN+E Busbar Chamber	1	No		
	b) 400A TPN+E Busbar Chamber	1	No		
8	Cable tray/Trunking				
	a) 100x50mm, 14SWG galvanized cable tray	1	M		
	b) 150x50mm 3 rectangular skirting trunking Type B	1	M		
	c) 200x50mm 3 rectangular skirting trunking Type B	1	M		

SECTION F

BILLS OF QUANTITIES

BILLS OF QUANTITIES

A. Installation Items – Other Bills

- (i) The brief description of the items in these Bills of Quantities should in no way modify or supersede the detailed descriptions in the contract Drawings, conditions of contract and specifications.
- (ii) The unit of measurements and observations are as per those described in clause 1.0 5 of the section C.

B. Summary

The summary contains tabulation of the separate parts of the Bills of Quantities carried forward with provisional sum, contingencies and any prime cost sums included. The Contract shall insert his totals and enter his grand total tender sum in the space provided below the summary.

This grand total tender sum shall be entered in the Form of Tender_provided elsewhere in this document.

SPECIAL NOTES TO THE BILLS OF QUANTITIES

1. The Bills of Quantities form part of the contract documents and are to be read in conjunction with the contract drawings and general specifications of materials and works.
2. The prices quoted shall be deemed to include for all obligations under the sub-contract including but not limited to supply of materials, labour, delivery to site, storage on site, installation, testing, commissioning and all taxes **applicable at the time of tender**).

In accordance with Government policy, the 16% V.A.T and 3% withholding Tax **shall be deducted** from all payments made to the tenderer, and the same shall be forwarded to the **Kenya Revenue Authority (KRA)**.

3. All prices omitted from any item, section or part of the Bills of Quantities shall be deemed to have been included to another item, section or part.
4. The brief descriptions of the items given in the Bills of Quantities are for the purpose of establishing a standard to which the sub-contractor shall adhere to. Otherwise alternative brands of **equal** and **approved** quality will be accepted.

Should the sub-contractor install any material not specified here-in before receiving **approval** from the Project Manager, the sub-contractor shall remove the material in question and, **at his own cost**, install the proper material.

5. The grand total of prices in the price summary page must be carried forward to the **Form of Tender**.
6. Tenderers must enclose, together with their submitted tenders, detailed coloured manufacturer's Brochures detailing Technical Literature and specifications on all the equipment they intend to offer.

PROPOSED OFFICE SPACE AT NSSF ANNEX HOUSE 10TH FLOOR
W. P. ITEM No. D107 NB/NB/1902 JOB No. 10759 A
ELECTRICAL INSTALLATION WORKS

Bill No. 2, Electrical Installation Works

Item	Description	Qty	Unit	Rate (Kshs)	Cost Kshs
	Supply, install, test and commission the following items:				
1.00	MAINTENANCE OF EXISTING ELECTRICAL ENGINEERING SERVICES				
1.10	Maintenance of existing 600X600MM, 4X18W Recessed Modular fluorescent lighting fittings				
1.11	Carefully relocate, clean and fix existing 600X600mm, 4X18W Recessed Modular fluorescent fitting as shall be required and approved by the Project Electrical Engineer	130	No		
1.12	Replacement of existing 4x18Watts fluorescent tubes with equal and approved LED tubes as specified in particular specifications including any necessary accessories, test and commission to approval of the Project Electrical Engineer	130	Item		
2.00	LIGHTING POINTS				
2.10	Lighting points wired in 3 x 1.5mm ² PVC/SC CU cables drawn in 25mm-Ø concealed HG PVC conduits complete with all necessary accessories but excluding switches for:-				
	a) One way switching	130	No.		
	b) Two way switching.	66	No.		
	c) Two way intermediate switching.	20	No.		
3.00	LIGHTING SWITCHES				
3.10	10A, moulded ivory white switch plates as MK Range or approved equivalent as follows:-				
	a) 1 gang - 2 way	39	No.		
	b) 2 gang - 2 way.	29	No.		
	c) 3 gang - 2 way.	2	No.		
	d) 4 gang - 2 way.	2	No		
	e) 1 gang gang Intermediate	2	No		
	f) Two gang Intermediate	1	No		
	Sub-total carried forward to the next page				

Item	Description	Qty	Unit	Rate (Kshs)	Cost Kshs
Sub-total carried forward from the previous page					
3.20	10A, moulded ivory white architrave switch plates as MK Range or approved equivalent as follows:- a) 1 gang - 2 way b) 2 gang - 2 way. c) 1 gang gang Intermediate d) Two gang Intermediate	20 12 2 1	No. No. No No		
4.00	LIGHTING FITTINGS Lighting fittings complete with lamps of appropriate wattage and colour rendering and fixing materials as follows:- a) Type - D1 c) Type - D2 d) Type - E1s d) Type - E4 f) Type - G g) Type - S2	34 2 8 38 6 6	No No No No No No		
5.00	TRUNKING AND DUCTING				
5.01	Lay HG/PVC conduiting of size 3x32mm diameter HG/PVC ducts from the electrical service duct to the metal trunkings for telecommunication services.	150	M		
5.02	Lay HG/PVC conduiting of size 3x50mm diameter HG/PVC ducts from the electrical service duct to the metal trunkings for internal power reticulation	50	M		
5.03	Supply and install an 18AWG steel sheets spay painted to approval adaptable box 450x300x200mm to engineers approval.	4	No		
5.04	Supply and install rectangular skirting trunking Type B of dimensions 250x50mm 3 compartment along all walls as indicated in drawing number drg. Trunking to be powder coated and white in colour (to match existing)	150	M		
Sub-total carried forward to the next page					

Item	Description	Qty	Unit	Rate (Kshs)	Cost Kshs
Sub-total carried forward from the previous page					
5.05	Supply and install accessories for above trunking as follows				
	a) Inside Corner Bends	30	No.		
	b) Outside Corner Bends	20	No.		
	c) End Cover	28	No.		
	d) Cover plates with knockouts as follows:- 1No. single switch knockout for data, 1No. single switch knockout for Clean power, 1No. single switch knockout for Raw power	10	No.		
	i) Cover plates for 1No. single for data point	120	No.		
	ii) Cover plates for 1No. single for TV point	12	No.		
	iii) Cover plates for 1No. twin for Clean power point	65	No.		
	iv) Cover plates for 1No. twin for Raw power point	130	No.		
5.06	Floor Distribution Systems - Cuboid floor pedestal (with 4No. single data/voice, 4No. twin clean power and 4No. twin utility raw power outlet points provisions). To be constructed from high quality pre-galvanised steel sheets . Design to meet IEE Wiring Regulations and Trunking to conform to BS 4678 Part 2: 1973 standard. as Crabtree or approved equivalent	8	No.		
6.00	RAW POWER POINTS				
6.10	RAW POWER POINTS				
6.11	Raw power socket outlet power points comprising wiring in 3 x 2.5 mm ² PVC/SC CU cables drawn in 25mmØ concealed HG PVC conduits/trunking including all conduit accessories but excluding plates:-				
	a) single outlet	10	No.		
	b) twin outlet	80	No.		
6.12	13A, moulded ivory white switched socket outlet plates as Crabtree or approved equivalent as follows:				
	i) Single switched	10	No.		
	ii) Twin switched	80	No.		
Sub-total carried forward to the next page					

Item	Description	Qty	Unit	Rate (Kshs)	Cost Kshs
Sub-total carried forward from the previous page					
6.13	Hand Driers - Power points comprising wiring in 3 x 4mm ² PVC/SC/CU cables drawn in 25mm-Ø concealed HG PVC conduits	120	M		
	a) 20A DP control switch marked with neon light and cord outlet for above item as Crabtree or approved equivalent	4	No.		
6.14	Indoor Airconditioning Unit - Power points comprising wiring in 3 x 4mm ² PVC/SC/CU cables drawn in 25mm-Ø concealed HG PVC conduits	450	M		
	a) 20A DP control switch marked 'As per application' with neon light and cord outlet for above item as Crabtree or approved equivalent	12	No.		
6.15	Toilet Extract Fan - Power points comprising wiring in 3 x 4mm ² PVC/SC/CU cables drawn in 25mm-Ø concealed HG PVC conduits	80	M		
	a) 20A DP control switch marked with neon light and cord outlet for above item as Crabtree or approved equivalent	2	No.		
6.16	Cooker Power Point: Power points comprising wiring in 3 x 6.0 mm ² PVC insulated single core copper cables drawn in concealed 25 mm diameter heavy gauge PVC conduits and including all necessary accessories but excluding cooker control and connection unit	50	M		
	a) 45A DP cooker control unit with pilot light and an auxiliary 13A socket outlet as Crabtree or approved equivalent	1	No.		
	b) Cooker connection unit as Crabtree or approved equivalent	1	No		
6.20	CLEAN POWER POWER POINTS				
6.21	Clean/UPS power socket outlet power points comprising wiring in 3 x 2.5 mm ² PVC/SC CU cables drawn in 25mmØ concealed HG PVC conduits/trunking including all conduit accessories but				
	a) Twin outlet	65	No.		
6.22	13A Non-Standard switched socket outlet plates complete with Non-Stardard Top Plug as Crabtree or approved equivalent as follows:				
	a) Twin switched	65	No.		
Sub-total carried forward to the next page					

Item	Description	Qty	Unit	Rate (Kshs)	Cost Kshs
	Sub-total carried forward from the previous page				
7.00	INTERNAL POWER DISTRIBUTION				
7.10	Supply, install, test and commission consumer units/power distribution boards as that manufactured by Merlin GERIN or equal and approved equivalent as described below:- a) 100A, 12 Way TPN+E (Raw Power) - DB: R - 1 & 2	1	No.		
7.20	SP/TP MCBs for existing and the new DB above as follows: a) 10A SP MCB b) 20A SP MCB c) 30A SP MCB d) 40A SP MCB e) TP blanking plates	12 8 12 1 6	No. No. No. No. No.		
7.30	LV SWITCH BOARD				
	415V 12-Way Modular type, wall mount, power distribution L.V Switch Board with front access panels, cable manager compartments. To be fabricated using 14SWG steel sheets, manufactured to BS EN60 439-1, form 2b separation and fully wired for incoming MCCB's and 6No. TPN minimum outgoing feeders as described here below with the following and all the other necessary accessories: <u>Install the following in the L.V Switch Board</u> a) Incomer Adjustable TPN MCCB i) 1x330Amps Adjustable MCCB - main Incomer , adjustable and with trip coil as Siemens or Equal and approved b) 400Amps - TPN+E copper bus bar c) Metering Instruments: i) Indicator bulbs (for three phase) ii) 1No 1-500A digital ammeter c/w selector switch, 5A fuse iii) 1No 0-500V digital voltmeter c/w selector switch, 5A fuse d) Outgoing adjustable TPN MCCB i) 6 x 100A TPN MCCBs - (Adj. 80 -100%) ii) 2 x Spare spaces e) Outgoing adjustable SPN MCB i) 2 x Spare spaces	1	No.		
	Sub-total carried forward to the next page				

Item	Description	Qty	Unit	Rate (Kshs)	Cost Kshs
Sub-total carried forward from the previous page					
7.40	<u>MAIN POWER SUPPLY CABLE</u>				
7.41	1 x 185.0 mm ² 4-C PVC/SWA/PVC underground copper cable c/w appropriate cable lugs and glands from L.V Main Switchboard to the new L.V Sub-board	120	M		
	i) 1x300Amps Adjustable MCCB to be installed in the L.V Switchboard as Siemens or Equal and approved	1	No.		
7.50	SUB-MAIN CABLES				
7.51	Server Room/Reception Out door Airconditioning Units - 16.0 mm² 4-C PVC/SWA/PVC underground copper cable c/w appropriate cable lugs and glands from the New L.V Subboard to the Out door Air Conditioning Machines	100	M		
	a) 63A TPN metal clad Isolator as Crabtree or approved equivalent	1	No.		
	a) 45A TPN metal clad Isolator as Crabtree or approved equivalent	2	No.		
7.52	Board Rooms/Executive Offices Out door Airconditioning Units - 16.0 mm² 4-C PVC/SWA/PVC underground copper cable c/w appropriate cable lugs and glands from the New L.V Subboard to the Out door Air Conditioning Machines	100	M		
	a) 63A TPN metal clad Isolator as Crabtree or approved equivalent	1	No.		
	a) 45A TPN metal clad Isolator as Crabtree or approved equivalent	4	No.		
7.53	Air Handling Unit (AHU) - 35.0 mm² 4-C PVC/SWA/PVC underground copper cable c/w appropriate cable lugs and glands the New L.V Subboard to the Out door Air Conditioning Machines	100	M		
	a) 125A TPN metal clad Isolator as Crabtree or approved equivalent	1	No.		
7.54	150x50mm, 14SWG cable tray cw row bolts for mounting and all the other necessary accessories for power supply cable	120	Lm		
Sub-total carried forward to the next page					

Item	Description	Qty	Unit	Rate (Kshs)	Cost Kshs
----- Sub-total carried forward from the previous page -----					
7.60	20kVA CLEAN POWER UPS				
7.61	Scalable 20kVA, 415v, 50Hz Three phase in, Three phase out, True on line UPS with at least 30 minutes battery autonomy and complete with service Bypass, start up service and all other necessary accessories. The UPS to be as manufactured by M/s APC or other equal and approved.	1	No.		
	a) 45A TPN metal clad Isolator as Crabtree or approved equivalent	1	No.		
	b) 45A TP manual bypass switch and As MK or equivalent and approved.	1	No.		
	c) 10 mm sq. 4 core PVC/SWA/PVC copper cable for interwiring the LV switchboard, Clean Power UPS, Manual Bypass Switch, Isolator, Clean Power DB complete with necessary cable lugs and any other necessary accessories	200	M		
	i) Cable glands for the above item cable	8	No		
7.62	150x50mm, 14SWG cable tray cw row bolts for mounting and all the other necessary accessories for power supply cable	30	Lm		
8.00	TELEPHONE, PUBLIC ADDRESS, CCTV & ACCESS CONTROL & TELEVISION POINTS				
8.10	Data/Telephone outlet point done in 20mm diameter HG PVC conduits concealed in building fabric/trunking complete with all necessary accessories	80	No.		
8.20	CCTV System points done in 20mm diameter HG PVC conduits concealed in building fabric/trunking complete with all necessary accessories	20	No.		
8.30	Access Control System points done in 20mm diameter HG PVC conduits concealed in building fabric/trunking complete with all necessary accessories	10	No.		
Sub-total carried forward to the next page					

Item	Description	Qty	Unit	Rate (Kshs)	Cost Kshs
Sub-total carried forward from the previous page					
8.40	TV outlet point done in 20mm diameter HG PVC conduits concealed in building fabric/trunking complete with all necessary accessories	12	No.		
	a) Television white faceplate and as MK 3521 or approved equivalent.	12	No		
8.50	300mmx250mmx150mm, 18 SWG, powder coated, telephone draw box spray painted to approval	3	No		
9.00	<u>Fire Alarm System</u>				
9.01	Fire alarm manual call point wiring done using 2x1.5mm ² PVC fire resistant copper cables drawn in 20 mm dia PVC heavy gauge conduits but without the manual call point.	10	No		
9.02	As ditto but for fire alarm bell point	8	No		
9.03	As ditto but for beacon light outlet	8	No		
9.04	As ditto but for addressable smoke detector	55	No		
9.05	As ditto but for addressable heat detector	6	No		
9.06	Addressable manual call point to be installed recessed in building fabric as Menvier or approved equivalent.	10	No		
9.07	24V dc polarised 6" addressable fire bell for wall mounting and as Menvier or approved equivalent.	8	No		
9.08	Addressable fire beacon light for wall mounting as Menvier or approved equivalent.	8	No		
9.09	Addressable photoelectric smoke detector complete with the commonbase as Menvier or approved equivalent.	55	No		
9.10	Addressable rate of rise heat detector complete with the common base as MENVIER or approved equivalent.	6	No		
Sub-total carried forward to the next page					

Item	Description	Qty	Unit	Rate (Kshs)	Cost Kshs
Sub-total carried forward from the previous page					
9.11	4-LoopAddressable Fire alarm panel as MENVIER or approved equivalent.	1	No		
9.12	Fire Alarm Panel Power Point - Power points comprising wiring in fire resistant 3x2.5mm ² PVC insulated copper cables drawn in 25mm-Ø concealed HG PVC conduits	30	M		
	a) 20A DP control fused non-switchedswitch with neon light and cord outlet for above item as Crabtree or approved equivalent	1	No.		
9.13	Fire EXIT sign points wired in fire resistant 3x1.5mm ² PVC insulated copper cable drawn in 25mm-Ø concealed HG PVC conduits complete with all necessary accessories but excluding switches for:-	12	No.		
9.14	Lighting fittings complete with lamps of appropriate wattage and colour rendering and fixing materials as: Type - EXIT	12	No		
9.15	Allow for inter-connection of the new fire alarm panel (slave) to the existing fire alarm panel (master) and the server room fire suppression panel such that fire detection and alarm system in the entire building works as an integrated system - works include but not limited to identification of interconnection terminals, cabling, liaison, programming fire alarm panels if required.	1	Item		
Sub-total for Ground Floor c/f to Bill No. 2 Collection Page					

SUMMARY PAGE

Item	Description	Cost Kshs
A	Total for Bill No. 2 brought forward from H/11	
B	Total for Project Manager's Stationery brought forward from H/12	
C	Allow for 3No. Sets working drawings	
D	Allow for 3No. Sets of as installed drawings	
E	Allow for testing and commissioning of the structured cabling installation works	
F	CONTINGENCY SUM Allow a Provisional Sum of Kshs.800,000/- for contingency sum to be used at the discretion of the Project Manager	
G	Total for Electrical Installation Works c/f to form of tender	

TOTAL AMOUNT IN WORDS

.....

TENDERER'S NAME & STAMP

.....

SIGNATURE

DATE.....

P.I.N No.,.....

V.A.T CERTIFICATE No.....

WITNESS.....

ADDRESS.....

SIGNATURE OF WITNESS.....

DATE.....

PROPOSED OFFICE SPACE AT NSSF ANNEX HOUSE 10TH FLOOR

W. P. ITEM No. D107 NB/NB/1902 JOB No. 10759 A

Item	Type	Description
1	D1	5W, 100 mm diameter Low Voltage LED downlight with warm white output light suitable for recessed installation in standard ceiling as Maximus or approved equivalent
2	D1e	As Ditto but emergency version
3	D2	8W, 150 mm diameter Low Voltage LED downlight with warm white output light suitable for recessed installation in standard ceiling as Maximus or approved equivalent
4	D2e	As Ditto but emergency version
5	E1s	1260x140x90 (LxWxH) mm, 130 – 300V,V, 50/60Hz, made of White polycarbonate body, Splash Proof, IP65 rated with 32W, 1xLED ZVEI/ILCOS: LED/LED lamp (day light). To have direct, symmetric light distribution as ABB cat. Stanilite - Battern LED PBWAC35L-mains or approved equivalent
6	E4	45W, 220-240V, 50/60Hz, 600x600mm Recessed LED Panel Light c/w high brightness polished aluminium Louver. Suitable for mounting on 600x600mm T-section acoustic ceiling. Body to be white powder-painted steel sheet. . To have direct, symmetric light distribution and each luminaire to have a minimum Luminous Flux of 6000 lumen as LUG cat. No. 060311.5L03B.311 or approved equivalent
7	E4e	As Ditto but emergency version
8	G	16.5W, 220-240V, 50/60Hz, 250mm Surface mounted LED (day light),. White plastic body. IP65 rated with 1 x LED ZVEI/ILCOS/LED/LED Lamps. To have direct, symmetric light distribution with a minimum Luminous Flux of 6000 lumen as Relux cat. No. DKL Dome Basic 300 or approved equivalent
9	Ge	As Ditto but emergency version
10	S2	200mm diameter, 6.5w, (day light), Operating Voltage/Frequency/ High quality longtime LED lamps as Specified in Particular Specifications, IP65 rated made of Dark Gray die aluminium housing and white polycarbonate diffuser , suitable for wall mounting as Philips SMART LED WALL MOUNT Cat. No. BWS150 or approved equivalent
11	EXIT	2.5W, 6500K LED light source, IP65 Self-contained single/double sided LED EXIT sign with 2.5W LED lamp for non-maintained emergency lighting for 3 hour duration as manufactured by Ansellto engineers approvals or approved equivalent.
		<i>Note: Lighting fittings <u>Must</u> meet the minimum technical specification specified in particular specification section of the tender document</i>

SECTION G
TECHNICAL SCHEDULE
OF
ITEMS TO BE SUPPLIED

TECHNICAL SCHEDULE

1. The technical schedule shall be submitted by tenderers to facilitate and enable the Project Manager to evaluate the tenders, especially where the tenderer intends to supply or has based his tender sum on equipment which differs in manufacture, type or performance from the specifications indicated by the Project Manager.
2. The filling of this schedule forms part of Technical Evaluation of the tenders, and bidders shall therefore be required to indicate the type/make and country of origin of all the materials and equipment they intend to offer to the employer in this schedule.
3. This schedule shall form part of the technical evaluation criterion, and tenderers are therefore advised to complete the schedule as they shall be considered responsive.

TECHNICAL SCHEDULE OF ITEMS TO BE SUPPLIED
(To be completed by the Tenderer)

ITEM	DESCRIPTION	TYPE/MAKE	MODEL	COUNTRY OF ORIGIN
1	LIGHTING FITTINGS			
2	Lighting Switches			
3	D.P Switches			
4	Socket outlet plates			
5	TV outlet plates			
6	Manual fire break glass unit			
7	Copper tape			
8	Consumer unit/Distribution board			
9	MCB			
10	MCCB			
11	Cables			
12	PVC conduits			
13	Fire Alarm Control Panel			
14	Smoke/Heat detectors			
15	Fire Alarm Bells			
16	Time Switches			
17	TPN & SPN Isolating Switches			
18	DP Contactor			
19	Lightning Protection System i) Copper Tape ii) Air Termination Spike iii) Earth Rod			
20	UPS			

SECTION H

STANDARD FORMS

CONTENTS OF SECTION J

	<u>TITLE</u>	<u>PAGE</u>
1.	Tender Questionnaire	H/1
2.	Confidential Business Questionnaire	H/2 -H/3
3.	Key Personnel	H/4
4.	Schedule of Contracts completed in the last five (5) years	H/5
5.	Schedule of on-going projects	H/6
6.	Contractor's Equipment	H/7
7.	Audited Financial Reports for the last three (3) years	H/8
8.	Evidence of Financial Resources to Meet Qualification Requirements	H/9
9.	Bidder's Bank Information	H/10
10.	Details of Litigation or Arbitration Proceedings	H/11
11.	Statement of Compliance	H/12

NOTE:

- 1.0 Tenderers must duly fill these Standard Forms as a mandatory requirement as they will form part the evaluation criteria.
- 2.0 Any tender returned with **Unfilled Standard Forms** shall be considered **Non-Responsive and shall automatically be Disqualified.**

TENDER QUESTIONNAIRE

Please fill in block letters.

1. Full names of Tenderer:

.....

2. Full address of Tenderer to which tender correspondence is to be sent (unless an agent has been appointed below):

.....

3. Telephone number (s) of Tenderer:

.....

4. Telex/Fax Address of Tenderer:

.....

5. Name of Tenderer's representative to be contacted on matters of the tender during the tender period:

.....

6. Details of Tenderer's nominated agent (if any) to receive tender notices. This is essential if the Tenderer does not have his registered address in Kenya (name, address, telephone, telex):

.....

.....

.....

Signature of Tenderer

Make copy and deliver to:

**CHIEF EXECUTIVE OFFICER
PRIVATIZATION COMMISSION
P.O. BOX 34542-00100
NAIROBI**

CONFIDENTIAL BUSINESS QUESTIONNAIRE

You are requested to give the particulars indicated in Part 1 and either Part 2 (a), 2 (b) or 2(c) and (2d) whichever applies to your type of business.

You are advised that it is a serious offence to give false information on this Form.

Part 1 – General

Business Name

Location of business premises: Country/Town.....

Plot No..... Street/Road

Postal Address..... Tel No.....

Nature of Business.....

Current Trade Licence No..... Expiring date.....

Maximum value of business which you can handle at any time:
Kenya Shillings.....

Name of your bankers.....

Branch.....

Address.....Telephone.....

Part 2 (a) – Sole Proprietor

Your name in full..... Age.....

Nationality..... Country of Origin.....

Citizenship details

Part 2 (b) – Partnership

Give details of partners as follows:

	<i>Name in full</i>	<i>Nationality</i>	<i>Citizenship Details</i>	<i>Shares</i>
1.
2.
3.
4.

KEY PERSONNEL

Qualifications and experience of key personnel proposed for administration and execution of the Contract.

POSITION	NAME	HIGHEST QUALIFICATION <i>(Attach proof)</i>	YEARS OF EXPERIENCE (GENERAL)	YEARS OF EXPERIENCE IN PROPOSED POSITION
1.				
2.				
3.				
4.				
5.				
6.				
7.				

I certify that the above information is correct.

.....

Title

.....

Signature

.....

Date

CONTRACTS COMPLETED IN THE LAST FIVE (5) YEARS

Work performed on works of a similar nature, complexity and volume over the last 5 years.

<i>PROJECT NAME</i>	<i>NAME OF CLIENT</i>	TYPE OF WORK AND YEAR OF COMPLETION	VALUE OF CONTRACT (KSHS.)

I certify that the above works were successfully carried out and completed by ourselves.

.....

.....

.....

Title

Signature

Date

SCHEDULE OF ON-GOING PROJECTS

Details of on-going or committed projects, including expected completion date.

<i>PROJECT NAME</i>	<i>NAME OF CLIENT</i>	CONTRACT SUM	% COMPLETE	COMPLETION DATE

I certify that the above works are currently being carried out by ourselves.

.....

Title

.....

Signature

.....

Date

**SCHEDULE OF MAJOR ITEMS OF CONTRACTOR'S EQUIPMENT PROPOSED FOR
CARRYING OUT THE WORKS**

ITEM EQUIPMENT	OF	DESCRIPTION, MAKE AND AGE (Years)	CONDITION (New, good, poor) and number available	OWNED, LEASED (From whom?), or to be purchased (From whom?)

Statement of Compliance

- a) I confirm compliance of all clauses of the General Conditions, General Specifications and Particular Specifications in this tender.

- b) I confirm I have not made and will not make any payment to any person, which can be perceived as an inducement to win this tender.

Signed.....*for and on behalf of the Tenderer*

Date.....

Official Rubber Stamp.....