PROVISION OF GENERAL ELECTRICAL SYSTEMS, SECURITY AND ALARM SYSTEMS, FIRE DETECTION SYSTEMS & COMMUNICATIONS NETWORKS INSTALLATIONS AT USHURU PENSION TOWER , ELGON ROAD, UPPER HILL, NAIROBI

FOR

KENYA REVENUE AUTHORITY

****

VOLUME 1:
GENERAL ELECTRICAL SYSTEMS, SECURITY AND ALARM SYSTEMS, FIRE DETECTION SYSTEMS & COMMUNICATIONS NETWORKS INSTALLATIONS

****

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SECTION 1: INVITATION FOR TENDERS

Name: PROVISION OF GENERAL ELECTRICAL SYSTEMS, SECURITY AND ALARM SYSTEMS, FIRE DETECTION SYSTEMS & COMMUNICATIONS NETWORKS INSTALLATIONS AT USHURU PENSION TOWER , ELGON ROAD, UPPER HILL, NAIROBI

Tender reference No.: KRA/HQS/NCB-012/2020-2021

1. The **Kenya Revenue Authority** invites sealed tenders for the **Provision of General Electrical Systems, Security and Alarm Systems, Fire Detection Systems & Communications Networks Installations at Ushuru Pension Tower, Elgon Road, Upper Hill, Nairobi**

2. Interested contractors must be registered in category **NCA "4"** and above and appear in the current Building Contractors register.

3. A complete set of bidding documents in English may be obtained from KRA E-Procurement portal available on the KRA website www.kra.go.ke. Prospective bidders should register for E-Procurement to enable them access the KRA portal under "New Supplier Registration" found under the Tender Tab. For enquiries email to: **eprocurement@kra.go.ke**

4. Prices quoted should be net inclusive of all taxes, must be in Kenya shillings and shall remain valid for **335 days** from the closing date of tender.

5. Completed Bids are to be saved as PDF documents marked "**KRA/HQS/NCB-012/2020-2021: Provision of General Electrical Systems, Security and Alarm Systems, Fire Detection Systems & Communications Networks Installations at Ushuru Pension Tower, Elgon Road, Upper Hill, Nairobi** and submitted to the appropriate KRA E-procurement Web Portal found on the KRA web so as to be received on or before **22nd October 2020 at 11.00 a.m.**

An **original hard copy** of the Bid Security of not less than the indicated amount or equivalent amount freely convertible currency must be dropped in the **Tender security Box** located at **Times Tow Building,** Ground Floor any day before the tender closing date. The Bid Security must be in a seal envelope bearing the Tender Description and addressed to the address indicated below:

Deputy Commissioner-Supply Chain Management

Times Tower Building, 21st Floor
P.O. Box 48240 -00100 GPO, Tel:
+254 20 310900
Nairobi, Kenya
website: www.kra.go.ke
Email: eprocurement@kra.go.ke

Any canvassing or giving of false information will lead to automatic disqualification

SECTION 2: INSTRUCTIONS TO TENDERERS

NSTRUCTIONS TO TENDERERS

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INSTRUCTIONS TO TENDERERS

1 General/Eligibility/Qualifications/Joint venture/Cost of tendering

1.1 The Employer as defined in the Appendix to Conditions of Contract invites tenders for Works Contract as described in the tender documents. The successful tenderer will be expected to complete the Works by the Intended Completion Date specified in the tender documents.

1.2 All tenderers shall provide the Qualification Information, a statement that the tenderer (including all members of a joint venture and subcontractors) is not associated, or has not been associated in the past, directly or indirectly, with the Consultant or any other entity that has prepared the design, specifications, and other documents for the project or being proposed as Project Manager for the Contract. A firm that has been engaged by the Employer to provide consulting services for the preparation or supervision of the Works, and any of its affiliates, shall not be eligible to tender.

1.3 All tenderers shall provide in the Form of Tender and Qualification Information, a preliminary description of the proposed work method and schedule, including drawings and charts, as necessary.

1.4 In the event that pre-qualification of potential tenderers has been undertaken, only tenders from pre-qualified tenderers will be considered for award of Contract. These qualified tenderers should submit with their tenders any information updating their original pre- qualification applications or, alternatively, confirm in their tenders that the originally submitted pre-qualification information remains essentially correct as of the date of tender submission.

1.5 Where no pre-qualification of potential tenderers has been done, all tenderers shall include the following information and documents with their tenders , unless otherwise stated:

(a) copies of original documents defining the constitution or legal status, place of registration, and principal place of business; written power of attorney of the signatory of the tender to commit the tenderer:

(b) total monetary value of construction work performed for each of the last five years:

(c) experience in works of a similar nature and size for each of the last five years, and details of work under way or contractually committed; and names and addresses of clients who may be contacted for further information on these contracts;

(d) major items of construction equipment proposed to carry out the Contract and an undertaking that they will be available for the Contract.

(e) qualifications and experience of key site management and technical personnel proposed for the Contract and an undertaking that they shall be available for the Contract.

(f) reports on the financial standing of the tenderer, such as profit and loss statements and auditor's reports for the past five years;

(g) evidence of adequacy of working capital for this Contract (access to line(s) of credit and availability of other financial resources);

(h) authority to seek references from the tenderer's bankers;

(i) information regarding any litigation, current or during the last five years, in which the tenderer is involved, the parties concerned and disputed amount; and

(j) proposals for subcontracting components of the Works amounting to more than 10 percent of the Contract Price.

1.6 Tenders submitted by a joint venture of two or more firms as partners shall comply with the following requirements, unless otherwise stated:

(a) the tender shall include all the information listed in clause 1.5 above for each joint venture partner;

(b) the tender shall be signed so as to be legally binding on all partners;

(c) all partners shall be jointly and severally liable for the execution of the Contract in accordance with the Contract terms;

(d) one of the partners will be nominated as being in charge, authorised to incur liabilities, and receive instructions for and on behalf of all partners of the joint venture; and

(e) the execution of the entire Contract, including payment, shall be done exclusively with the partner in charge.

1.7 **To qualify for award of the Contract, tenderers shall meet the requirements as set in the criteria evaluation { Pages xxx – xx}**

(a) annual volume of construction work of at least 2.5 times the estimated annual cashflow for the Contract;

(b) experience as main contractor in the construction of at least wo works of a nature and complexity equivalent to the Works over the last 10 years (to comply with this requirement, works cited should be at least 70 percent complete);

(c) proposals for the timely acquisition (own, lease, hire, etc.) of the essential equipment listed as required for the Works;

(d) a Contract manager with at least five years' experience in works of an equivalent nature and volume, including no less than three years as Manager; and

(e) liquid assets and/or credit facilities, net of other contractual commitments and exclusive of any advance payments which may be made under the Contract, of no less than 4 months of the estimated payment flow under this Contract.

1.8 The figures for each of the partners of a joint venture shall be added together to determine the tenderer's compliance with the minimum qualifying criteria of clause 1.7 (a) and (e); however, for a joint venture to qualify, each of its partners must meet at least 25 percent of minimum criteria 1.7 (a), (b) and (e) for an individual tenderer, and the partner in charge at least 40 percent of those minimum criteria. Failure to comply with this requirement will result in rejection of the joint venture's tender. Subcontractors' experience and resources will not be taken into account in determining the tenderer's compliance with the qualifying criteria, unless otherwise stated.

1.9 Each tenderer shall submit only one tender, either individually or as a partner in a joint venture. A tenderer who submits or participates in more than one tender (other than as a subcontractor or in cases of alternatives that have been permitted or requested) will cause all the proposals with the tenderer's participation to be disqualified.

1.10 The tenderer shall bear all costs associated with the preparation and submission of his tender, and the Employer will in no case be responsible or liable for those costs.

1.11 The tenderer, at the tenderer's own responsibility and risk, is encouraged to visit and examine the Site of the Works and its surroundings, and obtain all information that may be necessary for preparing the tender and entering into a contract for construction of the Works. The costs of visiting the Site shall be at the tenderer's own expense.

1.12 The procuring entity's employees, committee members, board members and their relative (spouse and children) are not eligible to participate in the tender.

1.13 The document shall be downloaded from the KRA website free of charge.

1.14 The procuring entity shall allow the tenderer to review the tender document free of charge before purchase.

2 Tender Documents

2.1 The complete set of tender documents comprises the documents listed below and any addenda issued in accordance with Clause 2.4.

(a) These Instructions to Tenderers
(b) Form of Tender and Qualification Information
(c) Conditions of Contract
(d) Appendix to Conditions of Contract
(e) Specifications
(f) Drawings
(g) Bills of Quantities
(h) Forms of Securities

2.2 The tenderer shall examine all Instructions, Forms to be filled and Specifications in the tender documents. Failure to furnish all information required by the tender documents, or submission of a tender not substantially responsive to the tendering documents in every respect will be at the tenderer's risk and may result in rejection of his tender.

2.3 A prospective tenderer making an inquiry relating to the tender documents may notify the Employer in writing or by cable, telex or facsimile at the address indicated in the letter of invitation to tender. The Employer will only respond to requests for clarification received earlier than seven days prior to the deadline for submission of tenders. Copies of the Employer's response will be forwarded to all persons issued with tendering documents, including a description of the inquiry, but without identifying its source.

2.4 Before the deadline for submission of tenders, the Employer may modify the tendering documents by issuing addenda. Any addendum thus issued shall be part of the tendering documents and shall be communicated in writing or by cable, telex or facsimile to all tenderers. Prospective tenderers shall acknowledge receipt of each addendum in writing to the Employer.

2.5 To give prospective tenderers reasonable time in which to take an addendum into account in preparing their tenders, the Employer shall extend, as necessary, the deadline for submission of tenders, in accordance with Clause 4.2 here below.

3 Preparation of Tenders

3.1 All documents relating to the tender and any correspondence shall be in English language.

3.2 The tender submitted by the tenderer shall comprise the following:

(a) These Instructions to Tenderers, Form of Tender, Conditions of Contract, Appendix to Conditions of Contract and Specifications;
(b) Tender Security;
(c) Priced Bill of Quantities ;
(d) Qualification Information Form and Documents;
(e) Alternative offers where invited; and
(f) Any other materials required to be completed and submitted by the tenderers.

3.3 The tenderer shall fill in rates and prices for all items of the Works described in the Bill of Quantities. Items for which no rate or price is entered by the tenderer will not be paid for when executed and shall be deemed covered by the other rates and prices in the Bill of Quantities. All duties, taxes, and other levies payable by the Contractor under the Contract, or for any other cause relevant to the Contract, as of 30 days prior to the deadline for submission of tenders, shall be included in the tender price submitted by the tenderer.

3.4 The rates and prices quoted by the tenderer shall only be subject to adjustment during the performance of the Contract if provided for in the Appendix to Conditions of Contract and provisions made in the Conditions of Contract.

3.5 The unit rates and prices shall be in Kenya Shillings.

3.6 Tenders shall remain valid for a period of three hundred and thirty-five **(335) days** from the date of submission.

However in exceptional circumstances, the Employer may request that the tenderers extend the period of validity for a specified additional period. The request and the tenderers' responses shall be made in writing. A tenderer may refuse the request without forfeiting the Tender Security. A tenderer agreeing to the request will not be required or permitted to otherwise modify the tender, but will be required to extend the validity of Tender Security for the period of the extension, and in compliance with Clause 3.7 - 3.11 in all respects.

3.7 The tenderer shall furnish, as part of the tender, a Tender Security in the amount and form specified in the appendix to invitation to tenderers. This shall be in the amount not exceeding 2 percent of the tender price

3.8 The format of the Tender Security should be in accordance with the form of Tender Security included in Section G - Standard forms or any other form acceptable to the Employer . Tender Security shall be valid for 30 days beyond the validity of the tender.

3.9 Any tender not accompanied by an acceptable Tender Security shall be rejected. The Tender Security of a joint venture must define as "Tenderer" all joint venture partners and list them in the following manner: a joint venture consisting of"……","……",and "……".

3.10 The Tender Securities of unsuccessful tenderers will be returned within 28 days of the end of the tender validity period specified in Clause 3.6.

3.11 The Tender Security of the successful tenderer will be discharged when the tenderer has signed the Contract Agreement and furnished the required Performance Security.

3.12 The Tender Security may be forfeited

(a) if the tenderer withdraws the tender after tender opening during the period of tender validity;
(b) if the tenderer does not accept the correction of the tender price, pursuant to Clause 5.7;
(c) in the case of a successful tenderer, if the tenderer fails within the specified time limit to

(i) sign the Agreement, or
(ii) furnish the required Performance Security.

3.13 Tenderers shall submit offers that comply with the requirements of the tendering documents, including the basic technical design as indicated in the Drawings and Specifications. Alternatives will not be considered, unless specifically allowed in the invitation to tender. If so allowed, tenderers wishing to offer technical alternatives to

the requirements of the tendering documents must also submit a tender that complies with the requirements of the tendering documents, including the basic technical design as indicated in the Drawings and Specifications. In addition to submitting the basic tender, the tenderer shall provide all information necessary for a complete evaluation of the alternative, including design calculations, technical specifications, breakdown of prices, proposed construction methods and other relevant details. Only the technical alternatives, if any, of the lowest evaluated tender conforming to the basic technical requirements shall be considered.

3.14 **Bidders to note that the COMBINED TECHNICAL AND FINANCIAL proposal shall be submitted through the KRA supplier portal. The bidder shall submit combined technical and financial proposals electronically via supplier portal in the Notes and attachment Section of the RFX {Tender}**

3.15 The tender shall be typed or written in indelible ink and shall be signed by a person or persons duly authorised to sign on behalf of the tenderer, pursuant to Clause 1.5 (a) or 1.6 (b), as the case may be. All pages of the tender where alterations or additions have been made shall be initialized by the person or persons signing the tender.

3.16 Clarification of tenders shall be requested by the tenderer to be received by the procuring entity not later than 7 days prior to the deadline for submission of tenders.

3.17 The procuring entity shall reply to any clarifications sought by the tenderer within 3 days of receiving the request to enable the tenderer to make timely submission of its tender.

3.18 The tender security shall be in the amount of **Kshs 400,000.00** and valid for **365 days**.

4 Submission of Tenders

4.1 **Bidders to note that the COMBINED TECHNICAL AND FINANCIAL proposal shall be submitted through the KRA supplier portal. The bidder shall submit combined technical and financial proposals electronically via supplier portal in the Notes and attachment Section of the RFX {Tender}**

4.2 The Authority shall not accept Hard Copy Tenders

4.3 Any tender received after the deadline prescribed in clause 4.2 will be returned to the tenderer un-opened.

4.4 **Tenderers may modify or withdraw their tenders after submission and resubmit to the respective folders. All prior submissions cannot be deleted or overwritten. Tenderer to note that the latest submissions shall be considered as the final version and all prior submissions shall be disregarded. No tender may be modified after the deadline for submission of tenders..**

4.5 Withdrawal of a tender between the deadline for submission of tenders and the expiration of the period of tender validity specified in the invitation to tender or as extended pursuant to Clause 3.6 may result in the forfeiture of the Tender Security pursuant to Clause 3.11.

4.6 Tenderers may only offer discounts to, or otherwise modify the prices of their tenders by submitting tender modifications in accordance with Clause 4.4 or be included in the original tender submission.

4.7 Tenderers must submit together with the tender document a work plan and indicate the lead time for long lead items.

5 Tender Opening and Evaluation

5.1 The tenders will be opened by the Employer, including modifications made pursuant to Clause 4.4, in the presence of the tenderers' representatives who choose to attend at the time and in the place specified in the invitation to tender. Employer's representatives who are present during the opening shall sign a register evidencing their attendance.

5.2 The tenderers' names, the tender prices, the total amount of each tender and of any alternative tender (if alternatives have been requested or permitted), any discounts, tender modifications and withdrawals, the presence or absence of Tender Security, and such other details as may be considered appropriate, will be announced by the Employer at the opening. Minutes of the tender opening, including the information disclosed to those present will be prepared by the Employer.

5.3 Information relating to the examination, clarification, evaluation, and comparison of tenders and recommendations for the award of Contract shall not be disclosed to tenderers or any other persons not officially concerned with such process until the award to the successful tenderer has been announced. Any effort by a tenderer to influence the Employer's officials, processing of tenders or award decisions may result in the rejection of his tender.

5.4 To assist in the examination, evaluation, and comparison of tenders, the Employer at his discretion, may ask any tenderer for clarification of the tender, including breakdowns of unit rates. The request for clarification and the response shall be in writing or by cable, telex or facsimile but no change in the price or substance of the tender shall be sought, offered, or permitted except as required to confirm the correction of arithmetic errors discovered in the evaluation of the tenders in accordance with Clause 5.7.

5.5 Prior to the detailed evaluation of tenders, the Employer will determine whether each tender (a) meets the eligibility criteria defined in Clause 1.7;(b) has been properly signed; (c) is accompanied by the required securities; and (d) is substantially responsive to the requirements of the tendering documents. A substantially responsive tender is one Which conforms to all the terms, conditions and specifications of the tendering documents, without material deviation or reservation. A material deviation or reservation is one (a) which affects in any substantial way the scope, quality, or performance of the works; (b) which limits in any substantial way, inconsistent with the tendering documents, the Employer's rights or the tenderer's obligations under the Contract; or (c) whose rectification would affect unfairly the competitive position of other tenderers presenting substantially responsive tenders.

5.6 If a tender is not substantially responsive, it will be rejected, and may not subsequently be made responsive by correction or withdrawal of the nonconforming deviation or reservation.

5.7 Tenders determined to be substantially responsive will be checked for any arithmetic errors. Errors will be corrected as follows:

(a) where there is a discrepancy between the amount in figures and the amount in words, the amount in words will prevail; and

(b) where there is a discrepancy between the unit rate and the line item total resulting from multiplying the unit rate by the quantity, the unit rate as quoted will prevail, unless in the opinion of the Employer, there is an obvious typographical error, in which case the adjustment will be made to the entry containing that error.

(c) In the event of a discrepancy between the tender amount as stated in the Form of Tender and the corrected tender figure in the main summary of the Bill of Quantities, the amount as stated in the Form of Tender shall prevail.

(d) The Error Correction Factor shall be computed by expressing the difference between the tender amount and the corrected tender sum as a percentage of the corrected Builder's Work (i.e. Corrected tender sum less P.C. and Provisional Sums)

(e) The Error Correction Factor shall be applied to all Builder's Work (as a rebate or addition as the case may be) for the purposes of valuations for Interim Certificates and valuation of variations.

(f) the amount stated in the tender will be adjusted in accordance with the above procedure for the correction of errors and, with concurrence of the tenderer, shall be considered as binding upon the tenderer. If the tenderer does not accept the corrected amount, the tender may be rejected and the Tender Security may be forfeited in accordance with clause 3.11.

5.8 The Employer will evaluate and compare only the tenders determined to be substantially responsive in accordance with Clause 5.5.

5.9 In evaluating the tenders, the Employer will determine for each tender the evaluated tender price by adjusting the tender price as follows:

(a) making any correction for errors pursuant to clause 5.7;

(b) excluding provisional sums and the provision, if any, for contingencies in the Bill of Quantities, but including Dayworks where priced competitively.

(c) making an appropriate adjustment for any other acceptable variations, deviations, or alternative offers submitted in accordance with clause 3.12; and

(d) making appropriate adjustments to reflect discounts or other price modifications offered in accordance with clause 4.6

5.10 The Employer reserves the right to accept or reject any variation, deviation, or alternative offer. Variations, deviations, and alternative offers and other factors which are in excess of the requirements of the tender documents or otherwise result in unsolicited benefits for the Employer will not be taken into account in tender evaluation.

5.11 The tenderer shall not influence the Employer on any matter relating to his tender from the time of the tender opening to the time the Contract is awarded. Any effort by the Tenderer to influence the Employer or his employees in his decision on tender evaluation, tender comparison or Contract award may result in the rejection of the tender.

5.12 **There shall be no preference**

6 Award of Contract

6.1 Subject to Clause 6.2, the award of the Contract will be made to the tenderer whose tender has been determined to be substantially responsive to the tendering documents and who has offered the lowest evaluated tender price, provided that such tenderer has been determined to be (a) eligible in accordance with the provision of Clauses 1.2, and (b) qualified in accordance with the provisions of clause 1.7 and 1.8.

**This is in line with Section 86 (1) (a) of the Public Procurement and Asset Disposal Act, 2015. Which reads "(*The successful tender shall be the one who meets any one of the following as specified in the tender document-*

(a) ***The tender with the lowest evaluated price;"***

6.2 Notwithstanding clause 6.1 above, the Employer reserves the right to accept or reject any tender, and to cancel the tendering process and reject all tenders, at any time prior to the award of Contract, without thereby incurring any liability to the affected tenderer or tenderers or any obligation to inform the affected tenderer or tenderers of the grounds for the action.

6.3 The tenderer whose tender has been accepted will be notified of the award prior to expiration of the tender validity period in writing or by cable, telex or facsimile. This notification (hereinafter and in all Contract documents called the "Letter of Acceptance") will state the sum (hereinafter and in all Contract documents called the "Contract Price") that the Employer will pay the Contractor in consideration of the execution, completion, and maintenance of the Works by the Contractor as prescribed by the Contract. At the same time the other tenderers shall be informed that their tenders have not been successful.

The contract shall be formed on the parties signing the contract.

6.4 The Agreement will incorporate all agreements between the Employer and the successful tenderer. Within 14 days of receipt the successful tenderer will sign the Agreement and return it to the Employer.

6.5 Within 14 days after receipt of the Letter of Acceptance, the successful tenderer shall deliver to the Employer a Performance Security in the amount stipulated in the Appendix to Conditions of Contract and in the form stipulated in the Tender documents. The Performance Security shall be in the amount and specified form

6.6 Failure of the successful tenderer to comply with the requirements of clause 6.5 shall constitute sufficient grounds for cancellation of the award and forfeiture of the Tender Security.

6.7 Upon the furnishing by the successful tenderer of the Performance Security, the Employer will promptly notify the other tenderers that their tenders have been unsuccessful.

6.8 Preference where allowed in the evaluation of tenders shall not be allowed for contracts not exceeding one year (12 months)

6.9 The tender evaluation committee shall evaluate the tender within 30 days of the validity period from the date of opening the tender.

6.10 The parties to the contract shall have it signed within 30 days from the date of notification of contract award unless there is an administrative review request.

6.11 Contract price variations shall not be allowed for contracts not exceeding one year (12 months)

6.12 Where contract price variation is allowed, the valuation shall not exceed 15% of the original contract price.

6.13 Price variation request shall be processed by the procuring entity within 30 days of receiving the request.

6.14 The procuring entity may at any time terminate procurement proceedings before contract award and shall not be liable to any person for the termination.

6.15 The procuring entity shall give prompt notice of the termination to the tenderers and on request give its reasons for termination within 14 days of receiving the request from any

tenderer.

6.16 A tenderer who gives false information in the tender document about its qualification or who refuses to enter into a contract after notification of contract award shall be considered for debarment from participating in future public procurement.

7 Corrupt and Fraudulent practices

7.1 The procuring entity requires that tenderers observe the highest standards of ethics during procurement process and execution of contracts. A tenderer shall sign a declaration that he has not and will not be involved in corrupt and fraudulent practices.

SECTION 3: APPENDIX TO INSTRUCTIONS OF TENDERERS

The following clauses shall be amended as follows:

Clause 1.4: Delete the entire clause

Clause 1.5: To read "This invitation to tender is open to all eligible tenderers as per the tender invitation notice"

Clause 1.5 (a) For the requirement of this clause; add the following:

i Be registered with National Construction Authority, Category 4 and above (Evidence of current annual contractors practicing license is required)

ii Submit a valid Tax Compliance Certificate

Clause 1.5 (c) For the requirement of this clause;

i Omit the words "each of" appearing before the 'last five years'

ii Attach copies of practical completion certificates for similar works undertaken in the last five years

Clause 1.5 (d) Delete the word 'Major and substitute with word 'Relevant' Key equipment required to carry out the works

Clause 1.7 Add the following after the words 'qualifying criteria'; (attach the relevant supporting documents as evidence)

Clause 1.7 (d) Delete the words 'contract manager' and 'manager' at the beginning and end of the sub clause and substitute with the words 'general foreman' and 'foreman' respectively

e) Delete the figure '4' and substitute with figure '2'

Clause 1.7 (e) Introduce the following:-

e) The following tenders shall also be considered non-responsive:- Incomplete and/or unsigned form of tender

Clause 3.2 For the requirement of this clause; add the following

(g) Appendix to the Instruction to Bidders

Clause 3.6 Amend the first sentence to read as follows: "Tenders shall remain valid for a period of **335** days from the date of submission"

Clause 3.14 Delete the entire clause and substitute with the following:

The tenderer shall prepare one original of the volume of **tender documents** comprising the documents as described in clause 3.2 of these instructions and clearly submit online on the KRA-Portal.

SECTION 4: TENDER EVALUATION CRITERIA

After tender opening, the tenders will be evaluated in 3 stages, namely:

1. Preliminary evaluation
2. Technical evaluation
3. Financial Evaluation

1.1 PRELIMINARY EVALUATION

1.1 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:

S/No	MANDATORY REQUIREMENTS
1.	Valid Copy of certificate of incorporation/ Registration.
2.	Valid Copy of current KRA Tax compliance certificate
3.	Valid copy of **NCA 4 and above** registration certificate in the Electrical works and where a joint venture has been initiated the principal party need to have NCA 4 {in Electrical Works} or better.
4.	Duly filled, stamped and signed Confidential business questionnaire
5.	Duly filled, signed and stamped Form of Tender
6.	Power of attorney {Sole Proprietors Exempted} from the firm duly signed by director{s} and stamped or commissioning of Oaths.
7.	Tender security of Kes 400,000.00 valid for **365 days** from the date of tender closure **22nd October, 2020** from a reputable Insurance company as approved by IRA.
8.	Mandatory Site visit on **……9th October, 2020… at 10:00 am**, Attendance Register will be signed by all representatives and issued a Site Visit Form. All prospective Tenderers shall assemble at the ……**Ushuru Pension Tower**…… by ……**9:30. a.m.** Contact Person : **Mr. Ribiro : 0722-799246**
9.	Current annual Contractors Practicing Licence from **NCA 4 and above** for Electrical Works and where a joint venture has been initiated the principal party need to have NCA 4 {in Electrical Works] or better.
10.	**Proof of Financial Resources.** Reference letter from Bank confirming operation of an account {not older than six {6} months
11.	A valid Manufacturer Authorization for the assorted Items
12.	A valid Class of License with Energy Regulatory Commission (Class B and above)
13.	A Detailed Work plan

Tender Bid Document submitted without ANY of the above mentioned Mandatory Requirements shall be rejected by Evaluation Committee and will therefore not proceed to the vendor, technical and financial evaluation.

NB

The Authority may seek further classifications/confirmation if necessary, to confirm authenticity or compliance of any condition of the tenders.

1.2. **TECHNICAL EVALUATION**

(a) Vendor/Technical Evaluation Criteria

The following criteria will be used in the evaluation of all potential suppliers. The documents submitted will be evaluated for suitability and awarded marks. The cut off **score shall be 42** and above out of **60** marks.

Description of Criteria	Maximum Score	Cut off Score
Proof of qualified and experienced **technical key personnel** (qualifications considered will be Electronic Engineering, Electrical Engineering, Computer Engineering, Construction Management and other equivalent qualifications). Bidders must provide at least a **minimum of Four (4) key** technical staff to be involved in the project with at least five (5) years' experience. (CVS must be supported by Academic Certificates and submitted together with the bid). The authority reserves the right to determine the authenticity of the academic certificates submitted. Bidders who submit fake certificates shall be blacklisted forthwith. CV, 5yrs of Experience with a Degree ……. ……10 Diploma ……...8 Certificate ……..…..6	40	32
Reference from at **least Four (4) main past clients** (Only for projects above KES 40 million in last 5 years) (attach reference letters on client letter head accompanied by copy of contracts/LSO/Award and completion certificates) relevant to the procurement item and include a summary of the services rendered, value of contract, contact person and the email/telephone number. For a complete reference, all the items highlighted above must be presented. For each reference provided **(5 Marks for each)** • Award Letter/Contracts/ LSO {2 marks} • Completion Certificate/ Letter {2 marks} • Reference Letter { 1 mark}	20	10
Total Score	60	42

NB: Bidders will be required to meet the cut off score on every criteria under vendor evaluation in order to qualify for further evaluation.

1.3 FINANCIAL EVALUATION

Bids that pass the Technical Evaluation shall be subjected to the Financial Evaluation in two stages as follows

1. Tender Rates and arithmetic errors
2. Tender Sums
3. Completeness of the BQ (provide quotes for all line items in the BQ)

NB: Examination of Arithmetic Errors. Bids arithmetic errors shall be disqualified.

According to Section 82 of the Public Procurement and Asset Disposal Act (2015) that the tender sum as submitted and read out during the Tender Opening shall be absolute and final, and shall not be the subject of correction, adjustment or amendment in any way or by any person or entity, The committee will check the arithmetic errors and notify the winning bidder in case errors are found in the document, however no alteration of bid price will be done.

OVERAL EVALUATION CRITERIA

Criteria	**Maximum Score/ Requirement**	**Cut-off Score**
Tender Responsiveness	Mandatory	Provision of all Requirement
Vendor Evaluation	60	42
Technical Evaluation	Attributed Scores per table	Attributed cut-Off Scores per table
Financial Evaluation	Lowest evaluated responsive price	

1.2 TECHNICAL EVALUATION

The tender document shall be examined based on clause 1.5 of the Instruction to Tenderers which states as follows:

In accordance with clause 1.5 of Instruction to Tenderers, the tenderers will be required to provide evidence for eligibility of the award of the tender by satisfying the employer of their eligibility under clause
5.1 of Instructions to Tenderers and their capability and adequacy of resources to effectively carry out the subject contract.
In order to comply with provisions of clause 5.1 of Instruction to Tenderers, 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;
b) 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 bidders will be required to submit relevant technical brochures/technical specifications with the tender document, highlighting (using a mark-pen or highlighter) the Number/model of the proposed items. Such brochures/ technical specifications 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 bid will then be analyzed, using the information in the technical brochures, to determine compliance with key technical specifications for the works/items as indicated in the tender document. Bidders not complying with any of the key technical specifications shall be awarded 0 marks while those meeting all the key technical specifications shall be awarded 40 marks (evaluation committee may add more key requirements from the bid technical specifications).

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.

SECTION 5: CONDITIONS OF CONTRACT

CONDITIONS OF CONTRACT

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CONDITIONS OF CONTRACT

1. Definitions

1.1 In this Contract, except where context otherwise requires, the following terms shall be interpreted as indicated;

"Bill of Quantities" means the priced and completed Bill of Quantities forming part of the tender.

"Compensation Events" are those defined in Clause 24 hereunder.

"The Completion Date" means the date of completion of the Works as certified by the Project Manager, in accordance with Clause 31.

"The Contract" means the agreement entered into between the Employer and the Contractor as recorded in the Agreement Form and signed by the parties including all attachments and appendices thereto and all documents incorporated by reference therein to execute, complete, and maintain the Works,

"The Contractor" refers to the person or corporate body whose tender to carry out the Works has been accepted by the Employer.

"The Contractor's Tender" is the completed tendering document submitted by the Contractor to the Employer.

"The Contract Price" is the price stated in the Letter of Acceptance and thereafter as adjusted in accordance with the provisions of the Contract.

"Days" are calendar days; "Months" are calendar months.

"A Defect" is any part of the Works not completed in accordance with the Contract.

"The Defects Liability Certificate" is the certificate issued by Project Manager upon correction of defects by the Contractor.

"The Defects Liability Period" is the period named in the Contract Data and calculated from the Completion Date.

"Drawings" include calculations and other information provided or approved by the Project Manager for the execution of the Contract.

"Dayworks" are Work inputs subject to payment on a time basis for labour and the associated materials and plant.

"Employer", or the **"Procuring entity"** as defined in the Public Procurement Regulations (i.e. Central or Local Government administration, Universities, Public Institutions and Corporations, etc) is the party who employs the Contractor to carry out the Works.

"Equipment" is the Contractor's machinery and vehicles brought temporarily to the Site for the execution of the Works.

"The Intended Completion Date" is the date on which it is intended that the Contractor shall complete the Works. The Intended Completion Date may be revised only by the Project Manager by issuing an extension of time or an acceleration order.

"Materials" are all supplies, including consumables, used by the Contractor for incorporation in the Works.

"Plant" is any integral part of the Works that shall have a mechanical, electrical, chemical, or biological function.

"Project Manager" is the person named in the Appendix to Conditions of Contract (or any other competent person appointed by the Employer and notified to the Contractor, to act in replacement of the Project Manager) who is responsible for supervising the execution of the Works and administering the Contract and shall be an "Architect" or a "Quantity Surveyor" registered under the Architects and Quantity Surveyors Act Cap 525 or an "Engineer" registered under Engineers Registration Act Cap 530.

"Site" is the area defined as such in the Appendix to Condition of Contract.

"Site Investigation Reports" are those reports that may be included in the tendering documents which are factual and interpretative about the surface and subsurface conditions at the Site.

"Specifications" means the Specifications of the Works included in the Contract and any modification or addition made or approved by the Project Manager.

"Start Date" is the latest date when the Contractor shall commence execution of the Works. It does not necessarily coincide with the Site possession date(s).

"A Subcontractor" is a person or corporate body who has a Contract with the Contractor to carry out a part of the Work in the Contract, which includes Work on the Site.

"Temporary works" are works designed, constructed, installed, and removed by the Contractor which are needed for construction or installation of the Works.

"A Variation" is an instruction given by the Project Manager which varies the Works.

"The Works" are what the Contract requires the Contractor to construct, install, and turnover to the Employer, as defined in the Appendix to Conditions of Contract.

2. Interpretation

2.1 In interpreting these Conditions of Contract, singular also means plural, male also means female or neuter, and the other way around. Headings have no significance. Words have their

normal meaning in English Language unless specifically defined. The Project Manager will provide instructions clarifying queries about these Conditions of Contract.

2.2 If sectional completion is specified in the Appendix to Conditions of Contract, reference in the Conditions of Contract to the Works, the Completion Date and the Intended Completion Date apply to any section of the Works (other than references to the Intended Completion Date for the whole of the Works).

2.3 The following documents shall constitute the Contract documents and shall be interpreted in the following order of priority;

(1) Agreement,
(2) Letter of Acceptance,
(3) Contractor's Tender,
(4) Appendix to Conditions of Contract,
(5) Conditions of Contract,
(6) Specifications,
(7) Drawings,
(8) Bill of Quantities,
(9) Any other documents listed in the Appendix to Conditions of Contract as forming part of the Contract.

Immediately after the execution of the Contract, the Project Manager shall furnish both the Employer and the Contractor with two copies each of all the Contract documents. Further, as and when necessary the Project Manager shall furnish the Contractor [always with a copy to the Employer] with three [3] copies of such further drawings or details or descriptive schedules as are reasonably necessary either to explain or amplify the Contract drawings or to enable the Contractor to carry out and complete the Works in accordance with these Conditions.

3. Language and Law

3.1 Language of the Contract and the law governing the Contract shall be English language and the Laws of Kenya respectively unless otherwise stated.

4. Project Manager's Decisions

4.1 Except where otherwise specifically stated, the Project Manager will decide contractual matters between the Employer and the Contractor in the role representing the Employer.

5. Delegation

5.1 The Project Manager may delegate any of his duties and responsibilities to others after notifying the Contractor.

6. Communications

6.1 Communication between parties shall be effective only when in writing. A notice shall be effective only when it is delivered.

7. Form of Sub-contract

7.1 The successful tenderer will be appointed as a Nominated Sub-Contractor to the Main Contractor under the terms of the Conditions of Contract

7.2 He will be required to enter into a Sub-Contract with the Main Contractor indemnifying him against the same liabilities in respect of the Sub-Contract works as those for which the Main Contractor is liable to indemnify the Employer under the Main Contract

7.3 The Nominated Sub-Contractor will be required to enter into a written Sub-Contract Agreement with the Main Contractor on the latest edition of the Agreement and Conditions of Contract for Building Works (current edition) published by The Joint Building Council of Kenya

7.4 The Particular and General Preliminaries of the Bills of Quantities for the Main Contract where appropriate shall apply equally to the Sub-Contractor who is to examine these sections of the document and allow for all costs which he considers may arise from compliance with these Preliminaries

8. Subcontracting

8.1 The Contractor may subcontract with the approval of the Project Manager, but may not assign the Contract without the approval of the Employer in writing. Subcontracting shall not alter the Contractor's obligations.

9. Other Contractors

9.1 The Contractor shall cooperate and share the Site with other contractors, public authorities, utilities etc. as listed in the Appendix to Conditions of Contract and also with the Employer, as per the directions of the Project Manager. The Contractor shall also provide facilities and services for them. The Employer may modify the said List of Other Contractors etc., and shall notify the Contractor of any such modification.

10. Personnel

10.1 The Contractor shall employ the key personnel named in the Qualification Information, to carry out the functions stated in the said Information or other personnel approved by the Project Manager. The Project Manager will approve any proposed replacement of key personnel only if their relevant qualifications and abilities are substantially equal to or better than those of the personnel listed in the Qualification Information. If the Project Manager asks the Contractor to remove a person who is a member of the Contractor's staff or work force, stating the reasons, the Contractor shall ensure that the person leaves the Site within seven days and has no further connection with the Work in the Contract.

11. Works

11.1 The Contractor shall construct and install the Works in accordance with the Specifications and Drawings. The Works may commence on the Start Date and shall be carried out in

accordance with the Program submitted by the Contractor, as updated with the approval of the Project Manager, and complete them by the Intended Completion Date.

12. Safety and Temporary Works

12.1 The Contractor shall be responsible for the design of temporary works. However before erecting the same, he shall submit his designs including specifications and drawings to the Project Manager and to any other relevant third parties for their approval. No erection of temporary works shall be done until such approvals are obtained.

12.2 The Project Manager's approval shall not alter the Contractor's responsibility for design of the Temporary works and all drawings prepared by the Contractor for the execution of the temporary or permanent Works, shall be subject to prior approval by the Project Manager before they can be used.

12.3 The Contractor shall be responsible for the safety of all activities on the Site.

13. Discoveries

13.1 Anything of historical or other interest or of significant value unexpectedly discovered on Site shall be the property of the Employer. The Contractor shall notify the Project Manager of such discoveries and carry out the Project Manager's instructions for dealing with them.

14. Work Program

14.1 Within the time stated in the Appendix to Conditions of Contract, the Contractor shall submit to the Project Manager for approval a program showing the general methods, arrangements, order, and timing for all the activities in the Works. An update of the program shall be a program showing the actual progress achieved on each activity and the effect of the progress achieved on the timing of the remaining Work, including any changes to the sequence of the activities.

The Contractor shall submit to the Project Manager for approval an updated program at intervals no longer than the period stated in the Appendix to Conditions of Contract. If the Contractor does not submit an updated program within this period, the Project Manager may withhold the amount stated in the said Appendix from the next payment certificate and continue to withhold this amount until the next payment after the date on which the overdue program has been submitted. The Project Manager's approval of the program shall not alter the Contractor's obligations. The Contractor may revise the program and submit it to the Project Manager again at any time. A revised program shall show the effect of Variations and Compensation Events.

15. Possession of Site

15.1 The Employer shall give possession of all parts of the Site to the Contractor. If possession of a part is not given by the date stated in the Appendix to Conditions of Contract, the Employer will be deemed to have delayed the start of the relevant activities, and this will be a Compensation Event.

16. Access to Site

16.1 The Contractor shall allow the Project Manager and any other person authorised by the Project Manager, access to the Site and to any place where work in connection with the Contract is being carried out or is intended to be carried out.

17. Instructions

17.1 The Contractor shall carry out all instructions of the Project Manager which are in accordance with the Contract

18. Extension or Acceleration of Completion Date

18.1 The Project Manager shall extend the Intended Completion Date if a Compensation Event occurs or a variation is issued which makes it impossible for completion to be achieved by the Intended Completion Date without the Contractor taking steps to accelerate the remaining Work, which would cause the Contractor to incur additional cost. The Project Manager shall decide whether and by how much to extend the Intended Completion Date within 21 days of the Contractor asking the Project Manager in writing for a decision upon the effect of a Compensation Event or variation and submitting full supporting information. If the Contractor has failed to give early warning of a delay or has failed to cooperate in dealing with a delay, the delay caused by such failure shall not be considered in assessing the new (extended) Completion Date.

18.2 No bonus for early completion of the Works shall be paid to the Contractor by the Employer.

19. Management Meetings

19.1 A Contract management meeting shall be held monthly and attended by the Project Manager and the Contractor. Its business shall be to review the plans for the remaining Work and to deal with matters raised in accordance with the early warning procedure. The Project Manager shall record the minutes of management meetings and provide copies of the same to those attending the meeting and the Employer. The responsibility of the parties for actions to be taken shall be decided by the Project Manager either at the management meeting or after the management meeting and stated in writing to all who attended the meeting.

20. Early Warning

20.1 The Contractor shall warn the Project Manager at the earliest opportunity of specific likely future events or circumstances that may adversely affect the quality of the Work, increase the Contract Price or delay the execution of the Works. The Project Manager may require the Contractor to provide an estimate of the expected effect of the future event or

circumstance on the Contract Price and Completion Date. The estimate shall be provided by the Contractor as soon as reasonably possible.

20.2 The Contractor shall cooperate with the Project Manager in making and considering proposals on how the effect of such an event or circumstance can be avoided or reduced by anyone involved in the Work and in carrying out any resulting instructions of the Project Manager.

21. Defects

21.1 The Project Manager shall inspect the Contractor's work and notify the Contractor of any defects that are found. Such inspection shall not affect the Contractor's responsibilities. The Project Manager may instruct the Contractor to search for a defect and to uncover and test any Work that the Project Manager considers may have a defect. Should the defect be found, the cost of uncovering and making good shall be borne by the Contractor, However, if there is no defect found, the cost of uncovering and making good shall be treated as a variation and added to the Contract Price.

21.2 The Project Manager shall give notice to the Contractor of any defects before the end of the Defects Liability Period, which begins at Completion, and is defined in the Appendix to Conditions of Contract. The Defects Liability Period shall be extended for as long as defects remain to be corrected.

21.3 Every time notice of a defect is given, the Contractor shall correct the notified defect within the length of time specified by the Project Manager's notice. If the Contractor has not corrected a defect within the time specified in the Project Manager's notice, the Project Manager will assess the cost of having the defect corrected by other parties and such cost shall be treated as a variation and be deducted from the Contract Price.

22. Bills Of Quantities

22.1 The Bills of Quantities shall contain items for the construction, installation, testing and commissioning of the Work to be done by the Contractor. The Contractor will be paid for the quantity of the Work done at the rate in the Bills of Quantities for each item.

22.2 If the final quantity of the Work done differs from the quantity in the Bills of Quantities for the particular item by more than 25 percent and provided the change exceeds 1 percent of the Initial Contract price, the Project Manager shall adjust the rate to allow for the change.

22.3 If requested by the Project Manager, the Contractor shall provide the Project Manager with a detailed cost breakdown of any rate in the Bills of Quantities.

23. Variations

23.1 All variations shall be included in updated programs produced by the Contractor.

23.2 The Contractor shall provide the Project Manager with a quotation for carrying out the variations when requested to do so. The Project Manager shall assess the quotation, which shall be given within seven days of the request or within any longer period as may be stated by the Project Manager and before the Variation is ordered.

23.3 If the work in the variation corresponds with an item description in the Bills of Quantities and if in the opinion of the Project Manager, the quantity of work is not above the limit stated in Clause 21.2 or the timing of its execution does not cause the cost per unit of quantity to change, the rate in the Bills of Quantities shall be used to calculate the value of the variation. If the cost per unit of quantity changes, or if the nature or timing of the work in the variation does not correspond with items in the Bills of Quantities, the quotation by the Contractor shall be in the form of new rates for the relevant items of Work.

23.4 If the Contractor's quotation is unreasonable, the Project Manager may order the variation and make a change to the Contract price, which shall be based on the Project Manager's own forecast of the effects of the variation on the Contractor's costs.

23.5 If the Project Manager decides that the urgency of varying the Work would prevent a quotation being given and considered without delaying the Work, no quotation shall be given and the variation shall be treated as a Compensation Event.

23.6 The Contractor shall not be entitled to additional payment for costs that could have been avoided by giving early warning.

23.7 When the Program is updated, the Contractor shall provide the Project Manager with an updated cash flow forecast.

24. Payment Certificates, Currency of Payments and Advance Payments

24.1 The Contractor shall submit to the Project Manager monthly applications for payment giving sufficient details of the Work done and materials on Site and the amounts which the

Contractor considers himself to be entitled to. The Project Manager shall check the monthly application and certify the amount to be paid to the Contractor within 14 days. The value of Work executed and payable shall be determined by the Project Manager.

24.2 The value of Work executed shall comprise the value of the quantities of the items in the Bills of Quantities completed, materials delivered on Site, variations and compensation events. Such materials shall become the property of the Employer once the Employer has paid the Contractor for their value. Thereafter, they shall not be removed from Site without the Project Manager's instructions except for use upon the Works.

24.3 Payments shall be adjusted for deductions for retention. The Employer shall pay the Contractor the amounts certified by the Project Manager within 30 days of the date of issue of each certificate. If the Employer makes a late payment, the Contractor shall be paid simple interest on the late payment in the next payment. Interest shall be calculated on the basis of number of days delayed at a rate three percentage points above the Central Bank of Kenya's average rate for base lending prevailing as of the first day the payment becomes overdue.

24.4 If an amount certified is increased in a later certificate or as a result of an award by an Arbitrator, the Contractor shall be paid interest upon the delayed payment as set out in this clause. Interest shall be calculated from the date upon which the increased amount would have been certified in the absence of dispute.

24.5 Items of the Works for which no rate or price has been entered in will not be paid for by the Employer and shall be deemed covered by other rates and prices in the Contract.

24.6 The Contract Price shall be stated in Kenya Shillings. All payments to the Contractor shall be made in Kenya Shillings and foreign currency in the proportion indicated in the tender, or agreed prior to the execution of the Contract Agreement and indicated therein. The rate of exchange for the calculation of the amount of foreign currency payment shall be the rate of exchange indicated in the Appendix to Conditions of Contract. If the Contractor indicated foreign currencies for payment other than the currencies of the countries of origin of related goods and services the Employer reserves the right to pay the equivalent at the time of payment in the currencies of the countries of such goods and services. The Employer and the Project Manager shall be notified promptly by the Contractor of an changes in the expected foreign currency requirements of the Contractor during the execution of the Works as indicated in the Schedule of Foreign Currency Requirements and the foreign and local currency portions of the balance of the Contract Price shall then be amended by agreement between Employer and the Contractor in order to reflect appropriately such changes.

24.7 In the event that an advance payment is granted, the following shall apply:-

(a) On signature of the Contract, the Contractor shall at his request, and without furnishing proof of expenditure, be entitled to an advance of 10% (ten percent) of the original amount of the Contract. The advance shall not be subject to retention money.

(b) No advance payment may be made before the Contractor has submitted proof of the establishment of deposit or a directly liable guarantee satisfactory to the Employer in

the amount of the advance payment. The guarantee shall be in the same currency as the advance.

(c) Reimbursement of the lump sum advance shall be made by deductions from the Interim payments and where applicable from the balance owing to the Contractor. Reimbursement shall begin when the amount of the sums due under the Contract reaches 20% of the original amount of the Contract. It shall have been completed by the time 80% of this amount is reached.

The amount to be repaid by way of successive deductions shall be calculated by means of the formula:

$$R = \frac{A(x^1 - x^{11})}{80-20}$$

Where:

R = the amount to be reimbursed

A = the amount of the advance which has been granted

X^1 = the amount of proposed cumulative payments as a percentage of the original amount of the Contract. This figure will exceed 20% but not exceed 80%.

x^{11} = the amount of the previous cumulative payments as a percentage of the original amount of the Contract. This figure will be below 80%but not less than 20%.

(d) with each reimbursement the counterpart of the directly liable guarantee may be reduced accordingly.

25. Compensation Events

25.1 The following issues shall constitute Compensation Events:

(a) The Employer does not give access to a part of the Site by the Site Possession Date stated in the Appendix to Conditions of Contract.

(b) The Employer modifies the List of Other Contractors, etc., in a way that affects the Work of the Contractor under the Contract.

(c) The Project Manager orders a delay or does not issue drawings, specifications or instructions required for execution of the Works on time.

(d) The Project Manager instructs the Contractor to uncover or to carry out additional tests upon the Work, which is then found to have no defects.

(e) The Project Manager unreasonably does not approve a subcontract to be let.

(f) Ground conditions are substantially more adverse than could reasonably have been assumed before issuance of the Letter of Acceptance from the information issued to tenderers (including the Site investigation reports), from information available publicly and from a visual inspection of the Site.

(g) The Project Manager gives an instruction for dealing with an unforeseen condition, caused by the Employer or additional work required for safety or other reasons.

(h) Other contractors, public authorities, utilities, or the Employer does not work within the dates and other constraints stated in the Contract, and they cause delay or extra cost to the Contractor.

(i) The effects on the Contractor of any of the Employer's risks.

(j) The Project Manager unreasonably delays issuing a Certificate of Completion.

(k) Other compensation events described in the Contract or determined by the Project Manager shall apply.

25.2 If a compensation event would cause additional cost or would prevent the Work being completed before the Intended Completion Date, the Contract Price shall be increased and/or the Intended Completion Date shall be extended. The Project Manager shall decide whether and by how much the Contract Price shall be increased and whether and by how much the Intended Completion Date shall be extended.

25.3 As soon as information demonstrating the effect of each compensation event upon the Contractor's forecast cost has been provided by the Contractor, it shall be assessed by the Project Manager, and the Contract Price shall be adjusted accordingly. If the Contractor's forecast is deemed unreasonable, the Project Manager shall adjust the Contract Price based on the Project Manager's own forecast. The Project Manager will assume that the Contractor will react competently and promptly to the event.

25.4 The Contractor shall not be entitled to compensation to the extent that the Employer's interests are adversely affected by the Contractor not having given early warning or not having co-operated with the Project Manager.

25.5 Prices shall be adjusted for fluctuations in the cost of inputs only if provided for in the Appendix to Conditions of Contract.

25.6 The Contractor shall give written notice to the Project Manager of his intention to make a claim within thirty days after the event giving rise to the claim has first arisen. The claim shall be submitted within thirty days thereafter.

Provided always that should the event giving rise to the claim of continuing effect, the Contractor shall submit an interim claim within the said thirty days and a final claim within thirty days of the end of the event giving rise to the claim.

26. Price Adjustment

26.1 The Project Manager shall adjust the Contract Price if taxes, duties and other levies are changed between the date 30 days before the submission of tenders for the Contract and the date of Completion. The adjustment shall be the change in the amount of tax payable by the Contractor.

26.2 The Contract Price shall be deemed to be based on exchange rates current at the date of tender submission in calculating the cost to the Contractor of materials to be specifically imported (by express provisions in the Contract Bills of Quantities or Specifications) for permanent incorporation in the Works. Unless otherwise stated in the Contract, if at any time during the period of the Contract exchange rates shall be varied and this shall affect the cost to the Contractor of such materials, then the Project Manager shall assess the net difference in the cost of such materials. Any amount from time to time so assessed shall be added to or deducted from the Contract Price, as the case may be.

26.3 Unless otherwise stated in the Contract, the Contract Price shall be deemed to have been calculated in the manner set out below and in sub-clauses 25.4 and 25.5 and shall be subject to adjustment in the events specified thereunder;

(i) The prices contained in the Contract Bills of Quantities shall be deemed to be based upon the rates of wages and other emoluments and expenses as determined by the Joint Building Council of Kenya (J.B.C.) and set out in the schedule of basic rates issued 30 days before the date for submission of tenders.A copy of the schedule used by the Contractor in his pricing shall be attached in the Appendix to Conditions of Contract.

(ii) Upon J.B.C. determining that any of the said rates of wages or other emoluments and expenses are increased or decreased, then the Contract Price shall be increased or decreased by the amount assessed by the Project Manager based upon the difference, expressed as a percentage, between the rate set out in the schedule of basic rates issued 30 days before the date for submission of tenders and the rate published by the J.B.C. and applied to the quantum of labour incorporated within the amount of Work remaining to be executed at the date of publication of such increase or decrease.

(iii) No adjustment shall be made in respect of changes in the rates of wages and other emoluments and expenses which occur after the date of Completion except during

such other period as may be granted as an extension of time under clause 17.0 of these Conditions.

26.4 The prices contained in the Contract Bills of Quantities shall be deemed to be based upon the basic prices of materials to be permanently incorporated in the Works as determined by the J.B.C. and set out in the schedule of basic rates issued 30 days before the date for submission of tenders. A copy of the schedule used by the Contractor in his pricing shall be attached in the Appendix to Conditions of Contract.

26.5 Upon the J.B.C. determining that any of the said basic prices are increased or decreased then the Contract Price shall be increased or decreased by the amount to be assessed by the Project Manager based upon the difference between the price set out in the schedule of basic rates issued 30 days before the date for submission of tenders and the rate published by the J.B.C. and applied to the quantum of the relevant materials which have not been taken into account in arriving at the amount of any interim certificate under clause 23 of these Conditions issued before the date of publication of such increase or decrease.

26.6 No adjustment shall be made in respect of changes in basic prices of materials which occur after the date for Completion except during such other period as may be granted as an extension of time under clause 17.0 of these Conditions.

26.7 The provisions of sub-clause 25.1 to 25.2 herein shall not apply in respect of any materials included in the schedule of basic rates.

27. Retention

27.1 The Employer shall retain from each payment due to the Contractor the proportion stated in the Appendix to Conditions of Contract until Completion of the whole of the Works. On Completion of the whole of the Works, half the total amount retained shall be repaid to the Contractor and the remaining half when the Defects Liability Period has passed and the Project Manager has certified that all defects notified to the Contractor before the end of this period have been corrected.

28. Liquidated Damages

28.1 The Contractor shall pay liquidated damages to the Employer at the rate stated in the Appendix to Conditions of Contract for each day that the actual Completion Date is later than the Intended Completion Date. The Employer may deduct liquidated damages from payments due to the Contractor. Payment of liquidated damages shall not alter the Contractor's liabilities.

28.2 If the Intended Completion Date is extended after liquidated damages have been paid, the Project Manager shall correct any overpayment of liquidated damages by the Contractor by adjusting the next payment certificate. The Contractor shall be paid interest on the overpayment, calculated from the date of payment to the date of repayment, at the rate specified in Clause 23.30

29. Securities

29.1 The Performance Security shall be provided to the Employer no later than the date specified in the Letter of Acceptance and shall be issued in an amount and form and by a reputable bank acceptable to the Employer, and denominated in Kenya Shillings. The

Performance Security shall be valid until a date 30 days beyond the date of issue of the Certificate of Completion.

30. Day works

30.1 If applicable, the Day works rates in the Contractor's tender shall be used for small additional amounts of Work only when the Project Manager has given written instructions in advance for additional work to be paid for in that way.

30.2 All work to be paid for as Day works shall be recorded by the Contractor on Forms approved by the Project Manager. Each completed form shall be verified and signed by the Project Manager within two days of the Work being done.

30.3 The Contractor shall be paid for Day works subject to obtaining signed Day works forms.

31. Liability and Insurance

31.1 From the Start Date until the Defects Correction Certificate has been issued, the following are the Employer's risks:

(a) The risk of personal injury, death or loss of or damage to property (excluding the Works, Plant, Materials and Equipment), which are due to;

(i) use or occupation of the Site by the Works or for the purpose of the Works, which is the unavoidable result of the Works, or

(ii) negligence, breach of statutory duty or interference with any legal right by the Employer or by any person employed by or contracted to him except the Contractor.

(b) The risk of damage to the Works, Plant, Materials, and Equipment to the extent that it is due to a fault of the Employer or in Employer's design, or due to war or radioactive contamination directly affecting the place where the Works are being executed.

31.2 From the Completion Date until the Defects Correction Certificate has been issued, the risk of loss of or damage to the Works, Plant, and Materials is the Employer's risk except loss or damage due to;

(a) a defect which existed on or before the Completion Date.

(b) an event occurring before the Completion Date, which was not itself the Employer's risk

(c) the activities of the Contractor on the Site after the Completion Date.

31.3 From the Start Date until the Defects Correction Certificate has been issued, the risks of personal injury, death and loss of or damage to property (including, without limitation, the Works, Plant, Materials, and Equipment) which are not Employer's risk are Contractor's risks.

The Contractor shall provide, in the joint names of the Employer and the Contractor, insurance cover from the Start Date to the end of the Defects Liability Period, in the amounts stated in the Appendix to Conditions of Contract for the following events;

(a) loss of or damage to the Works, Plant, and Materials;

(b) loss of or damage to Equipment;

(c) loss of or damage to property (except the Works, Plant, Materials, and Equipment) in connection with the Contract, and

(d) personal injury or death.

31.4 Policies and certificates for insurance shall be delivered by the Contractor to the Project Manager for the Project Manager's approval before the Start Date. All such insurance shall provide for compensation required to rectify the loss or damage incurred.

31.5 If the Contractor does not provide any of the policies and certificates required, the Employer may effect the insurance which the Contractor should have provided and recover the premiums from payments otherwise due to the Contractor or, if no payment is due, the payment of the premiums shall be a debt due.

31.6 Alterations to the terms of an insurance shall not be made without the approval of the Project Manager. Both parties shall comply with any conditions of insurance policies.

32. Completion and taking over

32.1 Upon deciding that the Works are complete, the Contractor shall issue a written request to the Project Manager to issue a Certificate of Completion of the Works. The Employer shall take over the Site and the Works within seven [7] days of the Project Manager's issuing a Certificate of Completion.

33. Final Account

33.1 The Contractor shall issue the Project Manager with a detailed account of the total amount that the Contractor considers payable to him by the Employer under the Contract before the end of the Defects Liability Period. The Project Manager shall issue a Defects Liability Certificate and certify any final payment that is due to the Contractor within 30 days of receiving the Contractor's account if it is correct and complete. If it is not, the Project Manager shall issue within 30 days a schedule that states the scope of the corrections or additions that are necessary. If the final account is still unsatisfactory after it has been resubmitted, the Project Manager shall decide on the amount payable to the Contractor and issue a Payment Certificate. The Employer shall pay the Contractor the amount due in the Final Certificate within 60 days.

34. Termination

34.1 The Employer or the Contractor may terminate the Contract if the other party causes a fundamental breach of the Contract. These fundamental breaches of Contract shall include, but shall not be limited to, the following;

(a) the Contractor stops work for 30 days when no stoppage of work is shown on the current program and the stoppage has not been authorised by the Project Manager;

(b) the Project Manager instructs the Contractor to delay the progress of the Works, and the instruction is not withdrawn within 30 days;

(c) the Contractor is declared bankrupt or goes into liquidation other than for a reconstruction or amalgamation;

(d) a payment certified by the Project Manager is not paid by the Employer to the Contractor within 30 days (for Interim Certificate) or 60 days (for Final Certificate)of issue.

(e) the Project Manager gives notice that failure to correct a particular defect is a fundamental breach of Contract and the Contractor fails to correct it within a reasonable period of time determined by the Project Manager;

(f) the Contractor does not maintain a security, which is required.

34.2 When either party to the Contract gives notice of a breach of Contract to the Project Manager for a cause other than those listed under Clause 33.1 above, the Project Manager shall decide whether the breach is fundamental or not.

34.3 Notwithstanding the above, the Employer may terminate the Contract for convenience.

34.4 If the Contract is terminated, the Contractor shall stop work immediately, make the Site safe and secure, and leave the Site as soon as reasonably possible. The Project Manager shall immediately thereafter arrange for a meeting for the purpose of taking record of the Works executed and materials , goods, equipment and temporary buildings on Site.

35. Payment Upon Termination

35.1 If the Contract is terminated because of a fundamental breach of Contract by the Contractor, the Project Manager shall issue a certificate for the value of the Work done and materials ordered and delivered to Site up to the date of the issue of the certificate. Additional liquidated damages shall not apply. If the total amount due to the Employer exceeds any payment due to the Contractor, the difference shall be a debt payable by the Contractor.

35.2 If the Contract is terminated for the Employer's convenience or because of a fundamental breach of Contract by the Employer, the Project Manager shall issue a certificate for the value of the Work done, materials ordered, the reasonable cost of removal of equipment, repatriation of the Contractor's personnel employed solely on the Works, and the Contractor's costs of protecting and securing the Works.

35.3 The Employer may employ and pay other persons to carry out and complete the Works and to rectify any defects and may enter upon the Works and use all materials on the Site, plant, equipment and temporary works.

35.4 The Contractor shall, during the execution or after the completion of the Works under this clause remove from the Site as and when required, within such reasonable time as the Project Manager may in writing specify, any temporary buildings, plant, machinery, appliances, goods or materials belonging to or hired by him, and in default the Employer may (without being responsible for any loss or damage) remove and sell any such property of the Contractor, holding the proceeds less all costs incurred to the credit of the Contractor. Until after completion of the Works under this clause the Employer shall not be bound by any other provision of this Contract to make any payment to the Contractor, but upon such completion as aforesaid and the verification within a reasonable time of the accounts therefore the Project Manager shall certify the amount of expenses properly incurred by the Employer and, if such amount added to the money paid to the

Contractor before such determination exceeds the total amount which would have been payable on due completion in accordance with this Contract the difference shall be a debt payable to the Employer by the Contractor; and if the said amount added to the said money be less than the said total amount, the difference shall be a debt payable by the Employer to the Contractor.

36. Release from Performance

36.1 If the Contract is frustrated by the outbreak of war or by any other event entirely outside the control of either the Employer or the Contractor, the Project Manager shall certify that the Contract has been frustrated. The Contractor shall make the Site safe and stop Work as quickly as possible after receiving this certificate and shall be paid for all Work carried out before receiving it.

37. Corrupt gifts and payments of commission

The Contractor shall not;

(a) Offer or give or agree to give to any person in the service of the Employer any gift or consideration of any kind as an inducement or reward for doing or forbearing to do or for having done or forborne to do any act in relation to the obtaining or execution of this or any other Contract for the Employer or for showing or forbearing to show favour or disfavour to any person in relation to this or any other contract for the Employer.

(b) Enter into this or any other contract with the Employer in connection with which commission has been paid or agreed to be paid by him or on his behalf or to his knowledge, unless before the Contract is made particulars of any such commission and of the terms and conditions of any agreement for the payment thereof have been disclosed in writing to the Employer.

Any breach of this Condition by the Contractor or by anyone employed by him or acting on his behalf (whether with or without the knowledge of the Contractor) shall be an offence under the provisions of the Public Procurement Regulations issued under The Exchequer and Audit Act Cap 412 of the Laws of Kenya.

38. Settlement Of Disputes

38.1 In case any dispute or difference shall arise between the Employer or the Project Manager on his behalf and the Contractor, either during the progress or after the completion or termination of the Works, such dispute shall be notified in writing by either party to the other with a request to submit it to arbitration and to concur in the appointment of an Arbitrator within thirty days of the notice. The dispute shall be referred to the arbitration and final decision of a person to be agreed between the parties. Failing agreement to concur in the appointment of an Arbitrator, the Arbitrator shall be appointed by the Chairman or Vice Chairman of any of the following professional institutions;

(i) Architectural Association of Kenya

(ii) Institute of Quantity Surveyors of Kenya

(iii) Association of Consulting Engineers of Kenya

(iv) Chartered Institute of Arbitrators (Kenya Branch)

(v) Institution of Engineers of Kenya

On the request of the applying party. The institution written to first by the aggrieved party shall take precedence over all other institutions.

38.2 The arbitration may be on the construction of this Contract or on any matter or thing of whatsoever nature arising thereunder or in connection therewith, including any matter or thing left by this Contract to the discretion of the Project Manager, or the withholding by the Project Manager of any certificate to which the Contractor may claim to be entitled to or the measurement and valuation referred to in clause 23.0 of these conditions, or the rights and liabilities of the parties subsequent to the termination of Contract.

38.3 Provided that no arbitration proceedings shall be commenced on any dispute or difference where notice of a dispute or difference has not been given by the applying party within ninety days of the occurrence or discovery of the matter or issue giving rise to the dispute.

38.4 Notwithstanding the issue of a notice as stated above, the arbitration of such a dispute or difference shall not commence unless an attempt has in the first instance been made by the parties to settle such dispute or difference amicably with or without the assistance of third parties. Proof of such attempt shall be required.

38.5 Notwithstanding anything stated herein the following matters may be referred to arbitration before the practical completion of the Works or abandonment of the Works or termination of the Contract by either party:

37.5.1 The appointment of a replacement Project Manager upon the said person ceasing to act.

37.5.2 Whether or not the issue of an instruction by the Project Manager is empowered by these Conditions.

37.5.3 Whether or not a certificate has been improperly withheld or is not in accordance with these Conditions.

37.5.4 Any dispute or difference arising in respect of war risks or war damage.

37.6 All other matters shall only be referred to arbitration after the completion or alleged completion of the Works or termination or alleged termination of the Contract, unless the Employer and the Contractor agree otherwise in writing.

37.7 The Arbitrator shall, without prejudice to the generality of his powers, have powers to direct such measurements, computations, tests or valuations as may in his opinion be desirable in order to determine the rights of the parties and assess and award any sums which ought to have been the subject of or included in any certificate.

37.8 The Arbitrator shall, without prejudice to the generality of his powers, have powers to open up, review and revise any certificate, opinion, decision, requirement or notice and to determine all matters in dispute which shall be submitted to him in the same manner as if no such certificate, opinion, decision requirement or notice had been given.

37.9 The award of such Arbitrator shall be final and binding upon the parties.

39. Alternative Dispute Resolution

39.1 In pursuant to clause 37 of these Conditions of Contract, it shall be a condition that no dispute shall be referred to arbitration unless and until the matter has been dealt with through Alternative Dispute Resolution (ADR) mechanism

39.2 The person or persons to conduct the Alternative Resolution shall be agreed upon between the parties

39.3 The Alternative Dispute Resolution shall involve Reconciliation, Mediation or Adjudication

SECTION 6: APPENDIX TO CONDITIONS OF CONTRACT

THE EMPLOYER IS

Name:	**Kenya Revenue Authority**
Address:	**P.O. Box 48240 - 00100, GPO**
Name of Authorized Representative:	**Deputy Commissioner - Supply Chain Management**

THE PROJECT MANAGER IS

Name:	**Design Source Limited**
Address:	**P.O. Box 3282 - 00200, Nairobi**

Telep

hone:

Facsi

mile:

The name (and identification number) of the Contract is:

Provision of General Electrical Systems, Security and Alarm Systems, Fire Detection Systems & Communications Networks Installations at Ushuru Pension Tower

(KRA/HQS/NCB- 012-2020-2021)

The Works consist of:

Installation of Electrical Systems, Fire Detection Systems Services, Fire Alarm System Detection, Structured cabling, UPS Systems and Communication Network Installation.

The Start Date shall be:

Agreed with the Project Manager

The Intended Completion Date for the whole of the Works shall be:

Agreed with the Project Manager

The following documents shall also form part of the Contract:

As listed in Clause 2.3 of the Conditions of Contract

The Contractor shall submit a revised program for the Works within **14** days of the delivery of the
Letter of Acceptance.

The Site Possession Date shall Be:
Agreed with the Project Manager

The Site is located at:
Ushuru Pension Tower Building, Elgon Road, Upper Hill, Nairobi and is defined in drawings.

The Defects Liability period is **180** days.

Other Contractor, utilities etc., to be engaged by the Employer on the Site Include those for the execution of:

1. Builders' Works

The minimum insurance cover shall be:

1. The minimum cover for insurance of the Works and of Plant and Materials in respect of the
Contractor's fault design is **Contractors all risk policy**

2. The minimum cover for loss or damage to Equipment is **NIL**
3. The minimum of insurance of other property is **ksh. 500,000.00**
4. The minimum cover for personal injury or death insurance
   - For the Contractor's employees is **AS PER LAWS APPLICABLE**
   - And for other people is **AS PER LAWS APPLICABLE**

The following events shall also be Compensation Events:

1. **NONE (ONLY AS LISTED IN CLAUSE 24 OF THE CONDITIONS OF CONTRACT)**

The period between Program updates is **14** days.

The amount to be withheld for late submission of an updated Program is **WHOLE CERTIFICATE**

The proportion of payments retained is **10**

percent. The limit of payments retained is **5**

percent.

The Price Adjustment Clause **shall** apply.

The liquidated damages for the whole of the Works is Kshs. 5**0,000** per week or part thereof

The Performance Security shall be for the following minimum amounts equivalent as a percentage of the Contract Price **ten** percent (**10%**)

The Completion Period for the Works is **as agreed with the Project Manager**

Advance Payment **shall not** be granted.

The schedule of basic rates used in pricing by the Contractor is as attached *[Contractor to attach].*

SECTION 7: DRAWINGS

DRAWINGS

Note:

1. See separate booklet for a list of drawings, actual plans including Site plans

SECTION 8: STANDARD FORMS

STANDARD FORMS

(i) Form of Invitation for Tenders

(ii) Form of Tender

(iii) Letter of Acceptance

(iv) Form of Agreement

(v) Form of Tender Security

(vi) Performance Bank Guarantee

(vii) Bank Guarantee for Advance Payment

(viii) Qualification Information

(ix) Tender Questionnaire

(x) Confidential Business Questionnaire

(xi) Statement of Foreign Currency Requirement

(xii) Details of Sub-Contractors

(xiii) Request for Review Form

(xiv) Anti-Corruption Declaration Commitment/Pledge

(xv) Non- Debarment Statement Form

(xvi) Site Visit Form

FORM OF INVITATION FOR TENDERS

(Date)

To: *[name of Contractor]*

[address]

Dear Sirs:

Reference: **PROVISION OF GENERAL ELECTRICAL SYSTEMS, SECURITY AND ALARM SYSTEMS, FIRE DETECTION SYSTEMS AND COMMUNICATIONS NETWORKS INSTALLATIONS.**

You have been prequalified to tender for the above project.

We hereby invite you and other prequalified tenderers to submit a tender for the execution and completion of the above Contract.

A complete set of tender documents may be download by you from **www.kra.go.ke**

Completed Bids are to be saved as PDF documents marked "**KRA/HQS/NCB-012/2020-2021: : Provision of General Electrical Systems, Security and Alarm Systems, Fire Detection Systems and Communications Networks Installation at Ushuru Pension Tower Building, Elgon Road, Upper Hill, Nairobi** submitted to the appropriate KRA E-procurement Web Portal found on the KRA website so as to be received on or be **22nd October 2020 at 11.00 a.m**.

Please confirm receipt of this letter immediately in writing by cable/facsimile or telex. Yours

faithfully,

Authorized Signature

Name and Title

8.1 FORM OF TENDER

Date _____
Tender No. _____

To: KENYA REVENUE AUTHORITY
P. O. BOX 48240 – 00100 NAIROBI.

Gentlemen and/or Ladies:

1. Having examined the tender documents including Addenda Nos. ..... [Insert numbers].the receipt of which is hereby duly acknowledged, we, the undersigned, carry out work for the ***Provision of General Electrical Systems, Security and Alarm Systems, Fire Detection Systems and Communications Networks Installation at Ushuru Pension Tower (UPT) Building, Elgon Road, Upper Hill, Nairobi)***
KRA/HQS/NCB-012/2020-2021 *in conformity with the said tender documents for the sum of .....*

.....

.... (total tender amount in words and figures)

or such other sums as may be ascertained in accordance with the Schedule of Prices attached herewith and made part of this Tender.

2. We undertake, if our Tender is accepted carry out the works in accordance with the work plan specified in the Schedule of Requirements.

3. If our Tender is accepted, we will obtain the guarantee of a bank in a sum of equivalent to ***10%*** *percent of the Contract Price for the due performance of the Contract , in the form prescribed by Kenya Revenue Authority*

4. We agree to abide by this Tender for a period of ***335 days*** *from the date fixed for tender opening of the Instructions to tenderers, and it shall remain binding upon us and may be accepted at any time before the expiration of that period.*

5. This Tender, together with your written acceptance thereof and your notification of award, shall constitute a Contract, between us. Subject to signing of the Contract by the parties.

6. We understand that you are not bound to accept the lowest or any tender you may receive.

Dated this _____ *day of* _____ *20* _____

_____ _____
[signature] *[in the capacity of]*

Duly authorized to sign tender for an on behalf of _____

LETTER OF ACCEPTANCE

(Date)

To: (*Name of Contractor)*

(*Address of the Contractor)*

Dear Sir,

This is to notify you that your Tender dated for the execution of **Provision of General Electrical Systems, Security and Alarm Systems, Fire Detection Systems and Communications Networks Installation at Ushuru Pension Tower (UPT) Building, Elgon Road, Upper Hill, Nairobi** for the execution of (*name of the Contract and identification number, as given in the Tender Documents)* for the Contract Price of Kshs. (*amount in figures)* Kenya Shillings (*amount in Words)* in accordance with the Instructions to Tenderers is hereby accepted.

You are hereby instructed to proceed with the execution of the said Works in accordance with the Contract documents:

Authorized Signature:

Name and Title of Signatory:

Attachment : Agreement

FORM OF AGREEMENT

THIS AGREEMENT, made the day of 20 between of **Kenya Revenue Authority** of (or whose office is situated at) **Ushuru Pension Tower (UPT) Building, Elgon Road, Upper Hill, Nairobi** (herein after called "the Employer") of the one part AND
of (or whose registered office is situated at)
(hereinafter called "the Contractor") of the other part.

WHEREAS THE Employer is desirous that the Contractor executes **Provision of General Electrical Systems, Security and Alarm Systems, Fire Detection Systems and Communications Networks Installation at Ushuru Pension Tower (UPT) Building, Elgon Road, Upper Hill, Nairobi** and the Employer has accepted the tender submitted by the Contractor for the execution and completion of such works and the remedying of any defects therein for the Contract Price of Ksh.
(*Amount in figures)* Kenya Shillings
(*Amount in words)*

NOW THIS AGREEMENT WITNESSETH as follows:

1. In this Agreement, words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Contract hereinafter referred to.

2. The following documents shall be deemed to form and shall be read and construed as part of this Agreement i.e.

   (i) Letter of Acceptance

   (ii) Form of Tender

   (iii) Conditions of Contract Part I

   (iv) Conditions of Contract Part II and Appendix to Conditions of Contract

   (v) Specifications

   (vi) Drawings

   (vii) Priced Bills of Quantities

3. In consideration of the payments to be made by the Employer to the Contractor as hereinafter mentioned, the Contractor hereby covenants with the Employer to execute and complete the Works and remedy any defects therein in conformity in all respects with the provisions of the Contract.

4. The Employer hereby covenants to pay the Contractor in consideration of the execution and completion of the Works and the remedying of defects therein, the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

IN WITNESS whereof the parties thereto have caused this Agreement to be executed the day and year first before written.

The common Seal of: _____

Was hereunto affixed in the presence of: Signed _____

Sealed, and Delivered by the said: Binding _____

Signature of Employer: _____

Binding Signature of Contractor: _____

In the presence of (i) Name: Address: _____

Signature: _____

(ii) Name: _____

Address: _____

Signature: _____

FORM OF TENDER SECURITY

WHEREAS (hereinafter called "the Tenderer") has submitted his tender dated for the construction of

(*Name of Contract)*

KNOW ALL PEOPLE by these presents that WE having our registered office at (hereinafter called "the Bank"), are bound unto **Kenya Revenue Authority** (hereinafter called "the Employer") in the sum of Kshs. for which payment well and truly to be made to the said Employer, the Bank binds itself, its successors and assigns by these presents sealed with the Common Seal of the said Bank this Day of 20

THE CONDITIONS of this obligation are:

1. If after tender opening the tenderer withdraws his tender during the period of tender validity specified in the instructions to tenderers

   Or

2. If the tenderer, having been notified of the acceptance of his tender by the Employer during the period of tender validity:

   (a) fails or refuses to execute the form of Agreement in accordance with the Instructions to Tenderers, if required; or
   (b) fails or refuses to furnish the Performance Security, in accordance with the Instructions to Tenderers;

   We undertake to pay to the Employer up to the above amount upon receipt of his first written demand, without the Employer having to substantiate his demand, provided that in his demand the Employer will note that the amount claimed by him is due to him, owing to the occurrence of one or both of the two conditions, specifying the occurred condition or conditions.

   This guarantee will remain in force up to and including thirty (30) days after the period of tender validity, and any demand in respect thereof should reach the Bank not later than the said date.

.....	.....
(*Date)*	*(Signature of the Bank)*
.....	.....
(*witness)*	*(Seal)*

(Date)

PERFORMANCE BANK GUARANTEE -

To: Kenya Revenue
Authority P.O. Box 48240
- 00100
Nairobi, Kenya

Dear Sir,

WHEREAS (hereinafter called "the Contractor") has undertaken, in pursuance of Contract No. **Provision of General Electrical Systems, Security and Alarm Systems, Fire Detection Systems and Communications Networks Installation at Ushuru Pension Tower (UPT) Building, Elgon Road, Upper Hill, Nairobi** (hereinafter callef "the Works);

AND WHEREAS it has been stipulated by you in the said Contract that the Contractor shall furnish you with a Bank Guarantee by a recognised bank for the sum specified therein as security for compliance with his obligations in accordance with the Contract;

AND WHEREAS we have agreed to give the Contractor such a Bank Guarantee:

NOW THEREFORE we hereby affirm that we are the Guarantor and responsible to you, on behalf of the Contractor, up to a total of Kshs. *(amount of Guarantee in figures)* Kenya Shillings *(amount in Guarantee in words)* and we undertake to pay you, upon your first written demand and without cavil or argument, any sum or sums within the limits of Kenya Shillings *(amount of Guarantee in words)* as aforesaid without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the Contractor before presenting us with the demand.

We further agree that no change, addition or other modification of the terms of the Contract or of the Works to be performed thereunder or of any of the Contract documents which may be made between you and the Contractor shall in any way release us from any liability under this Guarantee, and we hereby waive notice of any change, addition, or modification.

This guarantee shall be valid until the date of issue of the Certificate of Completion.

SIGNATURE AND SEAL OF THE GUARANTOR: -

Name of Bank: _____

Address: _____
_____

Date:

BANK GUARANTEE FOR ADVANCE PAYMENT

(Date)

To: Kenya Revenue
Authority P.O. Box 48240
- 00100
Nairobi, Kenya

Gentlemen,

Ref: **Provision of General Electrical Systems, Security and Alarm Systems, Fire Detection Systems and Communications Networks Installation at Ushuru Pension Tower (UPT) Building, Elgon Road, Upper Hill, Nairobi**

In accordance with the provisions of the Conditions of Contract of the above-mentioned Contract, We
*(name and address of the Contractor) (*hereinafter called "the Contractor") shall deposit with **Kenya Revenue Authority** a bank guarantee to guarantee his proper and faithful performance under the said Contract in an amount of Kshs.
(*amount of Guarantee in figurers)* Kenya Shillings
(amount of guarantee in words).

We, [*bank or financial institution*], as instructed by the Contractor, agree unconditionally and irrevocably to guarantee as primary obligator and not as Surety merely, the payment to **Kenya Revenue Authority** on his first demand without whatsoever right of objection on our part and without his first claim to the Contractor, in the amount not exceeding Kshs.
[*amount of Guarantee in figures*] Kenya Shillings
[*amount of Guarantee in words*], such amount to be reduced periodically by the amounts recovered by you from the proceeds of the Contract.

We further agree that no change or addition to or other modification of the terms of the Contract or of the Works to be performed thereunder or of any of the Contract documents which may be made between **Kenya Revenue Authority** and the Contractor, shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modification.

No drawing may be made by you under this guarantee until we have received notice in writing from you that an advance payment of the amount listed above has been paid to the Contractor pursuant to the Contract.

This guarantee shall remain valid and in full effect from the date of the advance payment under the Contract until **Kenya Revenue Authority** receives full payment of the same amount from the Contract.

Yours faithfully,

Signature and Seal:

Name of the Bank or financial institution:

Address:

Date:

QUALIFICATION INFORMATION

1. Individual Tenderers or Individual Members of Joint Ventures

1.1 Constitution or legal status of tenderer (attach copy or Incorporation Certificate);

Place of registration: _____

Principal place of business: _____

Power of attorney of signatory of tender: _

1.2 Total annual volume of construction work performed in the last five years

Year	Volume	
	Currency	Value

1.3 Work performed as Main Contractor on works of a similar nature and volume over the last five years. Also list details of work under way or committed, including expected completion date.

Project Name	Name of Client and Contact Person	Type of work performed and year of	Value of Contract

1.4 Major items of Contractor's Equipment proposed for carrying out the Works. List all information requested below.

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?)

1.5 Qualifications and experience of key personnel proposed for administration and execution of the Contract. Attach biographical data.

Position	Name	Years of experience (general)	Years of experience in proposed position

1.6 Financial reports for the last five years: balance sheets, profit and loss statements, auditor's reports, etc. List below and attach copies.

_____

_____

1.7 Evidence of access to financial resources to meet the qualification requirements: cash in hand, lines of credit, etc. List below and attach copies of supportive documents.

_____

_____

1.8 Name, address and telephone, telex and facsimile numbers of banks that may provide reference if contacted by the Employer.

_____

1.9 Statement of compliance with the requirements of Clause 1.2 of the Instructions to Tenderers.

1.10 Proposed program (work method and schedule) for the whole of the Works.

2 Joint Ventures

2.1 The information listed in 1.1 – 1.10 above shall be provided for each partner of the joint venture.

2.2 The information required in 1.11 above shall be provided for the joint venture.

2.3 Attach the power of attorney of the signatory(ies) of the tender authorizing signature of the tender on behalf of the joint venture

2.4 Attach the Agreement among all partners of the joint venture (and which is legally binding on all partners), which shows that:

a) all partners shall be jointly and severally liable for the execution of the Contract in accordance with the Contract terms;

b) one of the partners will be nominated as being in charge, authorized to incur liabilities and receive instructions for and on behalf of any and all partners of the joint venture; and

c) the execution of the entire Contract, including payment, shall be done exclusively with the partner in charge.

TENDER QUESTIONNAIRE

1. Full names of tenderer

   .....

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

   .....

3. Telephone number(s) of tenderer

   .....

4. Telex address of tenderer

   .....

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

   .....

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

   .....

.....
Signature of Tender

CONFIDENTIAL BUSINESS QUESTIONNAIRE FORM

You are requested to give the particulars indicated in Part 1; either Part 2(a), 2(b) or 2 (c) whichever applied to your type of business; and Part 3.

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

	Part 1 – General
1.1	*Business Name* ....
1.2	*Location of Business Premises.* .....
1.3	*Plot No.....* *Street/Road* ..... *Postal Address* ..... *Tel No.* ..... *Fax* ..... *Email* .....
1.4	*Nature of Business ,*..... .....
1.5	*Registration Certificate No.* .....
1.6	*Maximum Value of Business which you can handle at any one time – Kshs.* .....
1.7	*Name of your Bankers* ..... *Branch* .....
	Part 2 (a) – Sole Proprietor
2a.1	*Your Name in Full* ..... *Age* .....
2a.2	*Nationality* ..... *Country of Origin* ..... *Citizenship Details* .....
	Part 2 (b) Partnership
2b.1	*Given details of Partners as follows:*

2b.2 *Name* *Nationality* *Citizenship Details* *Shares*

1.....
.....
2.....
.....
3.....
.....
4.....
.....

Part 2 (c) – Registered Company
2c.1 *Private or Public* *.....* *.....* 2c.2 *State the Nominal and Issued Capital of Company-* *Nominal Kshs. .....* *Issued Kshs. .....* 2c.3 *Given details of all Directors as follows* *Name* *Nationality* *Citizenship Details* *Shares* *1.....* *.....* *2.* *.....* *.....* *3.* *.....* *.....* *4.* *.....* *.....* *5* *.....* *.....*
Part 3 – Eligibility Status
3.1 *Are you related to an Employee, Committee Member or Board Member of Kenya Revenue Authority? Yes _____ No_____* 3.2 If answer in '3.1' is YES give the relationship. *.....* *.....* *.....* *.....*

3.3 *Does an Employee, Committee Member, Board Member of Kenya Revenue Authority sit in the Board of Directors or Management of your Organization, Subsidiaries or Joint Ventures? Yes_____ No _____*

3.4 *If answer in '3.3' above is YES give details.*

.....
.....
.....
.....
.....
.....

3.5 *Has your Organization, Subsidiary Joint Venture or Sub-contractor been involved in the past directly or indirectly with a firm or any of its affiliates that have been engaged by Kenya Revenue Authority to provide consulting services for preparation of design, specifications and other documents to be used for procurement of the goods under this invitation? Yes_____ No_____*

3.6 *If answer in '3.5' above is YES give details.*

.....
.....
.....
.....
.....
.....

3.7 *Are you under a declaration of ineligibility for corrupt and fraudulent practices? YES_____ No____*

3.8 *If answer in '3.7' above is YES give details:*

.....
.....
.....
..
.....
.....
.....

3.9 *Have you offered or given anything of value to influence the procurement process? Yes _____No_____*

3.10 If answer in '3.9' above is YES give details

.....
.....
.....
.....
.....
.....

I DECLARE that the information given on this form is correct to the best of my
knowledge and belief.

Date ..... Signature of Candidate
.....

- *If a Kenya Citizen, indicate under "Citizenship Details" whether by Birth, Naturalization or registration*

STATEMENT OF FOREIGN CURRENCY REQUIREMENTS

(See Clause 23] of the Conditions of Contract)

In the event of our Tender for the execution of **Provision of General Electrical Systems, Security and Alarm Systems, Fire Detection Systems and Communications Networks Installation at Ushuru Pension Tower (UPT) Building, Elgon Road, Upper Hill, Nairobi**
being accepted, we would require in accordance with Clause 21 of the Conditions of Contract, which is attached hereto, the following percentage:

(Figures) (Words)

of the Contract Sum, (Less Fluctuations) to be paid in foreign currency.

Currency in which foreign exchange element is required:

Date: The Day of 20

Enter 0% (zero percent) if no payment will be made in foreign currency.

Maximum foreign currency requirement shall be (percent) of the Contract Sum, less Fluctuations.
(percent) of

.....
(Signature of Tenderer)

DETAILS OF SUB-CONTRACTORS

If the Tenderer wishes to sublet any portion of the Works under any heading, he must give below details of the sub-contractors he intends to employ for each portion.

Failure to comply with this requirement may invalidate the tender.

(1) Portion of works to be sublet: .....

(i) Full name of Sub-contractor
And address of head office: .....

(ii) Sub-contractor's experience of similar works carried out in the last 3 years with Contract value:

.....

.....

.....

(2) Portion of works to be sublet: .....

(i) Full name of Sub-contractor
And address of head office: .....

(ii) Sub-contractor's experience of similar works carried out in the last 3 years with Contract value:

.....

.....

.....

....
(Signature of Tenderer) (Date)

LETTER OF NOTIFICATION OF AWARD

Kenya Revenue Authority
P.O. Box 48240 - 00100
Nairobi, Kenya

To: -

RE: Tender No.: **KRA/HQS/NCB-012/2020-2021**

Tender Name: **Provision of General Electrical Systems, Security and Alarm Systems, Fire Detection Systems and Communications Networks Installation at Ushuru Pension Tower (UPT) Building, Elgon Road, Upper Hill, Nairobi**

This is to notify that the contract/s stated below under the above mentioned tender have been awarded to you.

.....

.....

1. Please acknowledge receipt of this letter of notification signifying your acceptance.
2. The contract/contracts shall be signed by the parties within 30 days of the date of this letter but not earlier than 14 days from the date of the letter.
3. You may contact the officer(s) whose particulars appear below on the subject matter of this letter of notification of award.

   (FULL PARTICULARS

   .....

   .....

..... SIGNED
FOR ACCOUNTING OFFICER

Standard Forms Standard

REPUBLIC OF KENYA
PUBLIC PROCUREMENT ADMINISTRATIVE REVIEW BOARD

APPLICATION NO OF 20

BETWEEN

APPLICANT

AND

Kenya Revenue Authority

Request for review of the decision of the **Kenya Revenue Authority** of dated the day of 20 in the matter of Tender No. **KRA/HQS/NCB-012/2020-2021** of 20

REQUEST FOR REVIEW

I/We , the above named Applicant(s), of address: Physical address

Fax No. Tel. No. Email , hereby request the Public Procurement Administrative Review Board to review the whole/part of the above mentioned decision on the following grounds, namely:-

1. _____

2. _____

etc.

By this memorandum, the Applicant requests the Board for an order/orders that: -

1. _____

2. _____

etc.

SIGNED (Applicant)

Dated on day of / 20

FOR OFFICIAL USE ONLY

Lodged with the Secretary Public Procurement Administrative Review Board on day of 20

..... SIGNED

Board Secretary

ANTI-CORRUPTION DECLARATION COMMENT/PLEDGE

(Section 62, 65 and 66 of the PPAD Act, 2015)

I/We/Messrs ..... of Street, Buildinng, P.O. Box

.....

Contact/Phone/Email .....

Declare the Public Procurement is based on a free and fair competitive tendering process which should not be open to abuse

I/We ..... declare that
I/We will not offer or facilitate, directly or indirectly, any inducement or reward to any public officer, the relations or business associates, in connection with Tender/Tender No. **Provision of General Electrical Systems, Security and Alarm Systems, Fire Detection Systems and Communications Networks Installation at Ushuru Pension Tower (UPT) Building, Elgon Road, Upper Hill, Nairobi**
(KRA/HQS/NCB-012/2020-2021 for or in the subsequent performance of the contract if I/we am/are successful.

Authorized Signature: .....

Name and Title of Signatory: .....

NON-DEBARMENT STATEMENT FORM

I/We/Messrs ..... of Street/Avenue,

..... Buildinng, P.O. Box ..... Code ....., of ..... (Town), ...

(Nationality), Phone ..... E-mail ..... declare that I/we/messrs ..... are not debarred from participating in public procurement by the Public Procurement Oversight Authority pursuant to section 115 of the Public Procurement and Disposal Act, 2005.

Dated this ..... day of 20.....

Authorized Signature: .....

Official Stamp: .....

Name and Title of Signatory: .....

SITE VISIT FORM

CONFIRMATION OF PRE-BID SITE VISIT

Name of Tenderer: _

Tender Detail : **Provision of General Electrical Systems, Security and Alarm Systems, Fire Detection Systems & Communications Networks Installations at Ushuru Pension Tower**

Date of Visit: _

Name, position and signature of Tenderer's staff visiting the site.

Name: _____

Position: _____

Signature: Tenderer's Official Stamp: _

Site Visit conducted by **Kenya Revenue Authority** Officer's:

Name: _____

Designation: _

Signature: _____

SECTION 9: 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. 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.

3. The bidders shall attach technical specifications of items to be supplied

TECHNICAL SCHEDULE OF ITEMS TO BE SUPPLIED

(To be completed by the Tenderer and technical specification and data sheet to be attached)

ITEM	DESCRIPTION	BRAND NAME	MODEL	COUNTRY OF ORIGIN
1	Lighting Fittings			
2	Lighting Switches			
3	Socket Outlets			
4	Distribution Panels			
5	MCB			
6	Electrical Cables			
7	UPS 60kVA			
8	UPS 11kVA			
9	Security Controller			
10	Access Control Readers			
11	Access Control Master Controller			
12	Access Control Server			
13	Access Control Software			
14	CCTV Cameras			
15	CCTV NVR			
16	CCTV Monitor			
17	Network Switches			
18	Intruder Keypad			
19	LAN Cabinets			
20	CAT 6A Cables			
21	Fibre Cables			
22	CAT 6A Patch Panel			
23	Fire Alarm Devices			

SECTION 10: SCHEDULE OF UNIT RATES

SCHEDULE OF UNIT RATES

NO.	DESCRIPTION	UNIT RATE (KSHS)
1.	Light Fittings a) 600x600 mm Ceiling Recessed LED Panel b) Ditto but with Emergency kit c) 600x600 mm Ceiling Recessed LED Panel, Dimmable d) Ditto but with Emergency kit	
2.	PVC/SWA/PVC Copper cables per metre a) 4 core 10 mm^2	
3.	Manual Bypass Switches a) 30A TP	
4.	Distribution Boards a) 8 Ways 125A TPN, Recessed	
5.	500V white moulded socket plates a) 13A twin standard switched. b) 13A single standard switched c) 13A twin non-standard switched complete with 3 pin plugs	
6.	UPS a) 60KVA (Three Phase Output) b) 11KVA (Three Phase Output)	
7.	Data & Structured Cabling a) Outlet points b) Single face plate c) Dual face plate d) 24 Port CAT 6A Patch panel e) 42U LAN Cabinet	
8.	Fire Alarm a) Outlet points b) Smoke Detectors c) Heat Detector d) Addressable Fire Alarm Panel e) Repeater Panel	
9.	Security a) Access Control Data Gathering Panel b) Power Supply unit & Panel box c) Magnetic lock for frameless glass door d) Break glass e) Biometric card reader f) CCTV Cameras g) Network Video Recorder h) LED Monitor i) PIR (wall mounted) j) PIR (ceiling mounted) k) Security Keypad l) Plug-in 8 zone expander card m) Zones data gathering panel input expander	

SECTION 11: GENERAL AND PARTICULAR SPECIFICATION OF MATERIALS AND WORKS

SPECIFICATIONS FOR ELECTRICAL INSTALLATIONS

TABLE OF CONTENTS

1.1 Definitions

"Work" or "Works" used in this section of the Specification shall mean all the work required to be carried out in connection with the electrical installations as specified herein and shown on the drawings.

"Sub-contractor" shall be synonymous as far as the carrying out of the electrical works are concerned, and shall include either the sub-contractor, his own approved domestic sub-contractor, or a Nominated Sub-contractor, as appropriate. However final responsibility to the Engineer and the Owner will be the sub-contractor as defined on page 1/3 of this document.

The Engineer reserves the right to appoint a person or firm who will be vested with the authority of the Engineer in respect of the quality and sufficiency of materials and workmanship and other general requirements, but not in respect of variations or other matters which in any way affect the sub-contract Sum. Such appointment will not be a person to whom the sub-contractor shall object for reasons considered to be sufficient by an Arbitrator appointed under Clause 36 of the Conditions of sub-contract.

1.2 Work by approved person or firm

The whole of the electrical installations shall be carried out by a person or firm who is registered with the Ministry of Energy under an appropriate class of registration and shall be authorized to issue a Commencement of Work Notice and a Completion Certificate once the installation work has been completed. He must be conversant with the latest statutory requirements of the Kenya Power & Lighting Co. Ltd. to ensure that only the installation practice acceptable to them is followed.

Such person or firm shall constantly keep on the Site a literate Agent or Representative competent and experienced in the kind of work involved, who shall give his whole time to the superintendence of the electrical works. Such Agent or Representative shall receive on behalf of the person or firm, directions and instructions from the sub-contractor or Engineer and such directions and instructions shall be deemed to be given to them in accordance with the Conditions of sub-contract.

The Works shall be executed under the direction and to the entire satisfaction in all respects of the sub-contractor and Engineer who shall at all times during normal working hours have access to the works and to the yards and workshops of the person or firm carrying out these installations and subsidiary sub-contractors or other places where work is being prepared for the Works.

1.3 Scope of the works

It will be deemed that the sub-contractor has allowed for everything for the proper and satisfactory execution and completion of the works according to the true intent and meaning of the drawings and the Specification taken together, and to the approval of the Engineer.

It will be deemed that the sub-contractor, prior to submitting his tender for the works has obtained all particulars, information, explanations and clarifications from all appropriate sources, including the Engineer, necessary for the complete and correct preparation of that tender. Any claim based upon want of knowledge in any respect will not be entertained.

1.4 Drawings

The drawings used in the preparation of these Bills of Quantities are scheduled on the relevant Section hereof and are deemed to be Sub-Contract Drawings.

1.5 Standard of materials

Where material and equipment is specifically described and named in the Specification, it is so named or described for the purpose of establishing a standard of materials and workmanship to which the sub-contractor shall adhere. Alternatives may be supplied or used provided they are equal or superior to those specified. The sub-contractor shall submit, with his bid, a list indicating the manufacturer and place of origin of the various items of equipment that he proposes to supply. Should the sub-contractor install the material or carry out the method in question before receiving approval from the proper authorities, the Engineer shall direct the 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 are to be removed from the works and suitable materials shall be installed in their place at the expense of the sub-contractor.

1.6 Procurement of materials

The sub-contractor is advised that no assistance can be given in the procurement of materials to be used in the work. The sub-contractor may be called upon to show evidence that satisfactory arrangements have been made for the procurement of any materials required to complete the Works. Copies of purchase orders to suppliers may be requested.

The sub-contractor shall be responsible for all site and/or drawing measurements required for completion of quantities of materials required for the proper execution of the Works.

No claims for extra payment will be considered on the grounds of insufficient knowledge, or other errors on the part of the sub-contractor.

1.7 Low Voltage Switchboard

The sub-contractor must assure that switchgear can withstand the system fault level at the place of installation.

The switchgear shall be designed throughout to secure safety during operation, inspection, cleaning and maintenance and shall be so arranged as to minimize the risk of fire arising or spreading.

The switchboards shall be manufactured in accordance with BS EN 6097, which co-ordinates the requirements for electrical power switchgear and associated apparatus. It is not intended that this B.S. should cover the requirements for specific apparatus for which separate British Standards exist. All equipment and material used in the switchboard shall be in accordance with the appropriate B.S.

(i) Construction

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

Switchboards shall be of the flush fronted, enclosed, metal clad type with full front or rear access, suitable for indoor use, sectionalized as necessary to facilitate transport and erection. The maximum height shall 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.

All bus-bars and bus-bar connections shall consist of high conductivity copper and be provided in accordance with BS EN 5486. The bus-bars shall be clearly marked L1, L2, and L3 for the phases and N for the neutral. The bus-bars shall be so arranged in the switchboard that extensions to the left and right may be made in the future should the need arise.

Small wiring, which will be neatly arranged and cleared, shall be colored according to the phase or neutral connection.

(ii) Switches and fuse switches

These shall be in strict accordance with BS EN 6097-2 switches. Means of locking the switches in the "OFF" position shall be provided.

All fuse switches shall comply with B.S. 1361 and shall have a fault rating at least equal to the fault rating of the switchboard in which they are installed. Cartridge fuse links to B.S. 88 category AC 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 tier formation all necessary horizontal and vertical barriers shall be provided to ensure segregation from adjacent units. Means of locking the switches in the "OFF" position shall be provided.

(iii) Earth bar

A hard drawn high conductivity copper earthing bar shall be provided for the full length of the board and all fuse switch units and circuit breakers shall be bonded to this bar.

1.8 <u>Distribution boards</u>

Where the requirement for fuses is indicated on the drawing the distribution boards shall be fitted with high quality fuse carriers and bases, removable insulated shields to provide adequate protection against accidental contact with live metal, and circuit indicating labels fixed inside the cover.

Where the requirement for miniature circuit breakers is indicated on the drawings, the distribution boards shall be fitted with moulded thermoplastic units of the combined thermal overload and magnetic short circuit tripping type to BS EN 60898:1991 having clearly marked "ON" and "OFF" positions. MCB's of all ratings shall have a minimum short circuit current breaking capacity of 3,000 A for single pole breakers and 4,000 A for triple pole breakers.

Bus-bars shall be rated as the nominated current for the main isolator in their entire length.

A complete list of circuit details on typed cartridge paper glued to stiff cardboard 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 M.C.B. rating 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 circuit shown on the circuit chart.

1.9 Steel conduits

Conduits shall be heavy gauge Class B welded to B.S. 31. In no case will conduits smaller than 20 mm diameter be used in the works. Conduits installed within buildings shall be bake enameled finish except where specified otherwise. Where installed externally or in damp conditions they shall be galvanized. Conduit fittings, accessories or equipment used in conjunction with galvanized conduits shall also be galvanized or otherwise as approved by the Engineer.

1.10 Non metallic conduits

Conduit shall be best quality new super high impact grade heavy gauge Class 'A' rigid PVC unplastic conduit as manufactured by Metro Plastic Ltd. to B.S. 4607: Part 2: suitable for plain connections or as specified.

1.11 **Cable trays**

Cable trays shall be fabricated from perforated mild steel tray of minimum 14 SWG with returned flanges and coupling pieces for rigidity and strength.

Unless otherwise stated in the specification or shown on the drawings the cable tray shall be painted grey enamel for indoor use and shall be hot dipped galvanized for outdoor use.

1.12 Sheet steel cable trunking

Trunking shall be minimum 18 gauge zinc coated steel, enameled to approved color, to the sizes shown on the drawings.

1.13 Cables and flexible cords

All cables used in the sub-contract shall be manufactured in accordance with the current appropriate British Standards Specifications which are as follows:-

Rubber insulated cables and flexible cords	-	B.S.S 6500
P.V.C. insulated cables and flexible cords		-B.S.S 6004
P.V.C. insulated armoured cables	-	B.S.S 6346

Butyl rubber insulated cables - B.S.S 6101v

The sub-contractor will, at the Engineer's discretion, be required to submit samples of cables for his approval; he reserves the right to call for cables of an alternative manufacture without any extra cost being incurred.

P.V.C. insulated cables shall be 500/1000 volts grade. No cable smaller than 1.5 sq. mm (3/.029) shall be used unless otherwise specified.

1.14 Armoured P.V.C. insulated and sheathed cables

Shall be 11,000-600/1000 volts grade manufactured to B.S. 6346 with copper stranded conductors.

The cable cores shall be identified in accordance with the current edition of B.S. 6346.

PVC insulated, aluminium strip armoured and PVC sheathed multi core cables shall have solid aluminium conductors and shall be 11,000-600/1000 volt grade, manufactured in accordance with B.S. 6346.

1.15 Lighting switches

(a) Wall Switches: Shall be flush type contained in steel or pvc boxes of the ratings and gangs appropriate; complete with overlapping white cover plates and switch dollies. They shall be to B.S. 3676.

(b) Ceiling Switches: Shall be of semi-recessed pattern, white, for fixing to a standard conduit box, or surface pattern to B.S. 3676.

(c) Surface Wall Switches: Shall be contained in a steel box with steel cover plate, with rating and gangs as specified on the drawings and to BS 3676

1.16 **Sockets and switched sockets**

Shall be 13 amp, flush pattern in pvc box complete with overlapping ivory or BMA or brass finish coverplates.

They shall be 13 amp, 3 pin, shuttered, switched or unswitched as specified on the drawings to B.S. 1363. All sockets or switch-sockets shall be with fused plug top containing a fuse whose rating shall be suitable for the load connected to it. The plug top shall be to B.S. 1363.

Surface type sockets or switch sockets shall be in a steel box with metal- clad steel cover plates or ivory insulated with ivory mounting block and back plate and to B.S. 1363.

Shall be flush, D P switched or unswitched in a PVC box with ivory or BMA or matt chrome over-lapping cover-plate with or without pilot light to B.S. 3676

Surface fused spur boxes shall be in a steel box, D P switched or unswitched with metalclad steel cover plates to B.S. 3676.

1.17 Telephone outlets

These shall consist of 100 x 100 x 50 mm deep steel box with single or double outlet telephone cord-outlet plate and white.

1.18 Time switches

These shall be 30 amp, A C 200/250 volts 50 C/S with 9 hours spring reserve.

1.19 Clock connectors

Shall be fused 2 amps, S P with earthing facilities, flush, ivory or matt chrome either square pattern flush to fit on standard switch box or round pattern to fit on standard conduit box.

1.20 Watertight sockets

Shall be of rating 5 amp, or 15 amp, single pole and neutral with earth or three pole and neutral with earth, IP54 protection and to IEC 669-1

1.21 Fireman's switches

Shall be 15 amps, or 30 amps, DP as specified on the drawings and having cast iron weatherproof enclosures, finished red and complying with IEE Regulations.

1.22 Connectors

Shall be of the porcelain normal size 2 brass screws type of appropriate rating. These shall be fitted at all conduit box lighting point outlets for jointing of looped P.V.C. cables with flexible cables.

1.23 Lamp holders

Shall be of the extra heavy H.O. skirted pattern 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 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 lamp holders 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 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.

1.24 Amps

All lamps shall be suitable for normal stated supply voltage and the number and sizes of lamps detailed in 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 B.S. 161, B.S. 4533. Tubular fluorescent lamps shall comply with BSEN 60081.Tabular fluorescent lamps shall be T8/26mm with electronic control gear.

WORKMANSHIP

1.25 Workmanship generally

The workmanship and method of installation shall conform to the best standard practice. All work shall be performed by skilled tradesmen 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.

1.26 Installations liaison

The sub-contractor shall liaise with the Engineer in planning the works before work is commenced. Particular care shall be taken by the sub-contractor to ensure there is close liaison with other sub-contractors in installing services, to prevent clashing of service positions, etc. Any work which has to be re-done due to negligence in this respect shall be the sub- contractor's responsibility.

1.27 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 Engineer.

1.28 Working drawings

The sub-contractor shall prepare such working drawings as may be necessary, which shall be complete in such detail not only that the 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 works.

If the sub-contractor requires any further instructions, details, contract drawings or information drawings to enable him to prepare his working drawings or proposals, he shall apply in writing to the Engineer for such information at a time which is neither unreasonable distant from nor unreasonably close to the date when it is needed.

All working drawings shall be submitted to the Engineer for approval. If not so submitted the sub-contractor shall accept at his own cost, the risk that any work commenced or which he intends to commence on site, may be rejected.

The Engineer, in giving his approval to the working drawings, will presume that any necessary action has been, or shall be, taken by the sub-contractor to ensure that the Installations shown thereof have been cleared with any other person or bodies whose Installations and works might be affected.

Should he fail in this respect then he shall be liable to pay for any alteration or modification to his own, or other person or body's Installations which are incurred, notwithstanding any technical or other approval which the sub-contractor's working drawings may have received from the Engineer.

Working drawings to be prepared by the sub-contractor shall include but shall not be restricted to the following:-

(a) Any drawings required by the sub-contractor or the Engineer to enable structural provision to be made including builders work drawings or schedules and those for detailing of holes, chases, fixings, foundations, cables and pipework ducting whether below or above ground or in or outside or below buildings.

(b) General and layout arrangement drawings of all plant, control boards, fittings and apparatus or any part thereof.

(c) Schematic layout drawings of services and of control equipment.

(d) Layout drawings of all embedded and non-embedded pipework, ducts, and electrical conduits.

(e) Complete circuit drawings of the equipment together with associated circuit descriptions.

(f) Such other drawings as are called for in the text of the Specification or as the Engineer may reasonable require.

Three copies of all working drawings shall be submitted to the Engineer for approval. One copy will be returned to the Contractor indicating approval or any amendments that may be required.

Approved working drawings shall not be departed from except as may be approved or directed by the Engineer.

Approval by the Engineer of working drawings shall neither relieve the sub-contractor of any of his obligations under the contract nor relieve him from correcting any errors found subsequently in the approved working drawings or other working drawings and in the works on site or elsewhere associated therewith.

The sub-contractor shall ensure that his working drawings are submitted to the Engineer for approval at a time not unreasonably close to the date when such approval is required. Late submission will not relieve him of his obligation to complete the Works within the agreed contract period and in a manner that would receive the approval of the Engineer.

1.29 <u>Shop drawings</u>

Before manufacture of any item is begun the sub-contractor shall submit three copies of detailed drawings of all pieces of equipment including sizes, capacities, construction details, etc. and as may be required to determine the suitability of the equipment for the approval of the Engineer. Approval 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 drawings and Specification.

1.30 Setting out works

The sub-contractor is to set out the works and take all measurements and dimensions required for the erection of his materials on site, making any modifications in detail 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 sketches or drawings related thereto.

1.31 Positions and sizes of services, plant, equipment, fittings and apparatus

The contract drawings give a general indication of the intended layout. The positions of the equipment and appliances, and also the exact routes of the ducts, mains and distribution pipework shall be confirmed before installation is commenced. The exact siting of appliances, pipework etc. may vary from that indicated.

The routes of services and positions of apparatus shall be determined by approved dimensional details on wiring drawings or on site by the sub-contractor in consultation with the Engineer.

Services through ducts shall be arranged to allow maximum access along the ducts and the services shall be readily accessible for maintenance. Any work which has to be re-done due to negligence in this respect shall be the sub-contractor's responsibility.

The sub-contractor shall be deemed to have allowed in the contract sum for locating terminal points of services (e.g. switches, socket outlets, lighting points, control switches, thermostats and other initiating devices) in position plus or minus 1.2 m horizontally and vertically from the locations shown on the contract drawings. Within these limits no variations in the contract sum will be made unless the work has already been executed in accordance with previously approved working drawings and with the approval of the Engineer.

1.32 Access to plant rooms

It shall be the responsibility of the sub-contractor to ensure that all equipment ordered in respect of this sub-contract is to be constructed in such a manner that it may, if necessary, be dismantled to enable it to pass to its final position.

1.33 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 Engineer with regard to ceiling panel layouts.

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.

1.34 Identification of plant and components

The sub-contractor shall supply and fix approved identification labels to all major components of plant, starters, switches and items of control equipment, with black Traffolyte or equal labels engraved in white lettering denoting its name, function and section controlled. The labels shall be mounted on equipment in the most convenient positions, care been taken to ensure the labels can be read without difficulty.

1.35 Nameplates

All apparatus shall have a nameplate showing the size, name of equipment, serial number and all other information usually provided in stamped, edged or engraved lettering to be perfectly legible to the satisfaction of the Engineer, bearing the name and address of the manufacturer Nameplates shall not be painted ove2.

Motors shall have serial number, voltage, cycle, phase and horsepower.

1.36 Main power supply

The sub-contractor will be required to liaise with the Kenya Power & Lighting Company Limited in order to determine the most appropriate and the most economical method of bringing in the service line cable.

The location of the H.T metering panel and main M.V. Switchboard is shown on the relevant drawing. The layout and the provision of ducts must be agreed with the Kenya Power & Lighting Co Ltd.

The supply voltage shall be 240 volts single phase, or 415 volts, 3 phase, 50 Hz and 11 kilovolts,3 phase,50Hz at the intake point. The sub-contractor shall allow for liaising with the K P & L to ensure that the supply is made available by the Company at the appropriate time and to suit the programme of construction work.

The sub-contractor will be required to give all notices, completion forms, etc., to K P & L to enable the installation to be tested upon completion and shall pay all fees arising from the testing or any subsequent re- testing of the installation.

1.37 Distribution boards

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 M.C.B's. This shall also apply to earth bars when installed.

1.38 Conduit installation generally

A separate conduit system is required for each installation, lighting, power, telephone, etc.

Surface conduit shall be run in square symmetrical lines and shall be fixed by means of spacer-bar saddles spaced at not more than 0.9 m (for 20 and 25 conduit) and 1.2 m for larger sizes, for steel conduits and 0.6 m for PVC conduits. Surface conduit shall also be fixed on both sides of all boxes at a distance not greater than 0.2 m, the box itself being securely fixed. Where such an arrangement of boxes and saddles would prove to be both unsightly and unnecessary, short lengths of conduit not exceeding 0.6 m in length between boxes need not be secured further than by connection to the adjacent boxes.

Concealed conduit run in chases in walls shall be fixed by means of mild steel pipe hooks or non-metallic saddles spaced not more than 0.9 m. Where conduit is concealed behind plaster it shall be chased to a depth of either 15 mm below finished plaster level, or installed flush with the structural wall level before application of plaster, whichever is the lesser depth.
Conduit cast-in-situ shall be frequently secured to steel reinforcement work with heavy binding wire to prevent movement of conduit and conduit boxes during pouring and vibrating of concrete.

Outlet boxes shall be filled with paper to prevent ingress of concrete, and all boxes shall be securely fixed to shuttering with nails, or by means which shall be visible as a marker on removal of shuttering only where these marks can be concealed. Conduit shall be installed after the first grid of steel reinforcement work is securely fixed and all open ends of conduit shall be protected by couplings plugged with a suitable non-metallic stopping plug. The number of right angle bends in conduit cast-in-situ shall not exceed two between boxes. Where straight runs of conduit are installed draw-in boxes shall be provided at distances not exceeding 25 metres and at places approved by the Engineer.

Immediately prior to installing the wiring all conduit and fittings shall be dried and cleaned out by drawing through a cloth swab. Rawplugs shall be used for fixing to aluminium section, rawlnuts, spring toggles, gravity toggles or rawlbolts shall be used for fixing to other materials as approved by the Engineer. Corners shall be turned by easy bends or sets made in accordance with the manufacturer's instructions without altering the section or splitting the conduit.

Conduits shall be installed in such a manner as to prevent interference with other services and shall be kept at least 225 mm clear of gas or water pipes, and heat in excess of 70^0 C. Where this is impossible or impractical, insulation, to the prior written approval of the Engineer, shall be used.

Where conduit runs enter specified areas requiring flameproof equipment, barrier boxes shall be inserted immediately before the conduit enters the flameproof area. All conduits installed within this area shall be solid drawn galvanised, as shall be conduit fittings and accessories and Buxton Certified as suitable for Group II hazards. Equipment shall comply with B.S. 229.

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.

All horizontal surface conduit runs shall be erected at near ceiling level, and for all surface work the boxes used shall be tangent entry types.

All Conduits shall be efficiently drained before wiring, and ventilated in suitable positions to offset the effects of condensation.

The conduit shall be of such sizes that the conductors shall be easily drawn in after all tube has been installed, and they shall be in accordance with the Capacity of Conduits Table contained in the current edition of the I.E.E. Regulations.

Special care shall be taken to prevent dirt and rubbish getting into the conduit work during erection, screwed metal caps or plugs only shall be used for protecting open ends. Plugs of waste wood, paper, etc., shall under no circumstances be used.

Any conduit boxes and other fittings used on external walls, and in other wet situations which may be described in later clauses, shall have machined flanges and lids and shall be fitted with gaskets to prevent ingress of moisture.

The crossing of expansion joints shall be made with flexible conduit connecting each end of the conduit, the whole sleeved with 50 mm diameter PVC conduit. Care shall be taken to ensure that the flexible conduit/ conduit connectors are correctly installed and will not become disconnected when expansion and contraction takes place.

1.39 Non-metallic conduits

Where ceiling boxes, including extension rings, are flush with the ceiling surface, break joint rings shall be provided to hide the joints.

Where a non-metallic outlet box of thermoplastic material is used for the fixing or suspension of a lighting fitting the box shall be fitted with steel insert clips.

All spare ways in junction boxes etc. left for possible future extension shall be fitted with stopping plugs.

The conduit shall be bent and formed strictly in accordance with the manufacturer's instructions. Small sizes i.e. 20 and 25 mm diameter shall be bent cold by inserting the correct size bending spring. It is essential for right angle bends that the conduit is bent past 90^0 C to allow for "spring back"

Larger sizes of conduit shall be pre-heated before inserting a rubber cord to prevent kinking. Conduit badly formed or bent, or damaged in any way, shall not be used.

Joints shall be made water-tight by the use of 'Egaweld' cement applied with a brush or rag. The cement shall be applied to the complete circumference of the conduit. Conduit shall be thoroughly cleaned at the ends to ensure a good adhesion to the fittings.

All conduit fittings and accessories including couplers, ordinary clips, saddle pipe hooks, reducers, stopping plugs, locknuts and male and female bushes shall be manufactured dimensionally, similar to B.S. 31 where applicable. Solid tees shall not be used. Solid or inspection elbows or bends or inspection tees shall be used only in exceptional circumstances and then only with the approval of the Engineer.

Where it eases the installation of cast-in-situ back entry boxes for the loop-in system, purpose

made bends manufactured by Egatube may be used. They shall comprise a tight bend with a push socket at one end and a threaded socket at the other.

A means of expansion shall be provided in conduit runs in excess of 10 m without any bend or set, by the use of expansion couplings, which shall also be used at building expansion joints.

Unless it is clearly specified or shown on the drawing, the method of installing conduit shall be subject to the approval of the Engineer.

Small standard circular non-metallic conduit boxes, conforming dimensionally with B.S. 31 to standard circular non-metallic lids and brass fixing screws, shall be provided and fixed at all junctions.

Where ceiling roses occur and the ceiling box is recessed below the finished level of the ceiling, suitable extension rings to accommodate the ceiling rose must be provided.

1.40 Flexible conduit and fittings

All flexible conduits for connection to motors or machinery shall be a minimum 0.5 m length of metallic W.T. type. All ends shall be sweated into conduit threaded brass sweating glands with Tinman's solder, no spirit being used. A separate earth wire 1/1.78 mm (7/029) (tinned) shall be wound rounded the flexible conduit and efficiently bonded to the rigid conduit and apparatus at each end.

The solid conduit shall terminate in a large BESA or adaptable box enclosing sufficient coils of motor cable to enable "Tong-Test" reading to be taken in each conducto2. Earth continuity shall be maintained by means of a copper conductor sized in accordance with BSEN 7671 subject to a minimum 1.5 sq. mm and have green insulation.

1.41 Telephone / Computer Conduits

The arrangements and size of telephone conduits is to be such as will accommodate the number of circuits as indicated on the drawings. Where conduits enter adaptable boxes each conduit is to be numbered to indicate the outlet point which it feeds. Unless otherwise stated on the drawings, conduits will terminate in standard metal boxes to B.S. 1363 with flush fitting cover plate. Draw wires of piano quality steel wire of not less than 22 swg are to be left in all telephone conduits. Draw-in boxes are required in telephone conduits on the same basis as laid down for power and lighting.

Telephone outlet boxes, draw-in boxes and the telephone distribution boxes are to be marked internally with yellow paint to distinguish them from boxes provided for other services.

1.42 Cable trays

Cable trays shall be appropriately fixed on robust and substantial brackets fixed into walls or shall be suspended on rods securely fixed to the structure together with a bracket arrangement as required to facilitate the support for the cable tray. Suspension rods shall be minimum 8 mm diameter mild steel. Brackets or suspension supports shall be provided as necessary, the spacing of which shall not exceed 2.0 m.

Where the cable tray changes direction the minimum radius of bends shall not be less than 300 mm on the inside of the bend and in no case shall be less than the bending radius of the cable supported.

All brackets, suspension rods and attachments shall be finished as the cable tray supported.

1.43 Sheet steel cable trunking

The sub-contractor shall provide cable trunking to the details and sizes stated on the drawings. It shall be utilised where two or more distribution panels are connected together and where several surface conduits would otherwise have to be run alongside each other. The Engineer must be consulted as to precise details concerning trunking routes and applications.

All necessary accessories including long sleeve couplings and pieces, bends, tees, reducers, Offices, fillets, pinracks, cable retainers, etc. shall be deemed to have been allowed for.

It shall have two adjacent fixings at 600 mm centres.

Where trunking passes through walls and floors the cover plate shall be fitted before installation and shall project at least 38 mm on either side of the finished wall surface.

Fire protection barriers shall be provided at each point where trunking runs pass through floors.

Vertical lines shall be fitted with pinracks to support cables at intervals not greater than 1,500 mm.

1.44 Sheet steel cable trunking

Cable retainers and lid fixings shall be provided at all ends of trunking and for each accessory. Lid fixings shall be provided at intervals not exceeding 750 mm along straight lengths. Cable retainers shall be provided at intervals not exceeding 1,500 mm except where trunking is inverted when the distance shall not exceed 600 mm.

1.45 Continuity tests

Before any wiring is carried out, tests shall be made on all conduit and trunking systems. Any part of the system where the tests give readings exceeding one-half ohm impedance shall be corrected at the sub-contractor's expense. Test reading shall be sent to the Engineer.

The Engineer will check tests as necessary. The sub-contractor shall again carry out similar tests before the installation is handed over.

1.46 Wiring generally

Wiring shall be carried out in an approved type of PVC insulated single core copper conductor cable, minimum conductor size 1.5 sq. mm (3/0361), of one manufacture throughout the installation, and delivered to site with each coil having its seal intact and a label bearing the name of manufacturer, classification, size, description of cable, length and grade.

The colours of the cores shall comply with the colour code requirements of BSEN 7671

Cables shall be drawn in at accessories, distribution boards and switchgear after the erection of the conduit system.

Under no circumstances shall it be permitted to draw cable into an incomplete section of the conduit installation. The wiring shall be carried out on the looping-in principle. All joints shall be made at the terminals of main switches, and socketted outlets, etc., and fixed apparatus only. No joints shall be made in boxes unless approved.

The cables shall be run in the conduit so as not to exceed the capacities as set out in BSEN 7671.

Where fittings and accessories require earthing, an earth continuity conductor shall be run through the conduit. The earth continuity conductor shall be a bare copper wire of minimum size 2.5 sq. mm and shall be continuous between terminals. All metal boxes shall be equipped with an earth terminal. Each final sub-circuit that is required to be earthed shall be provided with its own individual earth continuity conductor which shall be run from a terminal on the earth bar in the distribution board or consumer's control unit protecting the particular final sub- circuit. Attention is drawn to the requirements to install earth continuity conductors when plastic conduit systems are used. The load and return conductors of the same circuit or circuits shall, in all cases, be drawn in the same conduit.

Not more than six final sub-circuit cables shall run in conduits feeding outlet boxes without the approval of the Engineer. Not more than eight cables running straight back to the distribution board shall be enclosed in any one conduit.

Cables shall be terminated at equipment positions unless otherwise indicated, by means of either sweated lugs of appropriate size eyelet type cable termination, or crimped type termination of reputable manufacture. Shake proof washers shall be used where electric motors are connected.

Cables shall be fitted with thimbles where cable cores are larger than terminal holes.

Cables shall be doubled or twisted back on themselves for all single connections, firmly twisted together before any connection is made and pinched screws shall not be permitted to cut the conductors.

1.47 <u>Sub-circuit wiring</u>

No lighting circuits shall comprise more than 10 points. Cables with different cross-sectional area of copper shall not be used in combination.

Power circuit P.V.C. cable shall be:

(i) 2.5 sq. mm for one, two or three 5 amp sockets wired in parallel

(ii) 2.5 sq. mm for one 15 amp socket.

(iii) 2.5 sq. mm for one or two 13 amp sockets wired in parallel from 20 amp fuseway

(iv) 2.5 sq. mm for a maximum of six 13 amp sockets wired from a 30 amp fuseway.

(v) 4 sq. mm for ring main containing a maximum of ten 13 amp sockets wired from a 30 amp fuseway.

1.48 Armoured cables

An approved system of compression terminations as recommended by the cable manufacturer shall be used. For cables 16 sq. mm and upwards terminations to be swaged and fitted with ferrules.

To eliminate the possibility of damage to cables due to thermal expansion, allowance for movement shall be made by the introduction of a bend or set in each core adjacent to the terminal.

The cables shall be terminated at the equipment served by a mechanical type cable gland. The glands shall be complete with armouring clamps suitable for bonding the armouring to the unit served by means of copper tape, and the bonds shall be carried out at the time of making the joints. PVC shrouds shall be fitted over terminal cable glands.

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

P.V.C., X.L.P.E,S.W.A, P.V.C. cables shall be terminated using "Telecom B" type glands and a P.V.C. tapered sleeve shall be provided to shroud each gland.

1.49 Armoured cables

Where cables rise from floor level to switchgear, etc., they shall be protected by P.V.C. conduit, to a height of 600 mm from finished floor level, whether the cable is run on the surface or recessed into the wall.

1.50 Heat resisting cable

Final connections to cookers, water heaters, etc. shall be made using butyl rubber insulated cable as C.M.A reference 6101v butyl (single core 600/1000 volts).

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 F is likely to be experienced) shall be made using silicone rubber insulated cable or equal approved.

1.51 Flexible cords

Shall be cord not less than 0.75 sq. mm in size, unless otherwise specified, to B.S. 6500.

Circular white twin T.2.S. flex shall be used for plain pendant fittings up to 100 watts. For all other type of lighting fittings the flexible cable shall be silicone rubber insulated.

1.52 Main cables

Cables shall at all times be handled with care and every effort made to avoid damage. Unloading, rolling to position and mounting of cable drums shall be carried out efficiently and carefully in the recognised manner and cable shall be pulled from the top of drum and twisting shall at all times be avoided.

Adequate numbers of drum jacks, rollers and other handling accessories shall be used and make-shift arrangements will not be tolerated. In all cases care shall be taken to break the rotation of the drum and cable shall not be dragged over loose earth, concrete or any surface but shall be adequately supported on rollers or man-handled into position.

The sub-contractor shall take particular care to avoid damage to other services which may run adjacent to or across the route of the cable being installed.

Cables shall be installed with a minimum of 200 mm clearances of any equipment or pipe work including lagging associated with other services. Where this condition is unavoidable or difficult to maintain the Engineer shall be informed prior to the installation being commenced, otherwise the sub-contractor may be called upon to divert or adjust the route of any cable so affected.

Cables shall not be installed within 300 mm of a metal roof, unless clipped to the lower side of wooden joists or otherwise protected from radiant heat.

Cables passing through structural floors shall be tightly wrapped with protective tape and grouted in with hardwood filler below, shaped to suit the cables passing through.

Where cables are run vertically, heavy gauge sheet metal guards shall be supplied and fixed to the wall. The casing shall be fixed from floor level to the underneath side of the appropriate end dividing box or to a height of 1.5 metres above floor level.

Where cables run through service ducts or cable trenches they shall be fixed by means of purpose made cable hangers which shall be of the "Unistrut" pattern.

Hangers shall be of non-ferrous metal and shall be treated with one coat of metal primer and two coats of anticorrosive paint and shall be suitable for horizontal and vertical mounting either cast in or secured to concrete structure using such brackets and adaptors as are available from the manufacturers.

Hangers shall be spaced according to BSEN 7671 or to the manufacturer's recommendations, as appropriate, for the supports of the cables. The Contractor shall take particular care to avoid sagging or stress on any cable by wrongly positioned or inadequately spaced hangers.

Single and multi-way cleats shall be of cast alloy, interlocking pattern, for mounting either on steel channels or directly to concrete structure in the case of single-way cleats.

The sizes of cleats shall be selected such that all cleats can be tightened down without exerting undue pressure or strain on the cables.

In the case of vertical cables the cleats shall be so designed and of sufficient number to grip the cable firmly to prevent creeping. No cable shall run without fixing and all cable hangers and racks shall be approved by the Engineer before installation.

Where cable routes are subject to numerous changes in level and direction, additional cable hangers shall be provided to satisfactorily negotiate all such obstructions.

Where cables are spaced some distance from a supporting surface, the cable racks shall be separately bolted to additional lengths of channel section which in turn shall be fixed to brackets bolted and fixed into the structure. Cables shall be colour correct throughout their length.

Identification for cables installed within buildings shall be supplied and attached to each cable at intervals not greater than 15 metres and at all conspicuous positions such as within cable ducts, manholes, and at all cable terminations.

Discs shall be machine engraved from non-deteriorating black "Traffolyte" or similar material, display white engraving indicating the design voltage, the designation of load, and the number and cross sectional area of the cores.

The characters shall not be less than 3 mm high and shall be clearly legible.

After the installations of cables all ducts shall be adequately sealed to prevent the ingress of moisture. The sealing substance shall be of the non-hardening type.

1.53 Labeling

All plant, apparatus, equipment, distribution boards, distribution cases, terminals and cable cores shall be securely and properly labeled to the approval of the Engineer. The labeling shall clearly show the identification of the item and if applicable its control function and the part of the system controlled. Labels shall be of Traffolyte sheet fixed with screws or rivets.

1.54 Earthing

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

(i) It shall be carried out in accordance with BSEN 7671 and in accordance with the requirements of The Kenya Power and Lighting Co Ltd.

(ii) At all main distribution panels and main service positions a 25 mm x 3 mm 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 c.s.a to a copper electrode.

(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 isolation of 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 the installation is carried out in accordance with the figure stated in the current edition of the I.E.E. Regulations.

(vii) Where an earth rod is specified it shall be of proprietary manufacture, solid hand drawn copper of 15 mm diameter driven into the ground to a minimum depth of 3.6 m. It shall be made up of 1.2 m sections with internal screw and socket joints and fitted with hardened steel tip and driving cap.

Connections to the rod shall be by means of a purpose-made clamp of non-ferrous metal, and the actual connection made below ground level in a concrete inspection pit with removable inspection cove2.

(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 I.E.E Regulations, by the Contractor in the presence of the Engineer, and the 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 6 mm. 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, rivetted with a minimum of two copper rivets and sweated solid.

(xii) Where holes are drilled in the earth tape for connection to items of equipment the effective c.s.a must be not less than required to comply with the Regulations.

(xiii)Bolts, nuts and washers for any fixing to the earth tape must be of non-ferrous materials.

1.55 Insulation

The insulation resistance to earth and between poles of the whole wiring system, fittings and lamps, shall not be less than the requirements of BSEN 7671. 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 who will then check test with his own instruments if necessary

1.56 Cable ends

All cable ends connected up in switchgear, M.C.B. 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 the appropriate phase colour. Black cable with black cable end markers shall only be used for neutral cables.

The wiring for impulse clocks, emergency lighting, and other systems, shall also have end markers of the same colours as the respective insulations detailed in the following clause.

All bus-bars shall be painted with colours corresponding to the phases, and cable boxes shall have the respective phase colours painted on the exteriors.

Phase colours shall be indicated on fuse switches, switch fuses, and isolators by means of coloured discs, minimum diameter 6 mm fixed to front covers.

1.57 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.

Non-braided P.V.C. cable shall be used unless otherwise stated in other clauses.

	System	Insulation Colour	Cable End Marker	Lighting and Power
1)	Mains and sub-mains			
	a)	Red Phase	Red	Red
	b)	Yellow Phase	Red	Yellow
	c)	Blue Phase	Red	Blue
	d)	Neutral	Black	Black
2)	Sub-circuits single phase			
	a)	Red Phase	Red	Red
	b)	Yellow Phase	Red	Yellow
	c)	Blue Phase	Red	Blue
	d)	Neutral	Black	Black
3)	Sub-circuits three phase			
	a)	Red Phase	Red	Red
	b)	Yellow Phase	Yellow	Yellow
	c)	Blue Phase	Blue	Blue
	d)	Neutral	Black	Black
4)	Fire Alarm	Grey	Grey	

5) Impulse Clock White White

6) Emergency lighting

Phase	Red	Red
Neutral	Black	Black

1.58 Phase colouring of bus bars

Phase colouring of bus-bars in the switchboard and M.C.B. panels shall be as follows:-

Top Bar	-	Phase 1 -	Red	
Next Bar	-	Phase 2 -	Yellow	
Next Bar	-	Phase 3 -	Blue	
Next Bar	-	Neutral	-	Black

1.59 Vibration isolation

Vibration absorbing devices shall be used to isolate all motorised equipment including refrigeration plant, air handling units, fans etc., to ensure that no objectionable vibrations or sound be transmitted to the building structure.

Spring type isolation shall be of cast iron construction with floating top plate for leveling purpose complete with adjusting belt. The spring to be incorporated into this housing shall be as determined by the isolation manufacturer to provide 95% dampening efficiency.

Rubber vibration isolators shall be of the rubber in sheer type having a suitable arrangement of material to achieve compression and sheer in each direction. Sound pads of 6 mm ribbed neoprene shall be used with all isolators.

1.60 Lighting Fittings

The sub-contractor shall provide, install (including internal wiring) and connect all lighting fittings in accordance with the makes and types marked on the drawings, complete with the lamps of number, wattage and colour required by the Engineer.
Conduit suspensions shall be provided for all pendant fittings. The stems shall be screwed to ball and socket type dome lids with positive earth connection.

White break joint rings shall be provided wherever necessary. Circuit cables shall not be routed through bulkhead or other fittings where the cables would be liable to undue temperature rise and shall terminate in a fixed base connector in a conduit box mounted behind or adjacent to the fitting. Final connection to each fitting shall be carried out with silicone rubber insulated cable.

Conduit terminations to all aluminium fittings shall be fitted with brass bushes to prevent corrosive action between the steel and aluminium components. Where PVC conduit is used

non-ferrous bushes may be replaced with an insulated pattern.

All fluorescent fittings shall be complete with quick starting control gear, power factor capacitors and "warm white" lamps. The metalwork of all fittings and starting equipment shall be effectively earthed to the installation. Fittings without a shunt connected PF capacitor shall incorporate a voltage dependent resistor to counteract surge voltages.

All fittings shall be cleaned with anti-static cleaning fluid prior to handover.

1.61 Security lighting installations

The layout of external security lighting installations is as shown on the layout drawing. The sub-contractor shall provide lighting columns in compliance with the details shown on the relevant drawings. These shall be primed and after installation painted to the approval of the Engineer

The cabling to various lighting columns shall be PVC/XLPE/SWA cables of the size and type as shown on the drawings. The cables shall generally be laid direct in ground at a depth of 600 mm with 50 mm sand bed under and over and provided with Danger Hatari concrete tiles throughout their length. Where cables cross roads or permanently finished surfaces these shall be drawn through PVC or concrete ducts provided by the sub-contractor.

The cables at the positions of the lighting columns shall be terminated by using brass compression glands. Each lighting column shall be provided with a lucy-cut-out fused at 5 Amps. The cabling to the luminaire at the top of the lighting standard shall be 1.5 mm PVC with earth.

The lighting installations shall be controlled by means of a photoelectric cell operating a suitably rated contactor.

The luminaires complete with lamps shall be provided under this sub-contract.

1.62 Over and Under-Voltage, Phase Failure and Phase Sequence Protection

The main incoming 415Volts switchboards and control panels shall be equipped with a relay which detects unacceptably high or low voltages.

It will monitor all phases and will cause all incoming circuit breaker(s) to trip when the voltage exceeds a maximum or minimum(which shall be selected from a range of settings).Visual indication shall be given of the cause of tripping and an electrical hours counter will record the time which during the supply exceeds the set limits.

Resetting of the relay shall be automatic but re-closure of the tripped circuit breaker shall be manual. I t shall be possible to delay the operation of the relay in order to ride through transient voltage variations.
Phase failure shall cause the circuit breaker to trip immediately and in correct phase sequence will prevent the circuit breaker from being closed.

The Lovato Electronic Voltmeter relay type RVT manufactured by the Officine Electromeccanica Lovato OF Italy or equal and approved that meets the requirements for the

application.

1.63 Surge Voltage Protection.

In order to give protection against transient over-voltages surges such as result from lightning strike, surge arresters shall be installed on the 415 Volts busbar of the main LV Panel.

They shall be connected permanently between each phase and earth and shall be suitable for continuous operation at 415 Volts. It shall comply with the class 2.5Ka requirements according to IEC 99.

1.64 Fault Levels.

The following prospective symmetrical fault levels are to be assumed for initial design considerations:

- 11kV KPLC overhead supply line 200MVA r.m.s.
- 415 Volts bus bars (secondary terminals of LV supply transformers) 30MVA r.m.s.

It shall be the responsibility of the subcontractor to ascertain the true fault levels.

1.65 Fire Detection and Alarm system

The sub-contractor shall be responsible for supplying, installing, wiring and commissioning a complete fire alarm system to BS 5839: 2002.

The system shall consist of manual break glass points, electronic sounders, beam detectors, smoke and heat detectors and a Fire Alarm panel complete with a charger and batteries installed in the positions shown on the drawings. The Fire alarm panel shall be connected to 240 V, 50 Hz A.C. power supply through a 13 Amps un-switched fused spur unit incorporating a pilot light.

The system shall work in the event of a signal being initiated from any break-glass contact and all bells shall ring simultaneously. The bells shall continue ringing until manually reset at the panel.

On silencing the bells, the buzzer within the panel shall remain operative until such time that the glass for the break glass contact has been replaced.
The wiring throughout shall be in 1.5 sq. mm Fire Tuff cables, enclosed in 25 mm diameter pvc or GI galvanised conduit. A completely separate and independent conduit system shall be used for wiring to fire alarm equipment.

The fire detection and alarm system shall be analogue addressable or convectional system as described in the drawings and bills of quantities.

The fire alarm system shall be commissioned by the specialist supplier who will also issue the completion certificate for the works

The operation of the fire alarm system on completion shall be demonstrated to the Engineer

and the Owner and one copy of the operating instructions shall be provided to the Engineer and two copies to the Owner.

1.66 Record drawings (as installed)

During the execution of the works the sub-contractor shall, in a manner approved by the Engineer record on working or other drawings at site all information necessary for preparing record drawings of the installed works. Marked-up working or other drawings and other documents shall be made available to the Engineer as he may require for inspection and checking.

Record drawings may, 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 works.

They shall include but are not restricted to the following drawings and information:-

a) Working drawings amended as necessary but titled "Record Drawings" and certified as a true record of the "as installed" Works. Subject to the approval of the Engineer such working drawings as may be inappropriate may be omitted.

b) Fully dimensioned drawings of all plant and apparatus.

c) General arrangement drawings of equipment, other areas containing plant forming part of the works and the like, indicating the accurate size and location of plant and apparatus suitable cross- referenced to the drawings mentioned in (b) above and hereinafter.

d) Route, types, sizes and arrangement of all pipework and ductwork including date of installation of underground pipe.

e) Relay adjustment charts and manuals.

f) Routes, types, sizes and arrangement of all electric cables, conduits, ducts and wiring including the date of installation of buried work.

g) System schematic and trunking diagrams showing all salient information relating to control and instrumentation.

h) Schematic diagrams of individual plant, apparatus and switch and control boards. These diagrams to include those peculiar to individual plant or apparatus and also those applicable to system operation as a whole.

Marked-up drawings of the installation of the works shall be kept up to date and completed by the date of Practical or Sectional Completion. Two copies of the record drawings of the works shall be provided not later than one month later.

The sub-contractor shall supply for fixing in sub-stations, switchrooms, boiler houses, plant rooms, pump houses, the office of the Maintenance Engineer and other like places, suitable valve and instruction charts, schematic diagrams of instrumentation and of the electrical reticulation as may be requested by the Engineer. All such charts and diagrams shall be of

suitable plastic material on a stiff backing and must be approved by the Engineer before final printing.

Notwithstanding the sub-contractor's obligations referred to above, if he fails to produce to the Engineers approval, either:-

a) The marked-up drawings during the execution of the works, OR

b) The record drawings etc. within one month of section or practical completion; the Engineer may have these drawings produced by others. The cost of obtaining the necessary information and preparing such drawings, etc. will be recovered from the sub-contractor.

1.67 Spares

The sub-contractor shall prepare a schedule of manufacturers' recommended spares together with any special tools required for maintenance purposes. The schedules shall indicate the number of individual spares required for each items of plant included in the works and the cost of each item.

1.68 Maintenance manual

On practical completion of the works, the sub-contractor shall provide to the Engineer, 2 copies of a Maintenance Manual relating to the installation of the Works.

The Manual shall be loose-leaf type, international A4 size with stiff covers, cloth bound.

The Manual shall contain full operating and maintenance instructions for each item of equipment, plant and apparatus, set out in a form dealing systematically with each system. It shall include the following and any other items listed in the text of the specification:

a) System description
b) Plant
c) Valve operation
d) Switch operation
e) Procedure for fault finding
f) Emergency procedures
g) Lubrication requirements
h) Maintenance and servicing periods and procedures
i) Colour coding legend for all services
j) Schematic and wiring diagrams of plant and apparatus
k) Record drawings, true to scale, reduced to international A4 size
l) Lists of primary and secondary spares

1.69 Checking of work

The subcontractor shall satisfy himself as to the correctness of the connections he makes to all items of equipment supplied before it is put into operation. Details of operation, working pressures, temperatures, voltages, phase, power rating, etc. shall be confirmed by manufacturers or their agents, the confirmation to be received before the system is first

operated.

1.70 Temporary and trial usage

It shall be understood and agreed that temporary or trial usage by the Owner of any device, machinery, apparatus, equipment or any other work or materials supplied under this sub-contract before final completion and written acceptance by the Engineer is not considered as evidence of acceptance of the item by the Owner. It is further understood and agreed that the Owner shall have the privilege of such temporary and trial usage as soon as the sub-contractor shall claim that the said work is completed in accordance with the drawings and Specification and to the manufacturer's instructions, and for such reasonable length of time as the Engineer shall deem suitable for making a complete and thorough test of the apparatus or system under test.

No claim for damage will be made by the sub-contractor for injury to or breaking of any parts of the Works which have been placed under test and which has been caused by weakness, flaw, or inaccuracy of structural parts or by defective material or workmanship of any kind whatsoever.

1.71 Setting to work and regulating the system

Each system shall be properly balanced, graded and regulated to ensure that correct distribution is achieved and where existing installations are affected, the sub-contractor shall also regulate these systems to ensure that their performance is maintained.

The proving of any system of plant or equipment as to compliance with the Specification shall not be approved by the Engineer, except at his discretion, until tests have been carried out under operating conditions pertaining to the most onerous conditions specified except were the time taken to obtain such conditions are unreasonable.

1.72 Tests at Sub-contractor's works

The Engineer shall have access at all reasonable times to such parts of the sub-contractor's or his sub-contractor's works as may be necessary for the purpose of inspecting, examining and testing the materials, workmanship and performance of plant.

Except where otherwise provided, the sub-contractor shall provide all labour, materials, power, fuel, stores, apparatus and properly calibrated and certified instruments for carrying out necessary tests at his own or his sub-contractor's works.

1.73 Testing on site

Upon completion of the works the sub-contractor shall subject all systems to an operating test in which he shall adjust all controls, speeds, etc., all to the satisfaction of the Engineer.

Test Certificates are to be provided by the sub-contractor and signed by the Engineer who witnesses the test. All test certificates are to be submitted to the Engineer and shall contain the following particulars therein:-

a) Earth continuity;

b) Neutral earth loop impedance;
c) Insulation resistance;
d) Earth resistance

For the purpose of all tests the sub-contractor shall provide all apparatus, attendance and assistance necessary together with all skilled labour and shall if requested, demonstrate the accuracy of any installation.

On completion, the installation must be tested in accordance with BSEN 7671: Part 7 and the sub-contractor must allow for preparing a test report for submission to the Engineer and the Kenya Power & Lighting Co. Ltd.

1.74 Hand-over

Practical completion shall occur and the Defects Liability Period shall commence only when the works and supporting services have been tested, commissioned and operated to the satisfaction of the Engineer and the Owner, and when KP & L approval has been obtained in writing.

The sub-contractor shall arrange with the Engineer and the Owner for a complete demonstration of each and every service to be carried out and or instruction to be given to the relevant operation staff of the Owner.

The sub-contractor shall prepare approved check lists of all controls and items of equipment, tools, spares and the like; he shall provide the 'as built' drawings and maintenance manual required herein; and shall clear the site and the installed systems of all surplus material, rubbish and dirt; prior to handing over the works.

ELECTRICAL SERVICES INSTALLATIONS

SECTION 3: PARTICULAR SPECIFICATIONS FOR ELECTRICAL INSTALLATIONS

CONTENTS

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).

3. Be duly registered with National Construction Authority for Electrical installation works with a valid annual practicing license.

4. Have a valid license from Energy Regulatory Commission for Electrical installation works.

SCHEDULE OF CONTRACT DRAWINGS

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SCHEDULE OF CONTRACT DRAWINGS

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DRAWING NO.	DRAWING TITLE
As will be issued by the Chief Manager – Facilities and Logistics Division	

NOTE:

Tenderers are advised to inspect the electrical drawings at the office of the KRA Chief Manager – Facilities & Logistics Services Division, at Times Tower, Nairobi along Haile Selassie Avenue, during normal working hours.

PARTICULAR SPECIFICATIONS OF MATERIALS AND WORKS

2.0 PARTICULAR SPECIFICATIONS FOR ELECTRICAL INSTALLATIONS

2.1 Location

The site of the proposed work is along Elgon Road, CBC Building, Upperhill, Nairobi.

2.2 Scope of Works.

The Electrical sub-contractor shall supply and install the complete Electrical Services installation systems comprising and not limited to:

- Kenya Power and Lighting Company Limited (KPLC) Mains Cable ductwork from the nearest power network to the Main LV switchboard.
- Main metering panel in the switch room
- Sub-mains cable from metering panel to the switchboard.
- Distribution power supply cables from the main switch board to the Distribution boards through the service ducts.
- Distribution Boards and Consumer Units
- Cable trays, metal trunking and PVC ducts and /or conduits
- Small power wiring for raw power
- Voice communications wiring and accessories
- Small Power outlets plates
- Mechanical equipment power circuits and Isolators
- Lighting wiring both internal and external.
- Light fittings both internal and external
- Emergency Lighting system
- Switching controls
- Security installations wiring containment
- Telephone Cable ductwork from the nearby Telkom Kenya Ltd network to the Main Distribution Frame (MDF).
- Main Distribution Frame (MDF)
- Earthing and Bonding
- KPLC liaison in connection with power supply to the facility
- Telephone Authority liaison in connection with the new facility.
- Liaison with Client appointed specialist contractors.

2.3 Method of Installation

Generally the method of installation shall comprise main distribution utilizing armoured copper cables drawn in ducts or surface on cable tray to sub-boards and distribution boards, PVC single wires in concealed PVC conduit and in trunking to the final circuits.

The final distribution wires installation shall be run in trunking within the suspended floor slabs and concealed within the fabric of the building/structure.

All final circuits shall be complete with the appropriately sized cable protective devices (CPD) in accordance with the requirement of the current issue of the IEE Wiring regulations (BS 7671 – 1998).

2.4 Power Supply

The electrical supply to the works shall be derived from the Kenya Power & Lighting Company network at a pressure of 415 volts, 50 Hz. The Electrical subcontractor will connect to the existing rising mains located in the building's Electrical duct. Two rising mains (Maintained and non-maintained) have been provided.

The Electrical subcontractor shall make all the necessary arrangements with KPLC for the provision of the power supply connections and Certification for the new works.

The Electrical subcontractor shall provide details and information in time for the entire necessary Builder's work to the Main Contractor for the provision of all ducts, sleeves and draw pits for the installation of the supply and communication cables.

2.5 Power Distribution

The Electrical subcontractor shall supply and install armoured distribution cables, Sub-Boards and Distribution Boards in positions as shown on layout drawings and in accordance with the schematic diagram

The various levels shall be fed by distribution boards and consumer units recessed or surface mounted as shown on layout drawings. The Distribution Boards will be fed from the main switchboards in the respective switch rooms via rising mains run in power duct.

2.6 Low Voltage Switchboard

The Contractor must assure that switchgear can withstand the system fault level at the place of installation.

The switchgear shall be designed throughout to secure safety during operation, inspection, cleaning and maintenance and shall be so arranged as to minimize the risk of fire arising or spreading.

The switchboards shall be manufactured in accordance with BS EN 6097,which co-ordinates the requirements for electrical power switchgear and associated apparatus. It is not intended that this B.S. should cover the requirements for specific apparatus for which separate British Standards exist. All equipment and material used in the switchboard shall be in accordance with the appropriate B.S.

(i) Construction

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

Switchboards shall be of the flush fronted, enclosed, metal clad type with full front or rear access, suitable for indoor use, sectionalized as necessary to facilitate transport and erection. The maximum height shall 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.

All bus-bars and bus-bar connections shall consist of high conductivity copper L1, L2, L3 for the phases and N for the neutral. The bus-bars shall be so arranged in the switchboard that extensions to the left and right may be made in the future should the need arise.

Small wiring, which will be neatly arranged and cleated, shall be coloured according to the phase or neutral connection.

(ii) Switches and fuse switches

These shall be in strict accordance with BS EN 6097-2 switches. Means of locking the switches in the "OFF" position shall be provided.

All fuse switches shall comply with B.S. 1361 and shall have a fault rating at least equal to the fault rating of the switchboard in which they are installed. Cartridge fuse links to B.S. 88 category AC 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 tier formation all necessary horizontal and vertical barriers shall be provided to ensure segregation from adjacent units. Means of locking the switches in the "OFF" position shall be provided.

(iii) Earth bar

A hard drawn high conductivity copper earthing bar shall be provided for the full length of the board and all fuse switch units and circuit breakers shall be bonded to this bar.

2.7 Distribution boards

Where the requirement for fuses is indicated on the drawing the distribution boards shall be fitted with high quality fuse carriers and bases, removable insulated shields to provide adequate protection against accidental contact with live metal, and circuit indicating labels fixed inside the cover.

Where the requirement for miniature circuit breakers is indicated on the drawings, the distribution boards shall be fitted with moulded thermoplastic units of the combined thermal overload and magnetic short circuit tripping type to BS EN 60898:1991 having clearly marked "ON" and "OFF" positions. MCB's of all ratings shall have a minimum short circuit current breaking capacity of 3,000 A for single pole breakers and 4,000 A for triple pole breakers.

Bus-bars shall be rated as the nominated current for the main isolator in their entire length.

A complete list of circuit details on typed cartridge paper glued to stiff cardboard 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 M.C.B. rating 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 circuit shown on the circuit chart.

2.8 Steel conduits

Conduits shall be heavy gauge Class B welded to B.S. 31. In no case will conduits smaller than 20 mm diameter be used in the works. Conduits installed within buildings shall be bake enameled 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 Engineer.

2.9 Non-metallic conduits

Conduit shall be best quality new super high impact grade heavy gauge Class 'A' rigid PVC un-plastic conduit as manufactured by Metro-plastic Ltd. Or equal and approved to B.S. 4607: Part 2: suitable for plain connections or as specified.

2.10 Cable trays

Cable trays shall be fabricated from perforated mild steel tray of minimum 14 SWG with returned flanges and coupling pieces for rigidity and strength.

Unless otherwise stated in the specification or shown on the drawings the cable tray shall be painted grey enamel for indoor use and shall be hot dipped galvanised for outdoor use.

2.11 Sheet steel cable trunking

Trunking shall be minimum 18 gauge zinc coated steel, enamelled to approved colour, to the sizes as described in the bills of quantities or shown on the drawings.

2.12 Cables and flexible cords

All cables used in the Contract shall be manufactured in accordance with the current appropriate British Standards Specifications which are as follows:-

flexible cords -B.S.S 6004
P.V.C. insulated armoured cables - B.S.S 6346
Butyl rubber insulated cables - B.S.S 6101v
Rubber insulated cables and flexible cords - B.S.S 6500
P.V.C. insulated cables and

The Contractor will, at the Engineer's discretion, be required to submit samples of cables for his approval; he reserves the right to call for cables of an alternative manufacture without any extra cost being incurred.

P.V.C. insulated cables shall be 500/1000 volts grade. No cable smaller than 1.5 sq. mm (3/.029) shall be used unless otherwise specified.

2.13 Armoured P.V.C. insulated and sheathed cables

Shall be 600/1000 volts grade manufactured to B.S. 6346 with copper stranded conductors.

The cable cores shall be identified in accordance with the current edition of B.S.6346.

PVC insulated, aluminium strip armoured and PVC sheathed multi core cablesshall have solid aluminium conductors and shall be 600/1000 volt grade, manufactured in accordance with B.S. 6346.

2.14 Lighting switches

(a) Wall Switches: Shall be flush type contained in steel or pvc boxes of the ratings and gangs appropriate; complete with overlapping white cover plates and switch dollies. They shall be to B.S. 3676.

(b) Surface Wall Switches: Shall be contained in a steel box with steel cover plate, with rating and gangs as specified on the drawings and to BS 3676

2.15 Sockets and switched sockets

Shall be 13 amp, flush pattern in pvc box ivory white moulded socket plates. They shall be 13 amp, 3 pin, shuttered, switched or un-switched as specified on the drawings to B.S. 1363. All sockets or switch-sockets shall be with fused plug top containing a fuse whose rating shall be suitable for the load connected to it. The plug top shall be to B.S. 1363.

Surface type sockets or switch sockets shall be in a steel box with metal- clad steel cover plates or ivory insulated with ivory mounting block and back plate and to B.S. 1363.

Shall be flush, D P switched or un-switched in a pvc box with ivory or BMA or matt chrome over-lapping cover-plate with or without pilot light to B.S. 3676

Surface fused spur boxes shall be in a steel box, D P switched or un-switched with metal clad steel cover plates to B.S. 3676.

2.16 Telephone outlets

These shall consist of 75 x 75 x 50 mm deep steel box with single or double outlet telephone cord-outlet plate and white.

2.17 Time switches

These shall be 30 amp, A C 200/250 volts 50 C/S with 9 hours spring reserve.

2.18 Clock connectors (Not Applicable)

Shall be fused 2 amps, S P with earthing facilities, flush, ivory or matt chrome either square pattern flush to fit on standard switch box or round pattern to fit on standard conduit box.

2.19 Watertight sockets

Shall be of rating 5 amp, or 15 amp, single pole and neutral with earth or three pole and neutral with earth , IP54 protection and to IEC 669-1

2.20 Fireman's switches

Shall be 15 amp, or 30 amp, DP as specified on the drawings and having cast iron weatherproof enclosures, finished red and complying with IEE Regulations.

2.21 Connectors

Shall be of the porcelain normal size 2 brass screws type of appropriate rating. These shall be fitted at all conduit box lighting point outlets for jointing of looped P.V.C. cables with flexible cables.

2.22 Lampholders

Shall be of the extra heavy H.O. skirted pattern 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 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 lamp holders 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 Contractor must order the appropriate type of holder when ordering lighting fittings, to ensure that the correct types of holders are provided irrespective of the type normally supplied by the manufacturers.

2.23 Amps

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

Tungsten filament lamps shall be manufactured in accordance with B.S. 161, B.S. 4533. Tubular fluorescent lamps shall comply with BSEN 60081.Tabular fluorescent lamps shall be T8/26mm with electronic control gear.

WORKMANSHIP

2.24 Workmanship generally

The workmanship and method of installation shall conform to the best standard practice. All work shall be performed by skilled tradesmen 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 Contractor's expense.

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

2.25 Installations liaison

The Contractor shall liaise with the Engineer in planning the works before work is commenced. Particular care shall be taken by the Contractor to ensure there is close liaison with other sub-contractors in installing services, to prevent clashing of service positions, etc. Any work which has to be re-done due to negligence in this respect shall be the Contractor's responsibility.

2.26 Regulations and standards

All work executed by the 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 Engineer.

2.27 Working drawings

The Contractor shall prepare such working drawings as may be necessary, which shall be complete in such detail not only that the works can be executed on site but also that the Engineer can approve the Contractor's proposals, detailed designs and intentions in the execution of the works.

If the Contractor requires any further instructions, details, contract drawings or information drawings to enable him to prepare his working drawings or proposals, he shall apply in writing to the Engineer for such information at a time which is neither unreasonable distant from nor unreasonably close to the date when it is needed.

All working drawings shall be submitted to the Engineer for approval. If not so submitted the Contractor shall accept at his own cost, the risk that any work commenced or which he intends to commence on site, may be rejected.

The Engineer, in giving his approval to the working drawings, will presume that any necessary action has been, or shall be, taken by the Contractor to ensure that the Installations shown thereof have been cleared with any other person or bodies whose Installations and works might be affected.

Should he fail in this respect then he shall be liable to pay for any alteration or modification to his own, or other person or body's Installations which are incurred, notwithstanding any technical or other approval which the Contractor's working drawings may have received from the Engineer.

Working drawings to be prepared by the Contractor shall include but shall not be restricted to the following:-

(a) Any drawings required by the Contractor or the Engineer to enable structural provision to be made including builders work drawings or schedules and those for detailing of holes, chases, fixings, foundations, cables and pipework ducting whether below or above ground or in or outside or below buildings.

(b) General and layout arrangement drawings of all plant, control boards, fittings and apparatus or any part thereof.

(c) Schematic layout drawings of services and of control equipment.

(d) Layout drawings of all embedded and non-embedded pipework, ducts, and electrical conduits.

(e) Complete circuit drawings of the equipment together with associated circuit descriptions.

(f) Such other drawings as are called for in the text of the Specification or as the Engineer may reasonable require.

Three copies of all working drawings shall be submitted to the Engineer for approval. One copy will be returned to the Contractor indicating approval or any amendments that may be required.

Approved working drawings shall not be departed from except as may be approved or directed by the Engineer.

Approval by the Engineer of working drawings shall neither relieve the Contractor of any of his obligations under the contract nor relieve him from correcting any errors found subsequently in the approved working drawings or other working drawings and in the works on site or elsewhere associated therewith.

The Contractor shall ensure that his working drawings are submitted to the Engineer for approval at a time not unreasonably close to the date when such approval is required. Late submission will not relieve him of his obligation to complete the Works within the agreed contract period and in a manner that would receive the approval of the Engineer.

2.28 Shop drawings

Before manufacture of any item is begun the Contractor shall submit three copies of detailed drawings of all pieces of equipment including sizes, capacities, construction details, etc. and as may be required to determine the suitability of the equipment for the approval of the Engineer. Approval shall not relieve the 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 drawings and Specification.

Upon award of the subcontract the subcontractor shall produce Three sets of the working drawings to Engineer prior to commencement of the work. The Engineer has to approve the drawings for the subcontractor to proceed with the works. The drawings shall be in A3 hard copies.

2.29 Setting out works

The Contractor is to set out the works and take all measurements and dimensions required for the erection of his materials on site, making any modifications in detail 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 sketches or drawings related thereto.

2.30 Positions and sizes of services, plant, equipment, fittings and apparatus

The contract drawings give a general indication of the intended layout. The positions of the equipment and appliances, and also the exact routes of the ducts, mains and distribution pipe work shall be confirmed before installation is commenced. The exact sitting of appliances, pipe work etc. may vary from that indicated.
The routes of services and positions of apparatus shall be determined by approved dimensional details on wiring drawings or on site by the Contractor in consultation with the Engineer.

Services through ducts shall be arranged to allow maximum access along the ducts and the services shall be readily accessible for maintenance. Any work which has to be re-done due to negligence in this respect shall be the Contractor's responsibility.

The Contractor shall be deemed to have allowed in the contract sum for locating terminal points of services (e.g. switches, socket outlets, lighting points, control switches, thermostats and other initiating devices) in position plus or minus 1.2 m horizontally and vertically from the locations shown on the contract drawings. Within these limits no variations in the contract sum will be made unless the work has already been executed in accordance with previously approved working drawings and with the approval of the Engineer.

2.31 Access to plant rooms

It shall be the responsibility of the Contractor to ensure that all equipment ordered in respect of this Contract is to be constructed in such a manner that it may, if necessary, be dismantled to enable it to pass to its final position.

2.32 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 Contractor must approach the Engineer with regard to ceiling panel layouts.

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.

2.33 Identification of plant and components

The Contractor shall supply and fix approved identification labels to all major components of plant, starters, switches and items of control equipment, with black Traffolyte or equal labels engraved in white lettering denoting its name, function and section controlled. The labels shall be mounted on equipment in the most convenient positions, care being be taken to ensure the labels can be read without difficulty.

2.34 Nameplates

All apparatus shall have a nameplate showing the size, name of equipment, serial number and all other information usually provided in stamped, edged or engraved lettering to be perfectly legible to the satisfaction of the Engineer, bearing the name and address of the manufacturer Nameplates shall not be painted ove2.

Motors shall have serial number, voltage, cycle, phase and horsepower.

2.35 Main power supply

The Contractor will be required to liaise with the Kenya Power & Lighting Company Limited in order to determine the most appropriate and the most economical method of bringing in the service line cable.

The location of the main M.V. Switchboard is shown on the relevant drawing. The layout and the provision of ducts must be agreed with the Kenya Power & Lighting Co Ltd.

The supply voltage shall be 0.240 volts single phase, or 0.415 and 11kvolts, 3 phase, 50 Hz. The Contractor shall allow for liaising with the K P & LCto ensure that the supply is made available by the Company at the appropriate time and to suit the programme of construction work.

The Contractor will be required to give all notices, completion forms, etc., to K P & L C to enable the installation to be tested upon completion and shall pay all fees arising from the testing or any subsequent re- testing of the installation.

2.36 Distribution boards

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 M.C.B's. This shall also apply to earth bars when installed.

2.37 Conduit installation generally

A separate conduit system is required for each installation, lighting, power, telephone, etc.

Surface conduit shall be run in square symmetrical lines and shall be fixed by means of spacer-bar saddles spaced at not more than 0.9 m (for 20 and 25 conduit) and

1.2 m for larger sizes, for steel conduits and 0.6 m for PVC conduits. Surface conduit shall also be fixed on both sides of all boxes at a distance not greater than 0.2 m, the box itself being securely fixed. Where such an arrangement of boxes and saddles would prove to be both unsightly and unnecessary, short lengths of conduit not exceeding 0.6 m in length between boxes need not be secured further than by connection to the adjacent boxes.

Concealed conduit run in chases in walls shall be fixed by means of mild steel pipe hooks or non-metallic saddles spaced not more than 0.9 m. Where conduit is concealed behind plaster it shall be chased to a depth of either 15 mm below finished plaster level, or installed flush with the structural wall level before application of plaster, whichever is the lesser depth.

Conduit cast-in-situ shall be frequently secured to steel reinforcement work with heavy binding wire to prevent movement of conduit and conduit boxes during pouring and vibrating of concrete.

Outlet boxes shall be filled with paper to prevent ingress of concrete, and all boxes shall be securely fixed to shuttering with nails, or by means which shall be visible as a marker on removal of shuttering only where these marks can be concealed. Conduit shall be installed after the first grid of steel reinforcement work is securely fixed and all open ends of conduit shall be protected by couplings plugged with a suitable non-metallic stopping plug. The number of right angle bends in conduit cast-in-situ shall not exceed two between boxes. Where straight runs of conduit are installed draw-in boxes shall be provided at distances not exceeding 25 metres and at places approved by the Engineer.

Immediately prior to installing the wiring all conduit and fittings shall be dried and cleaned out by drawing through a cloth swab. Raw plugs shall be used for fixing to aluminium section, rawlnuts, spring toggles, gravity toggles or rawlbolts shall be used for fixing to other materials as approved by the Engineer. Corners shall be turned by easy bends or sets made in accordance with the manufacturer's instructions without altering the section or splitting the conduit.

Conduits shall be installed in such a manner as to prevent interference with other services and shall be kept at least 225 mm clear of gas or water pipes, and heat in excess of 700 C. Where this is impossible or impractical, insulation, to the prior written approval of the Engineer, shall be used.

Where conduit runs enter specified areas requiring flameproof equipment, barrier boxes shall be inserted immediately before the conduit enters the flameproof area. All conduits installed within this area shall be solid drawn galvanised, as shall be conduit fittings and accessories and Buxton Certified as suitable for Group II hazards. Equipment shall comply with B.S. 229.

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.

All horizontal surface conduit runs shall be erected at near ceiling level, and for all surface work the boxes used shall be tangent entry types.

All Conduits shall be efficiently drained before wiring, and ventilated in suitable positions to offset the effects of condensation.

The conduit shall be of such sizes that the conductors shall be easily drawn in after all tube has been installed, and they shall be in accordance with the Capacity of Conduits Table contained in the current edition of the I.E.E. Regulations.

Special care shall be taken to prevent dirt and rubbish getting into the conduit work during erection, screwed metal caps or plugs only shall be used for protecting open ends. Plugs of waste wood, paper, etc., shall under no circumstances be used.

Any conduit boxes and other fittings used on external walls, and in other wet situations which may be described in later clauses, shall have machined flanges and lids and shall be fitted with gaskets to prevent ingress of moisture.

The crossing of expansion joints shall be made with flexible conduit connecting each end of the conduit, the whole sleeved with 50 mm diameter PVC conduit. Care shall be taken to ensure that the flexible conduit/ conduit connectors are correctly installed and will not become disconnected when expansion and contraction takes place.

2.38 Flexible conduit and fittings

All flexible conduits for connection to motors or machinery shall be a minimum 0.5 m length of metallic W.T. type. All ends shall be sweated into conduit threaded brass sweating glands with Tinman's solder, no spirit being used. A separate earth wire 1/1.78mm (7/029) (tinned) shall be wound rounded the flexible conduit and efficiently bonded to the rigid conduit and apparatus at each end.

The solid conduit shall terminate in a large BESA or adaptable box enclosing sufficient coils of motor cable to enable "Tong-Test" reading to be taken in each conducto2. Earth continuity shall be maintained by means of a copper conductor sized in accordance with BSEN 7671 subject to a minimum 1.5 sq. mm and have green insulation.

2.39 Telephone / Computer Conduits

The arrangements and size of telephone conduits is to be such as will accommodate the number of circuits as indicated on the drawings. Where conduits enter adaptable boxes each conduit is to be numbered to indicate the outlet point which it feeds. Unless otherwise stated on the drawings, conduits will terminate in standard metal boxes to B.S. 1363 with flush fitting cover plate. Draw wires of piano quality steel wire of not less than 22 SWG are to be left in all telephone conduits. Draw-in boxes are required in telephone conduits on the same basis as laid down for power and lighting.

Telephone outlet boxes, draw-in boxes and the telephone distribution boxes are to be marked internally with yellow paint to distinguish them from boxes provided for other services.

2.40 Cable trays

Cable trays shall be appropriately fixed on robust and substantial brackets fixed into walls or shall be suspended on rods securely fixed to the structure together with a bracket arrangement as required to facilitate the support for the cable tray. Suspension rods shall be minimum 8 mm diameter mild steel. Brackets or suspension supports shall be provided as necessary, the spacing of which shall not exceed 2.0 m.

Where the cable tray changes direction the minimum radius of bends shall not be less than 300 mm on the inside of the bend and in no case shall be less than the bending radius of the cable supported.

All brackets, suspension rods and attachments shall be finished as the cable tray supported.

2.41 Continuity tests

Before any wiring is carried out, tests shall be made on all conduit and trunking systems. Any part of the system where the tests give readings exceeding one-half ohm impedance shall be corrected at the Contractor's expense. Test reading shall be sent to the Engineer.

The Engineer will check tests as necessary. The Contractor shall again carry out similar tests before the installation is handed over.

2.42 Wiring generally

Wiring shall be carried out in an approved type of PVC insulated single core copper conductor cable, minimum conductor size 1.5 sq. mm (3/0361), of one manufacture throughout the installation, and delivered to site with each coil having its seal intact and a label bearing the name of manufacturer, classification, size, description of cable, length and grade.

The colours of the cores shall comply with the colour code requirements of BSEN 7671

Cables shall be drawn in at accessories, distribution boards and switchgear after the erection of the conduit system.

Under no circumstances shall it be permitted to draw cable into an incomplete section of the conduit installation. The wiring shall be carried out on the looping-in principle. All joints shall be made at the terminals of main switches, and socket outlets, etc., and fixed apparatus only. No joints shall be made in boxes unless approved.

The cables shall be run in the conduit so as not to exceed the capacities as set out in BSEN 7671.

Where fittings and accessories require earthing, an earth continuity conductor shall be run through the conduit. The earth continuity conductor shall be a bare copper wire of minimum size 2.5 sq. mm and shall be continuous between terminals. All metal boxes shall be equipped with an earth terminal. Each final sub-circuit that is required to be earthed shall be provided with its own individual earth continuity conductor which shall be run from a terminal on the earth bar in the distribution board or consumer's

control unit protecting the particular final sub- circuit. Attention is drawn to the requirements to install earth continuity conductors when plastic conduit systems are used. The load and return conductors of the same circuit or circuits shall, in all cases, be drawn in the same conduit.

Not more than six final sub-circuit cables shall run in conduits feeding outlet boxes without the approval of the Engineer. Not more than eight cables running straight back to the distribution board shall be enclosed in any one conduit.

Cables shall be terminated at equipment positions unless otherwise indicated, by means of either sweated lugs of appropriate size eyelet type cable termination, or crimped type termination of reputable manufacture. Shake proof washers shall be used where electric motors are connected. Holes.

Cables shall be fitted with thimbles where cable cores are larger than terminal

Cables shall be doubled or twisted back on themselves for all single connections, firmly twisted together before any connection is made and pinched screws shall not be permitted to cut the conductors.

2.43 Sub-circuit wiring

No lighting circuits shall comprise more than 10 points. Cables with different cross-sectional area of copper shall not be used in combination.

Power circuit P.V.C. cable shall be:

(i) 2.5 sq. mm for one, two or three 5 amp sockets wired in parallel

(ii) 2.5 sq. mm for one 15 amp socket.

(iii) 2.5 sq. mm for one or two 13 amp sockets wired in parallel from 20 amp fuseway

(iv) 2.5 sq. mm for a maximum of six 13 amp sockets wired from a 30 amp fuseway.

(v) 4 sq. mm for ring main containing a maximum of ten 13 amp sockets wired from a 30 amp fuseway.

2.44 Armoured cables

An approved system of compression terminations as recommended by the cable manufacturer shall be used. For cables 16 sq. mm and upwards terminations to be swaged and fitted with ferrules.

To eliminate the possibility of damage to cables due to thermal expansion, allowance for movement shall be made by the introduction of a bend or set in each core adjacent to the terminal.

The cables shall be terminated at the equipment served by a mechanical type cable gland. The glands shall be complete with armouring clamps suitable for bonding the armouring to the unit served by means of copper tape, and the bonds shall be carried out at the time of making the joints. PVC shrouds shall be fitted over terminal cable glands.

The wire armour of the cable shall be used wholly as an earth continuity conductor and the resistance of the wire armour shall have resistance not more than twice 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 glands and a P.V.C. tapered sleeve shall be provided to shroud each gland.

2.45 Heat resisting cable

Final connections to cookers, water heaters, etc. shall be made using butyl rubber insulated cable as C.M.A reference 6101v butyl (single core 600/1000 volts).

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 F is likely to be experienced) shall be made using silicone rubber insulated cable or equal approved.

2.46 Flexible cords

Shall be cord not less than 0.75 sq. mm in size, unless otherwise specified, to B.S. 6500.

Circular white twin T.2.S. flex shall be used for plain pendant fittings up to 100 watts. For all other type of lighting fittings the flexible cable shall be silicone rubber insulated.

2.47 Main cables

Cables shall at all times be handled with care and every effort made to avoid damage. Unloading, rolling to position and mounting of cable drums shall be carried out efficiently and carefully in the recognised manner and cable shall be pulled from the top of drum and twisting shall at all times be avoided.

Adequate numbers of drum jacks, rollers and other handling accessories shall be used and make-shift arrangements will not be tolerated. In all cases care shall be taken to break the rotation of the drum and cable shall not be dragged over loose earth, concrete or any surface but shall be adequately supported on rollers or man-handled into position.

The Contractor shall take particular care to avoid damage to other services which may run adjacent to or across the route of the cable being installed.

Cables shall be installed with a minimum of 200 mm clearances of any equipment or pipe work including lagging associated with other services. Where this condition is unavoidable or difficult to maintain the Engineer shall be informed prior to the installation being commenced, otherwise the Contractor may be called upon to divert or adjust the route of any cable so affected.

Cables shall not be installed within 300 mm of a metal roof, unless clipped to the lower side of wooden joists or otherwise protected from radiant heat.

Cables passing through structural floors shall be tightly wrapped with protective tape and grouted in with a hardwood filler below, shaped to suit the cables passing through.

Where cables are run vertically, heavy gauge sheet metal guards shall be supplied and fixed to the wall. The casing shall be fixed from floor level to the underneath side of the appropriate end dividing box or to a height of 1.5 metres above floor level.

Where cables run through service ducts or cable trenches they shall be fixed by means of purpose made cable hangers which shall be of the "Unistrut" pattern.

Hangers shall be of non-ferrous metal and shall be treated with one coat of metal primer and two coats of anticorrosive paint and shall be suitable for horizontal and vertical mounting either cast in or secured to concrete structure using such brackets and adaptors as are available from the manufacturers.

Hangers shall be spaced according to BSEN 7671 or to the manufacturer's recommendations, as appropriate, for the supports of the cables. The Contractor shall take particular care to avoid sagging or stress on any cable by wrongly positioned or inadequately spaced hangers.

Single and multi-way cleats shall be of cast alloy, interlocking pattern, for mounting either on steel channels or directly to concrete structure in the case of single-way cleats.

The sizes of cleats shall be selected such that all cleats can be tightened down without exerting undue pressure or strain on the cables.

In the case of vertical cables the cleats shall be so designed and of sufficient number to grip the cable firmly to prevent creeping. No cable shall run without fixing and all cable hangers and racks shall be approved by the Engineer before installation.

Where cable routes are subject to numerous changes in level and direction, additional cable hangers shall be provided to satisfactorily negotiate all such obstructions.

Where cables are spaced some distance from a supporting surface, the cable racks shall be separately bolted to additional lengths of channel section which in turn shall be fixed to brackets bolted and fixed into the structure. Cables shall be colour correct throughout their length.

Identification for cables installed within buildings shall be supplied and attached to each cable at intervals not greater than 15 metres and at all conspicuous positions such as within cable ducts, manholes, and at all cable terminations.

Discs shall be machine engraved from non-deteriorating black "Traffolite" or similar material, display white engraving indicating the design voltage, the designation of load, and the number and cross sectional area of the cores.

The characters shall not be less than 3 mm high and shall be clearly legible.

After the installations of cables all ducts shall be adequately sealed to prevent the ingress of moisture. The sealing substance shall be of the non-hardening type.

2.48 Labelling

All plant, apparatus, equipment, distribution boards, distribution cases, terminals and cable cores shall be securely and properly labeled to the approval of the Engineer. The labeling shall clearly show the identification of the item and if applicable its control function and the part of the system controlled. Labels shall be of Traffolite sheet fixed with screws or rivets.

2.49 Earthing

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

(i) It shall be carried out in accordance with BSEN 7671 and in accordance with the

requirements of The Kenya Power and Lighting Co Ltd.

(ii) At all main distribution panels and main service positions a 25 mm x 3 mm 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 c.s.a to a copper electrode.

(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 isolation of 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 the installation is carried out in accordance with the figure stated in the current edition of the I.E.E. Regulations.

(vii) Where an earth rod is specified it shall be of proprietary manufacture, solid hand drawn copper of 15 mm diameter driven into the ground to a minimum depth of 3.6 m. It shall be made up of 1.2 m sections with internal screw and socket joints and fitted with hardened steel tip and driving cap.

Connections to the rod shall be by means of a purpose-made clamp of non-ferrous metal, and the actual connection made below ground level in a concrete inspection pit with removable inspection cove2.

(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 I.E.E Regulations, by the Contractor in the presence of the Engineer, and the 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 6 mm. 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, rivetted with a minimum of two copper rivets and sweated solid.

(xii) Where holes are drilled in the earth tape for connection to items of equipment the effective c.s.a must be not less than required to comply with the Regulations.

(xiii)Bolts, nuts and washers for any fixing to the earth tape must be of non-ferrous materials.

2.50 Lightning Protection Installations (Not Applicable)

The Electrical subcontractor shall supply and install a complete Lightning Protection System in accordance with BS 60 and as shown on drawings.

The system will comprise of 25 x 3 mm copper tape air termination conductor network at the roof linked to the ground via a 25 x 3 mm copper down conductor system run surface on walls up to 1800 mm from finished ground level where it is run in the RC columns.

A test terminal shall be provided for each of the down conductor and ground electrode link. 1500 mm long 12 mm diameter earth electrodes shall be provided as shown on drawings and complete with a pre-cast concrete 300 x300 x 300mm inspection chamber.

2.51 Insulation

The insulation resistance to earth and between poles of the whole wiring system, fittings and lamps, shall not be less than the requirements of BSEN 7671. Complete tests shall be made on all circuits by the Contractor before the installations are handed over.

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

2.52 Cable ends

All cable ends connected up in switchgear, M.C.B. 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 the appropriate phase colour. Black cable with black cable end markers shall only be used for neutral cables.

The wiring for impulse clocks, emergency lighting, and other systems, shall also have end markers of the same colours as the respective insulations detailed in the following clause.

All bus-bars shall be painted with colours corresponding to the phases, and cable boxes shall have the respective phase colours painted on the exteriors.

Phase colours shall be indicated on fuse switches, switch fuses, and isolators by means of coloured discs, minimum diameter 6 mm fixed to front covers.

2.53 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.

Non-braided P.V.C. cable shall be used unless otherwise stated in other clauses.

System	Insulation Colour	Cable End Marker	Lighting and Power
1)	Mains and sub-mains		
a)	Red Phase	Red	Red
b)	Yellow Phase	Red	Yellow
c)	Blue Phase	Red	Blue
d)	Neutral	Black	Black
2)	Sub-circuits single phase		
a)	Red Phase	Red	Red
b)	Yellow Phase	Red	Yellow
c)	Blue Phase	Red	Blue
d)	Neutral	Black	Black
3)	Sub-circuits three phase		
a)	Red Phase	Red	Red
b)	Yellow Phase	Yellow	Yellow
c)	Blue Phase	Blue	Blue
d)	Neutral	Black	Black
4)	Fire Alarm	Grey	Grey
5)	Impulse Clock	White	White
6)	Emergency lighting		

Phase	Red	Red
Neutral	Black	Black

2.54 Phase colouring of bus bars

Phase colouring of bus-bars in the switchboard and M.C.B. panels shall be as follows:-

Top Bar	-	Phase 1	-	Red	
Next Bar		-	Phase 2	-	Yellow
Next Bar		-	Phase 3	-	Blue
Next Bar		-	Neutral	-	Black

2.55 Vibration isolation

Vibration absorbing devices shall be used to isolate all motorized equipment including refrigeration plant, air handling units, fans etc., to ensure that no objectionable vibrations or sound be transmitted to the building structure.

Spring type isolation shall be of cast iron construction with floating top plate for leveling purpose complete with adjusting belt. The spring to be incorporated into this housing shall be as determined by the isolation manufacturer to provide 95% dampening efficiency.

Rubber vibration isolators shall be of the rubber in sheer type having a suitable arrangement of material to achieve compression and sheer in each direction. Sound pads of 6 mm ribbed neoprene shall be used with all isolators.

2.56 Lighting Fittings

The Contractor shall collect, install (including internal wiring) and connect all lighting fittings in accordance with the makes and types marked on the drawings, complete with the lamps of number, wattage and colour required by the Engineer.

Conduit suspensions shall be provided for all pendant fittings. The stems shall be screwed to ball and socket type dome lids with positive earth connection.

White break joint rings shall be provided wherever necessary. Circuit cables shall not be routed through bulkhead or other fittings where the cables would be liable to undue temperature rise and shall terminate in a fixed base connector in a conduit box mounted behind or adjacent to the fitting. Final connection to each fitting shall be carried out with silicone rubber insulated cable.

Conduit terminations to all aluminium fittings shall be fitted with brass bushes to prevent corrosive action between the steel and aluminium components. Where PVC conduit is used non-ferrous bushes may be replaced with an insulated pattern.

All fluorescent fittings shall be complete with quick starting control gear, power factor capacitors and "warm white" lamps. The metalwork of all fittings and starting equipment shall be effectively earthed to the installation. Fittings without a shunt connected PF capacitor shall incorporate a voltage dependent resistor to counteract surge voltages.

All fittings shall be cleaned with anti-static cleaning fluid prior to handover.

2.57 Security lighting installations

The layout of external security lighting installations is as shown on the layout drawing. The Contractor shall provide lighting columns in compliance with the details shown on the relevant drawings. These shall be primed and after installation painted to the approval of the Engineer

The cabling to various lighting columns shall be PVC SWA cables of the size and type as shown on the drawings. The cables shall generally be laid direct in ground at a depth of 600 mm with 50 mm sand bed under and over and provided with Danger Hatari concrete tiles throughout their length. Where cables cross roads or permanently finished surfaces these shall be drawn through PVC or concrete ducts provided by the Contractor.

The cables at the positions of the lighting columns shall be terminated by using brass compression glands. Each lighting column shall be provided with a lucy-cut-out fused at 5 amps. The cabling to the luminaire at the top of the lighting standard shall be 1.5 mm PVC with earth.

The lighting installations shall be controlled by means of a photoelectric cell operating a suitably rated contactor.

The luminaires complete with lamps shall be provided under this Contract.

2.58 Fire Detection and Alarm system (Not Applicable)

The Contractor shall be responsible for supplying, installing, wiring and commissioning a complete fire alarm system to BS 5839: 2002.

The system shall consist of manual breakglass points, electronic sounders, smoke and heat detectors and a Fire Alarm panel complete with a charger and batteries installed in the positions shown on the drawings. The Fire alarm panel shall be connected to 240 v, 50 Hz A.C. power supply through a 13 amps unswitched fused spur unit incorporating a pilot light.

The system shall work in the event of a signal being initiated from any break-glass contact and all bells shall ring simultaneously. The bells shall continue ringing until manually reset at the panel.

On silencing the bells, the buzzer within the panel shall remain operative until such time that the glass for the break glass contact has been replaced.

The wiring throughout shall be in 1.5 sq. mm Fire Tuff cables, enclosed in 25 mm diameter pvc conduit. A completely separate and independent conduit system shall be used for wiring to fire alarm equipment.

The fire alarm system shall be commissioned by the specialist supplier who will also issue the completion certificate for the works

The operation of the fire alarm system on completion shall be demonstrated to the Engineer and the Owner and one copy of the operating instructions shall be provided to the Engineer and two copies to the Owner.

The Electrical subcontractor shall supply smoke and heat detectors, short circuit isolators and electronic sounders wired in 3core 1.5 mm sq fire resistant cables as FP200 or equal drawn in 25 mm diameter PVC conduit concealed in walls and slabs and as shown on drawings.

The Electrical subcontractor shall allow for the specialist supplier's testing and commissioning of the fire detection and alarm system in accordance with BS5839:2000 and to the satisfaction of the Engineer and Client.

2.59 Mechanical Equipment Power Installation.

The Electrical subcontractor shall supply and install all the mechanical circuits as shown in the schematic drawing comprising single PVC cables drawn in concealed conduit and surface mounted galvanized metal conduits to the water booster pumps and fire pumps.

The Electrical subcontractor shall supply and install all the TP& N Isolators in positions as detailed in this specification and as shown on the layout drawing.

The Electrical subcontractor shall supply, install and connect up all the cables up to the Isolators for the mechanical equipment and control panels.

2.60 Record drawings (as installed)

During the execution of the works the Contractor shall, in a manner approved by the Engineer record on working or other drawings at site all information necessary for preparing record drawings of the installed works. Marked-up working or other drawings and other documents shall be made available to the Engineer as he may require for inspection and checking.

Record drawings may, subject to the approval of the Engineer, include approved working drawings adjusted as necessary and certified by the Contractor as a correct record of the installation of the works.

They shall include but are not restricted to the following drawings and information:-

a) Working drawings amended as necessary but titled "Record Drawings" and certified as a true record of the "as installed" Works. Subject to the approval of the Engineer such working drawings as may be inappropriate may be omitted. b) Fully dimensioned drawings of all plant and apparatus.
c) General arrangement drawings of equipment, other areas containing plant forming part of the works and the like, indicating the accurate size and location of plant and apparatus suitable cross- referenced to the drawings mentioned in (b) above and hereinafter.

d) Route, types, sizes and arrangement of all pipework and ductwork including date of installation of underground pipe.

e) Relay adjustment charts and manuals.

f) Routes, types, sizes and arrangement of all electric cables, conduits, ducts and wiring including the date of installation of buried work.

g) System schematic and trunking diagrams showing all salient information relating to control and instrumentation.

h) Schematic diagrams of individual plant, apparatus and switch and control boards. These diagrams to include those peculiar to individual plant or apparatus and also those applicable to system operation as a whole.

Marked-up drawings of the installation of the works shall be kept up to date and completed by the date of Practical or Sectional Completion. Two copies of the record drawings of the works shall be provided not later than one month later.

The Contractor shall supply for fixing in sub-stations, switch rooms, boiler houses, plant rooms, pump houses, the office of the Maintenance Engineer and other like places, suitable valve and instruction charts, schematic diagrams of instrumentation and of the electrical reticulation as may be requested by the Engineer. All such charts and diagrams shall be of suitable plastic material on a stiff backing and must be approved by the Engineer before final printing.

Notwithstanding the Contractor's obligations referred to above, if he fails to produce to the Engineers approval, either:-

a) The marked-up drawings during the execution of the works, OR

b) The record drawings etc. within one month of section or practical completion; the Engineer may have these drawings produced by others. The cost of obtaining the

necessary information and preparing such drawings, etc. will be recovered from the Contractor.

The subcontractor shall prepare the as installed drawings at the completion for the subcontract. The drawings shall be in AUTOCAD Release 14 version and 3No. Sets of A3 hard copies

2.61 Spares

The Contractor shall prepare a schedule of manufacturers' recommended spares together with any special tools required for maintenance purposes. The schedules shall indicate the number of individual spares required for each items of plant included in the works and the cost of each item.

2.62 Maintenance manual

On practical completion of the works, the Contractor shall provide to the Engineer 2 copies of a Maintenance Manual relating to the installation of the Works.

The Manual shall be loose-leaf type, international A4 size with stiff covers, cloth.

The Manual shall contain full operating and maintenance instructions for each item of equipment, plant and apparatus, set out in a form dealing systematically with each system. It shall include the following and any other items listed in the text of the specification:

a) System description
b) Plant
c) Valve operation
d) Switch operation
e) Procedure for fault finding
f) Emergency procedures
g) Lubrication requirements
h) Maintenance and servicing periods and procedures
i) Colour coding legend for all services
j) Schematic and wiring diagrams of plant and apparatus
k) Record drawings, true to scale, reduced to international A4 size
l) Lists of primary and secondary spares

2.63 Checking of work

The Contractor shall satisfy himself as to the correctness of the connections he makes to all items of equipment supplied before it is put into operation. Details of operation, working pressures, temperatures, voltages, phase, power rating, etc. shall be confirmed by manufacturers or their agents, the confirmation to be received before the system is first operated.

2.64 Temporary and trial usage

It shall be understood and agreed that temporary or trial usage by the Owner of any device, machinery, apparatus, equipment or any other work or materials supplied

under this Contract before final completion and written acceptance by the Engineer is not considered as evidence of acceptance of the item by the Owner. It is further understood and agreed that the Owner shall have the privilege of such temporary and trial usage as soon as the Contractor shall claim that the said work is completed in accordance with the drawings and Specification and to the manufacturer's instructions, and for such reasonable length of time as the Engineer shall deem suitable for making a complete and thorough test of the apparatus or system under test.

No claim for damage will be made by the Contractor for injury to or breaking of any parts of the Works which have been placed under test and which has been caused by weakness, flaw, or inaccuracy of structural parts or by defective material or workmanship of any kind whatsoever.

2.65 Setting to work and regulating the system

Each system shall be properly balanced, graded and regulated to ensure that correct distribution is achieved and where existing installations are affected, the Contractor shall also regulate these systems to ensure that their performance is maintained.

The proving of any system of plant or equipment as to compliance with the Specification shall not be approved by the Engineer, except at his discretion, until tests have been carried out under operating conditions pertaining to the most onerous conditions specified except were the time taken to obtain such conditions are unreasonable.

2.66 Tests at Contractor's works

The Engineer shall have access at all reasonable times to such parts of the Contractor's or his sub-contractor's works as may be necessary for the purpose of inspecting, examining and testing the materials, workmanship and performance of plant.

Except where otherwise provided, the Contractor shall provide all labour, materials, power, fuel, stores, apparatus and properly calibrated and certified instruments for carrying out necessary tests at his own or his sub-contractor's works.

2.67 Testing on site

Upon completion of the works the Contractor shall subject all systems to an operating test in which he shall adjust all controls, speeds, etc., all to the satisfaction of the Engineer.

Test Certificates are to be provided by the Contractor and signed by the Engineer who witnesses the test. All test certificates are to be submitted to the Engineer and shall contain the following particulars therein:-

a) Earth continuity;
b) Neutral earth loop impedance;
c) Insulation resistance;
d) Earth resistance

For the purpose of all tests the Contractor shall provide all apparatus, attendance and assistance necessary together with all skilled labour and shall if requested, demonstrate the accuracy of any installation.

On completion, the installation must be tested in accordance with BSEN 7671: Part 7 and the Contractor must allow for preparing a test report for submission to the Engineer and the Kenya Power & Lighting Co. Ltd.

2.68 Hand-over

Practical completion shall occur and the Defects Liability Period shall commence only when the works and supporting services have been tested, commissioned and operated to the satisfaction of the Engineer and the Owner, and when KP & L approval has been obtained in writing.

The Contractor shall arrange with the Engineer and the Owner for a complete demonstration of each and every service to be carried out and or instruction to be given to the relevant operation staff of the Owner.

The Contractor shall prepare approved check lists of all controls and items of equipment, tools, spares and the like; he shall provide the 'as built' drawings and maintenance manual required herein; and shall clear the site and the installed systems of all surplus material, rubbish and dirt; prior to handing over the works.

PARTICULAR SPECIFICATIONS FOR SECURITY SYSTEMS

Instructions to Bidders:

1. Bidders **MUST** complete the Table below in the format provided.
2. Bidders **MUST** provide a substantive response in the format provided, irrespective of any attached technical documents. **Use of Yes, No, tick, compliant, blank spaces** etc. in the Technical Specification Table will be considered **Non Responsive**.
3. Bids MUST meet all mandatory **(MUST) requirements** marked 'M' in the Table below in order to be considered for further evaluation.

The Security System will be a unified platform comprising Access Control system (ACS) and Closed Circuit Television (CCTV) will be an expansion/extension of the existing system at Ushuru Pension Towers (UPT).
The system at Ushuru Pension Towers will be integrated with an existing system at Times Tower over the existing KRA wide area network (WAN) infrastructure.

The proposed unified platform software will have the following capabilities:-

- Access Control management
- Fire Alarm panel integration
- Map Interface with GIS live maps.
- Site threat level management.
- Video Management (CCTV)
- Ability to integrate to perimeter detection, UVSS (Under Vehicle Surveillance Solutions and luggage scanners
- Intrusion Detection System (Alarm system)
- Public Address System.

The access control system will include the following functional features;

- • Badge design & printing (Card configuration and issuing cards to staff)
- Visitor management (To issue visitors with access cards at the main reception to enable them visit different floors depending on their need).
- Time and attendance
- Guard tour
- Threat level management.
- Map interface showing all components of CCTV, ACS, LPR (License Plate Recognition), and intrusion.
- Federation (centralized monitoring and reporting across multiple sites)

Integration with Times Tower

The access control system solution to be installed MUST be integrated with the existing system in Times Tower and provide the following functionalities;

1) Centralized and onsite user registration,
2) Centralized and onsite access card activation,
3) Centralized and onsite access card deactivation,
4) Centralized and onsite user access level assignment,
5) Centralized change of user credentials from Times Tower,
6) Centralized generation of various user reports i.e. accessed areas, attendance, number of visitors in the building, visitors per floor, individual movement trails for staff/visitors etc.
7) One access card (Global cardholder management) will be used to access Times Tower, CBC, Fortis and Customs House Mombasa,

Training

The successful bidder will offer training to ten (10) KRA technical staff for the management of the unified platform at the site.

Support & Maintenance

Annual Preventive Maintenance contract as follows.

1. 1st Year for Existing system as per the specifications in **appendix 1,**
2. Three years for the entire system after the first year (new and existing) as per the specifications in **appendix2.**

DOOR CONTROLLER

IP BASED SINGLE DOOR CONTROLLER				
Specifications		Marks	Bidders Response	Score
Brand Model/Technology	Mature internationally recognized brand, in existence for at least 10 years (bidder **must** specify brand and model)			
	Manufacturer/Brand	5		
	Model	5		
	Technical Data sheet	5		
General Function	Controls readers, and door locks, and accepts inputs from door contacts and exit buttons, receives the entire configuration from the Access control server and is capable of stand-alone operation if the connection to the Access control server fails.	2		
Reader Support	2 Reader configuration (Entry and Exit)	1		
	Support Wiegand, proximity, magnetic, integrated keypad, smart card, RS-485	1		
	Support 3rd Party Readers from other manufacturer's	1		
Reader Input Protocols	Wiegand Data1/Data0, Magnetic Clock/Data, Custom Protocols Available	2		
Power Input	12VDC	2		
Power Output	12VDC, typical 250mA per reader	2		
Software Compatibility	Compatible with 3rd Party Security Management Software	2		
Outputs	3 (2 Readers outputs and 1 Auxiliary)	2		
Relays	Supports 2 Relay Outputs (1 Door strike, 1 Auxiliary)	2		
Access Levels	Supports 38 Access Levels Per Card	2		
Communication Interface	Ethernet communication	1		
Number of Cards in Stand-Alone Mode	Full Stand Alone Operation with Local database of 20,000 cards or 7,000 events	2		
Inputs	3 Inputs (1 Door Contact, 2 Auxiliary) (Supervised or Unsupervised)	2		
Security	Support up to 4 high security external relays Inbuilt electronic tamper	2		
Compliant Standards	CE, RoHS	1		
Manufacturers Authorization	Attach manufacturers authorization	10		
Warranty	3 years	2		
Total		**56 Marks**		
Cut-Off Marks		**54 Marks**		

MASTER CONTROLLER

IP BASED MASTER CONTROLLER				
Feature	**Minimum Specifications**	**Marks**	**Bidders Response**	**Score**
Brand Model/Technology	Mature internationally recognized brand, in existence for at least 10 years (bidder must specify brand and model)			
	Manufacturer/Brand	5		
	Model	5		
	Technical Data sheet	5		
General Function	A complete 96 Reader Intelligent System Controller ready for interfacing with field devices (single-door intelligent controllers) for access control system	2		
On-Board Memory	Up to 1,240,000 Cardholders or 65,535 Events with 8 MB of RAM	3		
Ethernet connectivity	Full Ethernet Connectivity to host and devices	3		
Access Levels	38 Access Levels per Card/255 Access Levels/Precision Access	3		
Activation/Deactivation	Timed Card Activation/Deactivation	2		
Memory Backup	Supported by on board power	2		
Communication	2 Host Ports (RS-485 or Ethernet 100 Base-T 4 Device ports (RS-485, RS-232, Ethernet 100 Base-T	2		
Inputs	1 Cabinet Tamper; 1 Power Fault	2		
Devices Control	96 Device Control (Readers, Alarm Panels, Status Panels)	2		
Operations Conditions	Operating Tem: -40 to 85° C Relative Humidity: 0 to 95%, non-condensing	1		
Compliant Standards	CE, RoHS	1		
Manufacturers Authorization	Attach manufacturers authorization	10		
Warranty	Provide System Management Agreement (SMA) between the client (Kenya Revenue Authority) and the manufacturer for three (3) years	5		
Total Marks		**56 Marks**		
Cut-Off Marks		**54 Marks**		

PROXIMITY CARD READER

HIGH SECURITY PROXIMITY CARD READER				
Feature	**Minimum Specifications**	**Marks**	**Bidders Response**	**Scores**
Brand Model/Technology	Mature internationally recognized brand, in existence for at least 10years (bidder must specify brand and model)			
	Manufacturer/Brand	5		
	Model	5		
	Technical Data Sheet	5		
Size/Form Factor	Single Gang Wall Proximity	4		
General Features	Architected for maximum security Support multiple card types Readers will also store time zones and access levels related to their part of the system The readers will have all inputs and outputs to support one additional door and an industry standard Wiegand output reader	4		
Typical Read Range	2.4" (6 cm) or 3.6" (9 cm	2		
Powerfully Secure	Provides layered security beyond the card media for added protection to identity data using SIOs.	2		
Adaptable	Interoperable with a growing range of technologies and form factors including mobile devices utilizing Seos	2		
Interoperable	Open Supervised Device Protocol (OSDP) for secure, bidirectional communication.	2		
Versatile	Extended read range is available for applications such as parking and gate control solutions.	4		
Card Support	13.56MHz card compatibility 125kHzcardcompatibility	2		
Supported outputs in Wiegand Mode	40 bits; 64 bits;	2		
Operating Range	Temperature: -35° - 65° C Voltage: +5 – 16 VDC	2		
Certifications	UL294/cUL (US), FCC Certification (US), IC (Canada), CE (EU), RCM (Australia, New Zealand), SRRC (China), KCC (Korea), NCC (Taiwan), iDA (Singapore), RoHS, FIPS201 Transparent FASC-N Reader4, MIC (Japan)4	2		
Warranty	3 years	2		
	Total Marks	**45 Marks**		
	Cut-Off Marks	**43 Marks**		

BIOMETRIC FINGER PRINT READER

IP BASED BIOMETRIC READER				
Feature	**Minimum Specifications**	**Marks**	**Bidders Response**	**Score**
Brand Model/Technology	Mature internationally recognized brand, in existence for at least 10 years (bidder must specify brand and model			
	Brand	5		
	Model	5		
	Technical Data Sheet	5		
Frequency	RF Option: 125KHz EM, 13.56MHz Mifare/DesFire, 13.56MHz iClass Has the Multi-Controller capacity	4		
Fingerprints capacity	10,000 templates (5,000 users)	6		
Identification speed	2,000 match in 1 second	2		
Logs capacity	Max. Text Log: 50000	2		
I/O interface	TTL input/output: 2 inputs for exit switch and door sensor	2		
Relay support	Internal relay: Deadbolt, Electro-magnetic (EM) lock Door strike, automatic door	2		
CPU:	1.0 GHZ	5		
LED Indicator:	Multi-Color	2		
Sound	Multi-tone Buzzer	2		
Operating Temperature	-20° to 50°C	1		
Tamper	Yes	1		
Manufacturers Authorization	Attach manufacturers authorization	10		
Warranty	2 years	2		
Total Marks		**56 Marks**		
Cut-Off Marks		**54 Marks**		

UNIFIED SERVER FOR ACCESS CONTROL AND CCTV (Two Servers)

The servers will be configured for redundancy for the existing system (two servers) as well as failover for the system at Ushuru Pension Plaza				
Specifications		Marks	Bidders Response	Score
Model and Technology	Mature internationally recognized brand, in existence for at least 10 years (bidder must specify brand, model and series)			
	Manufacturer/Brand	5		
	Model	5		
	Technical Data Sheet	5		
Remote Users	Unlimited concurrent users	1		
OS:	Windows Server (64 bit) Server 2016 (64 bit)	1		
Mobile client:	Support for Android and iOS devices	1		
Password profile:	Multiple protection levels	1		
Encryption:	Up to 4096 bit encryption	1		
Remote Administration:	Remote Administration: Remote control via TCP/IP network including restart and rebooting	1		
Advanced events:	Shows a real time stream of incoming events and alarms on the main window	1		
Event notification:	Via client viewer, email or TCP/IP message	1		
CPU:	Intel® Xeon® E5-2600 v4 product family	5		
CPU Speed:	E5-2620 v4 (8 core, 2.1GHz, 85W)	5		
Processor cache	20MB L3	1		
Form factor	2U rack	1		
Memory:	64 GB	5		
Hard disk type:	SAS SFF hot plug drives	1		
Hard disk space:	4TB	5		
Network	331i 4 ports -upgradable	3		
Network Port Speed	-1000 Mbps	1		
Power:	Input Voltage 240V ac , 50Hz	1		
Energy Smart	Two Hot plug high efficient 500w PSU	1		
Drives	3.5” Hot-plug hard drives	1		
Power	Hot-plug redundant power	1		
Cooling	Hot-plug redundant cooling	1		
Memory	Must have spare row for memory	1		
Redundancy	The servers will be configured as a backup (redundancy) for the existing system (two servers)	10		
Failover	Configure the server as a failover between Ushuru Pension Towers and Times Tower. When the system fails over, the following functions should be performed from either side.			
	System Administrator should be able to monitor both systems	1		
	All the equipment (CCTV & ACS) should be online	2		
	System Administrator should be able to register new users and it should synchronize on both systems	1		
	System Administrator should be able to deactivate users and it should synchronize on both systems	1		

	System Administrator should be able to give temporary cards to users and it should synchronize on both systems	2		
	System Administrator should be able to generate user reports	2		
Failover, redundancy software and licenses	Supply, install (configure), test and commission the failover and redundancy software's with one off license's for the four servers	20		
Manufacturers Authorization	**Attach manufacturers authorization**	10		
Warranty	3 years on hardware and software	5		
Total Marks		**110 Marks**		
Cut-Off Marks		**105 Marks**		

ACCESS CONTROL AND CCTV SOFTWARE (UNIFIED PLATFORM

UNIFIED PLATFORM				
Specifications	Minimum Requirements	Marks	Bidders Response	Score
Model and Technology	Mature internationally recognized brand, in existence for at least 10 years (bidder must specify brand, model and series)			
	Manufacturer/Brand	5		
	Unified Platform	5		
	Technical Data Sheet	5		
	The ACS will have the following functionalities:-			
	Time and attendance (First in and Last out)	1		
	Automatic alarm notification for all faulty cameras, door controllers and master controllers for: -			
	Camera temper	5		
	Network connectivity	5		
	Camera not recording	5		
	Door held open	5		
	Anti-pass back,	1		
	Visitors Management module-issue visitors' cards and retrieve data from database for repeat visitors (come back visitors)	5		
	Web Client (mainstream browsers supported),	1		
	Card holder Video Verification- Validate cardholder pictures against live or recorded video for every door within any monitoring or reporting task.	1		
	Badge printing & design for staff and visitors	1		
	Encrypted communication with two-way authentication,	1		
	High Level Elevator Interface support,	1		
	Support for different types of readers	1		
	Real time area presence tracking	1		
	Database: Licensed enterprise version	1		
	The unified access control and CCTV system at Ushuru Pension Towers (UPT) (onsite) solution to be installed MUST be integrated with the existing system in Times Tower (Central) and provide the following functionalities;			
	Centralized and onsite user registration	2		
	Centralized and onsite access card activation,	2		
	Centralized and onsite access card deactivation	2		
	Centralized change of user credentials from Times Tower for both sites,	2		
	Centralized generation of various user reports i.e. accessed areas, attendance, number of visitors in the building, visitors per floor, individual movement trails for staff/visitors etc.	2		

	The unified platform system will provide the following licensed features:			
	Video Management (CCTV),	1		
	Automatic Number plate recognition,	1		
	Integrate to perimeter detection, equipment and intrusion Detection System (Alarm system)	5		
	Integrate fire detection and alarm system with the access control system so that incase of fire alarm all doors are released(open)	10		
	Badge design & printing (Card configuration and issuing cards to staff and visitors	1		
	Visitor management (To issue visitors with access cards at the main reception to enable them visit different floors (access levels) depending on their needs).	1		
	Time and attendance (First in and Last out)	1		
	Forensic video Search	5		
	The access control system should support the anti-pass back (APB) to avoid tailgating,	1		
	High Level Elevator Interface support	1		
	Threat level management,	1		
	Map interface showing all components of CCTV, ACS, LPR, intrusion.	5		
	Federation (centralized monitoring and reporting across multiple sites)	1		
Version	Enterprise edition with one off (perpetual) license	10		
Upgrade	Upgrade the existing two servers to enterprise edition unified platform with one off (perpetual) license	10		
Archiving	Will have a one off license archiving module and be configured with the NAS box with the existing two (2) servers and one (1) NAS box for archiving	7		
Training	Ten (10) KRA staff local training	5		
Manufacturers Authorization	Attach manufacturers authorization	10		
Warranty	Provide System Management Agreement (SMA) between the client (Kenya Revenue Authority) and the manufacturer for three (3) years	5		
Total Marks		**141 Marks**		
Cut-Off Marks		**134 Marks**		

PRINTER

PRINTER				
Feature	Minimum Specifications	Marks	Bidder's Response	Score
Model and Technology	Mature internationally recognized brand, in existence for at least 10 years (bidder must specify brand, model and series)			
	Manufacturer/Brand	5		
	Model	5		
	Technical Data Sheet	5		
General Specifications	Dual-sided printing module, edge-to-edge printing Color-dye sublimation and monochrome thermal transfer 300 dpi print head (11.8 dots/mm) 16 MB of RAM.	5		
Supported Platforms	Windows™ 7 (64 bit), XP, Vista (64 bit), Windows XP & Mac OS X	2		
Card Feeder Capacity	100 cards (0.76 mm --- 30 mil)	5		
Card Types	All PVC, Composite PVC cards, PET, ABS & varnished cards	2		
Connections	USB Ethernet TCP-IP 10BaseT, 100BaseT (Traffic Led)	2		
Display	• Printer LEDs Graphic notifications from the printer: Empty feeder, cleaning, "approaching end-of-ribbon" and "end-of-ribbon" warning	1		
Warranty:	3 year manufacturer's warranty.	2		
Total Marks		34 Marks		
Pass Marks		32 Marks		

LIFECAM HD WEB CAMERA

LIFECAM HD WEB CAMERA				
Feature	Minimum Specifications	Marks	Bidder's Response	Score
Model and Technology	Mature internationally recognized brand, in existence for at least 10 years (bidder must specify brand, model and series)			
	Manufacturer/Brand	5		
	Model	5		
	Technical Data Sheet	5		
General Specifications	Max Digital Video Resolution:-1280 x 720	5		
Supported Platforms	Digital Zoom:4 x	2		
Card Feeder Capacity	Video Capture:-1280 x 720 @ 30 fps	5		
Card Types	Still Image Capture Resolution:-1280 x 720	5		
Connections	Features:-TrueColor Technology	5		
Display	Focus Adjustment:-automatic	3		
OS Required	Microsoft Windows 7 professional, Microsoft Windows 8 professional	2		
Color	Colored	2		
Audio Support	Yes	1		
Audio Support Features	Built-in microphone	2		
Computer Interface	USB 2.0	1		
Video Input Device Type	Color	1		
Connector Type	4 pin USB Type A	1		
Focus Adjustment	Automatic	1		
Warranty:	2 year manufacturer's warranty.	2		
Total Marks		53 Marks		
Pass Marks		50 Marks		

CCTV

INTRODUCTION

The system will be used for security and supervisory purpose. The system will be able to record pictures in a hard disk. The recorded pictures can be played back to get archived information whose duration depends on recording speed programmed. The schematic is shown in the drawings provided.

1. **CAMERAS**

i) OUTLINE

They will be used to capture pictures from various strategic positions. Their locations are shown in the drawings provided.

ii) TYPE

1.1. Cameras can be fixed dome or bullet type for external use and shall be as specified on the drawings and with the following specifications:

BUILDING INTERIOR SURVEILLANCE (INDOOR AREAS)				
TYPE: 6MP NETWORK INDOOR DOME CAMERA				
Specifications		**Marks**	**Bidder Response**	**Score**
Brand Model/Technology	Mature internationally recognized brand, in existence for at least 10 years (bidder must specify brand, model and series)			
	Brand	5		
	Model	5		
	Technical Data Sheet	5		
Power	Power over Ethernet IEEE 802.3af/802.3at	1		
Connectors	RJ45 10BASE-T/100BASE-TX PoE	2		
Image Sensor	1/2.9" progressive scan CMOS	2		
Lens	Varifocal, IR corrected, CS-mount 2.8–10 mm, F1.3	2		
Focusing	Auto	2		
Light Sensitivity	▪ Day Mode (Color image):0.24lux ▪ B/W: 0.03lux ▪ With IR Mode: 0.01lux	2		
IR Range	30 meters	2		
WDR	120 dB	2		
Video				
Compression	H.264, H.265Main Profile (MPEG-4Part 10/AVC), Motion JPEG	5		
Resolution	3072 x 1728 (6 MP) to 320X240	2		
Frame rate	30 fps @ 6 MP	5		
Video Streaming	Multiple, individually configurable streams in H.264andMotionJPEGControllableframe rate and bandwidth VBR/MBRH.264	5		

Image Settings:	Compression, Color, Brightness, Sharpness, Contrast, White balance, Exposure control, Exposure zones, Fine tuning of behavior at lowlight, Text and image overlay, Privacy mask,mirroringofimages,0°,180°rotation	5		
Internal recording	60 s pre alarm recording	1		
Memory	32 GB micro SDHC for automatic recording when connection to server is lost	5		
Audio line in	Must support	1		
Audio line out	Must support	1		
Operating Conditions	-20 °C to 50 °C with PoE	1		
Accessories	Proper mounting kit as will be determined on site	1		
System Support	Onvif compliance	5		
Supported Protocols	802.1x, DNS, DNSv6, DDNS (DynDNS.org, selfHOST.de, no-ip.com), SMTP, iSCSI, UPnP (SSDP), DiffServ (QoS), LLDP,SOAP, Dropbox™, CHAP, digest authentication	1		
Casing	Rating: IK10 impact resistant aluminum enclosure	1		
Warranty	3 Years on hardware and software	2		
Total Marks		**71 Marks**		
Cut-Off Marks		**68 Marks**		

2. **MONITORS**

The monitors will be used to display multi-screen and spot screen of live and /or recorded pictures.
The Monitor should be of High Definition.
The monitor should meet the following specifications.

Specifications		**Marks**	**Bidder's Response**	**Score**
Model and Technology	Mature internationally recognized brand, in existence for at least 10 years (bidder must specify brand, model and series)			
	Manufacturer/Brand	5		
	Model	5		
	Technical Data Sheet	5		
Type:	LED Commercial Screens c/w Wall Mounting brackets	10		
Size:	As Specified in Bills of Quantities with **49**"as a Minimum	2		
Native Resolution:	Minimum 1920 x 1080p full HD native resolution	2		
LED Backlight Technology:	Must use energy saving LED backlighting rather than cold cathode fluorescent lights (CCFL)	2		
PIP:	Must provide picture-in-picture (PIP) for any combination of 2 inputs.	2		
Energy Star certified:	Must be energy Star certified, ensuring reliability in a 24/7 security installation environment	2		
Design:	Must be constructed of a lightweight aluminum frame composition for desktop or wall-mount installations.	2		
Compliance:	ENERGY STAR® Level 5.1 Compliant	1		
Response Time:	6.5ms Response Time (typical)	1		
Viewing Angle (H/V):	178°/178°	1		
Refresh Rate:	60 Hz	1		
Panel Life:	50,000 plus hours (typical) as a Minimum	1		
Display Colours:	1.07 billion	1		
Panel Aspect Ratio:	16:9	1		
Connectors-Inputs:	1xHDMI, 1xVGA	1		
Power:	Input Voltage 240V ac , 50Hz	1		
Authorized distributor:	Attach Manufacturer's Authorization Form	1		
Location	The monitors will be installed in the existing control room	10		
Warranty:	3 years Manufacturer's warranty	4		
Total Marks		**50 Marks**		
Cut-Off Marks		**48 Marks**		

3 CLIENT WORKSTATION FOR THE MONITORS

CLIENT WORKSTATION				
Feature	Minimum Specifications	Marks	Bidder's Response	Score
Model and Technology	Mature internationally recognized brand, in existence for at least 10 years (bidder must specify brand, model and series)			
	Manufacturer/Brand	5		
	Model	5		
	Technical Data Sheet	5		
Processor	Processor – Intel i7 latest generation or Xeon E5 series.	5		
Chipset	Chipset: Intel® C612 chipset	5		
Operating System	Windows 10 Pro 64bit English	5		
Input output ports and Drives	Bays: Two internal 3.5" bays; two external 5.25" optical bays	1		
	Optical Drive: 16 X DVD+/-RW	1		
	Ports: 10 x USB, 2 x PS-2, RJ-45	1		
	Audio: 1 x microphone, 1 x headphone, 1 x internal speaker Audio line-in / microphone, Audio line-out	1		
	Monitor: No monitor (TV Screen will be used instead)	0		
Hardware Specifications	Graphics Card – NIVIDIA® Quadro® M2000 4GB with 4 Display Ports	3		
	Storage: Internal SATA 7200RPM, 1TB	3		
	Network Interface: 1000 Base-T	3		
Certification	FCC Class A	1		
Electrical Power	Input Voltage: 240 ±10% VAC, 50/60 Hz	1		
	Current: 0.875 A @ 230 VAC	1		
	Power Connector: Standard 3-conductor female socket	1		
Operating Conditions	Operating Temp: 32°F ~ 104°F (0°C ~ 40°C)	1		
Warranty:	3 year manufacturer's warranty.	2		
Total Marks		50 Marks		
Pass Marks		48 Marks		

4. **NETWORK ATTACHED STORAGE (NAS) BOX**

i) OUTLINE

These are the storage equipment for the CCTV system.
They will be installed in the existing security office at CBC.
The NAS box shall be as specified in the bills of quantities and with the following specifications:

IP BASED NAS BOX				
Specifications		**Marks**	**Bidder Response**	**Scores**
Brand Model/Technology	Mature internationally recognized brand, in existence for at least 10 years(bidder must specify brand and model)			
	Manufacturer/Brand	5		
	Model	5		
	Technical Data Sheet	2		
Capacity	90 Days for continuous recording for all cameras with supporting calculation from the Manufacturer	5		
Processor	Freescale™ ARM®v7 Cortex®-A9 dual-core 1.2GHz	4		
Flash Memory	512MB	4		
Memory	64 GB	4		
Archiving	Will be configured to store footage after the existing NAS box is full	10		
Hardware encryption engine	AES-NI	4		
Location	The NAS box will be installed in the existing security control room server room	10		
Power frequency	50/60Hz, single phase	2		
Warranty	3 years on hardware and software	5		
Total Marks		**50 Marks**		
Cut-Off Marks		**48 Marks**		

5. **CABLING**

Cabling shall be fibre optic or copper as specified in the bills of quantities.

6. NETWORK SWITCH

The Network switch should meet the following specifications.

Specifications		Marks	Bidder's Response /Comment (Do not use √ or X)	Scores
General Descriptive Requirement:	Enterprise standalone, High-density, High performance, Gigabit Ethernet switch. Layer 3 switching and basic routing to be supported. The switch MUST provide a seamless integration with the existing KRA network	4		
Model and Technology:	Mature internationally recognized brand, in existence for at least 10 years (bidder must specify brand, model and series)			
	Manufacturer/Brand	4		
	Model	4		
	Technical Data Sheet	4		
Network Ports:	Twenty four (24) Ports PoE+ Ethernet with 4 SFP gigabit Ethernet ports.	2		
PoE+ capable ports:	All ports, with up to 30W per port	2		
Features:	Must support (IPv4 and IPv6) features, advanced quality of service (QoS), rate limiting, Access Control Lists (ACLs)	2		
Total PoE+ power Budget:	390W Minimum for 24 port switch	4		
Power Source:	Dual power supply units, 240V, 50Hz	2		
Network Monitoring:	Compliant with IEEE SNMP standards. Capable of monitoring the Network up to Node Level. Management by a well-known and developed proprietary OS.	2		
Spanning Tree Protocol Technology:	Support for Spanning Tree Protocol Technology	2		
Security:	Port Level Security e.g. Port Filtering, Access Control Lists, Policy based routing etc. Management by a recognized proprietary operating system	2		
Compliance:	IEEE 802.1D STP, IEEE 802.1p CoS, Prioritization, IEEE 802.1Q VLAN, IEEE 802.1s, IEEE 802.1w, IEEE 802.1X, IEEE 802.1ab LLDP, Bluetooth v4.0, IEEE 802.3ad, IEEE 802.3af and IEEE 802.3at IEEE 802.3ah (100BASE-X, single/multimode fiber only), IEEE 802.3x full duplex on 10BASE-T, 100BASE-TX, and 1000BASE-T ports, IEEE 802.3 10BASE-T, IEEE 802.3u 100BASE-TX	2		
Authorized distributor:	Attach Manufacturer's Authorization Form	4		
End of life	The switch must not be a product that has/is reaching end of life support and end of sale in two years' time	10		
Warranty:	3 years on Parts, labour and software and next business day replacement for any hardware failure that may occur.	10		

	In addition, the equipment MUST include the Accelerated hardware replacement options, Operating assistance team, Online troubleshooting / support tools and proactive problem diagnosis services.			
Total Marks		**60 Marks**		
Cut-Off Marks		**57 Marks**		

GENERAL SPECIFICATIONS FOR DATA & STRUCTURED CABLING INSTALLATIONS.

1.1 Definition and Abbreviations.

1.1.1 Definitions.

For the purpose of this standard the following definitions apply:

(i) **Application**: A system, with its associated transmission method, which is supported by telecommunications cabling.

(ii) **Balance Cable**: A cable consisting of one or more metallic symmetrical cable elements (twisted pair s or quads)

(iii) **Building Backbone Cable**: A cable that connects the building distributor to a floor distributor. Building backbone cables may also connect floor distributors in the same building.

(iv) **Building Distributor**: A distributor in which the building backbone cable(s) terminal(s) and at which connections to the campus backbone cable(s) may be made.

(v) **Building Entrance Facility**: A facility that provides all necessary mechanical and electrical services, that complies with all relevant regulations, for the entry of telecommunications cables into a building.

(vi) **Cable**: An assembly of one or more cables units of the same type and category in an overall sheath. It may include an overall screen

(vii) **Cable Element**: The smallest construction unit in a cable. A cable element may have a screen.
NOTE: A pair, a quad, and a single fibre are examples of a cable element.

(viii) **Cabling:** A system of telecommunications cables, cords and connecting hardware that can support the connection of information technology equipment.

(ix) **Campus**: A premises containing one or more buildings.

(x) **Campus Backbone Cable**: A cable that connects the campus distributor to the building distributor(s). Campus backbone cables may also connect building distributors directly.

(xi) **Campus Distributor**: The distributor from which the campus backbone cabling emanates.

(xii) **Channel**: The end-to-end transmission path connecting any two pieces of applications-specific equipment. Equipment cables and work area cable are included in the channel.

(xiii) **Cross- Connect:** A facility enabling the termination of cable elements and either connection, primarily by means of patch cords or jumpers.

(xiv) **Distributor:** The term used for the functions of a collection of components (e.g. patch panels, patch cords) used to connect cables.

(xv) **Equipment Cable:** A cable connecting equipment to a distributor.

(xvi) **Equipment Room:** A room dedicated for housing distributors and applications-specific equipment.

(xvii) **Floor Distributor:** The distributor used to make connections between the horizontal cable, other cabling subsystem and active equipment

(xviii) **Generic Cabling**: A structured telecommunications cabling system, capable of supporting a wide range of applications. Applications – Specific hardware is not part of generic cabling.

(xix) **Horizontal Cable**: A cable connecting the floor distributor to the telecommunication outlet

(xx) **Hybrid Cable**: An assembly of two or more different types of cable units, cable or categories covered by an overall sheath. An overall screen may cover it.

(xxi) **Individual Work Area**: The minimum building space, which would be reserved for an occupant.

(xxii) **Interconnect:** A location at which equipment cables are terminated and interconnected to the cabling subsystems without using a patch cord or jumper.

(xxiii) **Interface:** A point at which connections are made to the generic cabling.

(xxiv) **Jumper:** A cable unit or cable element without connectors used to make a connection on the cross-connect.

(xxv) **Keying:** A mechanical feature of a connector system which guarantees correct orientation of a connection or prevent s the connection to a jack or optical fibre adapter of the same type intended for another purpose.

(xxvi) **Link:** The transmission path between any two interface of generic cabling. It excludes equipment cables and work area cables.

(xxvii) **Optical Fibre Cable**: (Or Optical Cable): A cable comprising one or more optical fibres cable elements.

(xxviii) **Optical Fibre Duplex Adapter**: A mechanical device designed to align and join two duplex.

(xxix) **Optical Fibre Duplex Connector:** A mechanical termination device designed to transfer optical power between two pairs of optical fibres.

(xxx) **Pair:** A twisted pair or one side circuit (two diametrical facing conductors) in a star quad.

(xxxi) **Patch Cord:** Flexible cable unit element with connector(s) used to establish connections on a patch panel

(xxxii) **Patch Panel**: A cross – connect designed to accommodate the use of patch cords. It facilitates administration for moves and changes.

(xxxiii) **Public Network Interface:** A point of demarcation between public and private network. In many cases it is the point of connection between the network provider's facilities and the customer premises cabling.

(xxxiv) **Screened Cable:** An assembly of two or more balanced twisted pair cable elements or more quad cable element wrapped by an overall screen or screen contained within a common sheath or tube.

(xxxv) **Screened Twisted Pair Cable:** An electrically conducting cable comprising one or more elements each of which is individually screened. There may be each of which is individually screened. There may be an overall screen in which case the cable is referred to as a screen twisted pair cable with an overall screen.

(xxxvi) **Splice**: A joining of conductors or fibres generally from separate cables.

(xxxvii) **Star Quad:** A cable element, which comprises four insulated conductors twisted together. Two diametrically facing conductors form a transmission.

NOTE 1. Cables containing star quad can be used interchangeably with cables consisting of pairs, provided the electrical characteristics meet the same specifications.

NOTE 2. Often the term quad is used instead of star quad.

(xxxviii) **Telecommunication:** A branch of technology concerned with the transmission, emission and reception of signs, signals, writing, images and sounds; that is information of any nature by cable, radio optical or other electromagnetic system. The term has no legal meaning when used in the document.

(xxxix) **Telecommunication Closet**: An enclosed space for housing telecommunications equipment, cable termination, cross – connect cabling. The telecommunications closet is a recognize d cross-connect point between the backbone and the horizontal cabling subsystems.

(xl) **Telecommunication Outlet**: A fixed connecting device where the horizontal cable terminates. The telecommunications outlet provides the interface to the work area cabling.

(xli) **Transition Point**: A location in the horizontal cabling where a change of cable form takes place.

NOTE: For example, where a flat cable connects to round cables or cables with differing numbers of elements are joined.

(xlii) **Twisted Pair:** A cable element, which consists of two insulated conductors twisted together in a determined fashion to form a balanced transmission line.

(xliii) **Unscreened Twisted Pair Cable (UTP)**: An electrically conducting cable comprising one or more pairs none of which is screened.
NOTE: There may be an overall screen, in which case the cable is referred to as unscreened twisted pair cable with an overall screen.

(xliv) **Work Area:** A building space where the occupants interact with telecommunications terminal equipment.

(xlv) **Work Area Cable:** A cable connecting the telecommunications outlet to the terminal equipment.

1.1.2 ABBREVIATIONS.

a.c Alternating Current

ACR	Attenuation to Crosstalk Ratio
ATM	Asynchronous Transfer Mode.
BD	Building Distributor
BFOC	Bayonet Fibre Optic ConnectorB-
ISDN	Broadband – ISDN
c	Velocity of propagation in free space
C	Connection
CD	Campus Distributor
CSMA/CD	Carrier Sense Multiple Access with Collision
Detection d.c	Direct Current
DUT	Device Under Test.
ELED	Edge Light Emitting Diode.
EMC	Electromagnetic
Compatibility EMI	
Electromagnetic Interference. EQP	
Equipment.	
ER	Equipment
Room. FD	Floor
Distributor	
FDDI	Fibre Distributed Data
Interface ffs	For further Studies.
IC	Integrated Circuit
IDC	Insulation Displacement
Connection. ISDN	Integrated Service Digital
Network.	
LAN	Local Area Network.
LCL	Longitudinal Conversion Loss
LCTL	Longitudal Conversion Transfer Loss
LED	Light Emitting
Diode. MUX	Multiplexor
N/A	Not Applicable.
N-BNC	N type to BNC convertor
NEXT	Near End Crosstalk Loss
PBX	Private Branch
Exchange.	
PMD	Physical Layer Medium
Dependent. S	Splice
SC	Optical Fibre Connector (Subscriber
Connector) SC-D	Duplex SC Connector.
STI	Surface Transfer Impedance.
TC	Telecommunications Closet.
TE	Terminal Equipment
TO	Telecommunications Outlet
TOC	Terminal Open
Circuit. TP	Transition
Point.	
TP-PMD	Twisted Pair Physical Layer Medium Dependent.

1.2 Standard Applicable

BS EN 50173: 1996 – Information Technology – Generic Cabling Systems

EIA/TIA – 568 – Maximum Cable distances for UTP cable

EIA/TIA – 569 – Quadratics for the design of horizontal, and work area pathways, building entrance facilities, telecommunication closets and equipment rooms.
EIA/TIA – 606 – Guidelines for labeling and administrating the components which comprises a structured wiring system.

1.3 Structure of the Generic Cabling System.

1.3.1 Horizontal Cabling Sub – System.

The horizontal cabling subsystem extends from a floor distributor to the telecommunication outlet(s) connected to it. T he subsystem includes the horizontal cables, the mechanical termination of the horizontal cables at the floor distributor, the cross – connection at the floor distributor and the telecommunication outlets.

Horizontal Cables should be continuous from the floor distributor to the telecommunications outlets.

1.3.2. Work Area Cabling.

The work area cabling connects the telecommunication outlet to the terminal equipment.

1.4 Floor Distributor.

There should be a minimum of one floor distributors for every 100m^2 of floor space reserved for offices. A minimum of one floor distributor should be provided for every floor.

1.5 Telecommunications Outlet

The telecommunication outlets are provided to serve a maximum of 10sq.m of usable floor space. Each individual work shall be served by a minimum of two. A minimum of one telecommunication outlet served by 100Ω cable shall be provided at each work area. Other outlets shall be supported by either balanced cables by optical fibre cable. When the outlet is supported by a cable, two pairs or four pairs shall be provided at each telecommunications outlet; all pairs shall be terminated.

1.6 Telecommunications Closets.

A telecommunications closet should provide all the facilities (Space, power, control etc) for passive components, active devices and public network interface housed within it. Each telecomm closet should have direct access to the backbone.

1.7 Earthing and Bonding.

Earthing shall meet the requirement of HD 384.5.54. Where compatible with required electrical codes, the earthing instruments and requirements of the equipment manufacturers should also be followed.

1.8 Horizontal Cabling.

The maximum horizontal cable length shall be 90m independent of medium. In establishing maximum length, a total mechanical length of 10m is allowed for works area cables, partial cords or jumpers, and equipment cables any horizontal segment.

1.9 Cable Requirement.

Generic Cabling system shall use cables in accordance with H.D. 608 or EN187000. In additions, Sectional Specifications E.N. 50167, EN 50168 and EN 50169 which cover overall screened, category 6 cables with low smoke zero Halogen Sheath Materials suitable for horizontal and backbone application.

1.10 Cable Installation Practices.

1.10.1 General.

Installations and cables management precautions that should be observed include the elimination of cable stress as caused by tension, sharp bend as and tightly cables.

In cabling pathways and in areas occupied by connecting hardware, cable Bends radius requirements shall be observed.

1.10.2 Cable Management.

In order to maintain consistent and correct point – to – point connections, provisions shall be made to ensure that termination provisions shall be made to ensure that terminations are properly located with present to connector positions and their corresponding cable elements.

Such provisions may include the use of colours, alpha – numeric identifiers on other means designed to ensure that cables are connected in a consistent manner throughout the system.

The untwisted length in a cable element as a result of termination to connecting hardware should be as short as possible. Also, for links with category 6 components, pair twisting should be provided to within 13mm.

1.10.3 Screening.

Screens are intended to improve electromagnetic compatibility performance. To achieve this effect they have to be properly bonded.

Screened cabling to be effective, requires that all cabling components are screened and meet requirements for transfer impedance.

Screening has to be continuous for the complete channel. This means that work is cables, equipment cables and the equipment attachment, shall also satisfy the continuity requirement.

1.11 Testing.

The installation must be tested to conform to ISO 11801 requirements for CAT 6 CABLING. These tested shall include but not limited to:

- Link Tests.
- Attenuation
- Near End Cross Talk (NEXT)
- Return Loss.
- ACR.
- Impedance.

PARTICULAR SPECIFICATIONS FOR STRUCTURED CABLING.

2.1 Location of the site

The site of the proposed work is along Elgon Road, Ushuru Pension Tower Building, Upperhill, Nairobi.

2.2 Description of the Project.

The proposed development comprises the fit out in an existing building.

The cabling in UTP cat 6A, 4 pair will be a star topology.

The works are to be executed in accordance to the description given in this document or any other directive issued by the client or the Project Manager or Engineer.

2.3 Extent of the Work.

The sub-contractor's work shall include the following:

(a) Providing horizontal cabling to the cabinet.

(b) Providing and connection of cabinet, patch panels, cable organizers and patch cords.

(c) Connection to all equipment into the workstations.

(d) Connection of terminal equipment plates and provision of work area cabling and patch cords.

(e) Providing the components for the data and telecommunication as specified in the bills of quantities.

2.4 Data Outlets

Instructions to Bidders:

1. Bidders **MUST** complete the Table below in the format provided.
2. Bidders **MUST** provide a substantive response in the format provided, irrespective of any attached technical documents. **Use of Yes, No, tick, compliant, blank spaces** etc. in the Technical Specification Table will be considered **Non Responsive**.
3. Bids MUST meet all mandatory **(MUST) requirements** marked 'M' in the Table below in order to be considered for further evaluation.

The Data outlets should meet the following specifications.

Feature	Minimum Specifications	Marks	Bidder's Response	Score
Model and Technology	Mature internationally recognized brand, in existence for at least 10 years (bidder must specify brand, model and series)			
	Manufacturer/Brand	5		
	Model	5		
	Technical Data Sheet	5		
Category	CAT 6A, UTP	1		
Connector	RJ45	1		
Wiring:	T568A/B	1		
Standards	ISO11501	1		
Authorized distributor	Attach Manufacturer's Authorization Form	1		
Warranty	20 year system performance assurance and product Warranty.	3		
Total Marks		**23 Marks**		
Cut-Off Marks		**22 Marks**		

2.5 Cabling and Patch Cords

Cables must be marked at both ends. A unique identifier shall be assigned to every cable, distributors and termination.

The Copper cables should meet the following specifications.

Feature	Minimum Specifications	Marks	Bidder's Response /Comment (√ or X)	Score
Model and Technology:	Mature internationally recognized brand, in existence for at least 10 years(bidder must specify brand and model)			
	Manufacturer/Brand	5		
	Model	5		
	Technical Data Sheet	5		
Category:	CAT 6A, UTP	1		
Connector:	RJ45	1		
Wiring:	T568A/B	1		
Gauge:	23AWG	1		
Pair count:	4 Pair	1		
PoE Support:	Suitable for PoE Type 1,2,3,4 and PoE	1		
Standards:	•ISO/IEC 11801-1 Ed.1.0 • ANSI/TIA 568.2-D • IEC 61156-5 Ed 2.0 (Category 6A) • UL CMR and CSA FT4 • UL CM, IEC 60332-1, Class Eca • LSOH: IEC 60332-1, IEC 60332-3-22, IEC 60754, IEC 61034, and EN 50575 Class Dcas1d1a1	1		
Applications Support:	• 10GBASE-T • 1000BASE-T • 100BASE-T • 10BASE-T • IEEE 802.3af (Type 1 PoE) • IEEE 802.3at (Type 2 PoE) • IEEE 802.3bt (Type 3 PoE) • IEEE 802.3bt (Type 4 PoE) • Power over HDBaseT (PoH)	1		
Authorized distributor:	Attach Manufacturer's Authorization Form	1		
Warranty:	20 year system performance assurance and product Warranty.	3		
Total Marks		**27 Marks**		
Cut-Off Marks		**26 Marks**		

2.6 Patch Panels.

Patch Panels shall be 24 ports as described in the bills of quantities, high density 19" suitable for RJ45 Jacks as Siemon or Equivalent and approved by Engineer.

The Patch Panel should meet the following specifications.

Feature	Minimum Specifications	Marks	Bidder's Response /Comment (√ or X)	Score
Model and Technology	Mature internationally recognized brand, in existence for at least 10 years(bidder must specify brand, model and series)			
	Manufacturer/Brand	5		
	Model	5		
	Technical Data Sheet	5		
Category	CAT 6A, UTP	1		
Connector	RJ45	1		
Wiring	T568A/B	1		
Footprint	1U,	1		
No. of ports	24 ports, as specified in the BoQ.	1		
Authorized distributor	Attach Manufacturer's Authorization Form	1		
Warranty	20 year system performance assurance and product Warranty.	2		
Total Marks		**24 Marks**		
Cut-Off Marks		**23 Marks**		

2.7 Equipment Cabinet.

Instructions to Bidders:

1. Bidders **MUST** complete the Table below in the format provided.
2. Bidders **MUST** provide a substantive response in the format provided, irrespective of any attached technical documents. **Use of Yes, No, tick, compliant, blank spaces** etc. in the Technical Specification Table will be considered **Non Responsive**.
3. Bids MUST meet all mandatory **(MUST) requirements** marked 'M' in the Table below in order to be considered for further evaluation.

The equipment shall be standard with capacity as indicated in bills of quantities. It shall incorporate cooling fans and ventilation fins to allow free movement of natural air. Space must be left between the stacks to enable free flow of air. The cabinets' standards must be of high quality finish as fabricated by APC or equal and approved, to the Approval of the Engineer.

The LAN Cabinet should meet the following specifications.

Feature	Minimum Specification	Marks	Bidder's Response /Comment (√ or X)	Score
Model and Technology:	Mature internationally recognized brand, in existence for at least 10 years(bidder must specify brand, model and series)			
	Manufacturer/Brand	5		
	Model	5		
	Technical Data Sheet	5		
Rack Height:	42U	1		
Rack Width:	19"	1		
PDU:	Rack unit to be c/w 2 no. PDUs.	1		
Protection Class:	IP20	1		
Approvals:	EIA-310E, UL 2416, UL 60950-1	1		
Authorized distributor:	Attach Manufacturer's Authorization Form	1		
Warranty:	5 year repair or replace.	2		
Total Marks		**23 Marks**		
Cut-Off Marks		**22 Marks**		

2.9 Tests.

Test results for CAT 6A UTP 4pair System must be provided complete with as installed drawings indicating cable routing and any other tests for the project may deemed necessary by either party.

FIRE ALARM SYSTEM TECHNICAL SPECIFICATIONS

Scope

Furnish a complete 24V DC (or to manufacturer's specification) addressable, electrically supervised, zone annunciated, fire detection and alarm system as specified herein and indicated on the drawings. The system shall include but not be limited to a control panel and/or Repeater panels with integral power supply to provide the 24V DC, signal initiating devices, audible and visual alarm devices, and all accessories required to provide a complete and operating system.

The fire alarm system shall be wired as 2 core signal loops. 24V DC power wiring shall be installed to alarm sounders via addressable sounder modules or via conventional monitored sounder outputs within the control panel.

Loop powered sounders shall be connected directly to the signal loops..

Codes and Standards

The following codes and standards shall apply to work of this section.

BS	- British Standards
ISO	- International Standards Organization
BS 5839	- Fire Detection and Alarm Systems for Buildings
ISO 9000	- Quality Management System

Qualifications of Installers

Installers of the products supplied for the fire alarm system shall have been in the business of installing Fire Alarm products for at least five years. They shall confirm compliance to the above codes and standards.

Fire Alarm Control Panel (FACP)

Functional Description

The fire alarm control panel (FACP) shall be the central processing unit of the system, receiving and analysing signals from fire sensors, providing audible and visual information to the user, initiating automatic alarm response sequences and providing the means by which the user interacts with the system. It shall be part of the security system.

The FACP shall be easily configurable to meet the exact detection zone and output mapping requirements of the building.

The FACP shall be microprocessor based and operate under a multitasking software program. Operating programs and configuration data shall be contained in reconfigurable non-volatile memory. Retention of the memory shall not rely on any form of battery or capacitor back-up device. The FACP shall incorporate separate processors for loop processing and central processing.

Provision shall be made for each addressable loop to be sub-divided into geographical zones. The section of wiring corresponding to each zone circuit shall be protected from faults in other sections by line isolator modules.

The fire alarm Main control panel should meet the following specifications.

Feature	Minimum Specifications	Marks	Bidder's Response	Score
Model and Technology	Mature internationally recognized brand, in existence for at least 10 years (bidder must specify brand, model and series)			
	Manufacturer/Brand	5		
	Model	5		
	Technical Data Sheet	5		
Mounting Type	Surface mount.	5		
Zone Capacity	48 zones	5		
Loop	4- loop versions as standard	5		
Standards	Certified to EN54-2, EN54-4	5		
Features	Loopless panel option(repeater)	1		
	Option for Enable Control key switch	1		
	48 zone indicator	1		
	Network up to 64 panels/repeaters	1		
	4 programmable sounder circuits as standard	1		
	5.25 amp power supply to EN54-4 part	1		
	Large graphic display	1		
	In built help and alarm information screens	1		
	Real time clock	1		
	Soft touch tactile button	1		
	3 programmable functions buttons	1		
	3 programmable front panel mounted LEDs	1		
	Front loading printer	1		
	Upto 512 programmable inputs/outputs per panel via 2 wire RS485 serial link	1		
Configuration features	Comprehensive day/night mode facility	1		
	Programmable one touch test mode	1		
	Powerful and versatile cause & effect programming	1		
	Disablement configuration	1		
	Test mode configuration	1		
Integration	Will be integrated with access control system to release (open) doors in case of fire alarm	5		
Location	Will be installed in the existing control room	10		
Training	The successful bidder will offer training to ten (10) KRA technical staff for the fire alarm and detection system locally.	10		
Warranty:	3 year manufacturer's warranty.	2		
Total Marks		**81 Marks**		
Cut-Off Marks		**77 Marks**		

Repeater Panel No. 1

Feature	Minimum Specifications	Marks	Bidder's Response	Score
Model and Technology	Mature internationally recognized brand, in existence for at least 10 years (bidder must specify brand, model and series)			
	Manufacturer/Brand	5		
	Model	5		
	Technical Data Sheet	5		
Mounting Type	Surface mount.	5		
Loop	4- loop versions as standard	5		
Standards	Certified to EN54-2, EN54-4	5		
	48 zone indicator	3		
	Network up to 64 panels/repeaters	1		
	5.25 amp power supply to EN54-4 part	1		
	In built help and alarm information screens	1		
	Real time clock	1		
	Soft touch tactile button	1		
	3 programmable functions buttons	1		
	3 programmable front panel mounted LEDs	1		
	Upto 512 programmable inputs/outputs per panel via 2 wire RS485 serial link	1		
Configuration features	Comprehensive day/night mode facility	1		
	Disablement configuration	1		
	Test mode configuration	1		
Location	Will be installed in Block BC ground floor	10		
Warranty:	3 year manufacturer's warranty.	2		
Total Marks		**56 Marks**		
Cut-Off Marks		**54 Marks**		

Repeater Panel No. 2

Feature	Minimum Specifications	Marks	Bidder's Response	Score
Model and Technology	Mature internationally recognized brand, in existence for at least 10 years (bidder must specify brand, model and series)			
	Manufacturer/Brand	5		
	Model	5		
	Technical Data Sheet	5		
Mounting Type	Surface mount.	5		
Loop	4- loop versions as standard	5		
Standards	Certified to EN54-2, EN54-4	5		
	48 zone indicator	3		
	Network up to 64 panels/repeaters	1		
	5.25 amp power supply to EN54-4 part	1		
	In built help and alarm information screens	1		
	Real time clock	1		
	Soft touch tactile button	1		
	3 programmable functions buttons	1		
	3 programmable front panel mounted LEDs	1		
	Upto 512 programmable inputs/outputs per panel via 2 wire RS485 serial link	1		
Configuration features	Comprehensive day/night mode facility	1		
	Disablement configuration	1		
	Test mode configuration	1		
Location	Will be installed in Block BC ground floor	10		
Warranty:	3 year manufacturer's warranty.	2		
Total Marks		**56 Marks**		
Cut-Off Marks		**54 Marks**		

Heat detectors

a) Allocate a zone
b) Set a delay before the panel responds to a fire signal
c) Indicate pre-alarm
d) Set day sensitivity and night sensitivity separately
e) Automatically address loop powered base sounder
f) Allocate a forty character location text message

The fire alarm heat detectors should meet should meet the following specifications

Feature	Minimum Specifications	Marks	Bidder's Response	Score
Model and Technology:	Mature internationally recognized brand, in existence for at least 10 years(bidder must specify brand, model and series)			
	Manufacturer/Brand	5		
	Model	5		
	Technical Data sheet	5		
Configuration Features	User selectable modes	3		
	Incorporates Fixed Temperature and Rate of Rise Heat elements	2		
	Requires the YBV-R/4 mounting base	1		
	Twin LEDs allow 360° viewing – green when polling, amber when isolating, red in fire	5		
	Pulsing/non-pulsing controlled from panel (1)	1		
	Electronically Addressed LPCB & VdS approved to Classes A1, B & C4	2		
Features	Operating Voltage 17 – 41 VDC	1		
	Low Power Mode (typ) 110 µA	1		
	Quiescent Current(typ) 350 µA	1		
	Quiescent Current Alarm Current (controlled by CIE) 9.1 mA (excluding remote indicator)	1		
	Current in Short Circuit 13.5mA	1		
	Transmission Method Digital Communications Using ESP	1		
	Operating Temperature Range -10 °C to + 50 °C	1		
	Operating Humidity 95% RH - Non Condensing (at 40 °C)	1		
	Storage Temperature Range -30 °C to +60 °C	1		
	Storage Humidity <80% RH at 70 °C	1		
	Colour / Case Material White	1		
	Weight (g) 95	1		
	Diameter (mm) / Height (mm) 100 / 45	1		
	Base Fixing Centres (mm) 48 ~ 74	1		
	Compatible Bases YBV-R/4	1		
Warranty	3 Years	3		
Total Marks		**47 Marks**		
Cut-Off Marks		**45 Marks**		

Fire alarm Smoke detectors should meet the following specifications

Feature	Minimum Specifications	Marks	Bidder's Response /Comment (V or X)	Score
Model and Technology:	Mature internationally recognized brand, in existence for at least 10 years(bidder must specify brand, model and series)			
	Brand	5		
	Model	5		
	Technical Data Sheet	5		
Configuration Features	Removable, High Performance chamber	3		
	Twin LEDs allow 360° viewing – green when polling, amber when isolating, red in fire	5		
	Locking mechanism (sensor to base)	1		
	Variable sensitivity	1		
	Electronically addressed	2		
	Pulsing/non-pulsing controlled from panel*1	1		
Features	Operating Voltage 17 – 41 VDC	1		
	Low Power Mode (typ) 120 µA	1		
	Quiescent Current (typ) 400 µA	1		
	Alarm Current (controlled by CIE) 9.1 mA (excluding remote indicator)	1		
	Transmission Method Digital Communications Using ESP	1		
	Operating Temperature Range -10 °C to + 50 °C	1		
	Operating Humidity 95% RH - Non Condensing (at 40 °C)	1		
	Sensitivity Levels 2%/m to 4.5%/m	1		
	Storage Temperature Range -30 °C to +60 °C	1		
	Storage Humidity <80% RH at 60 °C	1		
	Colour / Case Material White / ABS	1		
	Weight (g) 95	1		
	Diameter (mm) / Height (mm) 100/45	1		
	Base Fixing Centres (mm) 48 ~ 74	1		
	Compatible Bases *2 YBV-R/4 or YBV-R/4(WHT) , YBN-R/3, YBO-R/SCI, YBO-BS, YBO-BSB, YBN-R/3(SCI)	1		
Warranty	3 years	3		
Total Marks		**44 Marks**		
Cut-Off Marks		**42 Marks**		

Call points

a) Allocate a zone
b) Allocate a forty character location text message

Manual call points should meet should meet the following specifications.

Feature	Minimum Specifications	Marks	Bidder's Response /Comment (√ or X)	Score
Model and Technology:	Mature internationally recognized brand, in existence for at least 10 years(bidder must specify brand, model and series)			
	Brand	5		
	Model	5		
	Technical Data Sheet	5		
Configuration Features	Operating Voltage 17 – 41 VDC	1		
	Low Power Mode (typ) 180 µA (max), 100 µA (typ)	1		
	Quiescent Current 350 µA (max), 250 µA (typ)	1		
	Alarm Current 10.0 mA (max), 5 mA (typ)	1		
	Resistance in positive 100 mΩ when closed (max), 100 kΩ when open (min)	1		
	Short-circuit threshold (typ) 430 Ω	1		
Features	Transmission Method Digital Communication Using ESP	1		
	Operating Temperature Range -10 °C to + 50 °C	1		
	Storage Temperature Range -30 °C to + 70 °C	1		
	Maximum Humidity 95% RH - Non Condensing (at 40 °C)	1		
	Ingress Protection Rating IP24	1		
	Colour / Case Material Red / Modified Polyphenylene Oxide	1		
	Weight (g) / Dimensions (mm) (Flush Unit) 110 / W 89 x H 93 x D 27.5	1		
	Surface Mount Back (161 / W 89 x)	1		
	Flap cover and operation signage worded as follows; "***in case of fire lift flap cover and press call point***"	5		
Warranty	3 Years	2		
Total Marks		**36 Marks**		
Cut-Off Marks		**35 Marks**		

Switch units (input)

a) Allocate a zone for each input and the device itself
b) Define input action as fire, fault, pre-alarm, technical alarm, evacuate, alert, security alarm, silence alarm, reset, transparent, disablement or test mode.
c) Change the input action message from the default to any one of the above or to any one of a user defined library of 10 additional action messages.
d) Set a delay before the panel responds to a fire signal
e) Select whether the input requires the control panel to be reset or is self-clearing upon removal of the input
f) Allocate a forty character location text message

Relay or sounder units (output)

a) Allocate a zone for each input and the device itself
b) Define whether the device responds to evacuate inputs, as a sounder (default ringing), is silenceable, needs to be reset or produces a single pulsed operation of between one and five seconds (programmable)
c) Has a delay before operating (zero to five minutes)
d) Allocate a forty character location text message

Relay or sounder units (output) should meet should meet the following specifications.

Loop powered sounders with inbuilt beacon

a) Allocate a zone
b) Define whether the device responds to evacuate inputs, as a sounder (default ringing), is silenceable, needs to be reset or produces a single pulsed operation of between one
c) Has a delay before operating (zero to five minutes)
d) Select the volume from one of ten settings
e) Select the tone from one of five settings
f) Allocate a forty character location text message
g) Inbuilt flasher beacon

Loop powered sounders should meet should meet the following specifications.

Feature	Minimum Specifications	Marks	Bidder's Response	Score
Model and Technology:	Mature internationally recognized brand, in existence for at least 10 years (bidder must specify brand, model and series)			
	Brand	5		
	Model	5		
	Technical Data Sheet	5		
Configuration Features	Loop Powered	3		
	Single Loop	2		
	Variable Sound Output	1		
	90 ~ 102 dB(A) (±2 dB(A)) output at 1 metre	1		
	Fits Hochiki Standard or Isolator Base	2		
	Weatherproof Kit	2		
	51 User-Selectable Tones (all tones EN54-3 compatible)	1		
	Colour Red	1		
	Approved by LPCB & VdS	1		
	Operating Voltage 17 ~ 41 VDC	1		
	Quiescent Current (typ) 150 □A (with YBO-R/3(RED)) 200 □A (with YBO-R/SCI(RED))	1		
	Sounding Current (typ) 2 mA (90 dB(A) (±2 dB(A)) @ 1 m) ~ 8 mA (102 dB(A) (±2 dB(A)) @ 1 m)	1		
	Sound Output (at 1 metre) 90 ~ 102 dB(A) (±2 dB(A)) @ 24 VDC or above	1		
	Tone Frequency Range 300 Hz ~ 2850 Hz	1		
	Operating Temperature Range -10 □C to +50 □C	1		
	Storage Temperature Range -30 □C to +70 □C	1		
	Maximum Humidity 95% RH - Non Condensing (at 40 □C)	1		
	Colour/Case Material Red	1		
	Ingress Protection Rating IP21 (IP65 with WS2-WPK)	1		
	Weight (g)/Dimensions (mm) 152 / H112 x W112 x D67	1		
	Base Fixing Centres (mm) 48 ~ 74	1		
	Beacon will be Traffic Red	1		
Warranty	3 years	2		
Total Marks		**44 Marks**		
Cut-Off Marks		**42 Marks**		

Sounders

The FACP shall provide the necessary outputs to separately operate a minimum of four monitored circuits of common system sounders. Each output shall be capable of driving a sounder load of up to 500mA

The FACP shall also be able to monitor the integrity of and control standard sounder circuits, via a suitable addressable module.

The FACP shall be capable of providing a two-stage alarm sounder facility that can be programmed, on either a zonal basis or common system basis, to meet the requirements of the fire authority. Sounder outputs shall be available as follows:

- Alert, intermittent pulsed tone
- Evacuate, continuous tone

The FACP shall have the facility to change, on a per sounder zone basis, the sound output dependent upon whether the source of alarm is:

- an automatic detector, e.g. smoke, heat,
- a manual call point.

The FACP shall have the facility to generate a slow pulsed output to all sounder circuits in response to a security alert input.

Fault Reporting

The FACP shall monitor all critical system components and interconnections, internal and external, such that a failure, which would prevent the correct operation of the alarm functions, causes the FAULT indicator to light and a message to be given on the alphanumeric display within 60 seconds of occurrence.

The following faults shall be reported in the manner described above:

a. Loop Short Circuit
b. Loop Open Circuit
c. Unconfigured Device
d. Device missing
e. Addressable Device Failure
f. Incorrectly Configured Device
g. Fire routing equipment fault
h. System fault (processor)
i. Extinguisher connection fault
j. Low battery
k. Charger failure
l. Earth fault monitoring
m. Battery Fault
n. Mains Failure
o. Sounder Wiring Open Circuit (per circuit)
p. Sounder Wiring Short Circuit (per circuit)

To help fault finding and repair, the FACP shall provide text messages to indicate the location of where a fault has occurred in the system.

System Management

The FACP shall incorporate the following system management facilities:

a. Isolate/re-connect individual outputs or inputs of addressable points
b. Isolate/re-connect individual zones
c. Isolate/re-connect individual loops
d. Isolate/re-connect individual sounder circuits
e. Isolate/re-connect all volt-free contacts individually
f. Isolate/re-connect panel inputs
g. Walk-test of a selected zone to verify detectors and sounders
h. View system status
i. Print event log
j. Print point status
k. Set time
l. View contamination status

Access to the facilities describe above shall be restricted to user Engineer level or above. The FACP shall have an event log capable of storing up to the last 500 events that have occurred. It shall be possible to view the content of the log via the alphanumeric display. Events shall be displayed in chronological order with the newest events first. It shall be possible to scroll through the events.

The FACP shall be designed so that, for each type of analogue addressable detector, the overall response time including the sensor, the signal transmission system and the fire decision algorithm, meets the requirement of British Standards.

The FACP shall be capable of isolating a group of selected detectors in areas of the building where maintenance work is carried out.

Automatic Fire Detectors (General)

General

The installer shall have available the following types of analogue addressable automatic sensors, for direct connection to the system addressable loops:

- Ionization smoke sensors
- Photoelectric smoke sensors
- Heat sensors
- Multi-sensors

Addressable Units

The installer shall be capable of offering two-state addressable versions of the following units, taking only one address from the loop:

- Ionization smoke detectors
- Photoelectric smoke detectors
- Heat detectors
- Photoelectric beam smoke detectors
- Ultra-violet flame detectors

- Addressable sounder modules
- Addressable relay interface modules
- Addressable switch monitoring modules
- Short circuit isolator modules (no address required)
- Loop powered sounders
- Manual call points for indoor use with flap cover and signage
- Manual call points for outdoor use with flap cover and signage
- Multiple inputs/outputs

Analogue Addressable and addressable detectors and modules must be able to transmit to the FACP an address to be used in the system configuration.

It must be possible to connect and mix automatic detectors, addressable manual call points and addressable modules within the same zone sub-division of an addressable loop.

All equipment either connected to the system addressable loop, directly or via interfaces, shall be proofed against electrical noise, high frequency pulses and electromagnetic influences from other equipment.

The installer shall have available suitable equipment to test and remove or exchange all three main types of automatic point-type detectors when installed.

Ionisation Smoke Detectors

The ionisation smoke detectors shall be capable of detecting visible and invisible combustion gases emanating from fires, using a dual ionisation chamber in which the air is ionised by a single radioactive source.
The radioactive source used shall be AM 241 of one microcurie or less.

The ionisation smoke detectors shall be designed to have high resistance to contamination and corrosion and shall include RFI screening to minimise the effect of radiated and conducted electrical interference.

The ionisation smoke detectors shall be suitable for operation in air speeds of up to 10m/s and shall incorporate screens to minimise the effects of small insects.

The installer shall have available the following versions of the ionisation smoke detector to meet different applications:

- Analogue addressable
- Two-state addressable

The ionisation smoke detector shall incorporate two LED's, clearly visible from the outside, to provide indication of alarm actuation.

In locations where the detector is not readily visible, remote indicator units shall be provided.

Multi-Sensors - Analogue Addressable

The multi-sensor should be capable of monitoring two different sensing elements:

1) Photoelectric
2) Thermal

The design of the point-type multi-sensor photoelectric smoke detector sensing chamber shall be optimised to minimise the effect of dust deposit over a period of time. The chamber cover shall be removable for ease of cleaning or replacement.

The point-type multi-sensors shall incorporate screens designed to prevent all but the very smallest of insects from entering the sensing chamber, (50 holes per square centimetre or more).

The multi-sensors shall be designed to have high resistance to contamination and corrosion and shall include RFI screening to minimise the effect of radiated and conducted electrical interference.

The sensor should be able to operate in the following modes:

Combination Mode

The sensor should be able to operate as a photoelectric sensor but when the ambient temperature reaches 40o C or above, the thermal elements should be capable of sensing the 'Rate of Rise' and adjust the sensitivity of the photoelectric element automatically. The sensitivity of the photoelectric should be increased via an internal algorithm.

Photoelectric mode

The sensor should be able to return the analogue value for the photoelectric element during a normal polling sequence.

The sensor should also be able to signal to the FACP if the thermal sensing element exceeds a fixed temperature threshold.

Thermal mode

The sensor should be able to return the analogue value for the thermal element during a normal polling sequence. The sensor should also be able to signal to the FACP if the photoelectric sensing element exceeds a pre-defined threshold.

The multi-sensor shall incorporate two LED's, clearly visible from the outside, to provide indication of alarm actuation. The LED's should be controlled from the FACP if the LED's flash during the normal polling sequence.

The FACP should control the modes of the multi-sensor, when the FACP changes from one mode to another the FACP should re-calibrate the multi-sensor.

In locations where the detector is not readily visible, remote indicator units shall be provided.

The multi-sensor should have the capability of monitoring both sensing elements, if either or both of the elements fail it should be reported and displayed at the FACP.

Duct smoke detectors

The installer shall produce standard equipment for the installation of smoke detectors in air ducts. This equipment shall be designed to accommodate the manufacturer's standard smoke detectors and bases: Analogue addressable, Addressable and conventional.

Heat detectors

The heat detectors shall be capable of detecting rapid rise in temperature and/or fixed absolute temperatures.

The heat detectors shall employ two heat-sensing elements with different thermal characteristics to provide a rate of rise dependent response.

The heat detectors shall include RFI screening to minimise the effect of radiated and conducted electrical interference.

The installer shall have available the following versions of heat detectors to meet different applications:

- Analogue addressable - grade 1, 2 or 3.
- Two state addressable - grade 1
- Two state addressable - grade 2

The heat detectors shall incorporate two LED's, clearly visible from the outside, to provide an indication of alarm actuation.

In locations where the detector is not readily visible, remote indicator units shall be provided.

Detector Base

The automatic point-type fire detectors shall be fixed to the installation by mean of plugin bases. Analogue addressable bases, two-state addressable detector bases.
The three types of bases specified above shall incorporate the optional feature of being able to lock the detectors in place once plugged in. Termination facilities shall be available for earthing.

The two-state addressable base shall incorporate all the circuitry required for communicating detector statuses to the FACP.

Standard Analogue Addressable bases shall not contain any electronic circuitry. This shall enable insulation and continuity checks to be completed on the wiring with the detector heads removed.

Other devices

Addressable Manual Callpoints

The addressable manual call points shall monitor and signal to the FACP the status of a switch operated by a "break glass" assembly. They shall be red in colour and suitable for surface or flush mounting. The addressable call points shall be provided with an integral red LED to indicate activation.

One version of the addressable call point shall be available mounted in a weatherproof housing, affording protection to IP 66.

The addressable call points shall be capable of operating by means of thumb pressure and not require a hammer. They shall be capable of being tested using a special 'key' without the need for shattering the glass.

The addressable call points shall incorporate a mechanism to interrupt the normal addressable loop scan to provide an alarm response within 3 seconds and shall be field programmable to trigger either an alert or an evacuate response from the FACP.

Manual call points shall have flap covers and operation signage

Addressable multiple inputs/outputs

The multiple input/output device should allow a minimum of eight inputs and eight outputs at one loop address.

The FACP should be able to allocate up to 3 of the eight digital inputs as analogue. The outputs should be able to be operated by the FACP in one of the following modes:

1) Intermittent
2) Continuous
3) One-Shot

The FACP should be capable of operating the outputs in synchronization with the relay and addressable sounder controllers.
The addressable multiple inputs/outputs module shall provide an LED indication when it is being polled by the FACP.

Addressable Sounder Module

The addressable sounder module shall be capable of monitoring and controlling two independent circuits of alarm sounders using a single loop address.

24 V DC power to drive the sounders shall be derived independently from the FACP.

The addressable sounder module shall be capable of operating both sets of sounders in a pulsing or continuous mode as determined on the module. Each circuit shall be individually programmable. Sounder circuits shall be capable of synchronization.

The addressable sounder module shall provide the facility to monitor the wiring to the sounders for open or short-circuit and transmit the necessary fault signal to the FACP. Each sounder circuit shall be separately fused.

The addressable sounder module shall provide the facility to monitor for failure of the power supply for the sounders and transmit the necessary fault signal to FACP.
The addressable sounder module shall provide a green LED indication when the FACP is polling it.

Addressable relay interface module

The addressable relay interface module shall be capable of switching two independent

relays; either normally open or normally closed, each rated at 30V, 1Amp.

A single input shall provide open and short circuit monitoring facilities, set locally at the unit.

The addressable relay interface module shall use a single loop address.

The unit shall be powered directly from the addressable loop.

The addressable relay interface module shall provide an LED indication when the FACP is polling it.

Addressable switch monitoring module

The addressable switch monitoring module shall be capable of monitoring two independent voltage free contacts, each either normally open or normally closed, using a single loop address.
The unit shall be powered directly from the addressable loop.

The addressable switch-monitoring module shall provide a red LED indication when the FACP is polling it. The LED shall be continuously lit when either input is active.

Short Circuit Isolator Module

The short circuit isolator module shall provide protection on the addressable loop by automatically disconnecting the section of wiring between two modules where a short circuit has occurred.

The short circuit isolator module shall derive power directly from the addressable loop and shall provide an LED indication that the module has tripped. A base mounted version is available.

Loop powered sounders

Addressable electronic sounders shall be connected directly to the detection loops where required. These shall be incorporated in a suitable mounting base so that an analogue smoke or heat sensor may also be connected to the base, if required. Loop powered sounders shall be ceiling or wall mountable. A cover plate shall be fitted when a sensor is not to be fitted on the sounder.

The address of sounders used as sensor bases shall be set automatically at the FACP. This will be above 127 so as not to restrict the number of other addressable devices on the loop.

The loop-powered sounder volume shall be determined at the FACP. The loop powered sounders shall be programmable to have a minimum sound output of 85 dB (A) at 1 metre distance, and at this output shall have a maximum current consumption of 3 mA from the loop.

Ultra-violet flame detectors

The flame detector shall be of a point-type. It shall be mounted on its base using a simple twist action for ease of installation and removal.

The flame detector shall be able to detect weak ultra-violet rays in a 120° cone of vision, in a direct line of sight.

Remote Indicator Unit
The remote indicator unit shall provide a remote indication for any detector that may be located in an enclosed or locked compartment.

The remote indicator unit shall be driven directly from its associated local detector. It shall be either flush or surface mountable.

Sounders

Two types of Electronic sounders shall be acceptable: loop-powered addressable sounders (see above)

Alarm Bells

Fire alarm bells shall be under dome type with a high resonance pressed alloy-steel gong to ensure a load clear-tone ring. They shall be fully suppressed and polarized.

The operating mechanism shall be fully enclosed and the gong shall be red stove enameled for long life.

Alarm bells shall have a minimum sound output of 95 dB (A) at 1 meter distance, and shall have a maximum current consumption at 24V DC of 30 mA.

Training

The successful bidder will offer training to **ten (10)** KRA technical staff for the fire alarm and detection system locally.

PARTICULAR SPECIFICATIONS FOR UNINTERRUPTIBLE POWER SUPPLY (UPS)

1 NO. 60kVA, 1 NO. 11kVA THREE PHASE OUTPUT, UNINTERRUPTIBLE POWER SYSTEM

PART 1 - GENERAL

1.01 SUMMARY

A. This specification defines the electrical and mechanical characteristics and requirements for a continuous-duty Three-phase, solid-state, uninterruptible power supply system. The uninterruptible power supply system, hereafter referred to as the UPS, shall provide high-quality AC power for sensitive electronic equipment loads with battery power to maintain uptime. The UPS shall operate in conjunction with the existing building electrical system to protect electronic equipment from power disturbances that may occur with utility power, such as voltage fluctuations, frequency variations, brownouts, power surges and sags.

1.02 SYSTEM DESCRIPTION

Standard UPS System will include a minimum of (1) Rectifier, (1) Inverter, (1) Static bypass and (1) Battery system.

A. Components:

1. Rectifier
2. Inverter
3. Sealed lead acid or Lithium ion Batteries
4. Battery Charger
5. Automatic Bypass
6. User Interface Panel
7. Communication Card Slots (1)
8. Relay output contact (1)
9. Hardwired Input, Output and Bypass

B. Modes of Operation: The UPS shall operate as a double conversion UPS with the following operations modes:

1. **Normal**
   During the Double Conversion Mode the rectifier shall derive power as needed from the commercial AC utility or generator source and supply filtered and regulated DC power to the on-line inverter. The inverter shall convert the DC power to highly regulated and filtered AC power for the critical loads.

2. **Battery**
   Upon failure of the AC input source, the critical load must continue being supplied by the inverter without any switching. The inverter must obtain its power from the battery. There must be no interruption in power to the critical load upon failure or restoration of the AC input source.

3. **Recharge**
   Upon restoration of the AC input source, the rectifier/battery charger must recharge the battery. The inverter shall with no interruption in power regulate the power to the critical load.
4. **Bypass:**
   The static bypass switch has to be used for transferring the critical load to mains supply without interruption. Automatic re-transfer to normal operation must also be accomplished with no interruption in power to the critical load. The static bypass switch has to be capable of manual operation.
5. **External maintenance bypass:**
   The external maintenance bypass switch is required and shall be as supplied by the client but installed by the electrical contractor. Integral to the UPS is the integral maintenance bypass. It shall be used for supplying the load directly from the mains supply, while the UPS is isolated for maintenance.

1.05 QUALIFICATIONS

A. The manufacturer of the UPS shall have a minimum of ten years experience in the design, manufacture and testing of Uninterruptible Power Supplies.

Part 2 - PRODUCTS

2.01 GENERAL

A. Model
   The UPS system is initially provided as a parallel synchronized redundant system. The system can be configured with numerous options, including:

   1. External Matching Battery Cabinets
   2. Several Connectivity Options
   3. Wall Mounted Maintenance Bypass Cabinets
   4. External switchboards with paralleling busbars (by others)

2.02 UNINTERRUPTIBLE POWER SUPPLY

A. Converter (rectifier): Incoming power shall be filtered and converted to DC by a sine-wave rectifier. The DC power is then processed by a high-frequency converter to supply power to the inverter. The Converter corrects the input power factor to 0.99 and draws sinusoidal current (with less than 5% THD) from the utility. In the event of utility failure, the converter shall be supplied power without interruption from the internal of external batteries. During normal operation, the batteries will be charged through the rectifier.

   1. Overload Capacity: The converter shall be capable of supplying up to 150% of rated load for at least 5 seconds if no bypass is available.

B. Inverter: The inverter converts the DC Power to regulated AC Power for critical loads.

   1. Output Voltage: The inverter output voltage is specified in section 2.03.
   2. Voltage Regulation: The inverter steady state voltage regulation is +/- 2% in steady state and +/- 5% for a 0 to 100% load step.
   3. Frequency Control: The inverter steady state frequency regulation is +/-0.005 Hz free running in steady state. UPS is synchronized to mains in normal operation.

C. Batteries: The batteries shall be sealed, lead acid, maintenance-free, high-rate discharge cells. They will be kept fully charged by the battery charger. They have an expected life of200-300 complete full load discharge cycles when operated and maintained within specifications.

D. Battery Charger: The battery charger (or rectifier) is responsible for charging the battery and maintaining full battery charge when AC is applied to the UPS.

E. Automatic Bypass (Static bypass): The UPS shall provide an alternate path to the commercial AC or generator source in case of an overload, load fault or internal UPS failure. This input must match the output in voltage, frequency, and grounding in order to properly utilize this feature.

F. User Interface Panel: The UPS shall provide a user-friendly interface panel, which allows the user to: change operating modes, set system parameters, check alarm logs, etc. This LCD display should have back light and languages consisting of English and the number of optional local languages.

G. (1) Communication card slots: The UPS shall provide (1) Communication card slots in the front of the UPS allowing for additional connectivity options, including SNMP, AS400 relays, and Modus/Jbus capabilities, etc.

H. Disable Bypass Operation connection: If active the automatic transfer to the static bypass is prevented. Synchronization to bypass is not carried out (default).

I. ABM resting connection: If active the batteries are disconnected from the UPS unit. The discharge of batteries is not prevented but charging will not start.

J. Remote ON/OFF connection: If active the UPS output turns off regardless of mode of operation. Auxiliary power, communications and rectifier/battery charger shall remain functional.

K. External Bypass connection: If active the UPS is forced to static bypass operation regardless of the bypass status.

L. External Battery Breaker Status: If active the UPS knows that the batteries are connected.

M. Remote Go To Bypass connection: If active the UPS transfers to bypass if bypass voltage, frequency and synchronization are ok.

N. Remote Go To Normal connection: If active the UPS transfer to inverter operation if not prohibited by EPO or alarm condition.

O. External Matching Battery Cabinets: 64 and 96 block (7 Ah 12V) matching battery cabinets for extended runtime requirements.

P. Wall Mounted Maintenance Bypass Cabinets: Wall Mounted Make Before Break or Break Before Make Bypass Cabinets (supplied by client).

Q. SNMP/Web Adaptor: Internal communication card providing network communication via SNMP protocol.

2.03 SYSTEM RATINGS AND OPERATING CHARACTERISTICS

A. System Input

1. Input Voltage Operation Range

    a. Nominal Input Voltage range is 220-240VAC or 3x380-400VAC
    b. Maximum Input Voltage range is 176-276VAC or 3x339-484VAC

2. Input Frequency

    a. 45 to 65Hz
    b. auto sensing

3. Input Power Factor is 0.99

4. Input Current Distortion: 5% THD maximum at full linear load.

5. Inrush Current: 100% of full load input current

6. Surge Protection: IEC62040-2

B. System Output, Normal Mode

1. Nominal Output Voltage

    a. 380, 400 and 415 VAC with Three-phase input.

2. Voltage regulation: +/-3% of selected output voltage in steady state

3. Transient Voltage Response:

    a. Voltage Transient Response: +/- 3% maximum while in Double Conversion mode with resistive step loads from 0% to 50%, 50% to 100%, 100% to 50% and 50% to 0%. Or, +/-5% maximum while in Double Conversion mode with resistive step loads from 0% to 100% or 100% to 0%.

4. Transient Recovery Time: To within 1% of steady state output voltage within 50 milliseconds

5. Voltage THD:

    a. 3% Total Harmonic Distortion (THD) maximum into a 100 percent linear load
    b. 5% THD maximum into a 100% non-linear load

6. Nominal Frequency: 50 or 60 Hz selectable

7. Frequency Regulation:

a. Sync with line within +/-3 Hz of nominal line frequency, or
b. Transfer to battery power with frequency at +/-0.1 Hz of the selected nominal frequency if out of +/-3 Hz specification.

8. Current Overload Capability without bypass:

    a. 150% for 5 seconds
    b. 220% for 300 ms

9. Bypass:

    a. Automatic bypass shall provide an alternate path to power in the case of overload, inverter failure or other UPS failure.
    b. Both integral standard internal and external Maintenance Bypass can be utilized with the UPS to all servicing of the UPS.
    c. Transfer time to and from any internal bypass shall be no-break.

10. Efficiency:

    a. Typical of 98% while in bypass mode
    b. Nominal 93% in Normal Mode with full resistive load and fully charged batteries

C. System Output, Battery Mode:

1. Nominal Output Voltage: This shall be the user selected output voltage.

2. Voltage Regulation: +/-3% of selected nominal voltage

3. Transient Voltage Response

    a. Voltage Transient Response: +/- 3% maximum while in Battery mode with resistive step loads from 0% to 50%, 50% to 100%, 100% to 50% and 50% to 0%. Or, +/-5% maximum while in Battery mode with resistive step loads from 0% to 100% or 100% to 0%.

4. Transient Voltage Recovery: To within 1% of steady state output voltage within 50 milliseconds

5. Voltage THD:

    a. 3% Total Harmonic Distortion (THD) maximum into a 100 percent linear load
    b. 5% THD maximum into a 100% non-linear load

6. Frequency Regulation: +/-0.005 Hz of selected nominal frequency

7. Overload Capacity:

    a. 150% for 5 seconds
    b. 220% for 300 ms

D. Mechanical Construction:

1. All materials and components making up the UPS shall be new, of current manufacture, and shall not have been in prior service except as required during factory testing. The UPS shall be constructed of replaceable subassemblies. All active electronic devices shall be solid-state.

2. The UPS unit comprised of: input rectifier/battery charger, inverter, bypass, and battery consisting of the appropriate number of sealed battery modules, shall be housed in a single freestanding enclosure. The UPS cabinet shall be cleaned, primed, and painted with the manufacturer's standard color. Casters and leveling feet shall be provided as standard.

2.04 B A T T E R Y

A. Battery Type: Valve Regulated Lead Acid (VRLA), minimum 10 year float service life at 25 degrees C.

B. UPS Holdover Time (Runtime): Each UPS system, consisting of a minimum of one battery string for each power modules shall have a minimum holdover time of 5 minutes.

C. Extended Holdover Time (Runtime): Each UPS system shall have capability for addition of extra matching battery cabinets (in two cabinet sizes) to increase the total holdover time to 31 minutes.

D. Battery Recharge Time:

1. Base UPS System consisting of one or more battery will have a recharge time of max. 10 hours to 90% usable capacity @ nominal line after a full load discharge.

E. Bus Voltage: Nominal bus voltage is 432 VDC. This consists of 36 battery blocks with 7 Ah or 9 Ah capacity.

F. Battery Protection:

1. Short Circuit Protection: Over-current protection shall protect the batteries from all short circuit and reverse polarity fault conditions.
2. Battery Module Fusing: Internal Battery string fusing shall be provided.
3. Under-voltage Protection:
    a. Inverter cutoff voltage: Battery operation shall be terminated when the battery voltage drops to the 1.75 VPC set point.
    b. Protective shutdown voltage: Inverter shall shutdown after 1 min when the battery voltage drops below 1.75 VPC volts-per-cell typical.
4. Over-voltage Protection: If the UPS systems battery bus voltage exceeds the preset setpoint then the UPS will disable charger and alarm a high battery condition.

G. Advanced Battery Management:

1. Battery recharge: After recharging batteries to full capacity, the charger will entre the rest mode to increase the battery lifetime according the ABM cycle. Hence, continuous float charging of the battery shall not be allowed.

The active battery charger states are constant-current (charge mode), constant-voltage (float mode) and no-charge (rest mode).

2. Battery Runtime Monitoring: UPS shall monitor batteries and provide status to end user of battery runtime via front panel, serial communications, or both. Runtime calculations to be based on load demand and analysis of battery health.

3. Battery Health Monitoring: UPS shall periodically test&monitor battery health and provide warnings visually, audibly and/or serially when battery capacity falls below 80% of original capacity. Battery testing may also be user initiated via front panel or serial communications.

2.05 SYSTEM INPUT & OUTPUT CONNECTIONS

A. AC Input:

1. All UPS units shall be capable of utilizing Hardwired Input.

B. AC Output:

1. All UPS units shall be capable of utilizing Hardwired Output.

C. Extended Battery Connector: Ext. battery cabinets include cable kit to connect each battery cabinet to the UPS.

D. (1) Communication card slots: The UPS shall provide (2) Communication X-slots in the back of the UPS allowing for additional connectivity options, including SNMP/Web, AS/400 relays, Modbus/Jbus capabilities, etc.

E. (1) Programmable Input connections: The UPS shall provide a built-in inputs for field connection (environmental input). The inputs shall be parameter programmable to suit the needs of the application to a generator.

2.06 USER INTERFACE

A. Front Panel Display: The UPS shall include a front panel display consisting of a graphical LCD display with back light, four status LED's, and a four-key keypad.

1. Graphical LCD display: Basic Language (English and local selectable language), display of unit function and operating parameters. It shall be used to signify the operating state of the UPS, for indicating alarms, for changing operations control parameters and set points.
2. Four status LED's, which indicate:
    a. Alarms, with a Red LED
    b. On Battery, with a Yellow LED
    c. On Bypass, with a Yellow LED
    d. UPS ok, with a Green LED

4. Four-Key Multifunction Keypad: UPS shall have keypad to allow user to adjust UPS parameters, view alarm and inverter logs, change UPS operational modes, turn UPS on and off.

B. Power Management Software Package: The UPS shall include serial communications interface that provides the following communication capabilities:

1. Monitor and graphically display input and output voltage and other operating characteristics.
2. Notify end users in the event of a power anomaly via network, E-mail or page

C. Communication Ports:

1. (1) Communication card slots: The UPS shall provide (2) Communication X-slots in the back of the UPS allowing for additional connectivity options, including SNMP/Web, AS/400 relays, Modbus/Jbus capabilities, etc.

2.07 ENVIRONMENTAL CONDITIONS

A. The UPS shall be certified to the following safety standards:

1. EN 62040-1, IEC 62040-1, EN 60950

B. The UPS shall meet Category 3, IEC62040-2 for Emissions and IEC62040-2 (IEC610003-2) for Harmonics.

C. Audible Noise: Less than 50 dBA (A weighted) at 1 meter from all sides in all system modes.

D. Ambient Temperature

1. Operating: UPS 0 deg C to +40 deg C; battery 20 deg C to 30 deg C for optimum performance.
2. Storage: UPS -40 deg C to +60 deg C; battery 0 deg C to 32 deg C

E. Relative Humidity

1. Operating: 5 to 95% non-condensing.
2. Storage: 5 to 95% non-condensing.

F. Altitude

1. Operating: To 1000 meters. De-rating or reduced operating temperature range may be required for higher altitudes.
2. Storage: To 3000 meters.

G. Electrostatic Discharge: The UPS shall be able to withstand a minimum 8 kV without damage and shall not affect the critical load.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufactures instructions and associated User's and Installations Manual.

60KVA UPS

The UPS should meet the following specifications.

Feature	Minimum Specifications	Marks	Bidder's Response /Comment (√ or X)	Score
Model and Technology:	Mature internationally recognized brand, in existence for at least 10 years(bidder must specify brand, model and series) The manufacturer shall be ISO9001 registered			
	Manufacturer/Brand	5		
	Model	5		
	Technical Data Sheet	5		
Power Rating:	60KVA	1		
Voltage, Frequency:	415V, 3 Phase, 50 Hz, voltage range of +10%/-10%	1		
Topology:	Double conversion with optional Energy Saver System (ESS)	1		
Efficiency:	Up to 97% in double conversion Up to 99% in Energy Saver System	1		
Batteries:	Batteries to be VRLA, AGM, Gel, Wet, Lithium, Flywheel or Super Caps, Capacity to provide 10 minutes back-up at 100% load. Bidder to submit calculations.	1		
Power Factor:	Over 0.99.	1		
Load power factor:	Unity with the ability to support 0.8 leading to 0.8 lagging without derating	1		
Applicable standards:	Safety: IEC 62040-1 or EN 62040-1 IEC 60950-1 or EN 60950-1 Surge: IEC 61000-4-5 Emission & Immunity: IEC 62040 EN61000-4-2, -3, -4, -5 IEC 62040	1		
Submittals:	Submit one copy of a concise operation and maintenance manuals (i.e. User Manual)	1		
Authorized distributor:	Attach Manufacturer's Authorization Form	1		
Warranty:	3 Years manufacturer's warranty	3		
Total Marks		**28 Marks**		
Cut-Off Marks		**27 Marks**		

11KVA UPS

The UPS should meet the following specifications.

Feature	Minimum Specification	Marks	Bidder's Response /Comment (√ or X)	Score
Model and Technology	Mature internationally recognized brand, in existence for at least 10 years (bidder must specify brand, model and series). The manufacturer shall be ISO9001 registered			
	Manufacturer/Brand	5		
	Model	5		
	Technical Data Sheet	5		
Power Rating	11KVA	1		
Voltage, Frequency	415V, 3 Phase, 50 Hz, voltage range of +10%/-10%	1		
Topology:	Double conversion	1		
Efficiency	Up to 97%	1		
Batteries	sealed, lead-acid, maintenance-free, Capacity to provide 10 minutes back-up at 100% load. Bidder to submit calculations.	1		
Power Factor	Over 0.99.	1		
Communication	LCD Display, LEDs for notice and alarm, Audible Alarms,	1		
Load power factor	Unity with the ability to support 0.8 leading to 0.8 lagging without derating	1		
Applicable standards	Safety: IEC 62040-1 or EN 62040-1 IEC 60950-1 or EN 60950-1 Surge: IEC 61000-4-5 Emission & Immunity: IEC 62040 EN61000-4-2, -3,-4,-5 IEC 62040	1		
Submittals	Submit one copy of a concise operation and maintenance manuals (i.e. User Manual)	1		
Authorized distributor	Attach Manufacturer's Authorization Form	1		
Warranty	3 Years manufacturer's warranty	3		
Total Marks		**29 Marks**		
Cut-Off Marks		**28 Marks**		

SECTION 12: BILLS OF QUANTITIES FOR ELECTRICAL INSTALLATIONS

BILLS OF QUANTITIES

GENERAL NOTES

1. Unless stated otherwise in the tender documents, the Contract shall be for the whole Works, based on the unit rates and prices in the Bills of Quantities submitted by the bidder.

2. The bidder or tenderer shall fill in rates and prices for all items of the Works in the contract bills. Items against which no rate or price is entered by the bidder will not be paid for by the Employer when executed and shall be deemed to be covered by the rates for other items and prices in the Bills of Quantities.

3. All duties, taxes, and other levies payable by the Contractor under the Contract, or for any other cause, as of the date for submission of bids, shall be included in the rates and prices and the total Bid Price submitted by the bidder. The bid rates and prices shall also include all associated costs to be borne by the Contractor including all overheads, profits and supervision costs.

4. The rates in the contract bills shall be used in the valuation of variations and for interim payments.

5. Unless otherwise provided in these bills of quantities, the rates and prices quoted by the bidder shall not be subject to adjustment during the performance of the Contract on account of price fluctuations or fluctuations in the rate of exchange of the various currencies.

6. There shall be no component of 'Preliminaries and General Items' as these have been captured in the bills of quantities for main works.

7. Rates shall be inclusive of all Labour, tools, overheads, profits etc. and all associated/ancillary costs necessary for completing the installations.

ELECTRICAL SERVICES INSTALLATIONS

BILL ITEM No.	ITEM DESCRIPTIONS	QTY.	UNIT	UNIT RATES	TOTAL AMOUNT-KSHS.
BILL 1	**ELECTRICAL INSTALLATIONS**				
	LEVEL 03				
	Supply, install, test and commission in accordance to BS 7671:1998,the following as described below:				
1.0	**LIGHTING INSTALLATION**				
1.1	New Lighting points wired in 3x 1.5 sq.mm PVC insulated single core copper cable drawn in 20mm dia.PVC Heavy gauge conduit for one way switching.	No.	223		
1.2	Ditto, but for two way switching.	No.	0		
1.3	10A 500V white moulded switch plates as legrand or equal and approved as described:				
	a) One gang one way.	No.	7		
	b) Three gang one way.	No.	3		
	c) Four gang one way.	No.	1		
	d)One Gang One way dimmer switch	No.	7		
1.4	**Supply and install the following lighting fixtures complete with the control switchgears, ceiling roses and lamps as per description and symbols:**				
	a) 32W 600x600mm Ceiling recessed LED fittings Slim Profile as ROBUS SPACE LED panel lights R326060LED-CW or equal and approved, Type 2C	No.	48		
	b) Ditto as type 2C version but with Emergency kit as Robus Space LED R326060LED-CWE, Type 2CE.	No.	12		
	c) 45W 600x600mm Analogue dimmable ceiling recessed LED fittings Slim Profile as ROBUS SPACE LED panel lights R456060LED-CWAD or equal and approved, Type 2B	No.	16		
	d) Ditto as type 2B version but with Emergency kit, Type 2BE.	No.	8		
	e) Rectangular reccessed (85mmx 150mm) with Aluminium finish adjustable downlight with 2x35W GU10 lamp as Massive Apollo 59502/48/10 or equal and approved. Type D1A.	No.	10		
	f) Aluminium finish main voltage die cast adjustable downlight with 50W GU10 lamp as micromark MM31216 or equal and approved. Type D1.	No.	125		
	g) Ceiling mounted maintained LED exit sign as Robus LED Blade RE430M-01 2711 or equal and approved.Type EXIT.	No.	4		
	Carried Forward to the Next Page				

BILL ITEM No.	ITEM DESCRIPTIONS	QTY.	UNIT	UNIT RATES	TOTAL AMOUNT-KSHS.
BILL 1	**Brought Forward from Previous page**				
2.0	**SMALL POWER INSTALLATION**				
2.1	200 x 50mm 2-compartment angular, off-white PVC trunking complete with clip-on cover, bends and tees as Marshall Tufflex or equal and approved.	LM	105		
2.2	200 mm twin angular,screw type off-white and PVC template as Marshall Tufflex or equal and approved.	No.	45		
2.3	200 mm single angular,screw type off-white PVC template as Marshall Tufflex or equal and approved.	No.	18		
2.4	Ringmains circuit power points wired in 3x 2.5 sq.mm PVC insulated single core copper cable drawn in trunking or/and PVC Heavy gauge conduit concealed in building fabrics .	No.	164		
2.5	500V white moulded socket plates as Legrand or equal and approved as described:				
	a) 13A twin standard switched.	No.	94		
	b) 13A single standard switched	No.	1		
	c) 13A twin non standard switched complete with 3 pin plugs.	No.	69		
2.6	Radial circuit power points wired in 3x 2.5 sq.mm PVC insulated single core copper cable drawn in trunking or/and PVC Heavy gauge conduit concealed in building fabrics .				
	a) LAN Cabinet	No.	2		
	b) Security, Access and Fire alarm Panels	No.	3		
	c) Coffee Urn.	No.	1		
	d) 13A unswitched fused units for items (a&b) above	No.	5		
	e) 15A single standard socket outlet for item (c) above	No.	1		
2.70	Radial circuit power points wired in 3x 4 sq.mm PVC insulated three core flex copper cable drawn in trunking or/and PVC Heavy gauge conduit concealed in building fabrics for .				
	a) Under Sink Heater	No.	1		
	b) 20A DP switch with neon indicator for the item (b) above.	No.	1		
2.80	Factory manufactured electrical floor box made of stamped steel able to receive architectural floor finish on cover. Floor box shall have heavy duty hinges with: - 2 x 13A twin socket outlets - 1 x dual RJ45 faceplate - 1 x single blanking plate (spare)	No.	2		
	Carried Forward to the Next Page				

BILL ITEM No.	ITEM DESCRIPTIONS	QTY.	UNIT	UNIT RATES	TOTAL AMOUNT-KSHS.
BILL 1	**Brought Forward from Previous page**				
3.0	**POWER DISTRIBUTION INSTALLATION**				
3.1	8 Ways 125A TPN Reccesed Distribution board DB-B1 and DB-B2 complete with integral isolator and front lockable cover.	No.	2		
3.2	8 Ways 125A TPN Reccesed Distribution board DB-U3 and DB-U4 (for UPS Power) complete with integral isolator and front lockable cover.	No.	2		
3.3	MCBs for the items above:				
	a) 10A SP.	No.	6		
	b) 20A SP.	No.	6		
	c) 32A SP.	No.	25		
	d) 40A TP.	No.	0		
	e) blanking plates	No.	50		
3.4	4X 10 sq.mm PVC/SWA/PVC cu armoured cable +1 X 6sq mm ECC single core PVC insulated copper cables drawn in conduit/Trunking from Existing Isolator to DB-B1 and DB-B2. (Exact length to be confirmed on site)	LM.	20		
3.5	4X 10 sq.mm PVC/SWA/PVC cu armoured cable +1 X 6sq mm ECC single core PVC insulated copper cables drawn in conduit/Trunking from DB-UPS to DB-U3 and DB-U4. (Exact length to be confirmed on site)	LM.	80		
	30A TPN contactor with manual bypass and in housing for lighting DB above as Schneider Electric	No.	2		
3.7	200mm wide x 50mm high 16SWG galvanized slotted cable tray with divider fixed on brackets rail bolted in the service duct including tees, bends etc.	LM	165		
3.8	Bonding and clamping to all metal work including water pipes, gas pipes, hand-rails, air-conditioning units, window frames, cladding, metal roof etc. to the main earth for the building.	Item	1		
3.9	Carry out concise permanent traffolyte labelling for all the sub-circuits in item above.	Item	1		
4.0	**FIRE ALARM/TELEPHONE /CCTV/ ACCESS CONTROL OUTLETS**				
4.1	Outlet for security & fire alarm sensors & CCTv camera drawn in 25mm dia.PVC Heavy gauge conduit concealed in building fabrics complete with switchboxes, draw wire and blanking plate	No.	109		
4.2	Telephone/data outlet points installed using 25mm diameter pvc conduits or drawn in trunking complete with all the accessories and the draw wires.	No.	100		
4.3	25mm flexible conduits to furniture stations	LM	50		
4.4	TV Outlets drawn in 32mm dia PVC Heavy gauge conduit concealed in building fabrics complete with switchboxes, draw wire and blanking plate	No	1		
	Total for Electricals Carried Forward to the Summary Page				

BILL ITEM No.	ITEM DESCRIPTIONS	QTY.	UNIT	UNIT RATES	TOTAL AMOUNT-KSHS.
BILL 2	**ELECTRICAL INSTALLATIONS** **LEVEL 05** ***Supply,install,test and commission in accordance to BS 7671:1998,the following as described below:***				
1.0	**LIGHTING INSTALLATION**				
1.1	New Lighting points wired in 3x 1.5 sq.mm PVC insulated single core copper cable drawn in 20mm dia.PVC Heavy gauge conduit for one way switching.	No.	218		
1.2	Ditto, but for two way switching.	No.	0		
1.3	10A 500V white moulded switchplates as legrand or equal and approved as described:				
	a) One gang one way.	No.	6		
	b) Two gang one way.	No.	1		
	c) Three gang one way	No.	1		
	d) Four gang one way.	No.	2		
	e) One gang one way dimmer switch.	No.	3		
	f) 2g1w dimmer switch	No.	1		
1.4	**Supply and install the following lighting fixtures complete with the control switchgears, ceiling roses and lamps as per description and symbols:**				
	a) Ceiling recessed 25W LED downlight as Robus Eternity R2530DL or equal and approved equivalent, as Type D2.	No.	0		
	b) Ditto as type D2 version but with Emergency kit, Type D2E.	No.	1		
	c) 32W 600x600mm Ceiling recessed LED fittings Slim Profile as ROBUS SPACE LED panel lights R326060LED-CW or equal and approved, Type 2C	No.	48		
	d) Ditto as type 2C version but with Emergency kit as Robus Space LED R326060LED-CWE, Type 2CE.	No.	8		
	e) 45W 600x600mm Analogue dimmable ceiling recessed LED fittings Slim Profile as ROBUS SPACE LED panel lights R456060LED-CWAD or equal and approved, Type 2B	No.	15		
	f) Ditto as type 2B version but with Emergency kit, Type 2BE. g) Rectangular reccessed (85mmx 150mm) with Aluminium finish adjustable downlight with 2x35W GU10 lamp as Massive Apollo 59502/48/10 or equal and approved. Type D1A.	No.	15		
	h) Aluminium finish main voltage die cast adjustable downlight with 50W GU10 lamp as micromark MM31216 or equal and approved. Type D1.	No.	112		
	i) lx28W T5/T16 Bare batten fluorescent fitting with high frequency ballast as Thorn Poppack Pro 96239876. Type 4	No.	6		
	j) Ditto Type 4 but with emergency kit. Type 4E	No.	6		
	k) Ceiling mounted maintained LED exit sign as Robus LED Blade RE430M-01 2711 or equal and approved. Type EXIT.	No.	2		
	Carried Forward to the Next Page				

BILL ITEM No.	ITEM DESCRIPTIONS	QTY.	UNIT	UNIT RATES	TOTAL AMOUNT-KSHS.
BILL 2	**Brought Forward from Previous page**				
2.0	**SMALL POWER INSTALLATION**				
2.1	200 x 50mm 2-compartment angular, off-white PVC trunking complete with clip-on cover, bends and tees as Marshall Tufflex or equal and approved.	LM	75		
2.2	200 mm twin angular,screw type off-white and PVC template as Marshall Tufflex or equal and approved.	No.	20		
2.3	200 mm single angular,screw type off-white PVC template as Marshall Tufflex or equal and approved.	No.	10		
2.4	Ringmains circuit power points wired in 3x 2.5 sq.mm PVC insulated single core copper cable drawn in trunking or/and PVC Heavy gauge conduit concealed in building fabrics .	No.	130		
2.5	500V white moulded socket plates as Legrand or equal and approved as described:				
	a) 13A twin standard switched.	No.	77		
	b) 13A single standard switched	No.	1		
	c) 13A twin non standard switched complete with 3 pin plugs.	No.	52		
2.6	Radial circuit power points wired in 3x 2.5 sq.mm PVC insulated single core copper cable drawn in trunking or/and PVC Heavy gauge conduit concealed in building fabrics .				
	a) LAN Cabinet	No.	2		
	b) Security, Access, Fire alarm Panels and Fire suppression panel	No.	3		
	c) Coffee Urn.	No.	1		
	e) 13A unswitched fused units for items (a&b) above	No.	5		
	f) 15A single standard socket outlet for item (c) above	No.	1		
2.7	Radial circuit power points wired in 3x 4 sq.mm PVC insulated single core copper cable drawn in trunking or/and PVC Heavy gauge conduit concealed in building fabrics for .				
	a) Under Sink Heater	No.	1		
	b) 20A DP switch with neon indicator for the item (a) above.	No.	1		
2.8	Factory manufactured electrical floor box made of stamped steel able to receive architectural floor finish on cover. Floor box shall have heavy duty hinges with: - 2 x 13A twin socket outlets - 1 x dual RJ45 faceplate - 1 x single blanking plate (spare)	No.	6		
	Carried Forward to the Next Page				

BILL ITEM No.	ITEM DESCRIPTIONS	QTY.	UNIT	UNIT RATES	TOTAL AMOUNT-KSHS.
BILL 2	**Brought Forward from Previous page**				
3.0	**POWER DISTRIBUTION INSTALLATION**				
3.1	8 Ways 125A TPN Reccesed Distribution board DB-D1, and DB-D2 complete with integral isolator and front lockable cover.	No.	2		
3.2	8 Ways 125A TPN Reccesed Distribution board DB-U7 and DB-U8 (for UPS Power) complete with integral isolator and front lockable cover.	No.	2		
3.3	MCBs for the items above:				
	a) 10A SP.	No.	6		
	b) 20A SP.	No.	6		
	c) 32A SP.	No.	22		
	d) blanking plates	No.	50		
3.4	4X 10 sq.mm PVC/SWA/PVC cu armoured cable +1 X 6sq mm ECC single core PVC insulated copper cables drawn in conduit/Trunking from Existing Isolators to DB-D1 and DB-D2(Exact length to be confirmed on site)	LM.	20		
3.5	4X 10 sq.mm PVC/SWA/PVC cu armoured cable +1 X 6sq mm ECC single core PVC insulated copper cables drawn in conduit/Trunking from DB-UPS to DB-U7 and DB-U8. (Exact length to be confirmed on site)	LM.	120		
	30A TPN contactor with manual bypass and in housing for lighting DB above as Schneider Electric	No.	2		
3.6	200mm wide x 50mm high 16SWG galvanized slotted cable tray with divider fixed on brackets rawl bolted in the service duct including tees, bends etc.	LM	145		
3.7	Bonding and clamping to all metal work including water pipes, gas pipes, hand-rails, air-conditioning units, window frames, cladding, metal roof etc. to the main earth for the building.	Item	1		
3.8	Carry out concise permanent traffolyte labelling for all the sub-circuits in item above.	Item	1		
4.0	**FIRE ALARM/TELEPHONE /CCTV/ ACCESS CONTROL OUTLETS**				
4.1	Outlet for security & fire alarm sensors & CCTv camera drawn in 25mm dia.PVC Heavy gauge conduit concealed in building fabrics complete with switchboxes, draw wire and blanking plate	No.	123		
4.2	Telephone/data outlet points installed using 25mm diameter pvc conduits or drawn in trunking complete with all the accessories and the draw wires.	No.	60		
4.3	25mm flexible conduits to furniture stations	LM	50		
	Total for Electricals Carried Forward to the Summary Page				

BILL ITEM No.	ITEM DESCRIPTIONS	QTY.	UNIT	UNIT RATES	TOTAL AMOUNT-KSHS.
BILL 3	**ELECTRICAL INSTALLATIONS**				
	LEVEL 07				
	Supply, install, test and commission in accordance to BS 7671:2008,the following as described below:				
1.0	**LIGHTING INSTALLATION**				
1.1	New Lighting points wired in 3x 1.5 sq.mm PVC insulated single core copper cable drawn in 20mm dia.PVC Heavy gauge conduit for one way switching.	No.	197		
1.2	Ditto, but for two way switching.	No.	4		
1.3	10A 500V white moulded switchplates as legrand or equal and approved as described:				
	a) One gang one way.	No.	10		
	b) Three gang one way.	No.	1		
	c) Four gang one way.	No.	1		
	d) One gang one way dimmer switch.	No.	6		
1.4	**Supply and install the following lighting fixtures complete with the control switchgears, ceiling roses and lamps as per description and symbols:**				
	a) Ceiling recessed 25W LED downlight as Robus Eternity R2530DL or equal and approved equivalent, as Type D2.	No.	3		
	b) Ditto as type D2 version but with Emergency kit, Type D2E.	No.	1		
	c) 32W 600x600mm Ceiling recessed LED fittings Slim Profile as ROBUS SPACE LED panel lights R326060LED-CW or equal and approved, Type 2C	No.	60		
	d) Ditto as type 2C version but with Emergency kit as Robus Space LED R326060LED-CWE, Type 2CE.	No.	10		
	e) 45W 600x600mm Analogue dimmable ceiling recessed LED fittings Slim Profile as ROBUS SPACE LED panel lights R456060LED-CWAD or equal and approved, Type 2B	No.	19		
	f) Ditto as type 2B version but with Emergency kit, Type 2BE.	No.	7		
	g) Aluminium finish main voltage die cast adjustable downlight with 50W GU10 lamp as micromark MM31216 or equal and approved. Type D1.	No.	97		
	h) Ceiling mounted maintained LED exit sign as Robus LED Blade RE430M-01 2711 or equal and approved. Type EXIT.	No.	4		
	Carried Forward to the Next Page				

BILL ITEM No.	ITEM DESCRIPTIONS	QTY.	UNIT	UNIT RATES	TOTAL AMOUNT-KSHS.
BILL 3	**Brought Forward from Previous page**				
2.0	**SMALL POWER INSTALLATION**				
2.1	200 x 50mm 2-compartment angular, off-white PVC trunking complete with clip-on cover, bends and tees as Marshall Tufflex or equal and approved.	LM	80		
2.2	200 mm twin angular,screw type off-white and PVC template as Marshall Tufflex or equal and approved.	No.	26		
2.3	200 mm single angular,screw type off-white PVC template as Marshall Tufflex or equal and approved.	No.	13		
2.4	Ringmains circuit power points wired in 3x 2.5 sq.mm PVC insulated single core copper cable drawn in trunking or/and PVC Heavy gauge conduit concealed in building fabrics .	No.	119		
2.5	500V white moulded socket plates as Legrand or equal and approved as described:				
	a) 13A twin standard switched.	No.	72		
	b) 13A single standard switched	No.	0		
	c) 13A twin non standard switched complete with 3 pin plugs.	No.	47		
2.6	Radial circuit power points wired in 3x 2.5 sq.mm PVC insulated single core copper cable drawn in trunking or/and PVC Heavy gauge conduit concealed in building fabrics .				
	a) LAN Cabinet	No.	2		
	b) Security, Access, Fire alarm Panels and Fire suppression panel	No.	3		
	f) 13A unswitched fused units for items (a&b) above	No.	5		
2.7	Radial circuit power points wired in 3x 4 sq.mm PVC insulated single core copper cable drawn in trunking or/and PVC Heavy gauge conduit concealed in building fabrics for .				
	c) Under Sink Heater	No.	2		
	f) 20A DP switch with neon indicator for the item (b) above.	No.	2		
	Carried Forward to the Next Page				

BILL ITEM No.	ITEM DESCRIPTIONS	QTY.	UNIT	UNIT RATES	TOTAL AMOUNT-KSHS.
BILL 3	**Brought Forward from Previous page**				
3.0	**POWER DISTRIBUTION INSTALLATION**				
3.1	8 Ways 125A TPN Reccesed Distribution board DB-E2 and DB-E2 complete with integral isolator and front lockable cover.	No.	2		
3.2	8 Ways 125A TPN Reccesed Distribution board DB-U9 and DB-U10 (for UPS Power) complete with integral isolator and front lockable cover.	No.	2		
3.3	MCBs for the items above:				
	a) 10A SP.	No.	6		
	b) 20A SP.	No.	6		
	c) 32A SP.	No.	12		
	d) 40A TP.	No.	0		
	d) 50A TP.	No.	0		
	e) blanking plates	No.	50		
3.4	4X 10 sq.mm PVC/SWA/PVC cu armoured cable +1 X 6sq mm ECC single core PVC insulated copper cables drawn in conduit/Trunking from Existing Isolators to DB-E1 and DB-E2 (Exact length to be confirmed on site)	LM.	20		
3.5	4X 10 sq.mm PVC/SWA/PVC cu armoured cable +1 X 6sq mm ECC single core PVC insulated copper cables drawn in conduit/Trunking from DB-UPS to DB-U9 and DB-U10. (Exact length to be confirmed on site)	LM.	160		
3.6	30A TPN contactor with manual bypass and in housing for lighting DB above as Schneider Electric	No.	2		
3.7	200mm wide x 50mm high 16SWG galvanized slotted cable tray with divider fixed on brackets rawl bolted in the service duct including tees, bends etc.	LM	105		
3.8	Bonding and clamping to all metal work including water pipes, gas pipes, hand-rails, air-conditioning units, window frames, cladding, metal roof etc. to the main earth for the building.	Item	1		
3.9	Carry out concise permanent traffolyte labelling for all the sub-circuits in item above.	Item	1		
4.0	**FIRE ALARM/TELEPHONE /CCTV/ ACCESS CONTROL OUTLETS**				
4.1	Outlet for security & fire alarm sensors & CCTv camera drawn in 25mm dia.PVC Heavy gauge conduit concealed in building fabrics complete with switchboxes, draw wire and blanking plate	No.	105		
4.2	Telephone/data outlet points installed using 25mm diameter pvc conduits or drawn in trunking complete with all the accessories and the draw wires.	No.	80		
4.3	25mm flexible conduits to funiture stations	LM	50		
	Total for Electricals Carried Forward to the Summary Page				

SUMMARY PAGE

ITEM No.	ITEM DESCRIPTIONS	AMOUNT-KSHS.
1.0	Brought forward for Bill No.1 - Level 03 Installations	
2.0	Brought forward for Bill No.2 - Level 05 Installations	
3.0	Brought forward for Bill No.3 - Level 07 Installations	
4.0	Provide interface services to :- a) Security Installations Contractor b) Server Room Contractor/Structured Cabling c) UPS contractor d) Audio Visual contractor e) Fire Alarms Contractor	
5.0	3 No. Sets of Working and final "As Built" Drawings in A3 paper size, O & M Manuals including test results	
6.0	Allow for Testing & commissioning of all systems.	
	SUB-TOTAL	
	ADD 14% VAT	
	TOTAL FOR ELECTRICAL SERVICES CARRIED FORWARD TO MAIN SUMMARY PAGE	

DATA & STRUCTURED CABLING INSTALLATIONS

BILL ITEM No.	ITEM DESCRIPTIONS	QTY.	UNIT	UNIT RATES	TOTAL AMOUNT-KSHS.
	BILL No. 1- LEVEL 03				
	Supply, deliver, install and maintain the following as described:-				
	NOTE: TRADE NAMES				
	Where Trade Names are mentioned below, it is only intended to indicate the level of quality required.				
1.0	Communications outlet completely wired in 4 pair UTP Cat 6A cables horizontal cabling mounted in metal trunking and/or pvc conduit wherever applicable and as shown on drawing.	No	92		
2.0	Category 6A RJ45 Siemon dual face plates complete with all the necessary accessories mounted on trunking and flush on wall partitions complete with label.	No.	8		
3.0	Category 6A RJ45 Siemon single face plates complete with all the necessary accessories mounted on trunking and flush on wall partitions complete with label.	No.	70		
4.0	24-port Cat 6A Siemon Patch panels for voice and data complete with cable managers and fixed in the cabinets.	No	6		
5.0	42U cabinet (600mm x 600mm) complete with 2 No. Rack mounted PDU complete with accessories	No	2		
6.0	1 metre Cat 6A patch cords completely connected and with the appropriate RJ45 connectors.	No	184		
7.0	3 metre Cat 6A patch cords completely connected and with the appropriate RJ45 connectors for workstation equipment	No	92		
8.0	Supply and install 2 Core 62.5/125 multimode armoured fiber optic cable drawn in the ducts for the vertical backbone from Main server room to switch in this level LAN Cabinet complete with connectors or equal and approved (to be confirmed on site).	LM	80		
9.0	2 Core SC Fibre connectors for cables above	No.	4		
10.0	1 metre Fibre patch cords	No.	2		
11.0	12-port Fibre Patch panels for voice and data complete with cable managers and fixed in the cabinets.	No	1		
12.0	Backbone copper cable using Cat 6A F/UTP complete with connectors to link Network switch to existing system	LM	100		
13.0	Structured cabling terminations to the Data and Voice terminals, complete with labelling.	Item	1		
	Bill No.1 Carried Forward to Summary Page.				

BILL ITEM No.	ITEM DESCRIPTIONS	QTY.	UNIT	UNIT RATES	TOTAL AMOUNT-KSHS.
	BILL No. 2 - LEVEL 05 ***Supply, deliver, install and maintain the following as described:-*** **NOTE: TRADE NAMES** **Where Trade Names are mentioned below, it is only intended to indicate the level of quality required.**				
1.0	Communications outlet completely wired in 4 pair UTP Cat 6A cables horizontal cabling mounted in metal trunking and/or pvc conduit wherever applicable and as shown on drawing.	No	87		
2.0	Category 6A RJ45 Siemon dual face plates complete with all the necessary accessories mounted on trunking and flush on wall partitions complete with label.	No.	8		
3.0	Category 6A RJ45 Siemon single face plates complete with all the necessary accessories mounted on trunking and flush on wall partitions complete with label.	No.	65		
4.0	24-port Cat 6A Siemon Patch panels for voice and data complete with cable managers and fixed in the cabinets.	No	4		
5.0	42U cabinet (600mm x 600mm) complete with 2 No. Rack mounted PDU complete with accessories	No	2		
6.0	1 metre Cat 6A patch cords completely connected and with the appropriate RJ45 connectors.	No	174		
7.0	3 metre Cat 6A patch cords completely connected and with the appropriate RJ45 connectors for workstation equipment	No	87		
8.0	Supply and install 2 Core 62.5/125 multimode armoured fiber optic cable drawn in the ducts for the vertical backbone from Main server room to switch in this level LAN Cabinet complete with connectors or equal and approved (to be confirmed on site).	LM	200		
9.0	2 Core SC Fibre connectors for cables above	No.	4		
10.0	1 metre Fibre patch cords	No.	2		
11.0	12-port Fibre Patch panels for voice and data complete with cable managers and fixed in the cabinets.	No	1		
12.0	Backbone copper cable using Cat 6A F/UTP complete with connectors to link Network switch to existing system	LM	160		
13.0	Structured cabling terminations to the Data and Voice terminals, complete with labelling.	Item	1		
	Bill No.2 Carried Forward to Summary Page.				

BILL ITEM No.	ITEM DESCRIPTIONS	QTY.	UNIT	UNIT RATES	TOTAL AMOUNT-KSHS.
	BILL No. 3 - LEVEL 07				
	Supply, deliver, install and maintain the following as described:-				
	NOTE: TRADE NAMES				
	Where Trade Names are mentioned below, it is only intended to indicate the level of quality required.				
1.0	Communications outlet completely wired in 4 pair UTP Cat 6A cables horizontal cabling mounted in metal trunking and/or pvc conduit wherever applicable and as shown on drawing.	No	65		
2.0	Category 6A RJ45 Siemon dual face plates complete with all the necessary accessories mounted on trunking and flush on wall partitions complete with label.	No.	7		
3.0	Category 6A RJ45 Siemon single face plates complete with all the necessary accessories mounted on trunking and flush on wall partitions complete with label.	No.	45		
4.0	24-port Cat 6A Siemon Patch panels for voice and data complete with cable managers and fixed in the cabinets.	No	4		
5.0	42U cabinet (600mm x 600mm) complete with 2 No. Rack mounted PDU complete with accessories	No	2		
6.0	1 metre Cat 6A patch cords completely connected and with the appropriate RJ45 connectors.	No	130		
7.0	3 metre Cat 6A patch cords completely connected and with the appropriate RJ45 connectors for workstation equipment Supply	No	65		
8.0	and install 2 Core 62.5/125 multimode armoured fiber optic cable drawn in the ducts for the vertical backbone from Main server room in Level 12 to switch in Level 01 LAN Cabinet complete with connectors or equal and approved (to be confirmed on site).	LM	240		
9.0	2 Core SC Fibre connectors for cables above	No.	4		
10.0	1 metre Fibre patch cords	No.	2		
11.0	12-port Fibre Patch panels for voice and data complete with cable managers and fixed in the cabinets.	No	1		
12.0	Backbone copper cable using Cat 6A F/UTP to link Network switch to existing system	LM	200		
13.0	Structured cabling terminations to the Data and Voice terminals, complete with labelling.	Item	1		
	Bill No.3 Carried Forward to Summary Page.				

ITEM No.	ITEM DESCRIPTIONS		AMOUNT-KSHS.
	SUMMARY PAGE		
1.0	Brought forward for Bill No. 1- Level 03 Structured Cabling System.		
2.0	Brought forward for Bill No. 2- Level 05 Structured Cabling System.		
3.0	Brought forward for Bill No. 3- Level 07 Structured Cabling System.		
4.0	Allow for Testing and Commissioning of all systems		
	SUBTOTAL		
	ADD 14% VAT on VATable items		
	TOTAL CARRIED FORWARD TO MAIN SUMMARY PAGE		

FIRE ALARM SYSTEM INSTALLATIONS

ITEM	DESCRIPTIONS	QTY.	UNIT	UNIT RATES	TOTAL AMOUNT-KSHS.
BILL 1	**FIRE DETECTION AND ALARM SYSTEM LEVEL 03** **Supply, install, test and commission as per BS:5838 Part 1 the following as described below :**				
1.1	Fire alarm points wired in 4Cx1.5sq.mm fire resistant turf cable drawn in 25mm dia. PVC Heavy gauge conduits concealed in building fabrics.	No.	23		
1.2	Supply and install Addressable optical/ionisation smoke detector	No.	18		
1.3	Supply and install Addressable optical/ionisation heat detector	No.	1		
1.4	Supply and install Addressable manual call point	No.	2		
1.5	Supply and install Addressable electronic sounder and flasher unit	No.	2		
1.6	Addressable fire alarm panel complete with connection accessories (network card e.t.c.)	Item	1		
1.7	Allow for integration to existing base building fire alarm system complete with Input/Output interface unit	Item	1		
	Total for FASD Bill No. 1 Carried Forward to Main Summary page				

ITEM	DESCRIPTIONS	QTY.	UNIT	UNIT RATES	TOTAL AMOUNT-KSHS.
BILL 2	**FIRE DETECTION AND ALARM SYSTEM** **LEVEL 05** **Supply, install, test and commission as per BS:5838 Part 1 the following as described below :**				
1.1	Fire alarm points wired in 4Cx1.5sq.mm fire resistant turf cable drawn in 25mm dia. PVC Heavy gauge conduits concealed in building fabrics.	No.	21		
1.2	Supply and install Addressable optical/ionisation smoke detector	No.	16		
1.3	Supply and install Addressable optical/ionisation heat detector	No.	1		
1.4	Supply and install Addressable manual call point	No.	2		
1.5	Supply and install Addressable electronic sounder and flasher unit	No.	2		
1.6	Fire alarm repeater panel complete with connection accessories	Item	1		
1.7	Allow for connection to main fire alarm panel	Item	1		
	Total for FASD Bill No. 2 Carried Forward to Main Summary page				

ITEM	DESCRIPTIONS	QTY.	UNIT	UNIT RATES	TOTAL AMOUNT-KSHS.
BILL 3	**FIRE DETECTION AND ALARM SYSTEM LEVEL 07** **Supply, install, test and commission as per BS:5838 Part 1 the following as described below :**				
1.1	Fire alarm points wired in 4Cx1.5sq.mm fire resistant turf cable drawn in 25mm dia. PVC Heavy gauge conduits concealed in building fabrics.	No.	21		
1.2	Supply and install Addressable optical/ionisation smoke detector	No.	15		
1.3	Supply and install Addressable optical/ionisation heat detector	No.	2		
1.4	Supply and install Addressable manual call point	No.	2		
1.5	Supply and install Addressable electronic sounder and flasher unit	No.	2		
1.6	Fire alarm repeater panel complete with connection accessories (network card e.t.c.)	Item	1		
1.7	Allow for connection to main fire alarm panel	Item	1		
	Total for FASD Bill No. 3 Carried Forward to Main Summary page				

	FASD SUMMARY PAGE	
ITEM No.	**ITEM DESCRIPTIONS**	**AMOUNT-KSHS.**
1.0	Brought forward for Bill No.1 - Level 03	
2.0	Brought forward for Bill No.2 - Level 05	
3.0	Brought forward for Bill No.3 - Level 07	
4.0	Allow for Testing & commissioning of all systems.	
5.0	**SUB-TOTAL**	
6.0	**ADD 14% VAT**	
	TOTAL FOR FIRE ALARM SERVICES CARRIED FORWARD TO MAIN SUMMARY PAGE	

UPS SERVICES INSTALLATIONS

ITEM No.	ITEM DESCRIPTIONS	QTY.	UNIT	RATES	AMOUNT-KSHS.
	Supply, install, test and commission the following as described below:				
A	**UPS SERVICES**				
1.1	60 kVA, 415V, 50Hz 3 phase-in, 3 phase-out 0.99 Power factor and 97% efficiency on double conversion Uninterruptible Power Supply Unit complete with SNMP Card and 10 minutes backup autonomous time battery back-up (external battery pack to be included) and external by pass kit.	No.	1		
1.2	11 kVA, 415V, 50Hz 3 phase-in, 3 phase-out 0.99 Power factor and 97% efficiency on double conversion Uninterruptible Power Supply Unit complete with SNMP Card and 10 minutes backup autonomous time battery back-up (external battery pack to be included) and external by pass kit.	No.	1		
1.4	Any other items necessary to complete the above installation satisfactorily such as cable glands etc. Please specify. i). _____ ii). _____ iii). _____	Item	1		
	General Items				
1.5	Allow for Preliminaries and General Contract Conditions	Item	1		
1.6	Testing and commissioning by Equipment specialist and issuing of all necessary certifications and warranties.	Item	1		
	Subtotal amount				
	VAT 14% on VATable Items				
	TOTAL CARRIED FORWARD TO MAIN SUMMARY PAGE				

SECURITY SERVICES INSTALLATIONS

ITEM	DESCRPTION	QTY.	UNIT	UNIT RATES	TOTAL AMOUNT-KSHS.
BILL NO. 1	**LEVEL 03**				
	ACCESS CONTROL				
	Supply, deliver to site, install, commission and test the following:				
1.1	a) IP based Intelligent single door controller that Supports Wiegand and OSDP Readers 12/24VDC, 2 inputs and 2 outputs relays (2A and 5A) and cabinet tamper, RoHS, CE, C-Tick and UL294 certified	No.	10		
	b) Power Supply Unit & Panel Box	No.	10		
	c) Magnetic door lock, 300kg holding force for aluminium door	No.	0		
	d) Ditto but for frameless glass door	No.	10		
	e) Complete Breakglass	No.	10		
	f) Biometric (finger print) and proximity RFID card reader to be as MorphoAccess Sigma Lite Range WR Lite iClass or equal and approved.	No.	20		
	g) Request to Exit button	No.	2		
	h) Z & L brackets	No.	10		
	i) Overide/Keyswitch	No.	10		
	j) Frameless glass door closers	No.	10		
1.2	24 Port PoE+ Network Switch with 4 - SFP transceiver-based Gigabit Ethernet ports complete with 4no. 1 Gbit/s Fibre SFP modules.	No.	2		
1.3	24 port CAT 6 Patch Panels	No.	2		
1.4	Cat 6 Cable (30M) for linking to network switch on level 03	Item.	1		
1.5	1 metre Cat 6 patch cords completely connected and with the appropriate RJ45 connectors.	No	10		
1.6	Allow all cabling betweeen readers and accessories; and the network switch.	Item	1		
	Carried Forward to the Next Page				

BILL ITEM No.	ITEM DESCRIPTIONS	QTY.	UNIT	UNIT RATES	TOTAL AMOUNT-KSHS.
	Brought Forward from Previous page				
1.7	IP Based Master Controller with support for up to 1,240,000 card holders or 65,000 events and up to 96 device control	Item	1		
1.8	Design & supply unified server for Access Control and CCTV complete with client server operating on Windows ® software managing all access control doors on a single platform server to manage local and remote users with at least 100 access group levels, event monitoring and time schedule management with visitor management, Time and Attendance Software for up to 100,000 users. To be complete with: i. the desktop computer and ii. Printer. The access control manager to have video management system with video analytics capability. The access control system will be integrated/configured for redundancy for the existing system. The current platform is Genetec 5.5 Proffessional - to be upgraded to 5.8 Enterprise edition and the master controller is Synergis cloud link.	Item	2		
1.9	Access control Biometric enrollment kit	Item	1		
1.10	Lifecam Hd Web Camera with a built-in microphone and USB 2.0 interface	Item	1		
1.11	Allow for interconnection to Fire Alarm Detection System	Item	1		
	LEVEL 03 CARRIED FORWARD TO COLLECTION PAGE				

ITEM	DESCRPTION	QTY.	UNIT	UNIT RATES	TOTAL AMOUNT-KSHS.
	LEVEL 05				
	ACCESS CONTROL				
	Supply, deliver to site, install, commission and test the following:				
1.1	a) IP based Intelligent single door controller that Supports Wiegand and OSDP Readers 12/24VDC, 2 inputs and 2 outputs relays (2A and 5A) and cabinet tamper, RoHS, CE, C-Tick and UL294 certified	No.	13		
	b) Power Supply Unit & Panel Box	No.	13		
	c) Magnetic door lock, 300kg holding force for aluminium door	No.	0		
	d) Ditto but for frameless glass door	No.	13		
	e) Complete Breakglass	No.	13		
	f) Biometric (finger print) and proximity RFID card reader to be as MorphoAccess Sigma Lite Range WR Lite iClass or equal and approved.	No.	26		
	g) Request to Exit button	No.	2		
	h) Z & L brackets	No.	13		
	i) Overide/Keyswitch	No.	13		
	j) Frameless glass door closers	No.	13		
1.2	24 Port PoE+ Network Switch with 4 - SFP transceiver-based Gigabit Ethernet ports complete with 4no. 1 Gbit/s Fibre SFP modules.	No.	2		
1.3	24 port CAT 6 Patch Panels	No.	2		
1.4	Cat 6 Cable (30M) for linking to network switch on level 03	Item.	1		
1.5	1 metre Cat 6 patch cords completely connected and with the appropriate RJ45 connectors.	No	13		
1.6	Allow all cabling betweeen readers and accessories; and the network switch	Item	1		
	LEVEL 05 CARRIED FORWARD TO COLLECTION PAGE				

ITEM	DESCRPTION	QTY.	UNIT	UNIT RATES	TOTAL AMOUNT-KSHS.
	LEVEL 07				
	ACCESS CONTROL				
	Supply, deliver to site, install, commission and test the following:				
1.1	a) IP based Intelligent single door controller that Supports Wiegand and OSDP Readers 12/24VDC, 2 inputs and 2 outputs relays (2A and 5A) and cabinet tamper, RoHS, CE, C-Tick and UL294 certified	No.	10		
	b) Power Supply Unit & Panel Box	No.	10		
	c) Magnetic door lock, 300kg holding force for aluminium door	No.	0		
	d) Ditto but for frameless glass door	No.	10		
	e) Complete Breakglass	No.	10		
	f) Biometric (finger print) and proximity RFID card reader to be as MorphoAccess Sigma Lite Range WR Lite iClass or equal and approved.	No.	20		
	g) Request to Exit button	No.	2		
	h) Z & L brackets	No.	10		
	i) Overide/Keyswitch	No.	10		
	j) Frameless glass door closers	No.	13		
1.2	24 Port PoE+ Network Switch with 4 - SFP transceiver-based Gigabit Ethernet ports complete with 4no. 1 Gbit/s Fibre SFP modules.	No.	2		
1.3	24 port CAT 6 Patch Panels	No.	2		
1.4	Cat 6 Cable (30M) for linking to network switch on level 03	Item.	1		
1.5	1 metre Cat 6 patch cords completely connected and with the appropriate RJ45 connectors.	No	10		
1.6	Allow all cabling between readers and accessories; and the network switch	Item	1		
	LEVEL 07 CARRIED FORWARD TO COLLECTION PAGE				

ACCESS CONTROL COLLECTION PAGE

ITEM	DESCRIPTION	TENDER AMOUNT- KSHS
1.00	**Level 03**	
A	Total Brought Forward	
2.00	**Level 05**	
B	Total Brought Forward	
3.00	**Level 07**	
C	Total Brought Forward	
	TOTAL FOR ACCESS CONTROL CARRIED FORWARD TO SUMMARY PAGE	

ITEM	DESCRIPTION	UNIT	QTY	RATE KSHS	TENDER AMOUNT Kshs.
BILL No. 2	**CCTV, LEVEL 03** ***Supply, deliver to site, install, commission and test the following:***				
1.1	6 mp indoor PoE Ceiling/wall mounted dome CCTV camera with the following features; • Max 5M (2560x1960), Full HD(1080p) resolution • 25fps @ 2560x1960 • Min.Illumination 0Lux (IR Distance 30m) • Enhanced WDR (120dB) • 2.8 ~ 8.5mm (2.8x) motorized varifocal lens • Tampering Alarm • Lightcatcher capability • PoE supports. • Resolution:5MP (3K) • Camera Style:Dome • Camera to be complete with 32GB micro SDHC	No.	11		
1.2	Network Attached Storage (NAS) box Complete with SATA HDDs capable of providing 90 Days for continuous recording for all cameras with supporting calculation from the Manufacturer, 3 year warranty.	No.	1		
1.3	49" LED Monitor for CCTV use. Screen to have the following features; Supports 1920 x 1080p resolution, 16:9 display, 5ms response, High contrast ratio of 1000:1,	No.	2		
1.4	Client workstation with Intel i7 10th generation or Xeon E5 series, Nvidia quadro M2000 Graphics card with 4 display ports with 4no. Display ports to HDMI adapter, 16GB RAM, 1TB SATA Hard Disk. PC to be complete with windows 10 Pro 64 bit operating system.	No.	1		
1.5	Allow for Cabling between cameras, POE switches and Monitors	Item	1		
	Total Amount C/F to Collection Page				

ITEM	DESCRIPTION	UNIT	QTY	RATE KSHS	TENDER AMOUNT Kshs.
	CCTV, LEVEL 05 ***Supply, deliver to site, install, commission and test the following:***				
1.1	6 mp indoor PoE Ceiling/wall mounted dome CCTV camera with the following features; • Max 5M (2560x1960), Full HD(1080p) resolution • 25fps @ 2560x1960 • Min.Illumination 0Lux (IR Distance 30m) • Enhanced WDR (120dB) • 2.8 ~ 8.5mm (2.8x) motorized varifocal lens • Tampering Alarm • Lightcatcher capability • PoE supports. • Resolution:5MP (3K) • Camera Style:Dome • Camera to be complete with 32GB micro SDHC	No.	11		
1.2	Allow for Cabling between cameras, POE switches and Monitors	Item	1		
	Total Amount C/F to Collection Page				

ITEM	DESCRIPTION	UNIT	QTY	RATE KSHS	TENDER AMOUNT Kshs.
	CCTV, LEVEL 07 ***Supply, deliver to site, install, commission and test the following:***				
1.1	6 mp indoor PoE Ceiling/wall mounted dome CCTV camera with the following features; • Max 5M (2560x1960), Full HD(1080p) resolution • 25fps @ 2560x1960 • Min.Illumination 0Lux (IR Distance 30m) • Enhanced WDR (120dB) • 2.8 ~ 8.5mm (2.8x) motorized varifocal lens • Tampering Alarm • Lightcatcher capability • PoE supports. • Resolution:5MP (3K) • Camera Style:Dome • Camera to be complete with 32GB micro SDHC	No.	10		
1.2	Allow for Cabling between cameras, POE switches and Monitors	Item	1		
	Total Amount C/F to Collection Page				

CCTV COLLECTION PAGE

ITEM	DESCRIPTION	TENDER AMOUNT- KSHS
1.00	**Level 03**	
A	Total Brought Forward	
2.00	**Level 05**	
B	Total Brought Forward	
3.00	**Level 07**	
C	Total Brought Forward	
	TOTAL FOR CCTVCARRIED FORWARD TO SUMMARY PAGE	

ITEM	DESCRIPTION	AMOUNT
		Kshs.
	SECURITY SUMMARY PAGE	
A	Total Brought Forward From Bill No. 1 -Access Control	
B	Total Brought Forward From Bill No. 2 - CCTV Surveillance	
C	Allow for Security system integration with the existing system at Times Tower	
D	3 No. Sets of Working and final "As Built" Drawings in A3 paper size, O & M Manuals including test results	
E	Allow for Testing & commissioning of all systems.	
F	**SUB-TOTAL**	
G	**ADD 14% V.A.T**	
	TOTAL CARRIED FORWARD TO MAIN SUMMARY PAGE	

MAIN SUMMARY FOR ELECTRICAL WORKS

ITEM No.	ITEM DESCRIPTIONS	AMOUNT-KSHS.
1.0	ELECTRICAL INSTALLATIONS	
2.0	DATA & STRUCTURED CABLING	
3.0	FIRE DETECTION AND ALARM SYSTEM	
4.0	UPS SERVICES	
5.0	SECURITY SERVICES	
	SUB-TOTAL	
	PC Sum for tapping to existing Electrical bus bar	**300,000.00**
	Contingency	**3,650,000.00**
	TOTAL FOR ELECTRICAL WORKS CARRIED FORWARD TO GRAND SUMMARY PAGE	

GRAND SUMMARY PAGE

ITEM No.	ITEM DESCRIPTIONS	AMOUNT-KSHS.
1.0	ELECTRICAL WORKS INSTALLATIONS	
2.0	ANNUAL MAINTENANCE CONTRACT FOR EXISTING SECURITY SYSTEM - (1 YEAR)	
3.0	ANNUAL MAINTENANCE CONTRACT FOR UNIFIED SECURITY SYSTEM (Existing and New) FOR (YEAR 1) AFTER WARRANTY PERIOD	
4.0	ANNUAL MAINTENANCE CONTRACT FOR UNIFIED SECURITY SYSTEM (Existing and New) FOR (YEAR 2) AFTER WARRANTY PERIOD	
5.0	ANNUAL MAINTENANCE CONTRACT FOR UNIFIED SECURITY SYSTEM (Existing and New) FOR (YEAR 3) AFTER WARRANTY PERIOD	
	GRAND TOTAL CARRIED FORWARD TO FORM OF TENDER	

AMOUNT IN WORDS - KENYA SHILLINGS
……

SIGNED
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CONTRACTOR'S OFFICIAL STAMP
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DATE
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APPENDIX 1: ANNUAL MAINTENANCE CONTRACT FOR EXISTING SECURITY SYSTEM (1 YEAR)

The Contractor shall undertake a comprehensive annual maintenance service of the existing KRA Unified Security System (USS) at Ushuru Pension Towers. The contract will be for a period of one year starting immediately after commissioning of the project or as to be agreed with the client. The USS includes CCTV and Access Control System running on a Genetec platform. The contract will include the following;

- scheduled preventive maintenance,
- replacement/repairs of USS equipment/components.

The scope of the contract includes the following;

a) When equipment fails the Contractor shall first attempt to repair or fix it at site, if not repairable, the Contractor shall immediately replace the same with a similar one on temporary basis to ensure that the system remains in operation, pending procurement process,

b) The Contractor shall ensure that the works carried out is to the highest standard and quality and in full compliance with the requirements of the original equipment manufacturers recommendation, all replacements shall be new and of a manufacturer's revision level not less than that of the part to be replaced,

c) The Contractor shall use their own tools (Crimping Tool, Cable Tracer, Assorted Spanner, Avometer, Crimping Tools, Pliers, Cutter, Allen Keys, Assorted Screw Drivers, Assorted Brushes, Cable Ties and Drill) which shall be inspected at commencement of the contract and periodically in the course of the contract,

d) The Contractor shall provide details of the proposed program of preventative maintenance for the USS, which shall be on quarterly basis (the successful bidder shall provide a schedule at the time of reporting at the site) together with any necessary corrective action, on all system equipment, confirming or returning equipment to full and proper operation; a full equipment status report in writing shall be given to the KRA,

e) The Contractor shall after carrying out their duties, leave the equipment and place in a clean and sound condition,

f) That throughout the contract period, the Contractor shall establish and maintain an operational fault reporting platform to which all faults on the system shall be reported by KRA,

g) The Contractor shall provide a monthly report on all services and repairs undertaken to the Security Systems Manager,

h) The Contractor shall ensure that the full configuration of the USS i.e. CCTV and Access Control system is available to KRA in proper working condition viz. uptime of 97% of the time on a 24x7x365 basis during the contract period,

i) The Contractor shall use professionally qualified personnel (certified) who have expertise in Genetecs Unified Security System,

j) The Contractor shall ensure continuous capacity building to the KRA engineers by coordinating and initiating relevant manufacturer's certification trainings at the site once a year (The successful bidder to provide a plan on commencement of the contract),

k) The Contractor shall have certified resident engineer onsite for support and maintenance 24/7 during the entire contract period reporting to the Security Systems Manager,

l) The Contractor will put in place a ***System Management Agreement (SMA)*** between the client and the manufacturer, back-to-back arrangement with the manufacturer should there be any issue that requires escalation, escalated issues to be resolved within 8hrs after reporting.

m) The Contractor shall perform software upgrades whenever they are available from the manufacturer or if the existing software's are of lower versions,

n) The contractor (site technician) jointly with the client will be producing daily availability reports and sign together for ownership which will be used to compute the monthly system availability for payment,

o) The contractor shall provide branded uniform, reflective jackets, dust coat/overall, safety boots, helmets, gloves, face mask and head torch for use by site technician for both safety and identification purposes,

p) The contractor shall attend weekly Security meetings held by the Security Manager and various stakeholders,

Scope of the assignment

The proposed scope of this assignment will cover the following equipment at Ushuru Pension Towers

1. Unified Security System Network infrastructure backbone,
2. Software Systems and all that encompasses the Integrated Security system at KRA at Ushuru Pension Towers.

The scope line of work includes the following;

The planned preventive maintenance and repair including all parts and components of the CCTV Surveillance System;

1. Video Management and Client Management system,
2. Client Workstations,
3. Control Room equipment including CCTV Surveillance display equipment and workstations,
4. Cameras, lenses, housings, pan/tilt heads, interconnecting cabling and wiring,
5. Camera mounting posts, brackets, conduits and protective covers,
6. Electrical power connection to all USS equipment,
7. Entire CCTV security network backbone LAN network infrastructure including the CAT 6 Cabling, fiber, cabinets, network switches and wireless equipment.

The planned preventive maintenance and repair including all parts and components of the Access Control System;

1. Unified Servers,
2. Workstations,
3. Switches,
4. Software and database systems,
5. Master Controllers,
6. Door controllers,
7. Biometrics readers,
8. Proximity Card Readers,
9. Various door support and accessories including;
    - Door maglocks,
    - Door closures and its associated accessories,
    - Door contacts,
    - Buzzers,
    - Exit Buttons

10. Entire ACS Security Network Backbone LAN Network infrastructure including the Cat6 Cabling, fiber, cabinets, Network switches and Wireless equipment,

Equipment List

S/No	Equipment	Quantity	Remarks
1.	Unified Servers	2	
2.	Network Attached Storage (NAS) Box	1	
3.	Master Controllers	5	
4.	Door Controllers	128	
5.	Card Readers	254	
6.	Biometric Finger	16	
7.	Single Door Maglocks	60	
8.	Client Workstations	8	
9.	Badging Station		
10.	Double Door Maglocks	80	
11.	**Cameras** IP Dome Indoor Bullet IP PTZ	**185** 140 35 10	
12.	LCD Monitors	8	
13.	Switches	9	
14.	Cabinet	1	
15.	Glass door stoppers	50	
16.	Exit buttons	10	
17.	Door closer wooden	75	
18.	Back up batteries for door controllers	165	
19.	Door Closer	165	

Spare Part List

No	Spare part item	Unit of measure	Unit price
1.	CAT 6A cable (indoor)	Roll	
2.	CAT 6A cable (outdoor)	Roll	
3.	1000 base X 8 core fibre optic	Per m	
4.	SFP fibre module (multi-mode)- Cisco	Pc	
5.	Fiber Patch Cords 3M LC To SC OM3 MM	Pc	
6.	24 Port Fiber Trays loaded with Adaptors inclusive of installations	Pc	
7.	48 Port Fiber Trays loaded with Adaptors inclusive of installations	Pc	
8.	24 Port CAT 6A Patch panel	Pc	
9.	48 Port CAT 6A Patch Panel	Pc	
10.	1M CAT 6A Patch Cords	Pc	
11.	3M CAT 6A Patch Cords	Pc	
12.	RJ 45 Plugs (Connectors) CAT 6A	Pc	
13.	Cisco Switch – 48 Gigaport POE with 4 uplink Gigaport	Pc	
14.	Cisco Switch – 24 Gigaport POE with 4 uplink Gigaport	Pc	
15.	6 MP IP IR indoor Dome PoE Camera	Pc	
16.	6 MP IP IR Bullet PoE Camera	Pc	
17.	6 MP IR Day/Night Outdoor IP PoE PTZ Camera	Pc	
18.	6 MP IP IR Wireless Camera	Pc	
19.	6 MP 180° Fisheye IP PoE IR Camera	Pc	
20.	6 MP 360° Fisheye IP PoE IR Camera		
21.	42U cabinet complete with cable management accessories, power distribution unit, ventilation fans	Pc	

22.	Graphic Card (NVDA)	Pc	
23.	Hot- Swappable Disk- NVR 4TB	Pc	
24.	Internal HDD (256 GB SSD)	Pc	
25.	Client Workstation	Pc	
26.	APC UPS Rack Mountable 3.0 KVA	Pc	
27.	APC UPS Rack Mountable 1.5 KVA	Pc	
28.	Sony 55" LCD Monitor	Pc	
29.	Genetec Synergis Cloud Link PoE	Pc	
30.	IP Based HID VERTX V2000 PoE Door Controller	Pc	
31.	Proximity Card Reader HID	Pc	
32.	Printable Contactless Smart Cards 32 Bits	Pc	
33.	Door Contacts	Pc	
34.	Door Buzzers	Pc	
35.	Glass Break	Pc	
36.	Override Key	Pc	
37.	Double Door Maglock	Pc	
38.	Single Door Maglock	Pc	
39.	Uninterruptible Power Supply for the Door Controllers	Pc	
40.	Door Closer -Wooden	Pc	
41.	Door Closer - Metallic	Pc	
42.	Exit Buttons	Pc	
43.	Door Stoppers	Pc	
44.	Unified Client License (Genetec Client Licenses)	Per User	

45.	Camera License (Genetec)	Per Camera	
46.	HDMI Cable	5 Meters	

Evaluation of Bidders Response for Existing Security System

S/No	Minimum Specifications	Marks	Bidders Response	Score
1.	When equipment fails the Contractor shall first attempt to repair or fix it at site, if not repairable, the Contractor shall immediately replace the same with a similar one on temporary basis to ensure that the system remains in operation, pending procurement process,	10		
2.	The Contractor shall ensure that the works carried out is to the highest standard and quality and in full compliance with the requirements of the original equipment manufacturers recommendation, all replacements shall be new and of a manufacturer's revision level not less than that of the part to be replaced,	10		
3.	The Contractor shall use their own tools (Crimping Tool, Cable Tracer, Assorted Spanner, Avometer, Crimping Tools, Pliers, Cutter, Allen Keys, Assorted Screw Drivers, Assorted Brushes, Cable Ties and Drill) which shall be inspected at commencement of the contract and periodically in the course of the contract,	10		
4.	The Contractor shall provide details of the proposed program of preventative maintenance for the USS, which shall be on quarterly basis (the successful bidder shall provide a schedule at the time of reporting at the site) together with any necessary corrective action, on all system equipment, confirming or returning equipment to full and proper operation; a full equipment status report in writing shall be given to the KRA,	10		
5.	The Contractor shall after carrying out their duties, leave the equipment and place in a clean and sound condition,	10		
6.	That throughout the contract period, the Contractor shall establish and maintain an operational fault reporting platform to which all faults on the system shall be reported by KRA,	10		

7.	The Contractor shall provide a monthly report on all services and repairs undertaken to the Security Systems Manager,	10		
8.	The Contractor shall ensure that the full configuration of the USS i.e. CCTV and Access Control system is available to KRA in proper working condition viz. uptime of 97% of the time on a 24x7x365 basis during the contract period,	10		
9.	The Contractor will put in place a System Management Agreement (SMA) between the client and the manufacturer, back-to-back arrangement with the manufacturer should there be any issue that requires escalation, escalated issues to be resolved within 8hrs after reporting.	20		
10.	The Contractor shall ensure continuous capacity building to the KRA engineers by coordinating and initiating relevant manufacturer's certification trainings at the site once a year (The successful bidder to provide a plan on commencement of the contract),	10		
11.	The Contractor shall have certified resident engineer onsite for support and maintenance 24/7 during the entire contract period reporting to the Security Systems Manager,	10		
12.	The Contractor will put in place a System Management Agreement (SMA) between the client and the manufacturer, back-to-back arrangement with the manufacturer should there be any issue that requires escalation, escalated issues to be resolved within 8hrs after reporting.	10		
13.	The Contractor shall perform software upgrades whenever they are available from the manufacturer or if the existing software's are of lower versions,	10		
14.	The contractor (site technician) jointly with the client will be producing daily availability reports and sign together for ownership which will be used to compute the monthly system availability for payment,	10		
15.	The contractor shall provide branded uniform, reflective jackets, dust coat/overall, safety boots, helmets, gloves, face mask and head torch for use	10		

	by site technician for both safety and identification purposes,			
16.	The contractor shall attend weekly Security meetings held by the Security Manager and various stakeholders,	10		
17.	**Total Marks**	**170**		
18.	**Pass Mark**	**162**		

PROPOSAL FOR ANNUAL MAINTENANCE CONTRACT (EXISTING SECURITY SYSTEM)

ITEM No.	ITEM DESCRIPTIONS	AMOUNT-KSHS.
1.0	Maintenance for Existing Security System for 1 YEAR with supervision/operation as per scope of work and other terms & conditions of tender document. **ADD 14% V.A.T**	
	TOTAL CARRIED FORWARD TO GRAND SUMMARY	

APPENDIX 2: ANNUAL MAINTENANCE CONTRACT FOR UNIFIED SECURITY SYSTEM (3 YEARS)

The Contractor shall undertake a comprehensive annual maintenance service of the entire (existing and new) KRA Unified Security System (USS) at Ushuru Pension Towers. This contract will be for a period of three years starting exactly one year after commissioning of the project or as to be agreed with the client. The USS includes; CCTV and Access Control System running on a Genetec platform. The contract will include the following;

- scheduled preventive maintenance,
- replacement/repairs of USS equipment/components.

The scope of the contract includes the following;

q) When equipment fails the Contractor shall first attempt to repair or fix it at site, if not repairable, the Contractor shall immediately replace the same with a similar one on temporary basis to ensure that the system remains in operation, pending procurement process,

r) The Contractor shall ensure that the works carried out is to the highest standard and quality and in full compliance with the requirements of the original equipment manufacturers recommendation, all replacements shall be new and of a manufacturer's revision level not less than that of the part to be replaced,

s) The Contractor shall use their own tools (Crimping Tool, Cable Tracer, Assorted Spanner, Avometer, Crimping Tools, Pliers, Cutter, Allen Keys, Assorted Screw Drivers, Assorted Brushes, Cable Ties and Drill) which shall be inspected at commencement of the contract and periodically in the course of the contract,

t) The Contractor shall provide details of the proposed program of preventative maintenance for the USS, which shall be on quarterly basis (the successful bidder shall provide a schedule at the time of reporting at the site) together with any necessary corrective action, on all system equipment, confirming or returning equipment to full

and proper operation; a full equipment status report in writing shall be given to the KRA,

u) The Contractor shall after carrying out their duties, leave the equipment and place in a clean and sound condition,
v) That throughout the contract period, the Contractor shall establish and maintain an operational fault reporting platform to which all faults on the system shall be reported by KRA,
w) The Contractor shall provide a monthly report on all services and repairs undertaken to the Security Systems Manager,

x) That Contractor shall ensure that the full configuration of the USS i.e. CCTV and Access Control system is available to KRA in proper working condition viz. uptime of 97% of the time on a 24x7x365 basis during the contract period,

y) The Contractor shall use professionally qualified personnel (certified) who have expertise in Genetecs Unified Security System,

z) The Contractor shall ensure continuous capacity building to the KRA engineers by coordinating and initiating relevant manufacturer's certification trainings at the site once a year (The successful bidder to provide a plan on commencement of the contract),

aa) The Contractor shall have certified resident engineer onsite for support and maintenance 24/7 during the entire contract period reporting to the Security Systems Manager,

bb) The Contractor will put in place a ***System Management Agreement (SMA)*** between the client and the manufacturer, back-to-back arrangement with the manufacturer should there be any issue that requires escalation, escalated issues to be resolved within 8hrs after reporting.
cc) The Contractor shall perform software upgrades whenever they are available from the manufacturer or if the existing software's are of lower versions,

dd) The contractor (site technician) jointly with the client will be producing daily availability reports and sign together for ownership which will be used to compute the monthly system availability for payment,

ee) The contractor shall provide branded uniform, reflective jackets, dust coat/overall, safety boots, helmets, gloves, face mask and head torch for use by site technician for both safety and identification purposes,

ff) The contractor shall attend weekly Security meetings held by the Security Manager and various stakeholders,

Scope of the assignment

The proposed scope of this assignment will cover the following equipment at Ushuru Pension Towers

3. Unified Security System Network infrastructure backbone,
4. Software Systems and all that encompasses the Integrated Security system at KRA at Ushuru Pension Towers.

The scope line of work includes the following;

The planned preventive maintenance and repair including all parts and components of the CCTV Surveillance System;

8. Video Management and Client Management system,
9. Client Workstations,
10. Control Room equipment including CCTV Surveillance display equipment,
11. Cameras, lenses, housings, pan/tilt heads, interconnecting cabling and wiring,
12. Camera mounting posts, brackets, conduits and protective covers,
13. Electrical power connection to all USS equipment,

14. Entire CCTV security network backbone LAN network infrastructure including the CAT 6 Cabling, fiber, cabinets, network switches and wireless equipment.

The planned preventive maintenance and repair including all parts and components of the Access Control System;

11. Unified Servers,
12. Workstations,
13. Switches,
14. Software and database systems,
15. Master Controllers,
16. Door controllers,
17. Biometrics readers,
18. Proximity Card Readers,
19. Various door support and accessories including;
    - Door maglocks,
    - Door closures and its associated accessories,
    - Door contacts,
    - Buzzers,
    - Exit Buttons

20. Entire ACS Security Network Backbone LAN Network infrastructure including the Cat6 Cabling, fiber, cabinets, Network switches and Wireless equipment,

Equipment List

S/No	Equipment	Quantity	Remarks
1.	Unified Servers	4	
2.	Network Attached Storage (NAS) Box	2	
3.	Master Controllers	6	
4.	Door Controllers	161	
5.	Card Readers	254	

6.	Biometric Finger	82	
7.	Access Control Biometric enrolment kit	1	
8.	Single Door Maglocks	93	
9.	Client Workstations	11	
10.	Badging Station	1	
11.	LifeCam HD Web Camera with a built in microphone and USB 2.0 interface	1	
12.	Override /Keyswitch	33	
13.	Break Glass	33	
14.	Request To Exit (REX) Button	6	
15.	L & Z Brackets	33	
16.	Double Door Maglocks	80	
17.	24 Port PoE Network Switch	6	
18.	24 Port Patch Panels	6	
19.	**Cameras** IP Dome Indoor Bullet IP PTZ	**217** 172 35 10	
20.	LCD Monitors	10	
21.	Switches	15	
22.	Cabinet	1	
23.	Glass door stoppers	50	
24.	Exit buttons	16	
25.	Door closer wooden	75	
26.	Back up batteries for door controllers	198	
27.	Door Closer	201	

Spare Part List

No	Spare part item	Unit of measure	Unit price
1.	CAT 6A cable (indoor)	Roll	
2.	CAT 6A cable (outdoor)	Roll	
3.	1000 base X 8 core fibre optic	Per m	
4.	SFP fibre module (multi-mode)- Cisco	Pc	
5.	Fiber Patch Cords 3M LC To SC OM3 MM	Pc	
6.	24 Port Fiber Trays loaded with Adaptors inclusive of installations	Pc	
7.	48 Port Fiber Trays loaded with Adaptors inclusive of installations	Pc	
8.	24 Port CAT 6A Patch panel	Pc	
9.	48 Port CAT 6A Patch Panel	Pc	
10.	1M CAT 6A Patch Cords	Pc	
11.	3M CAT 6A Patch Cords	Pc	
12.	RJ 45 Plugs (Connectors) CAT 6A	Pc	
13.	Cisco Switch – 48 Gigaport POE with 4 uplink Gigaport	Pc	
14.	Cisco Switch – 24 Gigaport POE with 4 uplink Gigaport	Pc	
15.	6 MP IP IR indoor Dome PoE Camera	Pc	
16.	6 MP IP IR Bullet PoE Camera	Pc	
17.	6 MP IR Day/Night Outdoor IP PoE PTZ Camera	Pc	
18.	6 MP IP IR Wireless Camera	Pc	
19.	6 MP 180° Fisheye IP PoE IR Camera	Pc	

20.	6 MP 360° Fisheye IP PoE IR Camera		
21.	42U cabinet complete with cable management accessories, power distribution unit, ventilation fans	Pc	
22.	Graphic Card (NVDA)	Pc	
23.	Hot- Swappable Disk- NVR 4TB	Pc	
24.	Internal HDD (128 GB SSD)	Pc	
25.	Client Workstation	Pc	
26.	APC UPS Rack Mountable 3.0 KVA	Pc	
27.	APC UPS Rack Mountable 1.5 KVA	Pc	
28.	Sony 55" LCD Monitor	Pc	
29.	Genetec Synergis Cloud Link PoE	Pc	
30.	IP Based HID VERTX V2000 PoE Door Controller	Pc	
31.	Proximity Card Reader HID	Pc	
32.	Printable Contactless Smart Cards 32 Bits	Pc	
33.	Door Contacts	Pc	
34.	Door Buzzers	Pc	
35.	Glass Break	Pc	
36.	Override Key	Pc	
37.	Double Door Maglock	Pc	
38.	Single Door Maglock	Pc	
39.	Uninterruptible Power Supply for the Door Controllers	Pc	
40.	Door Closer -Wooden	Pc	
41.	Door Closer - Metallic	Pc	

42.	Exit Buttons	Pc	
43.	Door Stoppers	Pc	
44.	Unified Client License (Genetec Client Licenses)	Per User	
45.	Camera License (Genetec)	Per Camera	
46.	HDMI Cable	5 Meters	

Evaluation of Bidders Response for Unified Security System

S/No	Minimum Specifications	Marks	Bidders Response	Score
19.	When equipment fails the Contractor shall first attempt to repair or fix it at site, if not repairable, the Contractor shall immediately replace the same with a similar one on temporary basis to ensure that the system remains in operation, pending procurement process,	10		
20.	The Contractor shall ensure that the works carried out is to the highest standard and quality and in full compliance with the requirements of the original equipment manufacturers recommendation, all replacements shall be new and of a manufacturer's revision level not less than that of the part to be replaced,	10		
21.	The Contractor shall use their own tools (Crimping Tool, Cable Tracer, Assorted Spanner, Avometer, Crimping Tools, Pliers, Cutter, Allen Keys, Assorted Screw Drivers, Assorted Brushes, Cable Ties and Drill) which shall be inspected at commencement of the contract and periodically in the course of the contract,	10		
22.	The Contractor shall provide details of the proposed program of preventative maintenance for the USS, which shall be on quarterly basis (the successful bidder shall provide a schedule at the time of reporting at the site) together with any necessary corrective action, on all system equipment, confirming or returning equipment to full and proper operation; a full equipment status report in writing shall be given to the KRA,	10		
23.	The Contractor shall after carrying out their duties, leave the equipment and place in a clean and sound condition,	10		
24.	That throughout the contract period, the Contractor shall establish and maintain an operational fault reporting platform to which all faults on the system shall be reported by KRA,	10		

25.	The Contractor shall provide a monthly report on all services and repairs undertaken to the Security Systems Manager,	10		
26.	The Contractor shall ensure that the full configuration of the USS i.e. CCTV and Access Control system is available to KRA in proper working condition viz. uptime of 97% of the time on a 24x7x365 basis during the contract period,	10		
27.	The Contractor will put in place a System Management Agreement (SMA) between the client and the manufacturer, back-to-back arrangement with the manufacturer should there be any issue that requires escalation, escalated issues to be resolved within 8hrs after reporting.	20		
28.	The Contractor shall ensure continuous capacity building to the KRA engineers by coordinating and initiating relevant manufacturer's certification trainings at the site once a year (The successful bidder to provide a plan on commencement of the contract),	10		
29.	The Contractor shall have certified resident engineer onsite for support and maintenance 24/7 during the entire contract period reporting to the Security Systems Manager,	10		
30.	The Contractor will put in place a System Management Agreement (SMA) between the client and the manufacturer, back-to-back arrangement with the manufacturer should there be any issue that requires escalation, escalated issues to be resolved within 8hrs after reporting.	10		
31.	The Contractor shall perform software upgrades whenever they are available from the manufacturer or if the existing software's are of lower versions,	10		
32.	The contractor (site technician) jointly with the client will be producing daily availability reports and sign together for ownership which will be used to compute the monthly system availability for payment,	10		
33.	The contractor shall provide branded uniform, reflective jackets, dust coat/overall, safety boots, helmets, gloves, face mask and head torch for use	10		

	by site technician for both safety and identification purposes,			
34.	The contractor shall attend weekly Security meetings held by the Security Manager and various stakeholders,	10		
35.	**Total Marks**	**170**		
36.	**Pass Mark**	**162**		

PROPOSAL FOR ANNUAL MAINTENANCE CONTRACT (YEAR 1 AFTER WARRANTY PERIOD)

ITEM No.	ITEM DESCRIPTIONS	AMOUNT-KSHS.
1.0	Maintenance for Unified Security System (Existing and New) for YEAR 1 after warranty period with supervision/operation as per scope of work and other terms & conditions of tender document. **ADD 14% V.A.T**	
	TOTAL CARRIED FORWARD TO GRAND SUMMARY	

PROPOSAL FOR ANNUAL MAINTENANCE CONTRACT (YEAR 2 AFTER WARRANTY PERIOD)

ITEM No.	ITEM DESCRIPTIONS	AMOUNT-KSHS.
1.0	Maintenance for Unified Security System (Existing and New) for YEAR 2 after warranty period with supervision/operation as per scope of work and other terms & conditions of tender document. **ADD 14% V.A.T**	
	TOTAL CARRIED FORWARD TO GRAND SUMMARY	

PROPOSAL FOR ANNUAL MAINTENANCE CONTRACT (YEAR 3 AFTER WARRANTY PERIOD)

ITEM No.	ITEM DESCRIPTIONS	AMOUNT-KSHS.
1.0	Maintenance for Unified Security System (Existing and New) for YEAR 2 after warranty period with supervision/operation as per scope of work and other terms & conditions of tender document. **ADD 14% V.A.T**	
	TOTAL CARRIED FORWARD TO GRAND SUMMARY	