VOLUME 3 of 6

ELECTRICAL INSTALLATION WORKS

[2NO. 5,000MM2 INDUSTRIAL SHEDS ~ KENANIE INDUSTRIAL PARK]

REPUBLIC OF KENYA

MINISTRY OF AGRICULTURE,LIVESTOCK,FISHERIES AND COOPERATIVES

KENYA LEATHER DEVELOPMENT COUNCIL (KLDC)

PROPOSED CONSTRUCTION OF 2NO. INDUSTRIAL WAREHOUSES, EACH 5000SM, FOR TANNERIES AT KENYA LEATHER PARK, KENANIE EPZ SITE, MACHAKOS COUNTY

W.P. ITEM NO. D117 EN/MKS/1902 JOB NO. 10753B

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

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DECEMBER, 2020

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INSTRUCTIONS TO TENDERERS

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TENDER EVALUATION CRITERIA

After tender opening, the tenders will be evaluated in **2 stages**, namely:

1. Preliminary Evaluation;
2. Technical Evaluation;

STAGE 1: PRELIMINARY EVALUATION

This stage of evaluation shall involve examination of the mandatory requirements as set out in the Tender Advertisement Notice or Letter of Invitation to Tender and any other conditions stated in the bid document.

These conditions shall include the following:

i) Company Certificate of Incorporation/Registration;

ii) Current category of Registration with National Construction Authority (NCA 5 and above in Electrical Installation Works);

iii) Current National Construction Authority's Contractor's Annual Practicing License

iv) Current Class of Licenses with Energy and Petroleum Regulatory Authority (EPRA Class A1)

v) Valid Tax Compliance Certificate;

vi) Compliance with Technical Specifications

Note:

On compliance with Technical Specifications, bidders shall supply equipment/items which comply with the technical specifications set out in the bid document. In this regard, the bidder will be required to submit relevant technical brochure/catalogues with the tender document, highlighting (using a mark-pen or highlighter) the Catalogue Number/model of the proposed items. Such brochures/ catalogues should indicate comprehensive relevant data of the proposed equipment/items which should include but not limited to the following:
(i) Standards of manufacture;
(ii) Performance ratings/characteristics;
(iii) Material of manufacture;
(iv) Electrical power ratings; and
(v) All other requirements as indicated in the technical specifications of the bid.

The bids will then be analyzed, using the information in the technical brochures, to determine compliance with technical specifications for the works/items as indicated in the tender document. Bidders not complying with **any** of the technical specifications shall be adjudged technically non-responsive while those meeting all technical specifications shall be considered technically responsive.

The tenderer shall also fill in the Technical Schedule as specified in the tender document for Equipment and Items indicating the Country of Origin, Model/Make/Manufacturer and catalogue numbers of the Items/Equipments they propose to supply.

The tenderers who do not satisfy any of the above mandatory requirements shall be considered Non-Responsive and their tenders will not be evaluated further.

STAGE 2: TECHNICAL EVALUATION

In order to be compliant, the Tenderers shall be required;

a) *To fill the Standard Forms* provided in the bid document for the purposes of providing the required information. The tenderers may also attach the required information if they so desire;

The award of points considered in this section shall be as shown below:

PARAMETER	MAXIMUM POINTS
(i) Key personnel	12
(ii) Contract Completed in the last Five (5) years	9
(iii) Schedules of on-going projects	4
(iv) Schedules of Contractor's equipment	12
(v) Litigation History	2
TOTAL	**39**

The pass-mark under the Technical Evaluation is **28 points**.

The detailed scoring plan shall be as shown in table 1.

TABLE 1: Assessment for Eligibility

Item	Description	Points Scored	Max. Point	
1.	**Key Personnel (Attach evidence)**			
	Director of the firm • Holder of degree in relevant Engineering field---------- 4 • Holder of diploma in relevant Engineering field---------- 3 • Holder of certificate in relevant Engineering field---------- 2 • Holder of trade test certificate in relevant Engineering field------ 1 • No relevant certificate---------- 0		4	12
	At least 1No. degree/diploma holder of key personnel in relevant field • With over 10 years of relevant experience---------- 4 • With over 5 years of relevant experience---------- 2 • With under 5 years of relevant experience ---------- 1		4	
	At least 1No certificate holder of key personnel in relevant field • With over 10 years of relevant experience---------- 2 • With over 5 years of relevant experience ---------- 1 • With under 5 years of relevant experience ---------- 0.5		2	
	At least 2No artisan (trade test certificate in relevant field) • Artisan with over 10 years of relevant experience---------- 2 • Artisan with under 10 years of relevant experience ---------- 1 • Non skilled worker with over 10 years of relevant experience--0		2	
2.	**Contracts completed in the last five (5) years (Max of 3No. Projects) - Provide Evidence** • Project of similar nature, complexity or magnitude---------- 3 • Project of similar nature but of lower value than the one in consideration---------- 2 • No completed project of similar nature---------- 0		9	
3.	**On-going projects – Provide Evidence** • No Project of similar nature, complexity and magnitude ---------- 4 • Three and below Projects of similar, nature complexity and magnitude –----------3 • Four and above Projects of similar nature, complexity and magnitude ---------- 2		4	
4.	**Schedule of contractors equipment and transport (proof or evidence of ownership/Lease)**			
	a) Relevant Transport (at least 3No. each 2mks) • Means of transport (Vehicle)----------6 • No means of transport----------0		6	12
	b) Relevant Equipment (at least 6No. each 1mks) • Has relevant equipment for work being tendered--------6 • No relevant equipment for work being tendered--------0		6	

Item	Description	Points Scored	Max. Point
5.	**Litigation History** • Duly Filled ---------- 2 • Not filled ---------- 0		2
	TOTAL		39

Any bidder who scores <u>28 Points</u> and above shall be considered for further evaluation.

SECTION B

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OF

MATERIALS AND WORKS

GENERAL SPECIFICATIONS OF MATERIALS AND WORKS

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13. Conduit Boxes and Accessories
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26. Insulation

27. Lighting Switches

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31. Connectors

32. Lamp holders

33. Lamps

34. Lighting Fittings Street Lighting Lanterns

35. Position of Points and Switches
36. Street/Security Lighting Columns

37. Timing Control Switch

38. Wiring System for Street Lighting

39. Metal control Pillar

40. Current Operated Earth leakage circuit breaker

41. MV Switchboard

42. Steel Conduits and Steel Trunking

43. Testing on Site

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. 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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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).

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.

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.

SYSTEM	INSULATION COLOUR	CABLE END MARKER
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

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.

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.

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.

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

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

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

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

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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 of 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 bed 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 15mm. 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 galvanised 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.

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 (CA).

SECTION C

SCHEDULE OF CONTRACT DRAWINGS

SCHEDULE OF CONTRACT DRAWINGS

DRAWING NO.	DRAWING TITLE
As shall be issued by the Engineer	

NOTE:

Tenderers are advised to inspect the electrical drawings at the office of the **Chief Engineer (Electrical) – Ministry of Transport, Infrastructure, Public Works, Housing & Urban Development, 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 sub-contractor.

SECTION D

PARTICULAR SPECIFICATIONS

OF

MATERIALS AND WORKS

PARTICULAR SPECIFICATIONS

1.00 SITE LOCATION

The site of the proposed works is at **Kenanie EPZ Site, Machakos 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 Trunking, Conduit Works, Cabling, Isolators, LV Sub-Switchboards, LV Main Switchboard, Switchgear, Internal Lighting, Power fittings, Internal Power Distribution, Area Lighting, External Power Distribution & Reticulation, Lightning Protection System, Fire Alarm & Detection System and related accessories among other works.

3.00 MATERIALS FOR THE WORKS

Materials shall be as specified in Section B 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: PARTICULAR TECHNICAL SPECIFICATIONS OF LED LIGHTING

T8 LED FLUORESCENT TUBES SPECIFICATIONS

T8 LED Fluorescent tubes of T8 LFL fittings should meet the following minimum requirements:

Minimum Requirements

General

1) These fittings shall mostly be surface mounted luminaries. These shall be LED type fittings as indicated in the Bills of Quantities.
2) The electronic supply must be capable of withstanding an input voltage of 240V.
3) They shall:
   - be flux insensitive to mains voltage variations,
   - have a protection in case of lamp defect,
   - have a power factor >0.95,
   - be such that lamps shall ignite without flickering and shall conform to relevant standards of electromagnetic compatibility.
4) The electronic power supply shall be electronic of the high frequency type complying to IEC 928/929.
5) The retro fitting shall be complete with a PCB screen diffuser.
6) The lamp holders shall be stable and firm.
7) They shall be rated for 230V-50HZ operation. The tubes must have the Environment Protection RoHS and CE marking.
8) During the replacement of all tubes, a Licensed A electrician issued/Valid by ERC should be on site during all time.
9) All existing electronic ballast should be removed during the installation of the T8 LED tubes, as necessary.
10) Tubes Commission will consist of checking the THD and the Power factor of MEPA before and after the installation.

T8 (2/4/5) feet LED Lighting Fitting

Item No.	Parameters	Values	Comments
1.	Dimensions	(2ft) 600mm, (4ft) 1200mm & (5ft) 1500mm for T8 LED type	
2.	Voltage Operation	180Vac-260Vac	
3.	LED Luminous Flux 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
4.	Colour Rendering	>85% accurate	

Item No.	Parameters	Values	Comments
5.	Power Factor	>0.95	
6.	Protection Function	Open Circuit and Short Circuit Protection	
7.	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
8.	Maximum Light Decay	15% in 7years Linear decay	
9.	Color Temperature	4500-6500K Daylight White	
10.	THD	>10%	
11.	Working Humidity	10 to 90% RH6	
12.	Working Temperature	5 to 50 degree	
13.	Average Lighting Angle (Beam Angle)	>120 Degree	
14.	Make of LED	PHILIPS/ CREE/LUMILEDS/ OSRAM/NICHIA	
15.	Lamp Starting Time	Instantaneous, Less than 2 Seconds	
16.	System Efficacy (%)	Greater than 90%	
17.	Ingress Protection	IP20 & IP65	NABL accredited certificate must be provided for IP65
18.	Class of Protection	II	
19.	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	

6.00. TECHNICAL SPECIFICATION FOR COMPUTER AND ACCESSORIES

6.01) SPECIFICATIONS FOR DESKTOP COMPUTERS

ITEM	DESCRIPTION	MINIMUM REQUIREMENTS	BIDDER'S SPECIFICATIONS
A	**GENERAL SPECIFICATIONS**		
1	Make	**BRANDED**	
2	Model	HP EliteDesk 800 G1 Desktop	
3	Country of Origin		
4	Manufacturer's brochure and specifications	Must be supplied	
B	**TECHNICAL SPECIFICATIONS**		
5	Processor	Intel® Core™ i7-4790 with Intel HD Graphics 4600 (3.6 GHz, 8 MB cache, 4 cores)	
6	System Memory	16 GB 1600 MHz DDR3 SDRAM (1 x 4 GB)	
7	Disk cache	Integrated **8MB L2 cache** Bus Speed **2700 MHz**	
8	Storage sub system	**1 TB 7200 rpm SATA SSD**	
9		DVD / CD-Writer Drive Memory Card Reader	
10	Display/Graphics	**21" TFT Screen** (Free standing-Adjustable)	
11	Keyboard	PS/2 Enhanced keyboard	
12	Pointing device	PS/2 Compatible **Optical mouse**	
13	Audio/ Graphics Systems	❖ PCI 3D audio/video cards ❖ TV/FM cards ❖ Amplified speakers (External)	
14	Communication Interface	❖ 10/100/1000Gbs fast ethernet, RJ 45 jack ❖ 56K ITU V.90 data/fax modern, wake-on-ring ready	
15	**Operating System Pre-load plus CDs**	Windows 10 Professional 64	
16	**Application Software, pre-installed, registered and CDs supplied**	MS OFFICE 2017 OR MS OFFICE XP PRO (2017 Version)	
17	Power sub- system	220-240V ac, 50HZ	
18	Power extension cord	At least four outlets with surge protection	
C	**WARRANTY**	One year parts replacement warrant	

6.02) SPECIFICATIONS FOR LAPTOP COMPUTERS

ITEM	DESCRIPTION	MINIMUM REQUIREMENTS	BIDDER'S SPECIFICATIONS
A	GENERAL SPECIFICATIONS		
1	Make	BRANDED HP	
2	Model	HP ZBook G4 / HP UltraBook	
3	Country of Origin		
4	Manufacturer's brochure and specifications	Must be supplied	
B	TECHNICAL SPECIFICATIONS		
5	Processor	Intel® Core™ i7-4600U with Intel HD Graphics 4400 (2.7 GHz, 4 MB cache, 2 cores)	
6	System Memory	GB 2700 MHz DDR3 SDRAM (1 x 8 GB)	
7	Display/Graphics	15.6" diagonal LED - backlit FHD SVA anti - glare (1920 x 1080)	
8	Storage sub system	750GB SATA SSD	
		DVD/CD – WRITE DRIVE	
		Memory Card Reader	
9	Keyboard and Pointing Device	❖ 84/85/88 – Key ❖ 12 function keys, 4 cursor keys ❖ Built in pointing device ❖ Embedded numeric keyboard	
11	Audio System	❖ PCI 3D audio/video cards ❖ TV/FM cards ❖ Amplified speakers ❖ Built in microphone	
12	Communication Interface	❖ 10/100/1000Gbs fast Ethernet Port ❖ 56K ITU V.90 data/fax modern, ❖ PCM CIA Card ❖ Wireless Connectivity Card ❖ GPRS Port	
13	Operating System Pre-load	Windows 10 Professional	
14	Application Software installed Registered and CDs supplied	MS OFFICE 2013 OR MS OFFICE XP Professional (2013 Version)	
15	Accompanying accessories	❖ Optical Mouse ❖ Touch pad ❖ Leather carrying case/bag	
16	Battery Module	3 – Cell 56Wh Li - ion	
C	WARRANTY	One year parts replacement warrant (Certificate given)	

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	
11Design		❖ 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 **V.A.T, Withholding tax and all other taxes applicable at the time of tender**).

6. Any bid returned with unfilled Schedule of Unit Rates shall be considered technically non-responsive, and the bidder shall automatically be disqualified.

SCHEDULE OF UNIT RATES

(To be completed by the Tenderer)

NO	DESCRIPTION	QTY	UNIT	UNIT RATE (KSHS)	UNIT RATE (CTS)
1	PVC/SWA/PVC Armoured Copper cables per metre				
	a) 10.0mm sq. 2 core	1	M		
	b) 10.0 mm sq 4 core	1	M		
	c) 16.0 mm sq 2core	1	M		
	d) 16.0 mm sq 4core	1	M		
	e) 70.0 mm sq 4 core	1	M		
	f) 90.0 mm sq 4 core	1	M		
	g) 120.0 mm sq 4 core	1	M		
	h) 150.0 mm sq 4 core	1	M		
	i) 185.0 mm sq 4 core	1	M		
	j) 240.0 mm sq 4 core	1	M		
	k) 300.0 mm sq 4 core	1	M		
2	IP 65 rated Isolators as KATKO, 3 Phase				
	a) 20A	1	NO		
	b) 63A	1	NO		
	c) 100A	1	NO		
3	IP 65 rated Isolators as KATKO, single phase				
	a) 32A	1	NO		
	b) 63A	1	NO		
	c) 100A	1	NO		
4	Emergency shutdown switch	1	NO		
5	6 Meter, Street lighting pole with 1 meter outreach arm	1	NO		
6	125 Watts Beta79 street lighting fitting.	1	NO		
7	125 Watts, Gamma Six area lighting fitting.	1	NO		
8	LED Flood lights				
	a) 30 Watts	1	NO		
	b) 100 Watts	1	NO		
9	Industrial socket outlets, 5 pin				
	a) 20A	1	NO		
	b) 32A	1	NO		
10	Industrial socket outlets, 3 pin				
	a) 20A	1	NO		
	b) 32A	1	NO		

NO	DESCRIPTION	QTY	UNIT	UNIT RATE KSHS	UNIT RATE CTS
11	**Cables:** **a) Single Core PVC Cables** i) 10mm2 ii) 16mm2 iii) 25mm2 iv) 50mm2 v) 70mm2 vi) 95mm2 vii) 120mm2 viii) 150mm2 ix) 180mm2 x) 240mm2 xi) 300mm2	 1 1 1 1 1 1 1 1 1 1 1	 M M M M M M M M M M M		
12	**Consumer Units and Distribution Boards:** Lockable 12 Way TPN Distribution Board as Merlin Gerin or an approved equivalent a) 10 Way SPN with integral 100A Isolating Switch b) 10 Way TPN with integral 125A Isolating Switch c) 12 Way SPN with integral 100A Isolating Switch d) 12 Way TPN with integral 150A Isolating Switch	 1 1 1 1	 NO NO NO NO		
13b)	**IP65 rated Isolators as KATKO:** a) 63A TP Isolator 63A SP Isolator c) 100A TP Isolator d) 100A SP Isolator	 1 1 1 1	 NO NO NO NO		
14c)	**Bus Bars:** a) 150A TPN+E Busbar Chamber b) 250A TPN+E Busbar Chamber 300A TPN+E Busbar Chamber d) 400A TPN+E Busbar Chamber e) 500A TPN+E Busbar Chamber f) 600A TPN+E Busbar Chamber	 1 1 1 1 1 1	 NO NO NO NO NO NO		
15	**Cable Trunking** Two compartment powder coated steel trunking manufactured in 14 SWG galvanized mild steel sheet and finished in cream powder coating with the following dimensions; a) 50x25mm b) 75x50mm c) 150x50mm d) 200x50mm	 1 1 1 1	 M M M M		
16	**Cable Trunking** Two compartment powder coated HG PVC trunking manufactured in heavy gauge material and finished in cream powder coating with the following dimensions; a) 250x50mm b) 200x50mm	 1 1	 M M		

SECTION F

BILLS OF QUANTITIES

SPECIAL NOTES TO THE BILLS OF QUATITES

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 (including **Value Added Tax (V.A.T), Withholding tax and all other taxes applicable at the time of tender**).

   In accordance with Government policy, the Value Added Tax (V.A.T) and 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 thereof.

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 **approva**l 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 **Grand Price Summary Page of the Bills of Quantities for Main Works**.

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.

BILL NO. 1 : SUB-CONTRACT PRELIMINARIES

Item	Description	Qty	Unit	Rate (Kshs)	Amount (Kshs)
1.00	Discrepancies clause - Sub-contractor shall include all work either shown on the Contract Drawings or detailed in the specification. No claim or extra cost shall be considered for works which has been shown on the drawings or in the specification alone.	1	Item		
2.00	Payments clause - Payment will be made through certificates to the Main Contractor, unless he specifically agrees to forego this right, in which case direct payment can be made to the Domestic Sub- contractor. All payments will be less retention as specified in the Main Contract. No payment will become due until materials are delivered to site.	1	Item		
3.00	Scope of contract works clause - The sub-contractor shall supply, deliver, unload, hoist, fix, test, commission and hand-over in satisfactory working order the complete installations specified hereinafter and/or as shown on the Contract Drawings attached hereto, including the provision of labour, transport and plant for unloading material and storage, and handling into position and fixing	1	Item		
4.00	Extent of contractors duties clause - The Sub- contractor shall be responsible for verifying all dimensions relative to his work by actual measurements taken on site.Shall mark accurately on one set of drawings and indicate all alterations and/or modifications carried out to the designed system during the construction period. This information must be made available on site for inspection by the Engineer.	1	Item		
5.00	Firm price contract clause - No claims will be allowed for increased costs arising from the fluctuations in duties and/or day to day currency fluctuations. The Sub-contractor will be deemed to have allowed in his tender for any increase in the cost of materials which may arise as a result of currency fluctuation during the contract period.	1	Item		
6.00	Variation clause - Any variation from the contract price in respect of any extra work, alteration or omission requested or sanctioned by the Architect or Engineer shall be agreed and confirmed in writing at the same time such variations are decided and shall not affect the validity of the Contract. Schedule of Unit Rates shall be used to assess the value of such variations. No allowance shall be made for loss of profit on omitted works.	1	Item		
7.00	Prime cost and provisional sum clause The work covered by Prime Cost and Provisional Sums may or may not be carried out at the discretion of the Project Manager. The whole or any part of these sums utilized by the Sub-contractor shall be deducted from the value of the Sub-contract price when calculating the final account.	1	Item		
8.00	Government legislation and regulations clause - Sub- contractor shall allow for providing holidays and transport for work people, and for complying with Legislation, Regulations and Union Agreements. The Sub-contractor must also make himself acquainted with current legislation and any Government regulations regarding the movement, housing, security and control of labour, labour camps, passes for transport, etc.	1	Item		
9.00	Import duty and VAT clause - (Note this clause applies for materials supplied only whether imported or locally manufactured. The tenderer shall make full allowance in his tender for all such taxes.	1	Item		
	Sub-Total C/F to Next Page				

Item	Description	Qty	Unit	Rate (Kshs)	Amount (Kshs)
	Sub-Total B/F from Previous Page				
10.00	Insurance company fees clause - Attention is drawn to the tenderers to allow for all necessary fees, where known, that may be payable in respect of any fees imposed by Insurance Companies or statutory authorities for testing or inspection.	1	Item		
11.00	Samples and materials generally clause - The Sub- contractor shall, when required, provide for approval at no extra cost, samples of all materials to be incorporated in the works. Such samples, when approved, shall be retained by the Engineer and shall form the standard for all such materials incorporated.	1	Item		
12.00	Bills of quantities clause - All the Quantities are based on the Contract Drawings and are provisional and they shall not be held to gauge or to limit the amount or description of the work to be executed by the Sub- contractor but the value thereof shall be deducted from the Sub-contract Sum and the value of the work ordered by the Engineer and executed there under shall be measured and valued by the Engineer in accordance with the contract. All work liable to adjustment under this Sub-contract shall be left uncovered for a reasonable time to allow measurements needed for such adjustment to be taken by the Quantity Surveyor or Engineer. Immediately the work is ready for measuring the Sub- contractor shall give notice to the Quantity Surveyor or Engineer to carry out measurements before covering up. If the Sub-contractor shall make default in these respects he shall, if the Architect so directs, uncover the work to enable the necessary measurements to be taken and afterwards reinstate at his own expense.	1	Item		
13.00	Contractors office in Kenya clause - It shall be the Sub- contractor's responsibility to procure work permits, entry permits, licences, registration, etc., in respect of all expatriate staff. The Sub-contractor shall prepare a substantial proportion of his Working Drawings at his office in Kenya. No reasons for delays in the preparation or submission for approval or otherwise of such drawings or proposals will be accepted on the grounds that the Sub-contractor's Head Office is remote from his office in Nairobi or the site of the Sub- contract Works or otherwise.	1	Item		
14.00	Builders work clause 1- All chasing, cutting away and making good will be done by the Main Contractor but the Sub-contractor shall mark out in advance and shall be responsible for accuracy of the size and position of all holes and chases required.	1	Item		
15.00	Setting to work and regulating system clause- No testing or commissioning shall be undertaken except in the presence of and to the satisfaction of the Engineer unless otherwise stated by him (Sub-contractor's own preliminary and proving tests excepted). It will be deemed that the Sub-contractor has included in the Sub-contract Sum for the costs of all fuel, power, water and the like, for testing and commissioning as required.	1	Item		
16.00	Identification of plant components clause - Sub-contractor shall supply and fix identification labels to all plant, starters, switches and items of control equipment etc with white traffolyte or equal labels engraved in red lettering denoting its name, function and section controlled.	1	Item		
17.00	Working drawings clause - Sub-contractor shall prepare such Working Drawings as may be necessary. The Working Drawings shall be complete in such detail not only that the Sub-contract Works can be executed on site but also that the Engineer can approve the Sub-contractor's proposals, detailed designs and intentions in the execution of the Sub- contract Works.	1	Item		
	Sub-Total C/F to Next Page				

Item	Description	Qty	Unit	Rate (Kshs)	Amount (Kshs)
	Sub-Total B/F from Previous Page				
18.00	Records Drawings (As Installed) and instructions clause - Record Drawings, will be subject to the approval of the Engineer, include approved Working Drawings adjusted as necessary and certified by the Sub-contractor as a correct record of the installation of the Sub-contract Works.	1	Item		
19.00	Maintenance Manual clause - Upon Practical Completion of the Sub-contract Works, the Sub- contractor shall furnish the Engineer four copies of a Maintenance Manual relating to the installation forming part of all of the Sub-contract Works.	1	Item		
20.00	Hand over clause - The Sub-contract Works shall be considered complete and the Maintenance and Defects Liability Period shall commence only when the Sub-contract Works and supporting services have been tested, commissioned and operated to the satisfaction of the Engineer and officially approved and accepted by the Employer, provided always that the handing over of the Sub-contract Works shall be coincident with the handing over of the Main Contract Works.	1	Item		
21.00	Testing and inspection - manufactured plant clause - The Engineer reserves the right to inspect and test or witness of all manufactured plant equipment and materials. The right of the Engineer relating to the inspection, examination and testing of plant during manufacture. Sub-contractor shall give two weeks' notice to the Engineer of his intention to carry out any inspection or tests and the Engineer or his representative shall be entitled to witness such tests and inspections.	1	Item		
22.00	Testing and inspection - installation clause - Allow for testing each section of the Sub-contract Works installation.	1	Item		
23.00	Initial Maintenance Clause - The sub-contractor shall make routine maintenance once a month during the liability for the Defects Period and shall carry out all necessary adjustments and repairs, cleaning and oiling of moving parts. A monthly report of the inspection and any works done upon the installation shall be supplied to the Engineer. Shall allow in the sub-contract Sum of the initial maintenance, inspection and break-down service	1	Item		
24.00	Local and other authorities notice clause - The contractor shall comply with and give all notices required by any Regulations, Act or by Law of any Local Authority or of any Public Service, Company or Authority who have any jurisdiction with regard to the works or with those systems the same are or will be connected and he shall pay and indemnify the Government against any fees or charges legally demandable under any regulation or by-law in respect of the works; provided that the said fees and charges if not expressly included in the contract sum or stated by way of provisional sum shall be added to the contract sum.	1	Item		
25.00	Temporary Works clause - The contractor shall include for the cost of and make necessary arrangements with the Project Manager for such temporary works.	1	Item		
26.00	Patent Rights clause - The contractor shall fully indemnify the Government of Kenya; against any action, claim or proceeding relating to infringement of any patent or design rights, and pay any royalties which may be payable in respect of any article or any part thereof, which shall have been supplied by the contractor to the Project Manager.	1	Item		
	Sub-Total C/F to Next Page				

Item	Description	Qty	Unit	Rate (Kshs)	Amount (Kshs)
	Sub-Total B/F from Previous Page				
27.00	Mobilization and Demobilization clause -No claim will be entertained where the contractor has not made any provision for mobilization and demobilization of labour, plant and equipment in the preliminary bills of quantities.	1	Item		
28.00	Supervision by Engineer and site meetings clause - A competent Project Engineer appointed by the Chief Engineer as his representative shall supervise the Contract works. The Project Engineer shall be responsible for issuing all the site instructions in any variations to the works and these shall be delivered through the Contractor with the authority of the Project Manager. Any instructions given verbal shall be confirmed in writing. The Sub Contractor shall in his tender allow for the provision of management meetings and site inspections, as instructed by the Engineer, and also profit and attendance on these funds. The funds shall be expended according to Project Manager's instructions to the Contractor.	1	Item	400,000.00	**400,000.00**
29.00	Allow for Taxes, Profit and Attendance for the above Item		%		
30.00	Contract obligation and employers obligation clause - No claims will be entertained for pre-financing of the project by the sub-contractor, or for loss of profit (expectation loss) in case of premature termination, reduction or increase of works as the sub-contractor shall be deemed to have taken adequate measures in programming his works and expenditure and taken necessary financial precaution while executing the works.	1	Item		
31.00	Any other preliminaries	1	Item		
	Total for Bill No. 1: Sub-Contract Preliminaries C/F to Price Summary Page				

Bidders MUST either insert percentage or indicate as NIL for the following clauses:

(1) Attendance Upon Tradesmen, etc. **(Insert percentage only)** clause 1.58 of Section C

.....%

(2) Extended Preliminaries **(Insert percentage only)** Clause 1.66 of Section C

.....%

BILL NO. 2 - SCHEDULE NO. 1: 2NO. TYPICAL WAREHOUSES (5,000 SQM)

SCHEDULE NO. 1A: GROUND FLOOR

Item	Description	Qty	Unit	Rate (Kshs)	Amount (Kshs)
	Supply, Install, test and commission the following :				
1A.01	Lighting points comprising wiring in 3x1.5mm^2 Single Core PVC insulated Copper Cables drawn in concealed 20mm Diameter HG PVC conduits complete with all necessary accessories but excluding switches for:-				
	(a) One Way Switching.	96	No.		
	(b) Two Way Switching.	192	No.		
	(c) Unswitched.	8	No.		
1A.02	10A moulded ivory switch plates as MK, BG, Crabtree or approved equivalent as follows:				
	(a) 1 gang 1 way	12	No.		
	(b) 1 gang 2 way	6	No.		
	(c) 2 gang 1 way	1	No.		
	(d) 2 gang 2 way	10	No.		
	(e) 3 gang 1 way	2	No.		
	(f) 4 gang 2 way	4	No.		
	(g) Intermediate Switch	4	No.		
1A.03	High bay luminaire's Lighting point comprising wiring in 3x2.5mm^2 Single Core PVC insulated Copper Cables drawn in 25mm Diameter HG PVC conduits concealed in walls and along trusses (approximately 40m from DB) complete with all necessary accessories but excluding switches for:-				
	(a) One Way Switching.	40	No.		
1A.04	20A double pole control switch plates with neon light as MK, BG, Crabtree or approved equivalent as follows:				
	(a) 1 gang 1 way	10	No.		
1A.05	Metallic grid switch panel with a capacity of 20No. 20A DP switches to be mounted on wall	1	No.		
	LIGHTING FITTINGS				
1A.06	Lighting fittings complete with all accessories including LED tubes & lamps of appropriate wattage and colour rendering and fixing materials as follows:				
	(a) 600mm by 600mm, 4x18W, modular surface/recessed fluorescent luminaire designed for use in lay-in ceiling grids, with louvre retention system, electronic ballast and plug and socket installation method.	14	No.		
	Sub-Total C/F to the Next Page				

Item	Description	Qty	Unit	Rate (Kshs)	Amount (Kshs)
	Sub-Total B/F from Previous Page				
	(b) Decorative high bay luminaire for 250W elliptical discharge lamps with clear polycarbonate reflector. Autobalanced, single point suspension. IP23 protection as Thorn Cyber Deco	40	No.		
	(c) 1200mm, 1x36W standard waterproof IP65 fluorescent fitting with injection moulded polycarbonae body and polycarbonanate diffuser for T8 lamp with electronic control gear as Thorn Aquaproof or an approved equivalent.	2	No.		
	(d) 1200mm, 1x36W HPF, Surface Mounted Fluorescent batten fitting of slim cross section with electronic control gear, clip-on cover plate and adjustable end cap system as Thorn Popular Pack Batten or equal and approved equivalent.	10	No.		
	(e) 1200mm, 2x36W HPF, Suspended Fluorescent batten fitting of slim cross section with electronic control gear, clip-on cover plate and adjustable end cap system as Thorn Popular Pack Batten or equal and approved equivalent.	164	No.		
	(f) Standard circular splashproof surface luminaire with polycarbonate body and white trim, polycarbonate opal diffuser and integral control gear for 28 W 2D compact flourescent lamp as THORN Superclub or approved equivalent.	14	No.		
	(g) 1200mm, 1x 36 Watts slim fluorescent fitting with prismatic diffuser without a socket outlet point, for mirror lighting, as EGLO or approved equivalent.	6	No.		
	(h) 40W Outdoor Bulkhead with Opal Diffuser, grill & visor, IP65 protection as Massive Cleveland Outdoor or an approved equivalent.	30	No.		
	(i) Standard, Shallow surface luminaire with circular opal diffuser and white stand-off ring, with integral HPF control gear for 16W 2D compact fluorescent lamp. As Thorn Glorie or approved equivalent.	8	No.		
	(j) Self-contained double sided EXIT sign with 8W fluorescent lamp for non-maintained emergency lighting for 3 hour duration as Sapphire or approved equivalent.	8	No.		
1A.07	**TRUNKING & DUCTING**				
	i) 200x50mm two (2) compartment powder coated trunking manufactured in 14 swg galvanized mild steel sheet and finished in cream powder coating to details shown complete with covers and all fixing accessories. Allow for colour change to Architect's detail.	320	Lm.		
	ii) Factory made powder coated corner bends for the above trunking.	26	No.		
	iii) Powder coated twin punched outlet plate for fixing twin socket outlets.	32	No.		
	iv) Ditto but for data/telephone/single switched socket outlets.	20	No.		
	v) Carry out bonding throughout the entire length of the above trunking and connect to earthing.	1	Item		
1A.08	200mm x 50mm deep perfotrated GI cable tray complete with all accessories inside ceiling as manufactured by Schneider Electric Kenya or an approved equivalent.	20	Lm.		
	Sub-Total C/F to the Next Page				

Item	Description	Qty	Unit	Rate (Kshs)	Amount (Kshs)
	Sub-Total B/F from Previous Page				
1A.09	Lay HG/PVC conduiting of size 2x32mm diameter HG/PVC ducts from the electrical service duct to the metal trunkings for telecommunication services.	40	Lm.		
1A.10	Lay HG/PVC conduiting of size 2x50mm diameter HG/PVC ducts from the electrical service duct to the metal trunkings for internal power reticulation and inter-connecting electrical service ducts.	60	Lm.		
1A.11	Supply and Install an 16 SWG steel sheets spray painted to approval adaptable box 400mmx400mm to Engineer's approval.	4	No.		
	POWER POINTS				
1A.12	Ring mains socket outlets comprising wiring in 3x2.5mm sq. single core PVC insulated copper cables drawn in concealed 25 mm diameter Heavy Gauge PVC conduits complete with all the necessary accessories.	8	No.		
1A.13	Ring mains socket outlets comprising wiring in 3x2.5mm sq. single core PVC insulated copper cables drawn in trunking complete with all the necessary accessories.	32	No.		
1A.14	13A switched white moulded case socket outlet plates as MK, Clipsal, BG, Crabtree or an approved equivalent.				
	(a) Twin outlet.	40	No.		
1A.15	**Air Conditioner's Power Point,** comprising wiring drawn in 3x4mm2 PVC-SC-CU cables in concealed 25mm Diameter HG PVC conduits complete with all accessories but excluding the D.P switch .	2	No.		
1A.16	20A DP Control Switch marked 'As Per Application' with neon light and cord outlet for item above as MK, Crabtree or approved equivalent.	2	No.		
1A.17	**Hand Drier's Power Point**, wired in 3x 2.5sq mm PVC SC copper cables drawn in concealed 25mm Dia. HG PVC conduits complete with all accessories but excluding the D.P switch.	4	No.		
1A.18	13A DP Control Switch marked 'As Per Application' with neon light and cord outlet for item above as MK, Crabtree or approved equivalent.	4	No.		
1A.19	**Undersink Water Heater Power Point,** comprising wiring in 3 x 4mm2 PVC/SC/CU cables drawn in concealed 25mm Dia. HG/PVC conduits complete with all necessary accessories but excluding the D.P switch.	1	No.		
1A.20	20A DP Control Switch marked 'As Per Application' with neon light and cord outlet for item above as MK, Crabtree or approved equivalent.	1	No.		
1A.21	**Cooker (1-Φ) Power Point,** comprising of 3x6mm^2 PVC SC Copper cables drawn in concealed 25mm Dia. HG PVC conduits complete with all accessories.	1	No.		
1A.22	45A DP Cooker Control Unit with 13A integral Socket Outlet and Pilot Lamp marked 'As Per Application' for item above as MK, MEM or approved equivalent.	1	No.		
1A.23	Cooker Connection Unit for flush mounting and wired from Cooker Control Unit.	1	No.		
	Sub-Total C/F to the Next Page				

Item	Description	Qty	Unit	Rate (Kshs)	Amount (Kshs)
	Sub-Total B/F from Previous Page				
1A.24	**TELEVISION POINTS**				
	a) TV outlet point wired in 75 Ohms Screened Coaxial TV cables drawn in concealed 20mm diameter HG/PVC conduits and linked to the outside through the roof space (to the amplifier) via telephone draw in boxes.	1	No.		
	b) TV outlet plate with polished brass finish as MK, Clipsal, Crabtree or approved equivalent.	1	No		
	c) 300mmx250mmx150mm, 18SWG, powder coated, telephone draw box spray painted to approval.	1	No		
	DATA&TELEPHONE POINTS				
1A.25	Data/Telephone outlet point done in 25mm Dia. HG PVC conduits concealed in building fabric/ trunking complete with all necessary accessories.	20	No.		
	CCTV & ACCESS CONTROL POINTS				
1A.26	CCTV & Access Control System Points done in 25mm Dia. HG PVC conduits concealed in building fabric/trunking complete with all necessary accessories (N/B: conduit length for each point running from the communication room is approximately 20m).	10	No.		
	INTERNAL POWER DISTRIBUTION				
1A.27	12 Ways TPN+E, flush mounted Distribution Board complete with 125A integral isolator as SCHNEIDER ELECTRIC, HAUSMANN or an approved equivalent complete with all accessories but excluding MCBs.	2	No.		
1A.28	MCB's for item above				
	(i) 10A SP	18	No.		
	(ii) 20A SP	12	No.		
	(iii) 32A SP	14	No.		
	(iv) 45A SP	1	No.		
	(v) SP Spareway	15	No.		
	(vi) TP Spareway	4	No.		
1A.29	Carry out concise permanent traffolyte labelling for all the sub-circuits in item above.	2	Item		
	SUB-MAIN POWER DISTRIBUTION CABLE				
1A.30	$25mm^2$ 4Core PVC/SWA/PVC Copper cables in 50mmØ concealed HG PVC conduits complete with appropriate cable glands and any other necessary accessory (to supply 2No. DBs supplying lighting and power).	120	Lm.		
1A.31	4 Ways TPN+E, flush mounted Distribution Board complete with 125A integral isolator as SCHNEIDER ELECTRIC, HAUSMANN or an approved equivalent complete with all accessories but excluding MCBs.	1	No.		
	Sub-Total C/F to the Next Page				

Item	Description	Qty	Unit	Rate (Kshs)	Amount (Kshs)
	Sub-Total B/F from Previous Page				
1A.32	MCB's for item above				
	(i) 32A TP	2	No.		
	(ii) TP Spareway	2	No.		
1A.33	Carry out concise permanent traffolyte labelling for all the sub-circuits in item above.	1	Item		
1A.34	16mm^2 4Core PVC/SWA/PVC Copper cables in 50mmØ concealed HG PVC conduits complete with appropriate cable glands and any other necessary accessory (to supply DB supplying fork lift chargers).	80	Lm.		
1A.35	Supply and install a 4 core 4.0 sq. mm PVC/SWA/PVC- insulated cu cables from the Distribution board to the isolator at fork lift charger's point complete with necessary cable glands, cable lugs and any other termination accessory.	40	Lm.		
1A.36	Supply and instal 32A, TP metal clad isolator as Schneider Electric, Crabtree or approved equivalent.	2	No.		
1A.37	**FIRE DETECTION AND ALARM SYSTEM**				
	Supply, deliver, install and commission a complete Fire Detection and Alarm system, addressable type and in accordance with BS 5839 :2000, P2 and L2				
	i) Outlet for Fire Alarm Panel's concealed 25mm HG PVC conduit, wiring in 3 x 2.5mm2 SC-PVC-CU fire rated cables and all accessories, including 5A fused unswitched connection unit with neon light.	1	No.		
	ii) Outlet for fire alarm manual call point/smoke/heat detector comprising box, concealed 20mm HG PVC conduit, wiring in 3 x 1.5mm2 fire rated cables and all accessories.	57	No.		
	iii) Addressable Manual Fire break glass call point unit as MENVIER or approved equivalent complete with a packet of 5 spare glasses, a packet of 5 spare test keys, a spare back box and a hinged cover to be installed recessed in building fabric.	3	No.		
	iv) Addressable **Electronic Fire Alarm Sounder** complete with **Red Flashing Beacon Light** as MENVIER or approved equivalent.	3	No.		
	v) Addressable **Photometric Smoke Detector** as Menvier MENVIER or equal and approved.	50	No.		
	vi) Addressable **Rate of Heat Rise Detector** as Menvier MENVIER or equal and approved.	1	No.		
	vii) 10 - Loop zone addressable fire alarm control panel complete with 72hrs autonomous time emergency batteries as Menvier DF6100 or equal and approved.	1	No.		
	Total for Ground Floor C/F to Price Collection Page-Schedule No. 1: 2No. Typical Warehouses				

SCHEDULE NO. 1B: FIRST FLOOR

Item	Description	Qty	Unit	Rate (Kshs)	Amount (Kshs)
	Supply, Install, test and commission the following :				
1B.01	Lighting points comprising wiring in 3x1.5mm^2 Single Core PVC insulated Copper Cables drawn in concealed 20mm Diameter HG PVC conduits complete with all necessary accessories but excluding switches for:-				
	(a) One Way Switching.	46	No.		
	(b) Two Way Switching.	15	No.		
	(c) Unswitched.	3	No.		
1B.02	10A moulded ivory switch plates as MK, BG, Crabtree or approved equivalent as follows:				
	(a) 1 gang 1 way	10	No.		
	(b) 1 gang 2 way	4	No.		
	(c) 2 gang 1 way	1	No.		
	(d) 3 gang 1 way	2	No.		
	(e) Intermediate Switch	2	No.		
	LIGHTING FITTINGS				
1B.03	Lighting fittings complete with all accessories including LED tubes & lamps of appropriate wattage and colour rendering and fixing materials as follows:				
	(a) 600mm by 600mm, 4x18W, modular surface/recessed fluorescent luminaire designed for use in lay-in ceiling grids, with louvre retention system, electronic ballast and plug and socket installation method.	10	No.		
	(b) 37W, 600mm x 600mm, LED Panel Lighting fitting as Philips FullGlow or approved equivalent.	16	No.		
	(c) 1200mm, 1x36W standard waterproof IP65 fluorescent fitting with injection moulded polycarbonae body and polycarbonanate diffuser for T8 lamp with electronic control gear as Thorn Aquaproof or an approved equivalent.	2	No.		
	(d) Standard, Shallow surface luminaire with circular opal diffuser and white stand-off ring, with integral HPF control gear for 16W 2D compact fluorescent lamp. As Thorn Glorie or approved equivalent.	4	No.		
	(e) 1200mm, 1x36W HPF, Surface Mounted Fluorescent batten fitting of slim cross section with electronic control gear, clip-on cover plate and adjustable end cap system as Thorn Popular Pack Batten or equal and approved equivalent.	10	No.		
	(f) Standard circular splashproof surface luminaire with polycarbonate body and white trim, polycarbonate opal diffuser and integral control gear for 28 W 2D compact flourescent lamp as THORN Superclub or approved equivalent.	14	No.		
	Sub-Total C/F to the Next Page				

Item	Description	Qty	Unit	Rate (Kshs)	Amount (Kshs)
	Sub-Total B/F from Previous Page				
	(g) 1200mm, 1x 36 Watts slim fluorescent fitting with prismatic diffuser without a socket outlet point, for mirror lighting, as EGLO or approved equivalent.	5	No.		
	(h) Self-contained double sided EXIT sign with 8W fluorescent lamp for non-maintained emergency lighting for 3 hour duration as Sapphire or approved equivalent.	3	No.		
1B.04	**TRUNKING & DUCTING**				
	i) 200x50mm two (2) compartment powder coated trunking manufactured in 14 swg galvanized mild steel sheet and finished in cream powder coating to details shown complete with covers and all fixing accessories. Allow for colour change to Architect's detail.	110	Lm.		
	ii) Factory made powder coated corner bends for the above trunking.	12	No.		
	iii) Powder coated twin punched outlet plate for fixing twin socket outlets.	20	No.		
	iv) Ditto but for data/telephone/single switched socket outlets.	12	No.		
	v) Carry out bonding throughout the entire length of the above trunking and connect to earthing.	1	Item		
1B.05	Lay HG/PVC conduiting of size 2x32mm diameter HG/PVC ducts from the electrical service duct to the metal trunkings for telecommunication services.	20	Lm.		
1B.06	Lay HG/PVC conduiting of size 2x50mm diameter HG/PVC ducts from the electrical service duct to the metal trunkings for internal power reticulation and inter-connecting electrical service ducts.	30	Lm.		
1B.07	Supply and Install an 16 SWG steel sheets spray painted to approval adaptable box 400mmx400mm to Engineer's approval.	2	No.		
	POWER POINTS				
1B.08	Ring mains socket outlets comprising wiring in 3x2.5mm sq. single core PVC insulated copper cables drawn in concealed 25 mm diameter Heavy Gauge PVC conduits complete with all the necessary accessories.	2	No.		
1B.09	Ring mains socket outlets comprising wiring in 3x2.5mm sq. single core PVC insulated copper cables drawn in trunking complete with all the necessary accessories.	18	No.		
1B.10	13A switched white moulded case socket outlet plates as MK, Clipsal, BG, Crabtree or an approved equivalent.				
	(a) Twin outlet.	20	No.		
1B.11	**Air Conditioner's Power Point,** comprising wiring drawn in 3x4mm2 PVC-SC-CU cables in concealed 25mm Diameter HG PVC conduits complete with all accessories but excluding the D.P switch .	4	No.		
	Sub-Total C/F to the Next Page				

Item	Description	Qty	Unit	Rate (Kshs)	Amount (Kshs)
	Sub-Total B/F from Previous Page				
1B.12	20A DP Control Switch marked 'As Per Application' with neon light and cord outlet for item above as MK, Crabtree or approved equivalent.	4	No.		
1B.13	**Hand Drier's Power Point**, wired in 3x 2.5sq mm PVC SC copper cables drawn in concealed 25mm Dia. HG PVC conduits complete with all accessories but excluding the D.P switch.	3	No.		
1B.14	13A DP Control Switch marked 'As Per Application' with neon light and cord outlet for item above as MK, Crabtree or approved equivalent.	3	No.		
1B.15	**TELEVISION POINTS**				
	a) TV outlet point wired in 75 Ohms Screened Coaxial TV cables drawn in concealed 20mm diameter HG/PVC conduits and linked to the outside through the roof space (to the amplifier) via telephone draw in boxes.	4	No.		
	b) TV outlet plate with polished brass finish as MK, Clipsal, Crabtree or approved equivalent.	4	No		
	c) 300mmx250mmx150mm, 18SWG, powder coated, telephone draw box spray painted to approval.	4	No		
	DATA&TELEPHONE POINTS				
1B.16	Data/Telephone outlet point done in 25mm Dia. HG PVC conduits concealed in building fabric/ trunking complete with all necessary accessories.	12	No.		
	CCTV & ACCESS CONTROL POINTS				
1B.17	CCTV & Access Control System Points done in 25mm Dia. HG PVC conduits concealed in building fabric/trunking complete with all necessary accessories (N/B: conduit length for each point running from the communication room is approximately 20m).	4	No.		
	INTERNAL POWER DISTRIBUTION				
1B.18	6 Ways TPN+E, flush mounted Distribution Board complete with 125A integral isolator as SCHNEIDER ELECTRIC, HAUSMANN or an approved equivalent complete with all accessories but excluding MCBs.	2	No.		
1B.19	MCB's for item above				
	(i) 10A SP	4	No.		
	(ii) 20A SP	7	No.		
	(iii) 32A SP	4	No.		
	(iv) SP Spareway	12	No.		
	(v) TP Spareway	3	No.		
	Sub-Total C/F to the Next Page				

Item	Description	Qty	Unit	Rate (Kshs)	Amount (Kshs)
	Sub-Total B/F from Previous Page				
1B.20	Carry out concise permanent traffolyte labelling for all the sub-circuits in item above.	2	Item		
	SUB-MAIN POWER DISTRIBUTION CABLE				
1B.21	16mm^2 4Core PVC/SWA/PVC Copper cables in 50mmØ concealed HG PVC conduits complete with appropriate cable glands and any other necessary accessory (to supply 2No. DBs supplying lighting and power).	70	Lm.		
1B.22	**FIRE DETECTION AND ALARM SYSTEM**				
	Supply, deliver, install and commission a complete Fire Detection and Alarm system, addressable type and in accordance with BS 5839 :2000, P2 and L2				
	i) Outlet for fire alarm manual call point/smoke/heat detector comprising box, concealed 20mm HG PVC conduit, wiring in 3 x 1.5mm2 fire rated cables and all accessories.	18	No.		
	ii) Addressable Manual Fire break glass call point unit as MENVIER or approved equivalent complete with a packet of 5 spare glasses, a packet of 5 spare test keys, a spare back box and a hinged cover to be installed recessed in building fabric.	3	No.		
	iii) Addressable **Electronic Fire Alarm Sounder** complete with **Red Flashing Beacon Light** as MENVIER or approved equivalent.	3	No.		
	iv) Addressable **Photometric Smoke Detector** as Menvier MENVIER or equal and approved.	12	No.		
	Total for First Floor C/F to Price Collection Page-Schedule No. 1: 2No. Typical Warehouses				

1C: CENTRALIZED ANTENNA SYSTEM

Item	Description	Qty	Unit	Rate (Kshs)	Amount (Kshs)
	Supply, Install, Test & Commission the following: -				
	CENTRALIZED ANTENNA SYSTEM				
1C.01	Mast head High gain amplifier units.	1	No.		
1C.02	VHF aerial as Ellies or approved equivalent complete with mounting bracket.	1	No.		
1C.03	UHF aerial as Ellies or approved equivalent complete with mounting bracket	2	No.		
1C.04	Mast head Combiner unit as Ellies or approved equivalent	1	No.		
1C.05	Four way splitters as Ellies or approved equivalent	3	No.		
1C.06	13 Amp High voltage guard as Sollatec or approved equivalent	1	No.		
1C.07	Adjustable Telescopic Antenna Mast	1	No.		
1C.08	75 Ohms Screened Coaxial TV cables for interwiring the antennas, combiner units, splitter units and amplifier	300	Lm.		
1C.09	16SWG, powder coated, Security Lockable Box complete with lock and three keys to be handed over to the Client.	1	No.		
1C.10	16 SWG, (300 x 300 x 300) mm^3 galvanised steel draw box for TV works.	4	No.		
	Total for Centralized Antenna System C/F to Price Collection Page-Schedule No. 1: 2No. Typical Warehouses				

1D: LIGHTNING PROTECTION, EARTHING AND BONDING

Item	Description	Qty	Unit	Rate (Kshs)	Amount (Kshs)
	Supply, Install, Test & Commission the Lightning Protection System comprising the following:				
	AIR TERMINATION				
1D.01	Supply and lay along the ridge cap 25mm X 3mm thick bare pure copper tape as Furse P. No. TC030 or approved equivalent.	280	Lm.		
1D.02	State Holdfast to fix the above tape at 1000mm intervals at the roof ridge for air termination system complete with tape jointing clamps and all the necessary accessories all as Furse Cat. No. HF015 or approved equivalent.	280	No.		
1D.03	Air Termination Spike (lightning arrestors) comprising 2000mm by 15mm diameter copper rod as Furse P.No. RA240 complete with; Copper Multiple Point as Furse P. No. RA 600 and Copper Ridge Saddle as Furse P. No. SD115 or approved equivalent.	6	No.		
	DOWNWARD CONDUCTOR				
1D.04	Downward Conductor comprising 25mm X 3mm thick bare pure copper tape as Furse P. No. TC030 or approved equivalent.	120	Lm.		
1D.05	Copper Square Tape Clamp for making crossing tape joints as Furse CT 105 - FU or approved equivalent.	24	No.		
1D.06	DC Tape Clips for Fixing the Down Conductors to the wall as Furse CT 105-FU or approved equivalent.	1,200	No.		
1D.07	Copper Oblong Test/Junction Clamp complete with phosphor bronze nuts, washers and screws mounted 1800mm above finished ground level as Furse P. No. CN 105 or approved equivalent.	10	No.		
1D.08	32 mm diameter galvanised steel conduit recessed in wall between test clamp and ground and through the ring beam for sleeving at roof level for securing the down conductors.	40	Lm.		
1D.09	Copper Saddles fixed at 1000mm intervals at the surface on wall for the down conductor system complete with all the necessary accessories all as FURSE or approved equivalent.	40	No.		
	EARTHING				
1D.10	Earth Inspection Concrete Chamber 300mm x 300mm x 300mm with an air tight inspection cover to approval.	8	No.		
1D.11	Earthing with 16mm nominal diameter by 1500mm long threaded copper bond earth rods, complete with driving head and clamp.	8	No.		
1D.12	Driving Stud for the Item above as Furse ST 300 or approved equivalent.	8	No.		
1D.13	Earth Electrode Rod-to-Downward Conductor Copper Tape Clamps as Furse CR 105 or approved equivalent.	8	No.		
	Sub-Total C/F to the Next Page				

Item	Description	Qty	Unit	Rate (Kshs)	Amount (Kshs)
	Sub-Total B/F from Previous Page				
1D.14	1500mm x 1500mm copper earth mat/grid (pure copper electrode) made from 25mm x 3mm thick bare copper tape (as Furse P. No. TC030 or approved equivalent). Copper tape to be spaced at 200mm interval, gas welded joints to Engineer's approval and 6m long 25mm x 3mm insulated copper tape clamped to the down conductors. Include burrying the assembled grid to a minimum depth of 750mm below ground finish level (at permanent moisture level) and improving the earth to Engineer's approval. The measured earth resistance to be less than one (1) ohm.	8	No.		
	BONDING				
1D.15	Bonding and clamping to all metal work including water pipes, gas pipes, hand-rails, air-conditioning uits, window frames, cladding, metal roof etc and the main earth for the building.	1	Item		
1D.16	Testing and Commissioning the entire earthing and lightning protection system.	1	Item		
	Total for Lightning Protection, Earthing and Bonding C/F to Price Collection Page-Schedule No. 1: 2No. Typical Warehouses				

1E: AREA LIGHTING

Item	Description	Qty	Unit	Rate (Kshs)	Amount (Kshs)
	Supply, install, test and commission the following ;-				
	AREA LIGHTING				
1E.01	7.0 Meters outdoor/street lighting galvanized steel round column for side entry single arm painted with rust proof aluminum paint in concrete 1:2:4 ratio foundation and with a lockable anti-vandalism door.	10	No		
1E.02	5 Metres, Top Post entry, Galvanised steel security lighting posts cut outs, glanding plates and watertight covers.	8	No.		
1E.03	4-pole Lucy connector mounted on street lighting columns.	18	No		
1E.04	Side entry road lighting lantern for 90W sealed to IP65 outdoor LED FloodLight complete with mounting brackets to the poles above as Nikkon S419 Series or approved equivalent.	10	No		
1E.05	Top Post, Streetlighting lantern as THORN Gamma Basique with 2x24 compact flourescent lamp complete with integral control gear, wiring in 1.5mm2 twin with earth sheathed cable for a length of upto 5 metres per lantern, cut-out, cable glands and all other necessary accessories.	8	No.		
1E.06	Decorative amenity lantern, post top, with dome top or wide canopy in opal, white or grey for 150W HPS-T, (IP65) As Thorn Mexico or approved equivalent.	6	No		
1E.07	Wiring from lighting fitting to the cut-out fuses with 1.5mm2 twin PVC with ECC for street/outdoor lighting column between lucy connector and lantern.	150	Lm.		
1E.08	5A, HRC fuse, fuse holder and neutral block and all other necessary accessories.	24	No.		
1E.09	4 core, 4mm^2 for street lighting PVC/SWA/PVC copper cables complete with appropriate cable lugs, cable glands and any other necessary accessory (Switchboard to Control Pillar).	150	Lm.		
1E.10	Allow for Earthing at every third pole interval and the control pillars. The contractor to ensure that the earth resistance does not exceed 10 Ohms.	6	No.		
1E.11	30A SP 300mA residual circuit breaker with overload and short circuit protection (RCBO) to be mounted inside the control pillar As Hager, Telemecanique or equal and approved	2	No.		
1E.12	A photocell to fit 70-75lux switch on level and 1.5 maximum differential and as THORN QPK or approved equivalent	2	No.		
1E.13	30A, 240V 3-pole contactor as manufactured by Telemecanique or approved equivalent, to be installed inside the control pillar.	2	No.		
1E.14	Mounting the photocell above to one of security lighting post.	2	No.		
	Sub-Total C/F to the Next Page				

Item	Description	Qty	Unit	Rate (Kshs)	Amount (Kshs)
	Sub-Total B/F from Previous Page				
1E.15	2 core, 4mm^2 for street lighting PVC/SWA/PVC copper cables complete with appropriate cable glands and any other necessary accessory (from Control Pillar to Garden/Street Lights).	140	Lm.		
1E.16	Trenching at an average depth of 700mm, Cable Laying, Tiling with "HATARI" tiles and Backfilling of the trenches with soil and compact to natural ground level for the above cable to Engineer's Approval.	290	Lm.		
1E.17	200mm x 450mm x 600mm Weather Proof Lockable (with hinged door) Control Pillar made in 14 SWG galvanized steel sheet as per Engineer's drawing spray painted with rust proof paint and made with a provision for mounting the following: a 4-pole contactor, 1No. 80A TPN switch fuse, RCBO and a 4-way Distribution Board. The Control Pillar to be secured at 450mm above ground in concrete 1:2:4 ratio extending to 450mm below ground.	1	No		
1E.18	Allow for inter-wiring within the Control Pillar	1	Item		
1E.19	80A TP/N Switchfuse as Crabtree or approved equivalent	1	No		
1E.20	Earthing to Kenya Power (KP) standard at the board complete with manhole and cover.	1	Item		
1E.21	4-Ways TPN+E, Distribution Board complete with 100A integral isolator as SCHNEIDER ELECTRIC, HAUSMANN or an approved equivalent complete with all accessories but excluding MCBs.	1	No.		
1E.22	MCB's for item above				
	(i) 10A SP	8	No.		
	(ii) SP Spareway	4	No.		
1E.23	Carry out concise permanent traffolyte labeling for all the sub-circuits in item above.	1	Item		
	Total for Area Lighting C/F to Price Collection Page-Schedule No. 1: 2No. Typical Warehouses				

SCHEDULE No. 1F: MAIN SWITCHBOARD & POWER DISTRIBUTION & RETICULATION

Item	Description	Qty	Unit	Rate (Kshs)	Amount (Kshs)
	Supply, Install, test and commission the following :				
	PUMP HOUSE				
1F.01	Lighting points comprising wiring in 3x1.5mm2 Single Core PVC insulated Copper Cables drawn in concealed 20mm Diameter HG PVC conduits complete with all necessary accessories but excluding switches for:-				
	(a) One Way Switching.	6	No.		
1F.02	10A moulded ivory switch plates as MK, Clipsal, BG, Crabtree or approved equivalent as follows:				
	(a) 1 gang 1 way	1	No.		
	(b) 1 gang 1 way Weatherproof Switch	1	No.		
	LIGHTING FITTINGS				
1F.03	Lighting fittings complete with all accessories including lamps of appropriate wattage and colour rendering and fixing materials as follows:				
	(a) 1200mm, 1x36W Standard IP65 rated fluorescent fitting with corrosion resistant enclosure for T8 lamp with Electronic Switchstart Gear as Thorn Corrosionproof or an approved equivalent.	2	No.		
	(b) 40W Outdoor Bulkhead with Opal Diffuser, grill & visor, IP65 protection as Massive Cleveland Outdoor or an approved equivalent.	4	No.		
	POWER POINTS				
1F.04	Ring mains socket outlets comprising wiring in 3x2.5mm sq. single core PVC insulated copper cables drawn in concealed 25 mm diameter Heavy Gauge PVC conduits complete with all the necessary accessories.	2	No.		
1F.05	13A switched white moulded case socket outlet plates as MK Clipsal, BG, Crabtree or an approved equivalent.				
	(a) Twin outlet.	2	No.		
1F.06	**WATER BOOSTER PUMPS**				
	a) **Pump Motor Power Point,** wired in 3x 4.0sq mm PVC SC copper cables drawn in concealed 25mm Dia. HG PVC conduits complete with all accessories but excluding the D.P switch.	3	No.		
	b) 20A DP Control Switch marked 'As Per Application' with neon light and cord outlet for items above as MK, Crabtree or approved equivalent.	3	No.		
1F.07	**FIRE HOSE REEL PUMPS**				
	a) 4.0mm2 2 Core PVC/SWA/PVC copper cables drawn drawn in concealed 25mm Dia. HG PVC conduits complete with all accessories but excluding the Isolator switch.	150	Lm.		
	b) 20A SP isolator as MK or approved equivalent	3	No.		
	Sub-Total C/F to the Next Page				

Item	Description	Qty	Unit	Rate (Kshs)	Amount (Kshs)
	Sub-Total B/F from Previous Page				
	INTERNAL POWER DISTRIBUTION				
1F.08	4Ways TPN+E, flush mounted Distribution Board complete with 100A integral isolator as SCHNEIDER ELECTRIC, HAUSMANN or an approved equivalent complete with all accessories but excluding MCBs.	1	No.		
1F.09	MCB's for item above				
	(i) 10A SP	1	No.		
	(ii) 20A SP	1	No.		
	(iii) 32A SP	1	No.		
	(iv) SP Spareway	3	No.		
	(v) TP Spareway	2	No.		
1F.10	Carry out concise permanent traffolyte labeling for all the sub-circuits in item above.	1	Item		
	SUB-MAIN POWER DISTRIBUTION CABLE				
1F.11	Sub-main cables comprising of 5x10mm^2 Single Core Copper cables drawn in concealed 38mm2 Dia. HG PVC conduits and including all necessary accessories (From CLB to DB in the Pump House).	20	Lm.		
1F.12	Standard Cable Loop-in Box complete with 80A HRC fuse and fuse carrier +80A HRC fuse, Fuse Carrier with Neutral Block.	1	No.		
1F.13	Earthing to Kenya Power (KP) standard at the board complete with manhole and cover.	1	Item		
1F.15	16mm^2 4Core PVC/SWA/PVC Copper Cables complete with appropriate cable lugs, cable glands and including all other accessories (From Main Switchroom to CLB at the Pump House).	60	Lm.		
1F.16	Trenching at an average depth of 700mm, cable laying, laying "HATARI" tiles and backfilling for the above cable to Engineer's Approval.	60	Lm.		
1F.17	Concrete Cable Route Markers.	6	No.		
	Sub-Total C/F to the Next Page				

Item	Description	Qty	Unit	Rate (Kshs)	Amount (Kshs)
	Sub-Total B/F from Previous Page				
	MAIN DISTRIBUTION SWITCHBOARD				
1F.18	Supply, install, test and commission a Free-standing, IP66, purpose made front access lockable main switchboard with 250A TP + N + E busbars manufactured in 12SWG galvanised mild steel sheet and finished in cream (or appropriate colour) powder coating as shown on the schematic (the other details as per Particular Specification), To be manufactured by either Schneider Electric Kenya or Specialised Power Systems or approved manufacturer complete with the following details:-	1	Item		
	a) Incoming				
	i) 1No.180A TPN MCCB with Shunt Trip as Merlin Gerin or approved equivalent.				
	ii) 1No. Voltmeter 0-600V plus selector switch.				
	iii) 1No. Ammeter plus selector switch with C.T.s (600/5)				
	iv) 3No. Phase indicating lights				
	v) 1No. Power factor meter				
	vi) All power system parameters (KW, KVA, KWHr, KVArs, Frequency, P.F., harmonics etc.). The multimeter should be complete with selector switches for viewing/displaying the various parameters.				
	b) Outgoing				
	i) 2No. 100A TPN MCCB feeder to the 2No. Distribution Boards at Ground Floor as Merlin Gerin or approved equivalent.				
	ii) 2No. 20A TPN MCCB feeder to the 2No. Distribution Boards at First Floor Floor as Merlin Gerin or approved equivalent.				
	iii) 1No. 20A TPN MCCB feeder to the CLB at the Power House as Merlin Gerin or approved equivalent.				
	iv) 2No. 20A TPN MCCB feeder to street lighting control pillar as Merlin Gerin or approved equivalent.				
	v) A suitably rated 415V three-phase surge diverter as Furse ESP 415, fully wired, complete with enclosure with viewing window.				
	vi) Space for 4No. TPN MCCBs				
	vii) Space for 6No. SPN MCCBs				
	c) Carry out comprehensive labeling of all the bus bars. CT chambers, circuit breakers etc. above, indicating the areas served, outgoing cable sizes etc.				
	d) Carry out concise load balancing to achieve a maximum imbalance not greater than ± 10% between any two phases, measured at the Main LV switchboard	1	Lot		
	Sub-Total C/F to the Next Page				

Item	Description	Qty	Unit	Rate (Kshs)	Amount (Kshs)
	Sub-Total B/F from Previous Page				
	POWER FACTOR CORRECTION				
1F.19	150KVArs digital programmed modular type automatic power factor correction capacitor bank switched in 2 steps of 30 KVArs, 2 steps of 20 KVArs, 2 steps of 15 KVArs and 2 steps of 10 KVArs as that manufactured by POWER TECHNICS complete with alarm for low power factor, switching MCBs, contactor controls and interwiring to facilitate dropping out of the capacitor bank in the event of mains power failure to avoid disorientating the generator AVR modules.. The bank to be made from low-loss bio-degradable compactive units, complete with common firmly bonded/earthed metallic enclosure made from 14 gauge cream powder coated galvanised steel sheets. The PFC bank to be an integrated in the Switchboard in item 1F.18 above	1	No.		
	COMPREHENSIVE PROTECTIVE MULTIPLE EARTHING				
1F.20	Earthing of the subboard in accordance with KP&L company requirements, IET regulations,the government Electrical Installations regulations and other statutory requirements comprising but not limited to the following				
	a) Establish 450x450x700mm deep earthing chamber, complete with internal plastering, and heavy duty EAFW steel cover clearly marked "EARTH".	1	No.		
	b) 25mm X 3mm pure copper tape as Furse	20	Lm.		
	c) Pure copper earth rod (1500mm x 16mm)	4	No.		
	d) Driving head for earth rod	4	No.		
	e) Tape to earth rod clamp as Furse	4	No.		
	f) 25mm2 single core green PVC insulated copper earth lead	40	Lm.		
1F.21	**MAIN DISTRIBUTION CABLES, DUCTS & MANHOLES**				
	a) 70mm sq. 4 Core PVC/SWA/PVC 90^{o}C thermosetting insulated Copper Cable for connection of the Main Switchboard to Utility power complete with appropriate cable lugs, cable glands complete with plastic sleeves and all necessary accesories.	40	Lm.		
	b) 6mm sq. 4-core PVC/SWA/PVC Copper Cable from the Main Switchboard to the Street Lighting Control Pillars complete with appropriate cable lugs, cable glands complete with plastic sleeves and all necessary accesories.	80	Lm.		
	Sub-Total C/F to the Next Page				

Item	Description	Qty	Unit	Rate (Kshs)	Amount (Kshs)
	Sub-Total B/F from Previous Page				
1F.22	100mm dia. HG PVC duct in 200mm concrete surround buried 600mm underground for power supply cable way along road and parking crossings.	50	Lm.		
1F.23	Establish 630 x 550 x 700mm deep standard power manholes, complete with internal plastering, and heavy duty EAFW steel cover.	4	No.		
1F.24	Establish 450 x 450 x 700mm deep standard data/telephone manholes, complete with internal plastering, and heavy duty EAFW steel cover.	4	No.		
1F.25	70mm diameter HG PVC ducts encased in concrete surround buried in ground for incoming data/telephone supply cables.	50	Lm.		
1F.26	Excavate trenches for ducts and armoured cables above, average depth 700mm, remove soft earth, lay ducts, cover with "DANGER-HATARI" tiles, back fill soft earth and compact to natural ground level.	120	Lm.		
1F.27	Concrete Cable Route Markers.	12	No.		
	Total for Schedule No. 1F: Main Switchboard, Power Distribution & Reticulation C/F to Price Collection Page-Schedule No. 1: 2No. Typical Warehouses				

PRICE COLLECTION PAGE

SCHEDULE NO. 1: 2NO. TYPICAL WAREHOUSES [5,000MM2]

ITEM	DESCRIPTION	AMOUNT (KSHS)
1.00	TOTAL FOR 1A: GROUND FLOOR	
2.00	TOTAL FOR 1B: FIRST FLOOR	
3.00	TOTAL FOR 1C: CENTRALIZED ANTENNA SYSTEM	
4.00	TOTAL FOR 1D: LIGHTNING PROTECTION, EARTHING AND BONDING	
5.00	TOTAL FOR 1E: AREA LIGHTING	
6.00	TOTAL FOR 1F: MAIN SWITCHBOARD, POWER DISTRIBUTION & RETICULATION	
	TOTAL FOR 1NO. WAREHOUSE = [A]	
	TOTAL FOR 2NO. TYPICAL WAREHOUSE = 2x[A]	
	TOTAL FOR SCHEDULE NO. 1 - 2NO. WAREHOUSES C/F TO PRICE SUMMARY PAGE	

SCHEDULE NO. 2: PROJECT MANAGER'S STATIONERY

Item	Description	Qty	Unit	Rate (Kshs)	Amount (Kshs)
	Supply and deliver to the Project Manager the following stationery to be used in running the project:				
2.01	Photocopying paper white A4 80g/M^2 (Reams)	20	No.		
2.02	Photocopying paper green A4 80g/M^2 (Reams)	4	No.		
2.03	Letterhead quality paper as CONQUERER or equal and approved blue 80g/m3	4	Ream		
2.04	A4 size translucent PVC covers as KATKO or approved equivalent, 100 sheets blue in colour and 0.2mm thick	5	Pkts.		
2.05	A4 size Embossed covers as KATKO or approved equivalent, 100 sheets blue in colour	4	Pkts.		
2.06	22mm diameter spiral binders black in colour	4	Pkts.		
2.07	HP Laser Jet Cartridges				
	i) CC364A	3	No.		
	ii) Q7553A	3	No.		
	iii) CE505A	6	No.		
2.08	Ipad Pro 12.9" with a Quad Core 3.0GHz.	2	No.		
2.09	2TB Portable Harddisk as Hp/ Transcend/Toshiba.	2	No.		
2.10	Fluke 1664FC Multifunction Installation Tester	1	No.		
2.11	Laptop Computer Intel corei7 fifth generation processor /3.2GHz Quad-core/16GB System RAM/750GB SSD/DVD RW/ win10/HD15.6" Screen/carry case as Hp Zbook G4.	1	No.		
	Total for Schedule No. 2: Project Manager's Stationery C/F to Price Summary Page				

SCHEDULE NO. 3: CONTINGENCY SUM, PROVISIONAL SUMS & OTHERS

Item	Description	Qty	Unit	Rate (Kshs)	Amount (Kshs)
3.01	Kenya Power Service line Upgrade and Transformer	1	Item	1,500,000.00	1,500,000.00
3.02	Attendance and liason with Kenya Power		%		
3.03	Allow for preparation and production of 3No. Sets of "As Installed Drawings" (Hard & Soft Copies in AutoCAD 2020)	1	Item		
3.04	Allow for airtime for (3No.) Project officers at a rate of Kshs 2,000.00 per officer per Week for the entire project duration.	1	Item	100,000.00	100,000.00
3.05	Allow for taxes, profit and attendance on Item above.		%		
3.06	Allow a **Contigency Sum** to be expended at the discretion of the Project Manager	1	Item	1,000,000.00	1,000,000.00
	Total for Schedule No. 3: Contingency Sum, Provisional Sums & Others C/F to Price Summary Page				

PRICE SUMMARY PAGE - ELECTRICAL INSTALLATION WORKS

ITEM	DESCRIPTION	AMOUNT (KSHS)
1.00	TOTAL FOR BILL NO. 1: SUB-CONTRACT PRELIMINARIES	
2.00	TOTAL FOR SCHEDULE NO. 1: 2NO. TYPICAL CUSTOM WAREHOUSES	
3.00	TOTAL FOR SCHEDULE NO. 2: PROJECT MANAGER'S STATIONERY	
4.00	TOTAL FOR SCHEDULE NO. 3: CONTINGENCY SUM, PROVISIONAL SUMS & OTHERS	
	TOTAL C/F TO GRAND PRICE SUMMARY PAGE OF THE BOQ FOR MAIN WORKS	

Total Amount in Words (Kenya Shillings) .....

.....

Bidder's Name (Domestic) & Official Stamp .....

P.O. Box.....

Signature.....Date.....

PIN NO.....V.A.T Certificate NO.....

Witness.....Address.....

Signature of Witness.....Date.....

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	Cable Trunking			
2	Cable Accessories			
3	HG PVC Conduits			
4	Consumer unit/Distribution board			
5	MCBs			
6	MCCBs			
7	Cables ❖ single core PVCI Copper ❖ Armoured Copper (PVC/SWA/PVC)			
8	PVC conduits			
9	LV Switchboards			
10	TPN Isolators			
11	SPN Isolators			
12	Internal Lighting Fittings			
13	Outdoor Floodlights			
14	Lighting Switches			
15	Socket Outlets			
16	DP Switches			
17	Cooker Control Units			
18	Fire Alarm & Detection Control Panel			
19	Smoke Detectors			
20	Heat Detectors			
21	Manual Call Points			
22	Lightning Protection System			
23	Centralized Antenna System			

SECTION H

STANDARD FORMS

CONTENTS OF SECTION H

NOTE:

1.0 Tenderers must duly fill these Standard Forms as a mandatory requirement as they will form part the evaluation criteria.

KEY PERSONNEL

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

POSITION	NAME	HIGHEST QUALIFICATION *(Attach proof)*	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.

PROJECT NAME	*NAME OF CLIENT*	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.

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

DETAILS OF LITIGATION OR ARBITRATION PROCEEDINGS IN WHICH THE TENDERER HAS BEEN INVOLVED AS ONE OF THE PARTIES IN THE LAST 5 YEARS
DETAILS OF LITIGATION OR ARBITRATION PROCEEDINGS IN WHICH THE TENDERER HAS BEEN INVOLVED AS ONE OF THE PARTIES IN THE LAST 5 YEARS

1. .....

2. .....

3. .....

4. .....

5. .....

6. .....

7. .....

8. .....

9. .....

10. .....

Code: E/CG/01

REPUBLIC OF KENYA

MINISTRY OF TRANSPORT, INFRASTRUCTUTRE, PUBLIC WORKS, HOUSING & URBAN DEVELOPMENT

STATE DEPARTMENT OF PUBLIC WORKS

(ELECTRICAL DEPARTMENT)

PROPOSED CONSTRUCTION OF LEATHER INDUSTRIAL SHEDS FOR TANNERIES AND ASSOCIATED INFRASTRUCTURE AT KENANIE LEATHER INDUSTRIAL PARK, KENANIE EPZ SITE, MACHAKOS COUNTY

W.P. ITEM NO. D117 EN/MKS/1902 JOB NO. 10753B

TESTING & COMMISSIONING GUIDE

FOR

ELECTRICAL INSTALLATION WORKS ON SITE

Issued by:

The Chief Engineer (Electrical),
Ministry of Transport, Infrastructure, Public Works, Housing & Urban Development,
State Department of Public Works,
P. O.BOX 41191 – 00100 GPO,
NAIROBI.

EIW-H/6

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

STATE DEPARTMENT OF PUBLIC WORKS

(ELECTRICAL DEPARTMENT)

TESTING AND COMMISSIONING OF ELECTRICAL INSTALLATION WORKS ON SITE.

PROJECT NAME.....

W.P ITEM No.....JOB No.....

PROJECT SITE.....

CLIENT.....

The sub-contractor shall test in accordance with the relevant section of IEE regulations, Rule 3 of the Electrical Power Act for additional tests not covered by the regulations, Government Electrical specifications I & II and the Kenya Power & Lighting Co. Ltd by-laws.

A PRELIMINARY CHECKS

The Engineer shall check to establish the following data:-

<table>
<tr><th>ITEM</th><th colspan="3">DESCRIPTION</th><th>REMARKS</th></tr>
<tr><td>(i)</td><td colspan="3">Type of installation (New/Renovation/Addition/ to existing installation)</td><td></td></tr>
<tr><td>(ii)</td><td colspan="3">a) Power supply 240V/415V/11KV
b) Frequency of the mains supply
c) Installation power factor</td><td>.....
.....
.....</td></tr>
<tr><td>(iii)</td><td colspan="3">Method of Metering (New /Monitoring/Existing meter)</td><td></td></tr>
<tr><td>(iv)</td><td colspan="3">Are Testing/Measuring instruments available</td><td></td></tr>
<tr><td>(v)</td><td colspan="3">Are there maintenance/operational manuals for specialized systems (if any)</td><td></td></tr>
<tr><td rowspan="6">(vi)</td><td rowspan="6">List of 'as installed drawings'</td><td>Drg No.</td><td>Description</td><td rowspan="6"></td></tr>
<tr><td></td><td></td></tr>
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</table>

B TESTS

ITEM	TEST DESCRPTION	OBSERVATIONS/ RESULTS	REMARKS
1	**Tests shall be carried out to ensure:**		
	a) All fuses and single pole switches are installed in live conductor		
	b) All outlets and switched socket outlets are connected to 'LIVE' conductor in the Terminal marked so and each earth pin effectively bonded to earth continuity system		
	c) Verify continuity of all final conductors of each 'Ring' circuit. **(0.05 to 0.8Ω)**	……Ohms	
	d) All radial circuits emanate from respective distribution boards/consumer units and that they do not supply any other Equipment		
	e) The correct phase sequence is maintained throughout the installation		
	f) Effective 'Discrimination' in the arrangement of protective devices. i.e. a fault in the furthest power point/Lighting point should not blow or trip Fuses/MCBs respective in the Meter board.		
2	**Inspect to ensure:**		
	a) No terminal in the Ceiling Rose is 'LIVE' when the corresponding switch is in the off position.		
	b) All conduit termination conduit boxes, Consumer unit, DB's and Adaptable boxes have smooth edges and are properly bushed.		
	c) All fixed metal works close to Electrical installation are bonded to earth continuity conductor.		
	d) All Fuse ways and Circuit breakers for final sub circuits are properly labeled		

B TESTS CONT'D

ITEM	TEST DESCRPTION	OBSERVATIONS/ RESULTS	REMARKS
3	**Carry out the following tests:**		
	a) Insulation Resistance tests i) Between phases a) R -Y b) R -B c) B-Y ii) Phase to Neutral a) R - N b) R - N c) B - N iii) Phase to Earth a) R - E b) R -E c) B -E **Minimum thresholds for above and for:** i) ELV circuits (SELV & PELV) = 0.25 MΩ ii) LV Circuits up to 500V = 0.5 MΩ iii) LV Circuits above 500V = 1 MΩ	……. ……MΩ ……..MΩ ……..MΩ ……..MΩ ……..MΩ ……..MΩ ……..MΩ ……..MΩ ……..MΩ	
	b) Earth continuity conductor impedance **(0.005 to 2Ω)**	……..Ohms	
	c) Earth fault Loop impedance **(0 - 2000 Ω)**	……..Ohms	
	d) Earth Electrode resistance **(Less than 4Ω)**	……..Ohms	
	e) Earth Lead resistance **(Less than 4Ω)**	……..Ohms	
	f) The operation of protection MCCBS & MCBS (Tripping under faulty conditions)		
	g) Check the mechanical toggling (make & break) of all the switches to installed accessories.		
4	**Underground cabling, Check for:**		
	i) Continuity of the phases		
	ii) Factory tests done (avail certification)		
	iii) Proper termination		
	iv) Route markers		

B TESTS CONT'D

ITEM	TEST DESCRPTION	OBSERVATIONS/ RESULTS	REMARKS
5	**Installed load** i) Lighting points (No.) ii) Socket outlets (No.) iii) Motors (Give rating) iv) Other machines (Attach list if more)		
	Item / **Description** / **Rating**		
6	**Type of Earthing**: TN-C/TN-S/ TN-C-S/TT/IT.		
7	**LV switchboard:** The board shall be checked to ascertain the following		
	i) Rating of the switchboard		
	ii) Rating of main incomer MCCB		
	iii) Form of construction (1/2B/3B/4)		
	iv) Degree of protection (IP rating)		
	v) Nameplates for identification of all circuits entering/leaving switchgear		
	vi) Proper Electrical & Mechanical operation of functional parts i.e MCCBs, Indicating meters, CTs & VTs .		
	vii) Check cable terminations, type & terminals		
	viii) General comments on the appearance of the finished mechanical assembly including welding, full nuts & tightness of bolted parts.		
8	**Fireman's switch.**		
	i) Make and manufacturer		
	ii) The rating of the switch		
	iii) Test for the Electrical and Mechanical operation of the switch		
	iv) State the types of loads supported by the maintained board on the switch.		
	** see foot note		

General comments on the Electrical installation:-

Testing and Commissioning witnessed by:

M.O.T.I.P.W.H&UD REPRESENTATIVE/ PROJECT ELECTRICAL ENGINEER:-

Name .....Designation.....

Sign..... Date.....

CONTRACTOR'S REPRESENTATIVE:-

Name .....Designation.....

Sign..... Date.....

**If there are other defects/outstanding works noted, list them overleaf or on a separate sheet and attach.