NAROK COUNTY GOVERNMENT
P.O Box 898 Narok

PROPOSED NAROK COUNTY TEACHING & REFERRAL HOSPITAL.

TENDER DOCUMENT
FOR
SUPPLY, DELIVERY, INSTALLATION, TESTING AND COMMISSIONING
OF

ELECTRICAL & MECHANICAL ENGINEERING SERVICES

TENDER No. NCG/TECH/SERVICES/REFERRAL/037/2021-2022

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INVITATION TO TENDER

FROM: NAROK COUNTY GOVERNMENT P. o. Box 898-20500 NAROK

SUBJECT: TENDER DOCUMENT FOR SUPPLY AND INSTALLATION OF ELECTRICAL & MECHANICAL SERVICES INSTALLATIONS FOR THE PROPOSED NAROK COUNTY TEACHING & REFFERAL HOSPITAL.

TENDER NO: NCG/TECH/REFERRAL/SERVICES/037/2021-2022

1. The *Narok County Government* invites sealed tenders for the Supply, deliver, Installation, Testing & Commissioning of General Electrical works for the Proposed Narok County Teaching & Referral Hospital.

2. Tendering will be conducted under open competitive method National using a standardized tender document. Tendering is open to all qualified and interested Tenderers.

3. Qualified and interested tenderers may obtain further information and inspect the Tender Documents during office hours *0900 to 1500 hours* at the address given below.

4. A complete set of tender documents may be obtained free of charge by interested tenders electronically from the Narok county govt Website www.narok.go.ke or PPIP website www.tenders.go.ke).

5. Tenderers who download the tender document must forward their particulars immediately to ***procument@narok.go.ke*** to facilitate any further clarification or addendum.

6. Tenders shall be quoted be in Kenya Shillings and shall include all taxes. Tenders shall remain valid for **120 days** from the date of opening of tenders.

7. All Tenders must be accompanied by a *tender Security* of *KES: 500,000.00*

8. The Tenderer shall chronologically serialize all pages of the tender documents submitted.

9. Completed tenders must be delivered to the address below on or before **12:00 noon on 16th-Nov-21** Electronic Tenders ***will not*** be permitted.

10. Tenders will be opened immediately after the deadline date and time specified above or any deadline date and times pecified later. Tenders will be publicly opened in the presence of the Tenderers' designated representatives who choose to attend at the address below.

11. Late tenders will be rejected.

12. The addresses referred to above are:

A. Address for obtaining further information and for purchasing tender documents

(1) Name of Procuring Entity: **NAROK COUNTY GOVERMENT**

(2) Physical address; PROCUMENT OFFICE SITUATED AT NAROK COUNTY GOVERNMENT OFFICES HEADQUATERS

(3) Postal Address: P. o. BOX 898-20500 NAROK.

(4) Email address: ***procument@narok.go.ke***

B. Address for Submission of Tenders.

(1) Name of Procuring Entity: NAROK COUNTY GOVERMENT

(2) Physical address for hand Courier Delivery to PROCUMENT OFFICE SITUATED AT NAROK COUNTY GOVERNMENT OFFICES HEADQUATERS

(3) Postal Address: P. o. BOX 898-20500 NAROK.

(4) Email address: ***procument@narok.go.ke***

The Original and Copy of the tender should be sealed in a single outer envelope, clearly marked: - **TENDER NO: NCG/TECH/ REFERRAL/SERVICES/037/2021-2022 – FOR SUPPLY AND INSTALLATION OF ELECTRICAL & MECHANICAL SERVICES WORKS FOR THE PROPOSED NAROK COUNTY TEACHING & REFFERAL HOSPITAL.**

Address for Opening of Tenders.

(5) Name of Procuring Entity: NAROK COUNTY GOVERMENT

(6) Physical address; PROCUMENT OFFICE SITUATED AT NAROK COUNTY GOVERNMENT OFFICES HEADQUATERS

(7) Postal Address: P. o. BOX 898-20500 NAROK.

(8) Email address: ***procument@narok.go.ke***

SECTION A: INSTRUCTIONS

TO TENDERERS

A GENERAL PROVISIONS

1.1 Scope of tender

1.2 The Procuring Entity as defined in the Appendix to Conditions of Contract invites tenders for Works Contract as described in the tender documents. The name, identification, and number of lots (contracts) of this Tender Document are specified in the TDS.

1.3 Throughout this tendering document:

a) The term "inwriting" means communicated in written form (e.g. by mail, e-mail, fax, including if specified in the TDS, distributed or received through the electronic-procurement system used by the Procuring Entity) with proof of receipt;

b) if the context so requires, "singular" means "plural" and vice versa;

c) "Day" means calendar day, unless otherwise specified as "Business Day". A Business Day is any day that is an official working day of the Procuring Entity. It excludes official public holidays.

2.1 Fraud and corruption

2.2 The Procuring Entity requires compliance with the provisions of the Public Procurement and Asset Disposal Act, 2015, Section 62 "Declaration not to engage in corruption". The tender submitted by a person shall include a declaration that the person shall not engage in any corrupt or fraudulent practice and a declaration that the person or his or her sub-contractors are not debarred from participating in public procurement proceedings.

2.3 The Procuring Entity requires compliance with the provisions of the Competition Act 2010, regarding collusive practices in contracting. Any tenderer found to have engaged in collusive conduct shall be disqualified and criminal and/or civil sanctions may be imposed. To this effect, Tenders shall be required to complete and sign the "Certificate of Independent Tender Determination" annexed to the Form of Tender.

2.4 Tenderers shall permit and shall cause their agents (whether declared or not), subcontractors, sub-consultants, service providers, suppliers, and their personnel, to permit the Procuring Entity to inspect all accounts, records and other documents relating to any initial selection process, pre-qualification process, tender submission, proposal submission, and contract performance (in the case of award), and to have them audited by auditors appointed by the Procuring Entity.

2.5 Unfair Competitive Advantage - Fairness and transparency in the tender process require that the firms or their Affiliates competing for a specific assignment do not derive a competitive advantage from having provided consulting services related to this tender. To that end, the Procuring Entity shall indicate in the **Data Sheet** and make available to all the firms together with this tender document all in formation that would in that respect give such firm any unfair competitive advantage over competing firms.

3.1 Eligible tenderers

3.2 A Tenderer may be a firm that is a private entity, a state-owned enterprise or institution subject to ITT 3.8, or an individual or any combination of such entities in the form of a joint venture (JV) under an existing agree mentor with the intent to enter in to such an agreement supported by a letter of intent. In the case of a joint venture, all members shall be jointly and severally liable for the execution of the entire Contract in accordance with the Contract terms. The JV shall nominate a Representative who shall have the authority to conduct all business for and on behalf of any and all the members of the JV during the tendering process and, in the event the JV is awarded the Contract, during contract execution. Members of a joint venture may not also make an individual tender, be a subcontractor in a separate tender or be part of another joint venture for the purposes of the same Tender. The maximum number of JV members shall be specified in the **TDS.**

3.3 Public Officers of the Procuring Entity, their Spouses, Child, Parent, Brothers or Sister. Child, Parent, Brother or Sister of a Spouse, their business associates or agents and firms/organizations in which they have a substantial or controlling interest shall not be eligible to tender or be awarded a contract. Public Officers are also not allowed to participate in any procurement proceedings.

3.4 A Tenderer shall not have a conflict of interest. Any tenderer found to have a conflict of interest shall be disqualified. A tenderer may be considered to have a conflict of interest for the purpose of this tendering process, if the tenderer:

a) Directly or indirectly controls, is controlled by or is under common control with an other tenderer;

b) Receives or has received any director indirect subsidy from another tenderer;

c) Has the same legal representative as an other tenderer;

d) Has a relationship with an other tenderer, directly or through common third parties, that puts it in a position to influence the tender of an other tenderer, or influence the decisions of the Procuring Entity regarding this tendering process;

e) Any of its affiliates participated as a consultant in the preparation of the design or technical specifications of the goods or works that are the subject of the tender;

f) Any of its affiliates has been hired (or is proposed to be hired) by the Procuring Entity as a consultant for Contract implementation;

g) Would be providing goods, works, or non-consulting services resulting from or directly related to consulting services for the preparation or implementation of the contract specified in this Tender Document;

h) Has a close business or personal relationship with senior management or professional staff of the Procuring Entity who has the ability to influence the bidding process and:

   i) Are directly or indirectly involved in the preparation of the Tender document or specifications of the Contract, and/or the Tender evaluation process of such contract; or

   ii) May be involved in the implementation or supervision of such Contract unless the conflicts temming from such relationship has been resolved in a manner acceptable to the Procuring Entity throughout the tendering process and execution of the Contract.

3.5 A tenderer shall not be involved in corrupt, coercive, obstructive or fraudulent practice. A tenderer that is proven to have been involved in any of these practices shall be automatically disqualified

3.6 A Tenderer (either individually or as a JV member) shall not participate in more than one Tender, except for permitted alternative tenders. This includes participation as a subcontractor in other Tenders. Such participation shall result in the disqualification of all Tenders in which the firm is involved. Members of a joint venture may not also make an individual tender, be a sub-contractor in a separate tender or be part of another joint venture for the purposes of the same Tender. A firm that is not a tenderer or a JV member may participate as a subcontractor in more than one tender.

3.7 A Tenderer may have the nationality of any country, subject to the restrictions pursuant to ITT3.9. ATenderer shall be deemed to have the nationality of a country if the Tenderer is constituted, incorporated or registered in and operates in conformity with the provisions of the laws of that country, as evidenced by its articles of incorporation (or equivalent documents of constitution or association) and its registration documents, as the case may be. This criterion also shall apply to the determination of the nationality of proposed sub-contractors or sub-consultants for any part of the Contract including related Services.

3.8 A Tenderer that has been debarred from participating in public procurement shall be ineligible to tender or be awarded a contract. The list of debarred firms and individuals is available from the website of PPRA www.ppra.go.ke.

3.9 A Tenderer that is a state-owned enterprise or a public institution in Kenya may be eligible to tender and be awarded Contract(s) only if it is determined by the Procuring Entity to meet the following conditions, i.e. if it is:

i) A legal public entity of Government and/or public administration,

ii) financially autonomous and not receiving any significant subsidies or budget support from any public entity or Government, and;

(iii) operating under commercial law and vested with legal rights and liabilities similar to any commercial enterprisetoenableitcompetewithfirmsintheprivatesectoronanequalbasis.

3.10 Firms and individuals shall be ineligible if their countries of origin are:

(a) As a matter of law or official regulations, Kenya prohibits commercial relations with that country;

(b) byanactofcompliancewith a decision of the United Nations Security Council taken under Chapter VII of theCharterof the United Nations, Kenya prohibits any import of goods or contracting of works or services from that country, or any payments to any country, person, or entity in that country.

A tenderer shall provide such documentary evidence of eligibility satisfactory to the Procuring Entity, as the Procuring Entity shall reasonably request.

3.11 Foreign tenderers are required to source at least forty (40%) percent of their contract inputs (in supplies, local sub-contracts and labor) from citizen suppliers and contractors. To this end, a foreign tenderer shall provide in its tender documentary evidence that this requirement is met. Foreign tenderers not meeting this criterion will be automatically disqualified. Information required to enable the Procuring Entity determine if this condition is met shall be provided for this purpose in *"SECTIONI II - EVALUATION AND QUALIFICATION CRITERIA, Item 9"*.

3.12 Pursuant to the eligibility requirements of ITT 3.10, a tender is considered a foreign tenderer, If it is registered in Kenya and has less than 51 percent ownership by nationals of Kenya and if it does not subcontract to foreign firms or individuals more than 10 percent of the contract price, excluding provisional sums. JVs are considered as foreign tenderers if the individual member firms registered in Kenya have less 51 percent ownership by nationals of Kenya. The JV shall not subcontract to foreign firms more than 10 percent of the contract price, excluding provisional sums.

3.13 The National Construction Authority Act of Kenya requires that all local and foreign contractors be registered with the National Construction Authority and be issued with a Registration Certificate before they can undertake any construction works in Kenya. Registration shall not be a condition for tender, but it shall be a condition of contract award and signature. A selected tenderer shall be given opportunity to register before such award and signature of contract. Application for registration with National Construction Authority may be accessed from the website www.nca.go.ke.

3.14 The Competition Act of Kenya requires that firms wishing to tender as Joint Venture undertakings which may prevent, distort or lessen competition in provision of services are prohibited unless they are exempt in accordance with the provisions of Section 25 of the Competition Act, 2010. JVs will be required to seek for exemption from the Competition Authority. Exemption shall not be a condition for tender, but it shall be a condition of contract award and signature. A JV tenderer shall be given opportunity to seek such exemption as a condition of award and signature of contract. Application for exemption from the Competition Authority of Kenya may be accessed from the website www.cak.go.ke.

4.14 A kenyan tenderer shall be eligible to tender if it provides evidence of having fulfilled his/her tax obligations by producing valid tax compliance certificate or tax exemption certificate issued by the Kenya Revenue Authority.

4.1 Eligible goods, equipment, and services

4.2 Goods, equipment and services to be supplied under the Contract may have their origin in any country that is not ineligible under ITT 3.9. At the Procuring Entity's request, Tenderers may be required to provide evidence of the origin of Goods, equipment and services.

4.3 Any goods, works and production processes with characteristics that have been declared by the relevant national environmental protection agency or by other competent authority as harmful to human beings and to the environment shall not be eligible for procurement.

5.1 Tenderer's responsibilities

5.2 The tenderer shall bear all costs associated with the preparation and submission of his/her tender, and the Procuring Entity will in no case be responsible or liable for those costs.

5.3 The tenderer, at the tenderer's own responsibility and risk, is encouraged to visit and examine and inspect 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 beat the tenderer's own expense.

5.4 The Tenderer and any of its personnel or agents will be granted permission by the Procuring Entity to enter upon its premises and lands for the purpose of such visit. The Tenderer shall indemnify the Procuring Entity again stall liability arising from death or personal injury, loss of or damage to property, and any other losses and expenses incurred as a result of the examination and inspection.

5.5 The tenderer shall provide in the Form of Tender and Qualification Information, a preliminary description of the proposed work method and schedule, including charts, as necessary or required.

B. CONTENTS OF TENDER DOCUMENTS

6.1 Sections of Tender Document

6.2 The tender document consists of Parts 1, 2, and 3, which includes all the sections specified below, and which should be read in conjunction with any Addenda issued in accordance with ITT 10.

PART 1: Tendering Procedures
Section I – Instructions toTenderers
Section II – Tender Data Sheet (TDS)
Section III- Evaluation and Qualification
Criteria Section IV – Tendering Forms

PART 2: Works'
Requirements Section V -
Bills of Quantities Section VI -
Specifications Section VII -
Drawings

PART 3: **Conditions of Contract and Contract Forms**
Section VIII - General Conditions (GCC)
Section IX - Special Conditions of Contract
Section X- Contract Forms

6.3 The Invitation to Tender Notice issued by the Procuring Entity is not part of the Contract documents. Unless obtained directly from the Procuring Entity, the Procuring Entity is not responsible for the completeness of the Tender document, responses to requests for clarification, the minutes of a pre-arranged site visit and those of the pre-Tender meeting (if any), or Addenda to the Tender document in accordance with ITT 10. Incase of any contradiction, documents obtained directly from the Procuring Entity shall prevail.

6.4 The Tenderer is expected to examine all instructions, forms, terms, and specifications in the Tender Document and to furnish with its Tender all information and documentation as is required by the Tender document.

7.1 Clarification of Tender Document, Site Visit, Pre-tender Meeting

7.2 A Tenderer requiring any clarification of the Tender Document shall contact the Procuring Entity in writing at the Procuring Entity's address specified in the **TDS** or raise its enquiries during the pre-Tender meeting if provided for in accordance with ITT 7.2. The Procuring Entity will respond in writing to any request for clarification, provided that such request is received no later than the period specified in the **TDS p**rior to the deadline for submission of tenders. The Procuring Entity shall forward copies of its response to all tenderers who have acquired the Tender documents in accordance with ITT 7.4, including a description of the inquiry but without identifying its source. If

so specified in the **TDS**, the Procuring Entity shall also promptly publish its response at the web page identified in the **TDS**. Should the clarification result in changes to the essential elements of the Tender Documents, the Procuring Entity shall amend the Tender Documents following the procedure under ITT 8 and ITT 22.2.

7.3 The Tenderer, at the Tenderer's own responsibility and risk, is encouraged to visit and examine and inspect the site(s) of the required contracts and obtain all information that may be necessary for preparing a tender. The costs of visiting the Site shall be at the Tenderer's own expense. The Procuring Entity shall specify in the **TDS** if a pre-arranged Site visit and or a pre-tender meeting will be held, when and where. The Tenderer's designated representative is invited to attend a pre-arranged site visit and a pre-tender meeting, as the case may be. The purpose of the site visit and the pre-tender meeting will be to clarify issues and to answer questions on any matter that may be raised at that stage.

7.4 The Tenderer is requested to submit any questions in writing, to reach the Procuring Entity not later than the period specified in the **TDS** before the meeting.

7.5 Minutes of a pre-arranged site visit and those of the pre-tender meeting, if applicable, including the text of the questions asked by Tenderers and the responses given, together with any responses prepared after the meeting, will be transmitted promptly to all Tenderers who have acquired the Tender Documents. Minutes shall not identify the source of the questions asked.

7.6 TheProcuring Entity shall al so promptly publish anonymized (*no names*) Minutes of the pre-arranged site visit and those of the pre-tender meeting at the web page identified in the **TDS**. Any modification to the Tender Documents that may become necessary as a result of the pre-arranged site visit and those of the pre-tender meeting shall be made by the Procuring Entity exclusively through the issue of an Addendum pursuant to ITT 8 and not through the minutes of the pre-Tender meeting. Non-attendance at the pre-arranged site visit and the pre-tender meeting will not be a cause for disqualification of a Tenderer.

8.1 Amendment of Tender Documents

8.2 At any time prior to the deadline for submission of Tenders, the Procuring Entity may amend the Tender Documents by issuing addenda.

8.3 Any addendum issued shall be part of the Tender Documents and shall be communicated in writing to all who have obtained the Tender Documents from the Procuring Entity. The Procuring Entity shall also promptly publish the addendum on the Procuring Entity's website in accordance with ITT 7.5.

8.4 To give Tenderers reasonable time in which to take an addendum into account in preparing their Tenders, the Procuring Entity should extend the dead line for the submission of Tenders, pursuant to ITT 22.2.

C. PREPARATION OF TENDERS

9. Cost of Tendering

The Tenderer shall bear all costs associated with the preparation and submission of its Tender, and the Procuring Entity shall not be responsible or liable for those costs, regardless of the conduct or outcome of the tendering process.

10.0 Language of Tender

The Tender, as well as all correspondence and documents relating to the tender exchanged by the tenderer and the Procuring Entity, shall be written in the English Language. Supporting documents and printed literature that are part of the Tender may be in another language provided they are accompanied by an accurate and notarized translation of the relevant passages into the English Language, in which case, for purposes of interpretation of the Tender, such translation shall govern.

11.1 Documents Comprising the Tender

11.2 The Tender shall comprise the following:

a) Form of Tender prepared in accordance with ITT 12;

b) Schedules including priced Bill of Quantities, completed in accordance with ITT 12 and ITT 14;

c) Tender Security or Tender-Securing Declaration, in accordance with ITT 19.1;

d) Alternative Tender, if permissible, in accordance with ITT 13;

e) ***Authorization:*** written confirmation authorizing the signatory of the Tender to commit the Tenderer, in accordancewithITT20.3;

f) *Qualifications:* documentary evidence in accordance with ITT 17 establishing the Tenderer's qualifications to per form the Contract if its Tender is accepted;

g) *Conformity:* a technical proposal in accordance with ITT 16;

h) Any other document required in the **TDS.**

11.3 In addition to the requirements under ITT 11.1, Tenders submitted by a JV shall include a copy of the Joint Venture Agreement entered into by all members. Alternatively, a letter of intent to execute a Joint Venture Agreement in the event of a successful Tender shall be signed by all members and submitted with the Tender, together with a copy of the proposed JV Agreement. Change of membership and conditions of the JV prior to contract signature will render the tenderliable for disqualification.

12.0 Form of Tender and Schedules

12.1 The Form of Tender and Schedules, including the Bill of Quantities, shall be prepared using the relevant forms furnished in Section IV, Tendering Forms. The forms must be completed with out any alterations to the text, and no substitutes shall be accepted except as provided under ITT 20.3. All blank spaces shall be filled in with the information requested. The Tenderer shall chronologically serialize all pages of the tender documents submitted.

12.2 The Tenderer shall furnish in the Form of Tender information on commissions and gratuities, if any, paid or to be paid to agents or any other party relating to this Tender.

13. Alternative Tenders

13.1 Unless otherwise specified in the TDS, alternative Tenders shall not be considered.

13.2 When alternative times for completion are explicitly invited, a statement to that effect will be included in the **TDS**, and the method of evaluating different alternative times for completion will be described in Section III, Evaluation and Qualification Criteria.

13.3 Except as provided under ITT 13.4 below, Tenderers wishing to offer technical alternatives to the requirements of the Tender Documents must first price the Procuring Entity's design as described in the Tender Documents and shall further provide all information necessary for a complete evaluation of the alternative by the Procuring Entity, including drawings, design calculations, technical specifications, breakdown of prices, and proposed construction methodology and other relevant details. Only the technical alternatives, if any, of the Tenderer with the Winning Tender conforming to the basic technical requirements shall be considered by the Procuring Entity.

13.4 When specified in the **TDS**, Tenderers are permitted to submit alternative technical solutions for specified parts of the Works, and such parts will be identified in the **TDS**, as will the method for their evaluating, and described in Section VII, Works' Requirements.

14.1 Tender Prices and Discounts

14.2 The prices and discounts (including any price reduction) quoted by the Tenderer in the Form of Tender and in the Billof Quantities shall conform to the requirements specified below.

14.3 The Tenderer shall fill in rates and prices for all items of the Works described in the Bill of Quantities. Items against which no rate or price is entered by the Tenderer shall be deemed covered by the rates for other items in the Bill of Quantities and will not be paid for separately by the Procuring Entity. An item not listed in the priced Bill of Quantities shall be assumed to be not included in the Tender, and provided that the Tender is determined substantially responsive notwithstanding this omission, the average price of the item quoted by substantially responsive Tenderers will be added to the Tender price and the equivalent total cost of the Tender so determined will be used for price comparison.

14.4 The price to be quoted in the Form of Tender, in accordance with ITT 12.1, shall be the total price of the Tender, including any discounts offered.

14.5 The Tenderer shall quote any discounts and the methodology for their application in the Form of Tender, in accordance with ITT 12.1.

14.6 It will be specified in the **TDS** if the rates and prices quoted by the Tenderer are or are not subject to adjustment during the performance of the Contract in accordance with the provisions of the Conditions of Contract, except incases where the contract is subject to fluctuations and adjustments, not fixed price. In such a case, the Tenderer shall furnish the indices and weightings for the price adjustment formulae in the Schedule of Adjustment Data and the Procuring Entity may require the Tenderer to justify its proposed indices and weightings.

14.7 Where tenders are being invited for individual lots (contracts)or for any combination of lots (packages), tenderers wishing to offer discounts for the award of more than one Contract shall specify in their Tender the price reductions applicable to each package, or alternatively, to individual Contracts within the package. Discounts shall be submitted in accordance with ITT 14.4, provided the Tenders for all lots (contracts) are opened at the sametime.

14.8 All duties, taxes, and other levies payable by the Contractor under the Contract, or for any other cause, as of the date 30 days prior to the deadline for submission of Tenders, shall be included in the rates and prices and the total Tender Price submitted by the Tenderer.

15.1 Currencies of Tender and Payment

15.2 The currency(ies) of the Tender and the currency(ies) of payments shall be the same**.**

15.3 Tenderers shall quote entirely in Kenya Shillings. The unit rates and the prices shall be quoted by the Tenderer in the Bill of Quantities, entirely in Kenya shillings.

a) A Tenderer expecting to incur expenditures in other currencies for inputs to the Works supplied from outside Kenya (referred to as "the foreign currency requirements") shall (if so allowed in the **TDS**) indicate in the Appendix to Tender the percentage(s) of the Tender Price (excluding Provisional Sums), needed by the Tenderer for the payment of such foreign currency requirements, limited to no more than two foreign currencies.

b) The rates of exchange to be used by the Tenderer in arriving at the local currency equivalent and the percentage(s) mentioned in (a) above shall be specified by the Tenderer in the Appendix to Tender and shall be based on the exchange rate provided by the Central Bank of Kenya on the date 30 days prior to the actual date of tender opening. Such exchange rate shall apply for all foreign payments under the Contract.

15.4 Tenderers may be required by the Procuring Entity to justify, to the Procuring Entity's satisfaction, their local and foreign currency requirements, and to substantiate that the amounts included in the unit rates and prices and shown in the Schedule of Adjustment Data in the Appendix to Tender are reasonable, in which case a detailed break down of the foreign currency requirements shall be provided by Tenderers.

16.0 Documents Comprising the Technical Proposal

The Tenderer shall furnish a technical proposal including a statement of work methods, equipment, personnel, schedule and any other information as stipulated in Section IV, Tender Forms, insufficient detail to demonstrate the adequacy of the Tenderer's proposal to meet the work's requirements and the completion time.

17.1 Documents Establishing the Eligibility and Qualifications of the Tenderer

17.2 Tenderers shall complete the Form of Tender, included in Section IV, Tender Forms, to establish Tenderer's eligibility in accordance with ITT 4.

17.3 In accordance with Section III, Evaluation and Qualification Criteria, to establish its qualifications to perform the Contract the Tenderer shall provide the information requested in the corresponding information sheets included in Section IV, Tender Forms.

17.4 If a marg in of preference applies as specified in accordance with ITT 33.1, nation al tenderers, individually or in joint ventures, applying for eligibility for national preference shall supply all information required to satisfy the criteria for eligibility specified in accordance with ITT 33.1.

17.5 Tenderers shall be asked to provide, as part of the data for qualification, such information, including details of ownership, as shall be required to determine whether, according to the classification established by the Procuring Entity, a particular contractor or group of contractors qualifies for a margin of preference. Further the information will enable the Procuring Entity identify any actual or potential conflict of interest in relation to the procurement and/or contract management processes, or a possibility of collusion between tenderers, and thereby help to prevent any corrupt influence in relation to the procurement process or contract management.

17.6 The purpose of the information described **in ITT 17.4** above overrides any claims to confidentiality which a tenderer may have. There can be no circumstances in which it would be justified for a tenderer to keep information relating to its ownership and control confidential where it is tendering to undertake public sector work and receive public sector funds. Thus, confidentiality will not be accepted by the Procuring Entity as a justification for a Tenderer's failure to disclose, or failure to provide required information on its ownership and control.

17.7 The Tenderer shall provide further documentary proof, information or authorizations that the Procuring Entity may request in relation to owner ship and control which in formation on any changes to the information which was provided by the tenderer under ITT 6.4. The obligations to require this information shall continue for the duration of the procurement process and contract performance and after completion of the contract, if any change to the information previously provided may reveal a conflict of interest in relation to the award or management of the contract.

17.8 All information provided by the tenderer pursuant to these requirements must be complete, current and accurate as at the date of provision to the Procuring Entity. In submitting the information required pursuant to these requirements, the Tenderer shall warrant that the information submitted is complete, current and accurate as at the date of submission to the Procuring Entity.

17.9 If a tenderer fails to submit the information required by these requirements, its tender will be rejected. Similarly, iftheProcuring Entity is unable, after taking reasonable steps, to verify to a reasonable degree the information submitted by a tenderer pursuant to these requirements, then the tender will be rejected.

17.10 If information submitted by a tenderer pursuant to these requirements, or obtained by the Procuring Entity (whether through its own enquiries, through notification by the public or otherwise), shows any conflict of interest which could materially and improperly benefit the tenderer in relation to the procurement or contract management process, then:

i) If the procurement process is still ongoing, the tenderer will bed is qualified from the procurement process,

ii) if the contract has been awarded to that tenderer, the contract award will be set as idepending the outcome of (iii),

iii) the tenderer will be referred to the relevant law enforcement authorities for investigation of whether the tenderer or any other person shave committed any criminal offence.

17.11 If a tenderer submits information pursuant to these requirements that is in complete, in accurate or out-of-date, or attempts to obstruct the verification process, then the consequences ITT 17.8 will ensue unless the tenderer can show to the reasonable satisfaction of the Procuring Entity that any such act was not material, or was due to genuine error which was not attributable to the intentional

act, negligence or recklessness of the tender.

18.0 Period of Validity of Tenders

18.1. Tenders shall remain valid for the Tender Validity period specified in the **TDS**. The Tender Validity period starts from the date fixed for the Tender submission deadline (as prescribed by the Procuring Entity in accordance with ITT 22). At ender valid for a shorter period shall be rejected by the Procuring Entity as non-responsive.

18.2 In exceptional circumstances, prior to the expiration of the Tender validity period, the Procuring Entity may requestTendererstoextendtheperiodofvalidityoftheirTenders.Therequestandtheresponsesshallbem adein writing. If a Tender Security is requested in accordance with ITT 19, it shall also be extended for thirty (30) days beyond the deadline of the extended validity period. A Tenderer may refuse the request without forfeiting its Tendersecurity.ATenderergrantingtherequestshallnotberequiredorpermittedtomodifyitsTender.

19.1 Tender Security

19.2 The Tenderer shall furnish as part of its Tender, either a Tender-Securing Declaration or a Tender Security as specified in the **TDS**, in original form and, in the case of a Tender Security, in the amount and currency **specified** in the **TDS**. A Tender-Securing Declaration shall use the form included in Section IV, Tender Forms.

19.3 If a Tender Security is specified pursuant to ITT 19.1, the Tender Security shall be a demand guarantee in any of the following forms at the Tenderer's option:

I) cash;

ii) a bank guarantee;

iii) a guarantee by an insurance company registered and licensed by the Insurance Regulatory Authority listed by the Authority;

(iv) a guarantee issued by a financial institution approved and licensed by the Central Bank of Kenya, from a reputable source, and an eligible country.

19.4 If an unconditional bank guarantee is issued by a bank located outside Kenya, the issuing bank shall have a correspondent bank located in Kenya to make it enforceable. The Tender Security shall be valid for thirty (30) days beyond the original validity period of the Tender, or beyond any period of extension if requested under ITT 18.2.

19.5 If a Tender Security or Tender-Securing Declaration is specified pursuant to ITT 19.1, any Tender not accompanied by a substantially responsive Tender Security or Tender-Securing Declaration shall be rejected by the Procuring Entity as non-responsive.

19.6 If a Tender Security is specified pursuant to ITT 19.1, the Tender Security of unsuccessful Tenderers shall be returned as promptly as possible upon the successful Tenderer's signing the Contract and furnishing the Performance Security and any other documents required in the TDS. The Procuring Entity shall also promptly return the tender security to the tenderers where the procurement proceedings are terminated, all tenders were determined non-responsive or a bidder declines to extend tender validity period.

19.7 The Tender Security of the successful Tenderer shall be returned as promptly as possible once the successful Tenderer has signed the Contract and furnished the required Performance Security, and any other documents required in the TDS.

19.8 The Tender Security may be forfeited or the Tender-Securing Declaration executed:

a) if a Tenderer withdraws its Tender during the period of Tender validity specified by the Tenderer on the Form of Tender, or any extension there to provided by the Tenderer; or

b) if the successful Tenderer fails to: -

i) signthe Contract in accordance with ITT47; or

ii) furnish a Performance Security and if required in the TDS, and any other documents required in the TDS.

19.9 Where tender securing declaration is executed, the Procuring Entity shall recommend to the PPRA todebars the Tenderer from participating in public procurement as provided in the law.

19.10 The Tender Security or the Tender-Securing Declaration of a JV shall be in the name of the JV that submits the Tender. If the JV has not been legally constituted into a legally enforceable JV at the time of tendering, the Tender Security or the Tender-Securing Declaration shall be in the names of all future members as named in the letter of intent referred to in ITT 4.1 and ITT 11.2.

19.11 A tenderer shall not issue a tender security to guarantee itself.

20.1 Format and Signing of Tender

20.2 The Tenderer shall prepare one original of the documents comprising the Tender as described in ITT 11 and clearly mark it "ORIGINAL." Alternative Tenders, if permitted in accordance with ITT 13, shall be clearly marked "ALTERNATIVE." In addition, the Tenderer shall submit copies of the Tender, in the number specified in the **TDS** and clearly mark them "COPY." In the event of any discrepancy between the origin a landthe copies, the original shall prevail.

20.3 Tenderers shall mark as "CONFIDENTIAL" all information in their Tenders which is confidential to their business. This may include proprietary information, trade secrets, or commercial or financially sensitive information.

20.4 Theoriginal and all copies of the Tender shall be typed or writtenvin indelible ink andshallbesignedby aperson duly authorized to sign on behalf of the Tenderer. This authorization shall consist of a written confirmation as specified in the**TDS** and shall be attached to the Tender. The name and position held by each person signing the authorization must be typed or printed below the signature. All pages of the Tender where entries or amendments have been made shall be signed or initialed by the person signing the Tender.

20.5 Incase the Tenderer is a JV, the Tender shall be signed by an authorized representative of the JV on behalf of the JV, and so as to be legally binding on all the members as evidenced by a power of attorney signed by their legally authorized representatives.

20.6 Any inter-lineation, erasures, or overwriting shall be valid only if they are signed or initialed by the person signing the Tender.

D. SUBMISSION AND OPENING OF TENDERS

21.1 Sealingand Marking of Tenders

21.2 The Tenderer shall deliver the Tender in a single sealed envelope, or in a single sealed package, or in a single sealed container bearing the name and Reference number of the Tender, addressed to the Procuring Entity and a warning not to open before the time and date for Tender opening date. Within the single envelope, package or container, the Tenderer shall place the following separate, sealed envelopes:

a) in an envelope or package or container marked "ORIGINAL", all documents comprising the Tender, as described in ITT 11; and
b) in a envelope or package or container marked "COPIES", all required copies of the Tender; and
c) if alternative Tenders are permitted in accordance with ITT 13, and if relevant:
   i) in an envelope or package or container marked "ORIGINAL –ALTERNATIVE TENDER", the alternative Tender; and
   ii) in the envelope or package or container marked "COPIES- ALTERNATIVE TENDER", all required copies of the alternative Tender.

The inner envelopes or packages or containers shall:
a) bear the name and address of the Procuring Entity,

b) bear the name and address of the Tenderer; and
c) bear the name and Reference number of the Tender.

21.3 If an envelope or package or container is not sealed and marked as required, the *Procuring Entity* will assume no responsibility for the misplacement or premature opening of the Tender. Tenders misplaced or opened prematurely will not be accepted.

22.1 Deadline for Submission of Tenders

22.2 Tenders must be received by the Procuring Entity at the address specified in the **TDS** and no later than the date andtimealsospecifiedinthe **TDS.** When so specified in the **TDS**, tenderers shall have the option of submitting their Tenders electronically. Tenderers submitting Tenders electronically shall follow the electronic Tender submission procedures specified in the **TDS**.

22.3 The Procuring Entity may, at its discretion, extend the deadline for the submission of Tenders by amending the TenderDocumentsinaccordance with ITT 8, in which case all rights and obligations of the Procuring Entity and Tenderers previously subject to the deadline shall there after be subject to the deadline as extended.

23.0 Late Tenders

The Procuring Entity shall not consider any Tender that arrives after the deadline for submissionof tenders, in accordance with ITT 22. Any Tender received by the Procuring Entity after the deadline for submission of Tenders shall be declared late, rejected, and returned unopened to the Tenderer.

24.1 Withdrawal, Substitution, and Modification of Tenders

24.2 A Tenderer may withdraw, substitute, or modify its Tenderafterith as been submitted by sending a written notice, duly signed by an authorized representative, and shall include a copy of the authorization in accordance with ITT 20.3, (except that withdrawal notices do not require copies). The corresponding substitution or modification of the Tender must accompany the respective written notice. All notices must be:

a) prepared and submitted in accordance with ITT 20 and ITT 21 (except that withdrawals notices do not require copies), and in addition, the respective envelopes shall be clearly marked "WITHDRAWAL," "SUBSTITUTION," "MODIFICATION;" and
b) received by the Procuring Entity prior to the deadline prescribed for submission of Tenders, in accordance with ITT 22.

24.3 Tenders requested to be withdrawn in accordance with ITT 24.1 shall be returned unopened to the Tenderers.

24.4 No Tender may be withdrawn, substituted, or modified in the interval between the deadline for submission of Tenders and the expiration of the period of Tender validity specified by the Tenderer on the Form of Tender or any extension thereof.

25. Tender Opening

25.1 Except in the cases specified in ITT 23 and ITT 24.2, the Procuring Entity shall publicly open and read out all Tenders received by the deadline, at the date, time and place specified **in the TDS**, in the presence of Tenderers' designated representatives who chooses to attend. Any specific electronic Tender opening procedures required if electronic Tendering is permitted in accordance with ITT 22.1, shall be as specified in the **TDS.**

25.2 First, envelopes marked "WITHDRAWAL" shall be opened and read out and the envelopes with the corresponding Tender shall not be opened but returned to the Tenderer. No Tender withdrawal shall be permitted unless the corresponding withdrawal notice contains a valid authorization to request the withdrawal and is read out at Tender opening.

25.3 Next, envelopes marked "SUBSTITUTION" shall be opened and read out and exchanged with the corresponding Tender being substituted, and the substituted Tender shall not be opened, but

returned to the Tenderer. No Tender substitution shall be permitted unless the corresponding substitution notice contains a valid authorization to request the substitution and is read out at Tender opening.

25.4 Next, envelopes marked "MODIFICATION" shall be opened and read out with the corresponding Tender. No Tender modification shall be permitted unless the corresponding modification notice contains a valid authorizationtorequestthemodificationandisreadoutatTenderopening.

25.5 Next, all remaining envelopes shall be opened one at a time, reading out: the name of the Tenderer and whether there is a modification; the total Tender Price, per lot (contract) if applicable, including any discounts and alternative Tenders; the presence or absence of a Tender Security or Tender-Securing Declaration, if required; and any other details as the Procuring Entity may consider appropriate.

25.6 Only Tenders, alternative Tenders and discounts that are opened and read out at Tender opening shall be considered further for evaluation. The Form of Tender and pages of the Bill of Quantities (to be decided on by the tender opening committee) are to be initialed by the members of the tender opening committee attending the opening.

25.7 At the Tender Opening, the Procuring Entitys hall neither discuss the merits of any Tender nor reject any Tender (except for late Tenders, in accordance with ITT 23.1).

25.8 The Procuring Entity shall prepare minutes of the Tender Opening that shall include, as a minimum: -

a) the name of the Tendere rand whether there is a withdrawal, substitution, or modification;
b) the Tender Price, per lot (contract) if applicable, including any discounts;
c) any alternative Tenders;
d) the presence or absence of a Tender Security, if new as required;
e) number of pages of each tender document submitted.

25.9 The Tenderers' representatives who are present shall be requested to sign the minutes. The omission of a Tenderer's signature on the minutes shall not invalidate the contents and effect of the minutes. A copy of the tender opening register shall be distributed to all Tenderers.

E. EVALUATION AND COMPARISON OF TENDERS

26. Confidentiality

26.1 Information relating to the evaluation of Tenders and recommendation of contract award shall not be disclosed to Tenderersorany other persons not officially concerned with the Tender process until information on Intention to Award the Contract is transmitted to all Tenderers in accordance with ITT 43.

26.2 Any effort by a Tenderer to influence the Procuring Entity in the evaluation of the Tenders or Contract award decisions may result in the rejection of its tender.

26.3 Not withstanding ITT 26.2, from the time of tender opening to the time of contract award, if a tenderer wishes to contact the Procuring Entity on any matter related to the tendering process, it shall do so in writing.

27.1 Clarification of Tenders

27.2 To assist in the examination, evaluation, and comparison of the tenders, and qualification of the tenderers, the Procuring Entity may, at its discretion, ask any tenderer for a clarification of its tender, given a reasonable time for aresponse. Any clarification submitted by a tenderer that is not in response to a request by the Procuring Entity shallnot be considered. The Procuring Entity's request for clarification and the response shall be in writing. No change, including any voluntary increase or decrease, in the prices or substance of the tender shall be sought, offered, or permitted, except to confirm the correction of arithmetic errors discovered by the Procuring Entity in the evaluation of the tenders, in accordance with ITT 31.

27.3 If a tenderer does not provide clarifications of its tender by the date and time set in the Procuring Entity's request for clarification, its Tender may be rejected.

28.1 Deviations, Reservations, and Omissions

28.2 During the evaluation of tenders, the following definitions apply: -

a) *"Deviation"* is a departure from the requirements specified in the tender document;
b) *"Reservation"* is the setting of limiting conditions or withholding from complete acceptance of the requirements specified in the tender document; and
c) *"Omission"* is the failure to submit part or all of the information or documentation required in the Tender document.

29.1 Determination of Responsiveness

29.2 The Procuring Entity's determination of a Tender's responsiveness is to be based on the contents of the tender itself, as defined in ITT 11.

29.3 A substantially responsive Tender is one that meets the requirements of the Tender document withoutmaterial deviation, reservation, or omission. A material deviation, reservation, or omission is one that, if accepted, would:

a) Affec tin any substantial way the scope, quality, or performance of the Works specified in the Contract;
b) limit in any substantial way, inconsistent with the tender document, the Procuring Entity's rights or the tenderer's obligations under the proposed contract;
c) if rectified, would unfairly affect the competitive position of other tenderers presenting substantially responsivetenders.

29.4 The Procuring Entity shall examine the technical aspects of the tender submitted in accordance with ITT 16, to confirm that all requirements of Section VII, Works' Requirements have been met without any material deviation, reservation or omission.

29.5 If a tender is not substantially responsive to the requirements of the tender document, it shall be rejected by the Procuring Entity and may not subsequently be made responsive by correction of the material deviation, reservation, or omission.

30.1 Non-material Non-conformities

30.2 Provided that a tender is substantially responsive, the Procuring Entity may waive any non-conformities in the tender.

30.3 Provided that a Tender is substantially responsive, the Procuring Entity may request that the tenderer submit the necessary information or documentation, within a reasonable period of time, to rectify non-material non- conformities in the tender related to documentation requirements. Requesting information or documentation on such non-conformities shall not be related to any aspect of the price of the tender. Failure of the tenderer to comply with the request may result in the rejection of its tender.

30.4 Provided that a tender is substantially responsive, the Procuring Entity shall rectify quantifiable non-

material non-conformities related to the Tender Price. To this effect, the Tender Price shall be adjusted, for comparison purposes only, to reflect the price of a missing or non-conforming item or component in the manner specified **in the TDS.**

31.1 Arithmetical Errors

31.2 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 by any person or entity.

31.3 Provided that the Tender is substantially responsive, the Procuring Entity shall handle errors on the following basis: -

a) Any error detected if considered a major deviation that affects the substance of the tender, shall lead to disqualification of the tender as non-responsive.
b) Any errors in the submitted tender arising from a miscalculation of unit price, quantity, subtotal and total bidpriceshallbe considered as a major deviation that affects the substance of the tender and shall lead to disqualification of the tender as non-responsive. and
c) if there is a discrepancy between words and figures, the amount in words shall prevail

31.4 Tenderers shall be notified of any error detected in their bid during the notification of award.

32.0 Conversion to Single Currency

For evaluation and comparison purposes, the currency(ies) of the Tender shall be converted in to a single currency asspecified in the **TDS**.

33.1 Margin of Preference and Reservations

33.2 A margin of preference may be allowed only when the contract is open to international competitive tendering where foreign contractors are expected to participate in the tendering process and where the contract exceeds the value/threshold specified in the Regulations.

33.3 A margin of preference shall not be allowed unless it is specified so in the **TDS**.

33.4 Contracts procured on basis of international competitive tendering shall not be subject to reservations exclusive to specific groups as provided in ITT 33.4.

33.5 Where it is intended to reserve a contract to as pecific group of businesses (these groups are Small and Medium Enterprises, Women Enterprises, Youth Enterprises and Enterprises of persons living with disability, as the case may be), and who are appropriately registered as such by the authority to be specified in the **TDS**, a procuring entity shall ensure that the invitation to tender specifically indicates that only businesses or firms belonging to the specified group are eligible to tender. No tender shall be reserved to more than one group. If not so stated in the Invitation to Tender and in the Tender documents, the invitation to tender will be open to all interested tenderers.

34.1 Nominated Subcontractors

34.2 Unless otherwise stated in the **TDS,** the Procuring Entity does not intend to execute any specific elements of the Works by subcontractors selected/nominated by the Procuring Entity. Incase the ProcuringEntity nominates a subcontractor, the subcontract agreement shall be signed by the Subcontractor and the Procuring Entity. The main contract shall specify the working arrangements between the main contractor and the nominated subcontractor.

34.3 Tenderers may propose sub-contracting up to the percentage of total value of contracts or the volume of works as specified in the **TDS**. Subcontractors proposed by the Tenderer shall be fully qualified for their parts of the Works.

34.4 Domestic subcontractor's qualifications shall not be used by the Tenderer to qualify for the Works unless their specialized parts of the Works were previously designated so by the Procuring Entity in the **TDS** a scan be met by subcontractors referred to hereafter as 'Specialized Subcontractors', in which case, the qualifications of the Specialized Subcontractorsproposed by the Tenderer may be added to the qualifications of the Tenderer.

35. Evaluation of Tenders

35.1 TheProcuring Entity shall use the criteria and methodologies listed in this ITT and Section III, Evaluation and Qualification Criteria No other evaluation criteria or methodologies shall be permitted. By applying the criteria and methodologies the Procuring Entity shall determine theLowest Evaluated Tender in accordance with ITT 40.

35.2 To evaluate a Tender, the Procuring Entity shall consider the following:

a) priceadjustment in accordance with ITT 31.1 (iii); excluding provisional sums and contingencies, if any, but including Daywork items, where priced competitively;

b) price adjustment due to discounts offered in accordance with ITT 14.4;

c) converting the amount resulting from applying (a) and (b) above, if relevant, to a single currency in accordance with ITT 32;

d) pricea djustment due to quantifiable non materialnon-conformities in accordance with ITT 30.3; and

e) any additional evaluation factors specified in the **TDS** and Section III, Evaluation and Qualification Criteria.

35.3 The estimated effect of the price adjustment provisions of the Conditions of Contract, applied over the period of execution of the Contract, shall not be consideredin Tender evaluation.

35.4 Where the tender involves multiple lots or contracts, the tenderer will be allowed to tender for one or more lots (contracts). Each lot or contract will be evaluated in accordance with ITT 35.2. The methodology to determine the lowest evaluated tenderer or tenderers base done lot (contract) or based on a combination of lots (contracts), will be specified in Section III, Evaluation and Qualification Criteria. In the case of multiple lots or contracts, tenderer will be will be required to prepare the Eligibility and Qualification Criteria Form for each Lot.

36.0 Comparison of tenders

The Procuring Entity shall compare the evaluated costs of all substantially responsive Tenders established in accordance with ITT 35.2 to determine the Tender that has the lowest evaluated cost.

37.1 Abnormally low tenders and abnormally high tenders

Abnormally LowTenders

37.2 An Abnormally Low Tender is one where the Tender price, in combination with other elements of the Tender, appears so low that it raises material concerns as to the capability of the Tenderer in regards to the Tenderer's ability to perform the Contract for the offered Tender Price or that genuine competition between Tenderersis compromised.

37.3 In the event of identification of a potentially Abnormally Low Tender, the Procuring Entity shall seek written clarifications from the Tenderer, including detailed price analyses of its Tender price in relation to the subject matter of the contract, scope, proposed methodology, schedule, allocation of risks and responsibilities and any otherrequirements of the Tender document.

37.4 After evaluation of the price analyses, in the event that the Procuring Entity determines that the Tenderer has failed to demonstrate its capability to perform the Contract for the offered Tender Price, the Procuring Entity shall reject the Tender.

Abnormally high tenders

37.5 Anabnormally high tender price is one where the tender price, in combination with other constituent elements of the Tender, appears unreasonably too high to the extent that the Procuring Entity is concerned that it (the Procuring Entity) may not be getting value for money or it may be paying too high a price for the contract compared with market prices or that genuine competition between Tenderers is compromised.

37.6 Incase of a nab normally high price, the Procuring Entity shall make a survey of the market prices,

check if the estimated cost of the contract is correct and review the Tender Documents to check if the specifications, scope of work and conditions of contract are contributory to the abnormally high tenders. The Procuring Entity may also seek written clarification from the tenderer on the reason for the high tender price. The Procuring Entity shall proceed as follows:

i) If the tender price is abnormally high based on wrong estimated cost of the contract, the Procuring Entity may accept or not a ccept the tender depending on the Procuring Entity's budget considerations.

ii) If specifications, scope of work and/or conditions of contract are contributory to the abnormally high tender prices, the Procuring Entity shall reject all tenders and may retender for the contract based on revised estimates, specifications, scope of work and conditions of contract, as the case may be.

37.7 If the Procuring Entity determines that the Tender Price is abnormally too high because genuine competition between tenderers is compromised (*often due to collusion, corruption or other manipulations*), the Procuring Entity shall reject all Tenders and shall institute or cause competent Government Agencies to institute an investigation on the cause of the compromise, before retendering.

38.1 Unbalanced and/ or front-loaded tenders

38.2 If in the Procuring Entity's opinion, the Tender that is evaluated as the lowest evaluated price is seriously unbalanced and/or frontloaded, the Procuring Entity may require the Tenderer to provide written clarifications. Clarifications may include detailed price analyses to demonstrate the consistency of the tender prices with the scope of works, proposed methodology, schedule and any other requirements of the Tender document.

38.3 After the evaluation of the information and detailed price analyses presented by the Tenderer, the Procuring Entity may as appropriate:

a) accept theTender;

b) require that the total amount of the Performance Security be increased at the expense of the Tenderer to a level not exceeding a 30% of the Contract Price;

c) agree on a payment mode that eliminates the inherent risk of the Procuring Entity paying too much for undelivered works;

d) reject the Tender,

39.1 Qualifications of the tenderer

39.2 The Procuring Entity shall determine to its satisfaction whether the eligible Tenderer that is selected as having submitted the lowest evaluated cost and substantially responsive Tender, meets the qualifying criteria specified in Section III, Evaluation and Qualification Criteria.

39.3 The determination shall be based upon an examination of the documentary evidence of the Tenderer's qualifications submitted by the Tenderer, pursuant to ITT 17. The determination shall not take into consideration the qualifications of other firms such as the Tenderer's subsidiaries, parent entities, affiliates, subcontractors (other than Specialized Sub-contractors if permitted in the Tender document), or any other firm(s) different from the Tenderer.

39.4 An affirmative determination shall be a prerequisite for award of the Contract to the Tenderer. A negative determination shall result in disqualification of the Tender, in which event the ProcuringEntityshallproceedto the Tenderer who offers a substantially responsive Tender with the next lowest evaluated price to make a similar determination of that Tenderer's qualifications to perform satisfactorily.

40.1 Lowest evaluated tender

Having compared the evaluated prices of Tenders, the Procuring Entity shall determine the Lowest Evaluated Tender. The Lowest Evaluated Tender is the Tender of the Tenderer that meets the Qualification Criteria and whose Tender has been determined to be:

a) Mostresponsive to the Tender document; and

b) the lowest evaluated price.

41.0 Procuring entity's right to accept any tender, and to reject any or all tenders.

The Procuring Entity reserves the right to accept or reject any Tender and to annul the Tender process and reject all Tenders at any time prior to Contract Award, without there by incurring any liability to Tenderers. Incase of annulment, all Tenders submitted and specifically, Tender securities, shall be promptly returned to the Tenderers.

F. AWARD OF CONTRACT

42.0 Award criteria

The Procuring Entity shall award the Contract to the successful tenderer whose tender has been determined to be the Lowest Evaluated Tender.

43.1 Notice of Intention to Enter into a Contract/Notification of Award

Uponaward of the contract and Prior to the expiry of the Tender Validity Period the Procuring Entity shall issue a Notification of Intention to Enter into a Contract/Notification of award to all tenderers which shall contain, at a minimum, the following information:

a) the name and address of the Tenderer submitting the successful tender;
b) the Contract price of the successful tender;
c) a statement of the reason(s) the tender of the unsuccessful tenderer to whom the letter is addressed was unsuccessful, unless the price information in (c) above already reveals the reason;
d) the expiry date of the Standstill Period; and
e) instruction son how to request a debriefing and/ or submit a complaint during the stand still period;

44.1 Stand still Period

44.2 The Contract shall not be signed earlier than the expiry of a Standstill Period of 14 days to allow any dissatisfied tender to launch a complaint. Where only one Tender is submitted, the Standstill Period shall not apply.

44.3 Where a Standstill Period applies, it shall commence when the Procuring Entity has transmitted to each Tenderer the Notification of Intention to Enter into a Contract with the successful Tenderer.

45.1 Debriefing by The Procuring Entity

45.2 On receipt of the Procuring Entity's Notification of Intention to Enter into a Contract referred to in ITT 43, an unsuccessful tenderer may make a written request to the Procuring Entity for a debriefing on specific issues or concerns regarding their tender. The Procuring Entity shall provide the debriefing within five days of receipt of the request.

45.3 Debriefings of unsuccessful Tenderers may be done in writing or verbally. The Tenderer shall bear its own costs of attending such a debriefing meeting.

46.0 Letter of Award

Prior to the expiry of the Tender Validity Period and upon expiry of the Standstill Period specified in ITT 42.1, upon addressing a complaint that has been filed with in the Standstill Period, the Procuring Entity shall transmit the Letter of Award to the successful Tenderer. The letter of award shall request the successful tenderer to furnish the Performance Security within 21 days of the date of the letter.

47.1 Signing of Contract

47.2 Upon the expiry of the fourteen days of the Notification of Intention to enter in to contract and upon the parties meeting their respective statutory requirements, the Procuring Entity shall send the successful Tenderer the Contract Agreement.

47.3 Within fourteen (14) days of receipt of the Contract Agreement, the successful Tenderer shall sign, date, and returnittotheProcuringEntity.

47.4 The written contract shall be entered into within the period specified in the notification of award and before expiry of the tender validity period.

48.1 Performance Security

48.2 Within twenty-one (21) days of the receipt of the Letter of Award from the Procuring Entity, the successful Tenderer shall furnish the Performance Security and, any other documents required in the **TDS**, in accordance with the General Conditions of Contract, subject to ITT 38.2 (b), using the Performance Security and other Forms included in Section X, Contract Forms, or another form acceptable to the Procuring Entity. A foreign institution providing a bank guarantee shall have a correspondent financial institution located in Kenya, unless the Procuring Entity has agreed in writing that a correspondent bank is not required.

48.3 Failure of the successful Tenderer to submit the above-mentioned Performance Security and otherdocuments required in the **TDS** or sign the Contract shall constitute sufficient grounds for the annulment of the award and forfeiture of the Tender Security. In that event the Procuring Entity may award the Contract to the Tenderer offering the next Best Evaluated Tender.

48.4 Performance security shall not be required for contracts estimated to cost less than the amount specified inthe Regulations.

49.1 Publication of Procurement Contract

Within fourteen days after signing the contract, the Procuring Entity shall publish the awarded contract at its notice boards and websites; and on the Website of the Authority. At the minimum, the notice shall contain the following information:

a) name and address of the Procuring Entity;
b) name and reference number of the contract being awarded, a summary of its scope and the selection method used;
c) the name of the successful Tenderer, the final total contract price, the contract duration;
d) dates of signature, commencement and completion of contract;
e) names of all Tenderers that submitted Tenders, and their Tender prices as readout at Tender opening.

50.0 Procurement related Complaint

The procedures for making Procurement-related Complaints are as specified in the **TDS.**

51.0 This Tender has 6 Specialist Displines viz; General Electrical Works, ICT, Nurse call System, UPS, Generator works & 3No. Hospital Lifts. Each Displine shall be treated as distinct work and shall have own requirements and will be evaluatated separately with each dispilne having a minimum score and the mean score shall be determined as an average of each of the 6 scores

The successful bidder shall be the tenderer with the lowest evaluated tender price subject to the employer's right to exercise due diligence relating to confirmation of information submitted by the bidder before the award of the tender in pursuant to Section 83 of the Public Procurement and Asset Disposal Act 2015.

SECTION B – TENDER DATA SHEET (TDS)

The following specific data shall complement, supplement, or amend the provisions in the Instructions to Tenderers (ITT). Whenever there is a conflict, the provisions herein shall prevail over those in ITT.

A. General	
ITT1.1	The reference number of the Invitation for Tenders is: **TENDER NO: NCG/TECH/ REFERRAL/SERVICES/037/2021-2022** The Procuring Entity is: ***NAROK COUNTY GOVERMENT*** The name of the Contract is: ***SUPPLY, DELIVER, INSTALLATION & TESTING OF ELECTRICAL & MECHANICAL SERVICES WORKS***
ITT2.3	The Information made available on competing firms is as follows: N/A
ITT2.4	The firms that provided consulting services for the contract being tendered for are: NA
ITT3.1	Maximum number of members in the Joint Venture (JV) shall be: ***N/A***

B. Contents of Tender Document	
ITT 7.1	(i) The Tenderer will submit any request for clarifications in writing at the Address; ***procument@narok.go.ke*** To reach the Procuring Entity not later than_12:00 noon 10th NOV 2021 (ii) The Procuring Entity shall publish its response at the website www.narok.go.ke
ITT 7.2	(A) A pre-arranged pretender site visit *shall not* take place at the following date, time and place: (B) Pre-Tender meeting "*shall not*" take place at the following date, time and place:
ITT 7.3	The Tenderer will submit any questions in writing, to reach the Procuring Entity not later than12:00 noon 10th NOV 2021
ITT 7.5	The Procuring Entity's website where Minutes of the pre-Tender meeting and the pre-arranged pretender will be published is_____
ITT 9.1	For Clarification of Tender purposes, for obtaining further information and for purchasing tender documents, the Procuring Entity's addressis: (1) Name of Procuring Entity NAROK COUNTY GOVERMENT Physical address for hand Courier Delivery to an office or Tender Box :Procument office Situated at the Narok County offices headquaters_ (3) Postal Address P.o. Box 898-20500 Narok (4) Email address: procurement@narok.go.ke
C. Preparation of Tenders	
ITT 11.1 (h)	The Tenderer shall submit the following additional documents in its Tender: *[list any additional document not already listed in ITT I I.I that must be submitted with the Tender.*
ITT 13.1	Alternative Tenders *shall not be* considered.
ITT 13.2	Alternative times for completion *shall no tbe* permitted.
ITT 13.4	Alternative technical solutions shall be permitted for the following parts of the Works: *[If alternative technical solutions are permitted, the evaluation method will be as specified in Section III Evaluation and Qualification Criteria.}*
ITT 14.5	The prices quoted by the Tenderer shall be *fixed*

ITT 15.2 (a)	Foreign currency requirements **not allowed.**
ITT 18.1	The Tender validity period shall be *120* days from the date of tender opening.
ITT 18.3	(a) The Number of days beyond the expiry of the initial tender validity period will be 30 days.
ITT 19.1	Tender shall provide **a Tender Security of** *KES. 500,000. must be pro vided in any of the following forms:* a bank guarantee; a guarantee by an insurance company registered and licensed by the Insurance Regulatory Authority listed by the Authority; or guarantee by a deposit taking micro-finance institution
ITT 20.1	In addition to the original of the Tender, the number of copies is:*2 (One original & One Copy)*
ITT 20.3	The written confirmation of authorization to sign on behalf of the Tenderer shall consist of:_____ *[insert the name and description of the documentation required to demonstrate the authority of the signatory to sign the Tender}*
D. Submission and Opening of Tenders	
ITT 22.1	(A) For Tender submission purposes only, the Procuring Entity's addressis: (1) Name of Procuring Entity: NAROK COUNTY GOVERMENT (2) Physical address: PROCUMENT OFFICE SITUATED AT NAROK COUNTY GOVERNMENT OFFICES HEADQUATERS (3) Postal Address: P. o. BOX 898-20500 NAROK. (4) Email address: ***procument@narok.go.ke*** (5) Date and time for submission of Tenders 12.00 Noon 16th NOV 2021 (6) Tenders shall **shall not submit**ted electronically.
ITT 25.1	The Tender opening shall take place at the time and the address for Opening of Tenders Provided below: (7) Name of ProcuringEntity: NAROK COUNTY GOVERMENT (1) Physical address for the location of tender opening: County Assembly Hall 2, on 17th Nov 2021 at 10.00AM
ITT25.5	The number of representatives of the Procuring Entity to sign is
E. Evaluation, and Comparison of Tenders	
ITT 30.1	Prices shall be quoted in Kenya Currency.
ITT 32.3	A margin of preference and/or reservation ***"shall not"*** apply

ITT 32.5	The invitation to tender is Open
ITT 33.2	**Price evaluation will be done for the completeness of the supply.** **The lowest Evaluated Bidders shall be awarded to supply all Item** **(Only one Bidder shall be awarded)** .
ITT 34.3	*[Indicate NIA if not applicable}* The parts of the Works for which the Procuring Entity permits Tenderers to propose Specialized Subcontractors are designated as follows: For the above-designated parts of the Works that may require Specialized Subcontractors, the relevant qualifications of the proposed Specialized Subcontractors will be added to the qualifications of the Tenderer for the purpose of evaluation.
ITT 35.2 (d)	Additional requirements apply. These are detailed in the evaluation criteria in Section III, Evaluation and QualificationCriteria.
ITT 49.1	The procedures for making a Procurement-related Complaint are detailed in the "Notice of Intention to Award the Contract" herein and are also available from the Narok County Website www.narok.go.ke or email procument@narok.go.ke If a Tenderer wishes to make a Procurement-related Complaint, the Tenderer should submit its complaint following these procedures, in writing (by the quickest means available, that is either by hand delivery or email to: Procuring Entity: *Narok County Goverment* Email address: procument@narok.go.ke In summary, a Procurement-related Complaint may challenge any of the following (among others): (i) the terms of the Tender Documents; and (ii) the Procuring Entity's decision to award thecontract.

3.1 TENDER EVALUATION (ITT 35)

Consistent with and in addition to the criteria listed in ITT 33.3 and ITT 29.3; and ITT 34 and its subparagraphs the following criteria shall apply:

The tenderer who passes the required Technical score and provides the lowest evaluated price will be considered for award

4.1 MULTIPLE CONTRACTS

4.2 Multiple contracts will be permitted in accordance with ITT 35.4. Tenderers are evaluated on basis of Lots and a lowest evaluated tenderer identified for each Lot. The Procuring Entity will select one Option of the two Options listed below for award of Contracts.

OPTION 1

(i) If a tenderer wins only one Lot, the tenderer will be awarded a contract for that Lot, provided the tenderer meets the Eligibility and Qualification Criteria for that Lot.

(ii) If a tenderer wins more than one Lot, the tender will be awarded a contract for all won Lots, provided the tenderer meets the aggregate Eligibility and Qualification Criteria for all the won Lots. The tenderer will be awarded only the combinations for which the tenderer qualifies and the others will be considered for award to second lowest the tenderers.

OPTION2

The Procuring Entity will consider all possible combinations of won Lots [contract(s)] and determine the combination with the lowest evaluated price. Tenders will then be awarded to the Tenderer or Tenderers in the combination provided the tenderer meets the aggregate Eligibility and Qualification Criteria for all the won Lots.

5.0 ALTERNATIVE TENDERS (ITT 13.1)

Alternative Tenders (ITT 13.1)

Analternative if permitted under ITT 3.1, will be evaluated as follows:

The Procuring Entity shall consider Tenders offered for alternatives as specified in Part 2 - Works requirements. Only the technical alternatives, if any, of the Tenderer with the Best Evaluated Tender conforming to the basic technical requirements shall be considered by the Procuring Entity.

6.1 MARGIN OF PREFERENCE

6.2 If the TDS so specifies, the Procuring Entity will grant a margin of preference of fifteen percent (15%) to be loaded on evaluated prices of the foreign tenderers, where the percentage of share holding of Kenyan citizensis less

than fifty- one percent (51%).

63 Contractors shall be asked to provide, as part of the data for qualification, such information, including details of ownership, as shall be required to determine whether, according to the classification established by the Procuring Entity, a particular contractor or group of contractors qualifies for a margin of preference.

64 After Tenders have been received and reviewed by the Procuring Entity, responsive Tenders shall be assessed to ascertain their percentage of shareholding of Kenyan citizens. Responsive tenders shall be classified into the following groups:

i) *Group A:* tenders offered by Kenyan Contractors and other Tenderers where Kenyan citizens hold shares of over fifty one percent (51%).
ii) *Group B:* tenders offered by foreign Contractors and other Tenderers where Kenyan citizens hold shares of less than fifty one percent (51%).

65 All evaluated tenders in each group shall, as a first evaluation step, be compared to determine the lowest tender, and the lowest evaluated tender in each group shall be further compared with each other. If, as a result of this comparison, a tender from Group A is the lowest, it shall be selected for the award of contract. If a tender from Group B is the lowest, an amount equal to the percentage indicated in Item 6.1 of the respective tender price, including unconditional discounts and excluding provisional sums and the cost of day works, if any, shall be added to the evaluated price offered in each tender from Group B. All tenders shall then be compared using new prices with added prices to Group B and the lowest evaluated tender from Group A. If the tender from Group A is still the lowest tender, it shall be selected foraward. If not, the lowest evaluated tender from Group B based on the first evaluation price shall be selected.

7. Post qualification and Contract ward (ITT 39), more specifically,

a) In case the tender <u>was subject to post-qualification</u>, the contract shall be awarded to the lowest evaluated tenderer, subject to confirmation of pre-qualification data, if so required.
b) Incase the tender <u>was not subject to post-qualification</u>, the tender that has been determined to be the lowest evaluated tenderer shall be considered for contract award, subject to <u>meeting each of the following conditions</u>.
   i) The Tenderer shall demonstrate that it has access to, or has available, liquid assets, unencumbered real assets, lines of credit, and other financial means (independent of any contractual advance payment) sufficient to meet the construction cash flow of Kenya Shillings
   ii) Minimum <u>average</u> annual construction turnover of Kenya Shillings_____*[insert amount]*, equivalent calculated as total certified payments received for contracts in progress and/or completed within the last__*[insert of year]* years.

iii) Atleast 5 of contract(s) of a similar nature executed within Kenya, or the East African Community or a broad, that have been satisfactorily and substantially completed as a prime contractor, or joint venture member or sub-contractor each of minimum value Kenya shillings <u>30 million</u>

equivalent.

iv) Contractor's Representative and Key Personnel, which are specified as

v) Contractors key equipment listed on the table "Contractor's Equipment" below and more specifically listed as *[specify requirements for each lot as applicable]*

iv) Other conditions depending on their seriousness.

a) **History of non-performing contracts**:

Tenderer and each member of JV in case the Tenderer is a JV, shall demonstrate that non-performance of a contract did not occur because of the default of the Tenderer, or the member of a JV in the last 5 *years*). The required information shall be furnished in the appropriate form.

b) Pending Litigation

Financialpositionandprospectivelong-termprofit ability of the Single Tenderer, and in the case the Tenderer is a JV, of each member of the JV, shall remain sound according to criteria established with respect to Financial Capability under Paragraph (i) above if all pending litigation will be resolved against the Tenderer. Tenderer shall provide information on pending litigations in the appropriate form.

c) LitigationHistory

There shall be no consistent history of court/arbitral award decisions against the Tenderer, in the last
5 years. All parties to the contract shall furnish the information in the appropriate form about any litigation or arbitration resulting from contracts completed or on going unde rits execution over the years specified. A consistent history of awards against the Tenderer or any member of a JV may result in rejection of the tender.

QUALIFICATION FORM*

1	2	3	4	5
Item No.	**Qualification Subject**	**Qualification Requirement**	***Document To be Completed by Tenderer***	***For Procuring Entity's Use (Qualification met or Not Met)***
1	Nationality	Nationality in accordance with ITT 3.6	Forms ELI - 1.1 and 1.2, with attachments	
2	Tax Obligations for Kenyan Tenderers	Has produced a current tax clearance certificate or tax exemption certificate issued by Kenya Revenue Authority in accordance with ITT 3.14.	Attachment	
3	Conflict of Interest	No conflicts of interest in accordance with ITT 3.3	Form of Tender	
4	PPRA Eligibility	Not having been declared ineligible by the PPRA as described in ITT 3.7	Form of Tender	
5	State- owned Enterprise	Meets conditions of ITT 3.8	Forms ELI - 1.1 and 1.2, with attachments	
6	Goods, equipmentand services to besupplied under thecontract	To have their origin in any country that is not determined ineligible under ITT 4.1	Forms ELI - 1.1 and 1.2, with attachments	
7	History of Non-Performing Contracts	Non-performanceofacontractdidnotoccurasaresultof contractor default since 1st January[.....}.	Form CON-2	
8	Suspension Based on Execution of Tender/Proposal Securing Declaration by the Procuring Entity	Not under suspension based on-execution of a Tender/Proposal Securing Declaration pursuant to ITT 19.9	Form of Tender	
9	Pending Litigation	Tender's financial position and prospective long-term profitability still sound according to criteria established in 3.1 and assuming that all pending litigation will NOT be	FormCON-2	

1	2	3	4	5
Item No.	**Qualification Subject**	**Qualification Requirement**	***Document To be Completed by Tenderer***	***For Procuring Entity's Use (Qualification met or Not Met)***
10	LitigationHistory	No consistent history of court/arbitral award decisions against the Tenderer since 1st January *[insert year]*.	Form CON - 2	
11	Financial Capabilities	(i) The Tenderer shall demonstrate that it has access to, or has available, liquid assets, unencumbered real assets, lines of credit, and other financial means (independent of any contractual advance payment) sufficient to meet the construction cash flow requirements estimated as Kenya Shillings *[insert amount]* equivalent for the subject contract(s) net of the Tenderer's othercommitments. (ii) The Tenderers shall also demonstrate, to thesatisfaction of the Procuring Entity, that it has adequate sources of finance to meet the cash flow requirements on works currently in progress and for future contractcommitments. (iii) The audited balance sheets or, if not required by the laws of the Tenderer's country, other financial statements acceptable to the Procuring Entity, for the last *[insert number of years]* years shall be submitted and must demonstrate the current soundness of theTenderer's financial position and indicate its prospective long-term profitability.	Form FIN - 3.1, with attachments	

1	2	3	4	5
Item No.	**Qualification Subject**	**Qualification Requirement**	***Document To be Completed by Tenderer***	***For Procuring Entity's Use (Qualification met or Not Met)***
14	Specific Construction & Contract Management Experience	A minimum number of *[state the number}* similar contracts specified below that have been satisfactorily and substantially completed as a prime contractor, joint venture member, management contractor or sub-contractor between 1st January *[insert year]* and tender submission deadline i.e. .. .. (number) contracts, each of minimum value Kenya shillings..... .... equivalent. *[In case the Works are to be tender as individual contracts under multiple contract procedure, the minimum number of contracts required for purposes of evaluating qualification shall be selected from the options mentioned in ITT 35.4}* The similarity of the contracts shall be based on the following: *[Based on Section VII, Scope of Works, specify the minimum key requirements in terms of physical size, complexity, construction method, technology and/or other characteristics including part of the requirements that may be met by specialized subcontractors, if permitted in accordance with ITT 34.3}*	Form EXP 4.2(a)	

SECTION C- TENDERING FORMS

QUALIFICATION FORMS

1. FOREIGN TENDERERS 40%RULE

Pursuant to ITT 3.9, a foreign tenderer must complete this form to demonstrate that the tender fulfils this condition.

ITEM	Description of Work Item	Describe location of Source	COST in K. shillings	Comments, if any
A	Local Labor			
1				
2				
3				
4				
5				
B	Sub contracts from Local sources			
1				
2				
3				
4				
5				
C				
1				
2				
3				
4				
5				
D				
1	PERCENTAGE OF CONTRACT PRICE			
2				
3				
4				
5				
E				
1				
2				

3				
4				
5				
6				

2. FORMEQU: EQUIPMENT

The Tenderer shall provide adequate information to demonstrate clearly that it has the capability to meet the requirements for the key equipment listed in Section III, Evaluation and Qualification Criteria. A separate Form shall be prepared for each item of equipment listed, or fo ralternative equipment proposed by the Tenderer.

Item of equipment		
Equipment information	Name of manufacturer	Model and power rating
	Capacity	Year of manufacture
Current	Current location	
	Indicate source of the equipment ☐ Owned ☐ Rented ☐ Leased ☐ Specially manufactured	
Omit the following information for equipment owned by the Tenderer.		
Owner	Name of owner	
	Address of owner	
	Telephone	Contact name and title
	Fax	Telex
Agreements	Details of rental / lease / manufacture agreements specific to the project	

3. FORM PER -1

Contractor's Representative and Key Personnel Schedule

Tenderers should provide the names and details of the suitably qualified Contractor's Re presentative and Key Personnel to perform the Contract. The data on their experience should be supplied using the Form PER-2 below for each candidate.

Contractor' Representative and Key Personnel

1.	**Title of position:** Contractor's Representative	
	Name of candidate:	
	Duration of appointment:	[*insert the whole period (start and end dates) for which this position will be engaged*]
	Time commitment: for this position:	[*insert the number of days/week/months/ that has been scheduled for this position*]
	Expected time schedule for this position:	[*insert the expected time schedule for this position (e.g. attach high level Gantt chart*]
2.	**Title of position:** *[ ]*	
	Name of candidate :	
	Duration of appointment:	[*insert the whole period (start and end dates) for which this position will be engaged*]
	Time commitment: for this position:	[*insert the number of days/week/months/ that has been scheduled for this position*]
	Expected time schedule for this position:	[*insert the expected time schedule for this position (e.g. attach high level Gantt chart*]
3.	**Title of position:** *[ ]*	
	Name of candidate :	
	Duration of appointment:	[*insert the whole period (start and end dates) for which this position will be engaged*]
	Time commitment: for this position:	[*insert the number of days/week/months/ that has been scheduled for this position*]
	Expected time schedule for this position:	[*insert the expected time schedule for this position (e.g. attach high level Gantt chart*]
4.	**Title of position:** *[ ]*	
	Name of candidate :	
	Duration of appointment:	[*insert the whole period (start and end dates) for which this position will be engaged*]
	Time commitment: for this position:	[*insert the number of days/week/months/ that has been scheduled for this position*]
	Expected time schedule for this position:	[*insert the expected time schedule for this position (e.g. attach high level Gantt chart*]
5.	**Title of position:** *[in sert title]*	
	Name of candidate	
	Duration of appointment:	[*insert the whole period (start and end dates) for which this position will be engaged*]
	Time commitment: for this position:	[*insert the number of days/week/months/ that has been scheduled for this position*]
	Expected time schedule for this position:	[*insert the expected time schedule for this position (e.g. attach high level Gantt chart*]

4. FORM PER - 2:

Resume and Declaration - Contractor's Representative and Key Personnel.

Name of Tenderer

Position[#1]:[*title of position from Form PER-1*]		
Personnel information	Name:	Date of birth:
	Address:	E-mail:
	Professional qualifications:	
	Academic qualifications:	
	Language proficiency: *[language and levels of speaking, reading and writing skills]*	
Details		
	Address of Procuring Entity:	
	Telephone:	Contact (manager / personnel officer):
	Fax:	
	Jobtitle:	Years with present Procuring Entity:

Summarize professional experience in reverse chronological order. Indicate particular technical and managerial experience relevant to the project.

Project	Role	Duration of involvement	Relevant experience
[main project details]	*[role and responsibilities on the project]*	*[time in role]*	*[describe the experience relevant to this position]*

Declaration

I, the undersigned *[insert either "Contractor's Representative" or "Key Personnel" as applicable]*, certify that to the best of my knowledge and belief, the information contained in this Form PER-2 correctly describes myself, my qualificationsandmyexperience.

I confirm that I am available as certified in the following table and throughout the expected time schedule for this position as provided in the Tender:

Commitment	Details
Commitment to duration of contract:	*[insert period (start and end dates) for which this Contractor's Representative or Key Personnel is available to work on this contract]*
Time commitment:	*[insert period (start and end dates) for which this Contractor's Representative or Key Personnel is available to work on this contract]*

I understand that any misrepresentation or omission in this Form may:

a) be taken into consideration during Tender evaluation;
b) result in my disqualification from participating in theTender;
c) result in my dismissal from the contract.

Name of Contractor's Representative or Key Personnel: [*insert name*]

Signature:_____

Date: (day month year): _____

Counter signature of authorized representative of the Tenderer:

Signature:_____

Date: (day month year): _____

5. TENDERERS QUALIFICATION WITHOUT PREQUALIFICATION

To establish its qualifications to perform the contract in accordance with Section III, Evaluation and Qualification Criteria the Tenderer shall provide the information requested in the corresponding Information Sheets included hereunder.

51 FORM ELI -1.1

Tenderer

InformationForm

Date:_____

ITT No. andtitle:_____

Tenderer's name
In case of Joint Venture (JV), name of each member:
Tenderer's actual or intended country of registration: *[indicate country of Constitution]*
Tenderer's actual or intended year of incorporation:
Tenderer's legal address [in country of registration]:
Tenderer's authorized representative information Name: _____ Address: _____ Telephone/Fax numbers: _____ E-mail address: _____
1. Attached are copies of original documents of ☐ Articles of Incorporation (or equivalent documents of constitution or association), and/or documents of registration of the legal entity named above, in accordance with ITT 3.6 ☐ In case of JV, letter of intent to form JV or JV agreement, in accordance with ITT 3.5 ☐ In case of state-owned enterprise or institution, in accordance with ITT 3.8, documents establishing: • Legal and financial autonomy • Operation under commercial law • Establishing that the Tenderer is not under the supervision of the Procuring Entity 2. Included are the organizational chart, a list of Board of Directors, and the beneficial ownership.

52 FORM ELI -1.2

Tenderer's JV Information Form
(to be completed for each member of Tenderer's JV)

Date:_____

ITT No. andtitle:_____

Tenderer's JV name:
JV member's name:
JV member's country of registration:
JV member's year of constitution:
JV member's legal address in country of constitution:
JV member's authorized representative information Name: _____ Address: _____ Telephone/Fax numbers: _____ E-mail address: _____
1. Attached are copies of original documents of ☐ Articles of Incorporation (or equivalent documents of constitution or association), and/or registration documents of the legal entity named above, in accordance with ITT 3.6. ☐ In case of a state-owned enterprise or institution, documents establishing legal and financial autonomy, operation in accordance with commercial law, and that they are not under the supervision of the Procuring Entity, in accordance with ITT 3.5. 2. Included are the organizational chart, a list of Board of Directors, and the beneficial ownership.

53 FORM CON –2

Historical Contract Non-Performance, Pending Litigation and Litigation History

Tenderer'sName:_____Date:_____

JVMember's Name_____ITT No. andtitle:_____

Non-Performed Contracts in accordance with Section III, Evaluation and Qualification Criteria
☐ Contract non-performance did not occur since 1st January *[insert year]*specified in Section III, Evaluation and Qualification Criteria, Sub-Factor 2.1. ☐ Contract(s) not performed since 1st January *[insert year]* specified in Section III, Evaluation and Qualification Criteria, requirement 2.1 ☐ Contract(s) withdrawn since 1st January *[insert year]* specified in Section III, Evaluation and Qualification Criteria, requirement 2.1

Year	Non- performed portion of contract	Contract Identification	Total Contract Amount (current value, currency, exchange rate and Kenya Shilling equivalent)
[insert year]	*[insert amount and percentage]*	Contract Identification: *[indicate complete contract name/ number, and any other identification]* Name of Procuring Entity: *[insert full name]* Address of Procuring Entity: *[insert street/city/country]* Reason(s) for nonperformance: *[indicate main reason(s)]*	*[insert amount]*

Pending Litigation, in accordance with Section III, Evaluation and Qualification Criteria
☐ No pending litigation in accordance with Section III, Evaluation and Qualification Criteria, Sub-Factor 2.3. ☐ Pending litigation in accordance with Section III, Evaluation and Qualification Criteria, Sub-Factor 2.3 as indicated below.

Year of dispute	Amount in dispute (currency)	Contract Identification	Total Contract Amount (currency), Kenya Shilling Equivalent (exchange rate)
		Contract Identification:_____ Name of Procuring Entity:_____ Address of Procuring Entity:_____ Matter in dispute:_____ Party who initiated the dispute:____ Status of dispute: _____	
		Contract Identification: Name of Procuring Entity: Address of Procuring Entity: Matter in dispute: Party who initiated the dispute: Status of dispute:	

Litigation History in accordance with Section III, Evaluation and Qualification Criteria

☐ No Litigation History in accordance with Section III, Evaluation and Qualification Criteria, Sub-Factor 2.4.
☐ Litigation History in accordance with Section III, Evaluation and Qualification Criteria, Sub-Factor 2.4 as indicated below.

Year of award	Outcome as percentage of Net Worth	Contract Identification	Total Contract Amount (currency), Kenya Shilling Equivalent (exchange rate)
[insert year]	*[insert percentage]*	Contract Identification: [indicate complete contract name, number, and any other identification] Name of Procuring Entity: *[insert full name]* Address of Procuring Entity: *[insert street/city/country]* Matter in dispute: *[indicate main issues in dispute]* Party who initiated the dispute: *[indicate "Procuring Entity" or "Contractor"]* Reason(s) for Litigation and award decision *[indicate main reason(s)]*	*[insert amount]*

Include details relating to potential bid-rigging practices such as previous occasions where tenders were withdrawn, joint bids with competitors, subcontracting work to unsuccessful tenderers, etc.

5.4 FORM FIN – 3.1:

Financial Situation and Performance

Tenderer's Name:_____

Date:_____

JV Member's Name_____

ITT No. and title:_____

5.4.1. Financial Data

Type of Financial information in_____ (currency)	**Historic information for previous _____*years,*** _____ **(amount in currency, currency, exchange rate*, USD equivalent)**				
	Year1	Year2	Year 3	Year4	Year 5
Statement of Financial Position (Information from Balance Sheet)					
Total Assets (TA)					
Total Liabilities (TL)					
Total Equity/Net Worth (NW)					
Current Assets (CA)					
Current Liabilities (CL)					
Working Capital (WC)					
Information from Income Statement					
Total Revenue (TR)					
Profits Before Taxes (PBT)					
Cash Flow Information					
Cash Flow from Operating Activities					

**Refer to ITT 15 for the exchange rate*

5.42 Sources of Finance

Specify sources of finance to meet the cash flow requirements on works currently in progress and for future contract commitments.

No.	Source of finance	Amount (Kenya Shilling equivalent)
1		
2		
3		

5.43 Financial documents

The Tenderer and its parties shall provide copies of financial statements for_____years pursuant Section III, Evaluation and Qualifications Criteria, Sub-factor 3.1. The financial statements shall:

a) reflect the financial situation of the Tenderer or incase of JV member, and not an affiliated entity (such as parent company or group member).

b) Be independently audited or certified in accordance with local legislation.

c) Be complete, including all notes to the financial statements.

d) Correspond to accounting periods already completed and audited.

☐ Attached are copies of financial statements[1] for the_____years required above; and complying with the requirements.

[1] *If the most recent set of financial statements is for a period earlier than 12 months from the date of Tender, the reason for this should be justified.*

5.6 FORMFIN–3.2:

Average Annual Construction Turnover

Tenderer's Name:_____
Date:_____
JV Member's Name_____
ITT No. and title:_____

	Annual turnover data (construction only)		
Year	**Amount Currency**	**Exchange rate**	**Kenya Shilling equivalent**
[indicate year]	*[insert amount and indicate currency]*		
Average Annual Construction Turnover *			

** See Section III, Evaluation and Qualification Criteria, Sub-Factor 3.2.*

5.7 FORMFIN–3.3:

Financial Resources

Specify proposed sources of financing, such as liquid assets, unencumbered real assets, lines of credit, and other financia lmeans, net of current commitments, available to meet the total construction cash flow demands of the subject contractor contracts as specified in Section III, Evaluation and Qualification Criteria.

Financial Resources		
No.	**Source of financing**	**Amount (Kenya Shilling equivalent)**
1		
2		
3		

5.8 FORMFIN–3.4:

Current Contract Commitments / Works in Progress

Tenderers and each member to a JV should provide information on their current commitments on all contracts that have been awarded, or for which a letter of intent or acceptance has been received, or for contracts approaching completion, but for which an unqualified, full completion certificate has yet to be issued.

Current Contract Commitments					
No.	**Name of Contract**	**Procuring Entity's Contact Address, Tel,**	**Valueof Outstanding Work [Current Kenya Shilling /month Equivalent]**	**Estimated Completion Date**	**Average Monthly Invoicing Over Last Six Months [Kenya Shilling /month)]**
1					
2					
3					
4					
5					

59 FORM EXP -4.1

General Construction Experience

Tenderer'sName:_____ Date:_____

JVMember'sName_____ ITT No. andtitle:_____

Page_____of_____pages

Starting Year	Ending Year	Contract Identification	Role of Tenderer
		Contract name: _____ Brief Description of the Works performed by the Tenderer: _____ Amount of contract: _____ Name of Procuring Entity: _____ Address: _____	
		Contract name: _____ Brief Description of the Works performed by the Tenderer: _____ Amount of contract: _____ Name of Procuring Entity: _____ Address: _____	
		Contract name: _____ Brief Description of the Works performed by the Tenderer: _____ Amount of contract: _____ Name of Procuring Entity: _____ Address: _____	

5.10 FORM EXP - 4.2(a)

Specific Construction and Contract Management Experience

Tenderer's Name:_____
Date:_____
JV Member's Name_____
ITT No. and title:_____

Similar Contract No.	**Information**			
Contract Identification				
Award date				
Completion date				
Role in Contract	Prime Contractor ☐	Member in JV ☐	Management Contractor ☐	Sub-contractor ☐
Total Contract Amount			**Kenya Shilling**	
If member in a JV or sub-contractor, specify participation in total Contract amount				
Procuring Entity's Name:				
Address: Telephone/fax number E-mail:				
Description of the similarity in accordance with Sub-Factor 4.2(a) of Section III:				
1 Amount				
2 Physical size of required works items				
3 Complexity				
4 Methods/Technology				
5 Construction rate for key activities				
6 Other Characteristics				

5.11 FORM EXP - 4.2 (b)

Construction Experience in Key Activities

Tenderer's Name:_____
Date:_____
Tenderer's JV Member Name:_____
Sub-contractor's Name[2] (as per ITT 34):_____
ITT No. and title:_____

All Sub-contractors for key activities must complete the information in this form as per ITT 34 and Section III, Evaluation and Qualification Criteria, Sub-Factor 4.2.

1. Key Activity No One:

Contract Identification	**Information**			
Award date				
Completion date				
Role in Contract	Prime Contractor ☐	Member in JV ☐	Management Contractor ☐	Sub-contractor ☐
Total Contract Amount			**Kenya Shilling**	
Quantity (Volume, number or rate of production, as applicable) performed under the contract per year or part of the year	Total quantity in the contract (i)	Percentage participation (ii)		Actual Quantity Performed (i) x (ii)
Year1				
Year 2				
Year 3				
Year 4				
Procuring Entity's Name:				
Address: Telephone/fax number E-mail:				
Description of the key activities in accordance with Sub-Factor 4.2(b) of Section III:				

[2] *If applicable*

OTHER FORMS

6. FORM OF TENDER

INSTRUCTIONS TO TENDERERS

i) The Tenderer must prepare this Form of Tender on stationery with its letterhead clearly showing the Tenderer's complete name and business address.

ii) Allitalicized text is to help Tenderer in preparing this form.

iii) Tenderer must complete and sign CERTIFICATE OF INDEPENDENT TENDER DETERMINATION and the SELF DECLARATION OF THE TENDERER attached to this Form of Tender.

iv) The Form of Tender shall include the following Forms duly completed and signed by the Tenderer.

- *Tenderer's Eligibility- Confidential Business Questionnaire*
- *Certificate of Independent Tender Determination*
- *Self-Declaration of the Tenderer*

v) **Date of thisTender submission**: *[insert date (as day, month and year) of Tender submission]* **Request for Tender No.:** *[insert identification]* **Name and description of Tender** *[Insert as per ITT)* **AlternativeNo.:** *[insert identification No if this is a Tender for an alternative]*

vi) **To:** *[insert complete name of Procuring Entity]*

Dear Sirs,

1. Inaccordance with the Conditions of Contract, Specifications, Drawings and Bills of Quantities for the execution of the above-named Works, we, the undersigned offer to construct and complete the Works and remedy any defects there in for the sum[3] of Kenya Shillings:

   [*Amount in figures*] _____

   Kenya Shillings *[amount in words*]_____

   _____

   _____

   _____

   _____

2. Weunder take, if our tender is accepted, to commence the Works as soon as is reasonably possible after the receipt of the Architect notice to commence, and to complete the whole of the Works comprised in the Contract within the time stated in the Special Conditions of Contract.

3. We agree to adhereby this tender until_____*[Insert date],* and it shall remain binding upon us and may be accepted at any time before that date.

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

5. We, the undersigned, further declare that:

i) No reservations: We have examined and have no reservations to the tender document, including Addenda issuedinaccordance with ITT 28;

ii) Eligibility: We meet the eligibility requirements and have no conflict of interest in accordance with ITT 3 and 4;

iii) Tender - Securing Declaration: We have not been suspended nor declared ineligible by the Procuring Entity based on execution of a Tender-Securing or Proposal-Securing Declaration in the Procuring Entity's Country in accordance with ITT 19.8;

iv) Conformity: We offer to execute in conformity with the tendering documents and in accordance with the implementation and completion specified in the construction schedule, the following Works: *[insert a brief description of the Works];*

v) Tender Price: The total price of our Tender, excluding any discounts offered in item 1 above is: *[Insert one of the options below as appropriate]*

vi Option 1, incase of one lot: Total priceis: *[insert the total price of the Tender in words and figures, indicating the various amounts and the respective currencies*]; or

Option2, in case of multiple lots:

(a) Total price of each lot [*insert the total price of each lot in words and figures, indicating the various amounts and the respective currencies*]; and

(b) Total price of all lots (sum of all lots) [*insert the total price of all lots in words and figures, indicating the various amounts and the respective currencies*];

vii) Discounts: The discounts offered and the methodology for their application are:

viii) The discounts offered are: [*Specify in detail each discount offered.*]

ix) The exact method of calculations to determine the net price after application of discounts is shown below: [*Specify in detail the method that shall be used to apply the discounts*];

x) Tender Validity Period: Our Tender shall be valid for the period specified in TDS 18.1 (as amended, if applicable) from the date fixed for the Tender submission deadline specified in TDS 22.1 (as amended, if applicable), and it shall remain binding upon us and may be accepted at any time before the expiration of that period;

xi) Performance Security: If our Tender is accepted, we commit to obtaina Performance Security in accordance with the Tendering document;

xii) One Tender Per Tender: Weare not submitting any other Tender(s) as an individual Tender, and we are not participating in any other Tender(s) as a Joint Venture member or as a sub-contractor, and meet the requirements of ITT 3.4, other than alternative Tenders submitted in accordance with ITT 13.3;

xiii) Suspension and Debarment: We, along with any of our subcontractors, suppliers, Engineer, manufacturers, or service providers for any part of the contract, are not subject to, and not controlled by any entity or individual that is subject to, a temporary suspension or a debarment imposed by the Public Procurement Regulatory Authority or any other entity of the Government of Kenya, or any international organization.

xiv) State-owned enterprise or institution: [*select the appropriate option and delete the other*] [*We are not a state- owned enterprise or institution*]/[*We are a state-owned enterprise or institution but meet the requirements of ITT3.8*];

xv) Commissions, gratuities, fees: We have paid, or will pay the following commissions, gratuities, or fees with respect to the tender process or execution of the Contract: *[insert complete name of each Recipient, its full address, the reason for which each commission or gratuity was paid and the amount and currency of each such commission or gratuity].*

Name of Recipient	Address	Reason	Amount

(If none has been paid or is to be paid, indicate "none.")

[3]*This sum should be carried forward from the Summary of the Bills of Quantities.*
[4]*The percentage quoted above should not include provisional sums, and not more than two foreign currencies are allowed.*

xvi) Binding Contract: We understand that this Tender, together with your written acceptance there of included in your Letter of Acceptance, shall constitute a binding contract between us, until a formal contract is prepared and executed;

xvii) Not Bound to Accept: We understand that you are not bound to accept the lowest evaluated cost Tender, the Most Advantageous Tender or any other Tender that you may receive;

xviii) Fraud and Corruption: We here by certify that we have taken steps to ensure that no personacting for us or on our behalf engages in any type of Fraud and Corruption; and

xix) Collusive practices: We hereby certify and confirm that the tender is genuine, non-collusive and made with the intention of accepting the contract if awarded. To this effect we have signed the "Certificate of Independent Tender Determination" attached below.

xx) We undertake to adhere by the Code of Ethics for Persons Participating in Public Procurement and Asset Disposal, copy available from___(*specify website*) during the procurement process and the execution of any resulting contract.

xxi) We, the Tenderer, have completed fully and signed the following Forms as part of our Tender:

a) Tenderer's Eligibility; Confidential Business Questionnaire - to establish we are no tin any conflict to interest.

(b) Certificate of Independent Tender Determination - to declare that we completed the tender without colluding with other tenderers.

(a) Self-Declarationo f the Tenderer - to declare that we will, if awarded a contract, not engage in any form of fraud and corruption.

(d) Declaration and commitment to the Code of Ethics for Persons Participating in Public Procurement and Asset Disposal.

Further, we confirm that we have read and understood the full content and scope of fraud and corruption as informed in **"Appendix 1 - Fraud and Corruption**" attached to the Form of Tender.

Name of the Tenderer: _____
*[*insert complete name of the tenderer*]

Name of the person duly authorized to sign the Tender on behalf of the Tenderer:
_____
_____

**[*insert complete name of person duly authorized to sign the Tender*]

Title of the person signing the Tender: _____

[*insert complete title of the person signing the Tender*]

Signature of the person named above: _____

[*insert signature of person whose name and capacity are shown above*]

Date signed_____day of_____,_____

Notes
** In the case of the Tender submitted by joint venture specify the name of the Joint Venture as Tenderer.*
***Person signing the Tender shall have the power of attorney given by the Tenderer to be attached with the Tender.*

(a) **TENDERER'S ELIGIBILITY-CONFIDENTIAL BUSINESS**

QUESTIONNAIRE Instruction to Tenderer

Tender is in structed to complete the particulars required in this Form, *one form for each entity if Tender is a JV*. Tenderer isfurtherreminded that it is an offence to give false information on this Form.

(a) Tenderer'sdetails

	ITEM	DESCRIPTION
1	Name of the Procuring Entity	
2	Reference Number of the Tender	
3	Date and Time of Tender Opening	
4	Name of the Tenderer	
5	Full Address and Contact Details of the Tenderer.	1. Country 2. City 3. Location 4. Building 5. Floor 6. Postal Address 7. Name and email of contact person.
6	Current Trade License Registration Number and Expiring date	
7	Name, country and full address (*postal and physical addresses, email, and telephone number*) of Registering Body/Agency	
8	Description of Nature of Business	
9	Maximum value of business which the Tenderer handles.	
10	State if Tenders Company is listed in stock exchange, give name and full address (*postal and physical addresses, email, and telephone number*) of state which stock exchange	

General and Specific Details

(b) Sole Proprietor, provide the following details.

Name in full_____Age_____
Nationality_____Country of Origin_____
Citizenship_____

(c) Partnership, provide the following details.

	Names of Partners	Nationality	Citizenship	% Shares owned
1				
2				
3				

(d) Registered Company, provide the following details.

I) Private or public Company _____
ii) State the nominal and issued capital of the Company_____

Nominal Kenya Shillings (Equivalent).....
Issued Kenya Shillings (Equivalent).....

iii) Give details of Directors as follows.

	Names of Director	Nationality	Citizenship	% Shares owned
1				
2				
3				

(e) DISCLOSURE OF INTEREST - Interest of the Firm in the Procuring Entity.

i) Are there any person/persons in…… (*Name of Procuring Entity)* who has/have an interest or relationship in this firm? Yes/No……

If yes, provide details as follows.

	Names of Person	Designation in the Procuring Entity	Interest or Relationship with Tenderer
1			
2			
3			

(ii) **Conflict of interest disclosure**

	Type of Conflict	Disclosure YES ORNO	If YES provide details of the relationship with Tenderer
	Tenderer is directly or indirectly controls, is controlled by or is under common control with another tenderer.		
	Tenderer receives or has received any direct or indirect subsidy from another tenderer.		
	Tenderer has the same legal representative as another tenderer		
	Tender has a relationship with another tenderer, directly or through common third parties, that puts it in a position to influence the tender of another tenderer, or influence the decisions of the Procuring Entity regarding this tendering process.		
	Any of the Tenderer's affiliates participated as a consultant in the preparation of the design or technical specifications of the works that are the subject of the tender.		
	Tenderer would be providing goods, works, non-consulting services or consulting services during implementation of the contract Specified in this Tender Document.		
	Tenderer has a close business or family relationship with a professional staff of the Procuring Entity who are directly or indirectly involved in the preparation of		

	the Tender document or specifications of the Contract, and/or the Tender evaluation process of such contract.		
	Tenderer has a close business or family relationship with a professional staff of the Procuring Entity who would be involved in the implementation or supervision of the such Contract.		
	Has the conflict stemming from such relationship stated in item 7 and 8 above been resolved in a manner acceptable to the Procuring Entity throughout the tendering process and execution of the Contract.		

Certification

On behalf of the Tenderer, I certify that the information given above is complete, current and accurate as at date of Sub-mission

Full Names_____

Title or Designation_____

(Signature) *(Date)*

b) CERTIFICATE OF INDEPENDENT TENDER DETERMINATION

I, the undersigned, in submitting the accompanying Letter of Tender to the_____ _____*[Name of Procuring Entity]* for: _____*[Name and number of tender]* in response to the request for tenders made by:_____*[Name of Tenderer]* do hereby make the following statements that I certify to be true and complete in every respect:

Icertify, on behalf of_____*[NameofTenderer]*that:

1. I have read and I understand the contents of this Certificate;

2. I understand that the Tender will be disqualified if this Certificate is found not to be true and complete in every respect;

3. Iamthe authorized representative of the Tenderer with authority to sign this Certificate, and to submit the Tender on behalf of the Tenderer;

4. For the purposes of this Certificate and the Tender, I understand that the word "competitor" shall include any individual or organization, other than the Tenderer, whether or not affiliated with the Tenderer, who:

   a) Has been requested to submit a Tender in response to this request for tenders;
   b) could potentially submit a tender in response to this request for tenders, based on their qualifications, abilities or experience;

5. TheTenderer discloses that [check one of the following, as applicable]:

   a) The Tenderer has arrived at the Tender independently from, and without consultation, communication, agreement or arrangement with, any competitor;

   b) theTenderer has entered into consultations, communications, agreements or arrangements with one or more competitors regarding this request for tenders, and the Tenderer discloses, in the attached document(s), complete details thereof, including the names of the competitors and the nature of, and reasons for, such consultations, communications, agreements or arrangements;

6. Inparticular, without limiting the generality of paragraphs (5)(a) or(5)(b) above, there has been no consultation, communication, agreement or arrangement with any competitor regarding:

   a) prices;
   b) methods, factors or formulas used to calculate prices;
   c) the intentiono r decision to submit, or not to submit, a tender; or
   d) the submission of a tender which does not meet the specifications of the request for Tenders; except as specifically disclosed pursuan tto paragraph (5)(b) above;

7. In addition, there has been no consultation, communication, agreement or arrangement with any competitor regarding the quality, quantity, specifications or delivery particulars of the works or services to which this request for tenders relates, except as specifically authorized by the procuring authority or as specifically disclosed pursuant toparagraph(5)(b) above;

8. Thetermsofthe Tender have not been, and will not be, knowingly disclosed by the Tenderer, directly or indirectly, to any competitor, prior to the date and time of the official tender opening, or of the awarding of the Contract, whichevercomesfirst, unless otherwise required byl aw or as specifically disclosed pursuant to paragraph (5)(b) above.

Name_____
Title_____
Date _____

[Name, title and signature of authorized agent of Tenderer and Date]

FORM SD1

(c) SELF- DECLARATION FORMS

SELF DECLARATION THAT THE PERSON/TENDERER IS NOT DEBARRED IN THE MATTER OF THE PUBLIC PROCUREMENT AND ASSET DISPOSAL ACT 2015.

I, ……, of Post Office Box ……..……. being a resident of …….. in the Republic of ……. do hereby make a statement as follows: -

1. THAT I am the Company Secretary/ Chief Executive/Managing Director/Principal Officer/Direct or of ……...…….. *(insert name of the Company)* who is a Bidder in respect of **Tender No.**
   …….. for ……. *(insert tender title/description)* for ……. *(insert name of the Procuring entity)* and duly authorized and competent to make this statement.

2. THAT the aforesaid Bidder, its Directors and subcontractors have not been debarred from participating in procurement proceeding under Part IV of the Act.

3. THAT what is deponed to here in above is true to the best of my knowledge, information and belief.

…….	…….	……
(Title)	(Signature)	(Date)

Bidder Official Stamp

FORM SD2

SELF DECLARATION THAT THE PERSON/TENDERER WILL NOT ENGAGE IN ANY CORRUPT OR FRAUDULENT PRACTICE.

I, ……of P.O. Box …….....……. being a resident of …….. in the Republic of ……. do hereby make a statement as follows: -

1. THAT I am the Chief Executive/Managing Director/Principal Officer/Director of ……..... (insert name of the Company) who is a Bidder in respect of **Tender No.**…… for …… *(insert tender title/description)* for …… *(insert name of the Procuring entity)* and duly authorized and competent to make this statement.

2. THAT theafore said Bidder, its servants and/oragents/subcontractorswillnotengageinanycorruptorfraudulent practice and has not been requested to pay any inducement to any member of the Board, Management, Staff and/or employees and/or agents of ……. *(insert name of the Procuring entity)* which is the procuring entity.

3. THAT the aforesaid Bidder, its servants and/or agents /subcontractors have not offered any inducement to any member of the Board, Management, Staff and/or employees and/or agents of ……. *(name of the procuring entity).*

4. THAT the aforesaid Bidder will not engage /has not engaged in any corrosive practice with other bidders participating in the subject tender

5. THAT what is deponed to here in above is true to the best of my knowledge information and belief.

……	……	…….....……
(Title)	(Signature)	(Date)

Bidder's Official Stamp

DECLARATION AND COMMITMENT TO THE CODE OF ETHICS

I ……. (person) on behalf of (***Name of the Business/ Company/Firm***) .....
…….. declare that I have read and fully understood the contents of the Public Procurement & Asset Disposal Act, 2015, Regulations and the Code of Ethics for persons participating in Public Procurementand Asset Disposal and my responsibilities under the Code.

I do here by commit to abide by the provisions of the Code of Ethics for persons participating in Public Procurement and Asset Disposal.

Name of Authorized signatory.....

Sign…….....

Position.....

Office address.....

Telephone..... E-

mail…….....

Name of the Firm/Company…….....

Date…….....

(Company Seal/ Rubber Stamp where applicable)

Witness

Name…….....

.

Sign…….....

Date…….....

(d) APPENDIX 1 - FRAUD AND CORRUPTION

(Appendix 1 shall not be modified)

1. Purpose

1.1 The Government of Kenya's Anti-Corruption and Economic Crime laws and their sanction's policies and procedures, Public Procurement and Asset Disposal Act *(no. 33 of 2015)* and its Regulation, and any other Kenya's Acts or Regulations related to Fraud and Corruption, and similar offences, shall apply with respect to Public Procurement Processes and Contracts that are governed by the laws of Kenya.

2. Requirements

2.1 The Government of Kenya requires that all parties including Procuring Entities, Tenderers, (applicants/proposers), Consultants, Contractors and Suppliers; any Sub-contractors, Sub-consultants, Service providers or Suppliers; any Agents (whether declared or not); and any of their Personnel, involved and engaged in procurement under Kenya's Laws and Regulation, observe the highest standard of ethics during the procurement process, selection and contract execution of all contracts, and refrain from Fraud and Corruption and fully comply with Kenya's laws and Regulations as per paragraphs 1.1 above.

2.2 Kenya's public procurement and asset disposal act *(no. 33 of 2015)* under Section 66 describes rules to be followed and actions to be taken in dealing with Corrupt, Coercive, Obstructive, Collusive or Fraudulent practices, and Conflicts of Interest in procurement including consequences for offences committed. A few of the provisions noted below highlight Kenya's policy of no tolerance for such practices and behavior:

1) A person to whom this Act applies shall not be involved in any corrupt, coercive, obstructive, collusive or fraudulent practice; or conflicts of interest in any procurement or as set disposal proceeding;

2) A person referred to under subsection (1) who contravenes the provisions of that sub-section commits an offence;

3) Without limiting the generality of the subsection (1) and (2), the person shall be: -

   a) disqualified from entering into a contract for a procurement or asset disposal proceeding; or

   b) if a contract has already been entered into with the person, the contract shall be voidable;

4) The voiding of a contract by the procuring entity under subsection (7) does not limit any legal remedy the procuring entity may have;

5) An employee or agent of the procuring entity or a member of the Board or committee of the procuring entity whohas a conflict of interest with respect to a procurement: -

   a) Shall not take part in the procurement proceedings;

   b) shall not, after a procurement contract has been entered in to, take part in any decision relating to the procurement or contract; and

   c) shall not be a subcontract or for the tender to whom was awarded contract, or a member of the group of tenderers to whom the contract was awarded, but the subcontractor appointed shall meet all the requirements of this Act.

6) An employee, agent or member described in subsection (1) who refrains from doing anything prohibited under that subsection, but for that subsection, would have been within his or her duties shall disclose the conflictofinteresttotheprocuringentity;

7) If a person contravenes subsection (1) with respect to a conflict of interest described in

subsection (5)(a) and the contract is awarded to the person or his relative or to another person in whom one of them had a direct or indirect pecuniary interest, the contract shall be terminated and all costs incurred by the public entity shall be made good by the awarding officer. Etc.

3. In compliance with Kenya's laws, regulations and policies mentioned above, the Procuring Entity:

a) Defines broadly, for the purposes of the above provisions, the terms setf orth below as follows:

i) "corrupt practice" is the offering, giving, receiving, or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party;
ii) "fraudulent practice" is any act or omission, including is representation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain financial or other benefit or to avoid an obligation;
iii) "collusive practice"is an arrangement between two or more parties designed to achieve an improper purpose, including to influence improperly the actions of another party; "coercive practice" is impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party;
iv) "obstructive practice" is:

- Deliberately destroying, falsifying, altering, or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede investigation by Public Procurement Regulatory Authority (PPRA) or any other appropriate authority appointed by Government of Kenya into allegations of a corrupt, fraudulent, coercive, or collusive practice; and/or threatening, harassing, or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation; or

- acts intended to materially impede the exercise of the PPRA's or the appointed authority's inspection and audit rights provided for under paragraph 2.3 e. below.

b) Defines more specifically, in accordance with the above procurement Act provisions set forth for fraudulent and collusive practices as follows:

"fraudulent practice" includes a misrepresentation of fact in order to influence a procurement or disposal processorthe exercise of a contract to the detriment of the procuring entity or the tenderer or the contractor, and includes collusive practices amongst tenderers prior to or after tender submission designed to establish tender prices at artificial non-competitive levels and to deprive the procuring entity of the benefits of free and open competition.

c) Rejects a proposal for award[1] of a contract if PPRA determines that the firm or individual recommended for award, any of its personnel, or its agents, or its sub-consultants, sub-contractors, service providers, suppliers and/ or their employees, has, directly or indirectly, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices in competing for the contract in question;

d) Pursuant to the Kenya's above stated Acts and Regulations, may recommend to appropriate authority(ies) for sanctioning and debarment of a firm or individual, as applicable under the Acts and Regulations;

e) Requires that a clause be included in Tender documents and Request for Proposal documents requiring(i) Tenderers (applicants/proposers), Consultants, Contractors, and Suppliers, and their Sub-contractors, Sub-consultants, Service providers, Suppliers, Agents personnel, permit the PPRA or any other appropriate authority appointed by Government of Kenya to inspect[2] all accounts, records and other documents relating to the procurement process, selection and/or contract execution, and to have them audited by auditors appointed by the PPRA or any other appropriate authority appointed by Government of Kenya; and

f) Pursuant to Section 62 of the above Act, requires Applicants/Tenderers to submit along with their Applications/Tenders/Proposals a "Self-Declaration Form" as included in the procurement document declaring that they and all parties involved in the procurement process

and contract execution have not engaged/will not engage in any corrupt or fraudulent practices.

[1] *For the avoidance of doubt, a party's in eligibility to be awarded a contract shall includee, without limitation, (i) applying for pre-qualification, expressing interest in a consultancy, and tendering, either directly or as a nominated sub-contractor, nominated consultant, nominated manufacturer or supplier, or nominated service provider, in respect of such contract, and (ii) entering into an addendum or amendment introducing a material modification to any existing contract.*

[2] *Inspections in this context usually are investigative (i.e., forensic) in nature. They involve fact-finding activities undertaken by the Investigating Authority or persons appointed by the Procuring Entity to address specific matters related to investigations/audits, suc has evaluating the veracity of an allegation of possible Fraud and Corruption, through the appropriate mechanisms. Such activity includes but is not limited to: accessing and examining a firm's or individual's financial records and information, and making copies thereof as relevant; accessing and examining any other documents, data and information (whether in hard copyor electronic format) deemed relevant for th einvestigation/audit, and making copies there of as relevant; interviewing staff and other relevant individuals; performing physical inspections and site visits; and obtaining third party verification of information.*

2. FORM OF TENDER SECURITY-DEMAND BANK GUARANTEE

Beneficiary:_____

Request forTenders No:

_____

Date:_____

TENDER GUARANTEE No.:_____

Guarantor: _____

1. We have been informed that_____(here inafter called "the Applicant") has submitted or will submit to the Beneficiary its Tender (here inafter called" the Tender") for the execution of_____ under Request for Tenders No. (“the ITT”).

2. Furthermore, we understand that, according to the Beneficiary's conditions, Tenders must be supported by a Tender guarantee.

3. At the request of the Applicant, we, as Guarantor, hereby irrevocably undertake to pay the Beneficiary any sum or sums not exceeding in total an amount of_____(__) upon receipt by us of the Beneficiary's complying demand, supported by the Beneficiary's statement, whether in the demand itself or a separate signed document accompanying or identifying the demand, stating that either the Applicant:

(a) has withdrawn its Tender during the period of Tender validity set forth in the Applicant's Letter of Tender (“the Tender Validity Period”), or any extension thereto provided by the Applicant; or

b) having been notified of the acceptance of its Tender by the Beneficiary during the Tender Validity Period or any extension there to provided by the Applicant, (i) has failed to execute the contract agreement, or (ii) has failed to furnish the Performance.

4. This guarantee will expire: (a) if the Applicant is the successful Tenderer, upon our receipt of copies of the contract agreement signed by the Applicant and the Performance Security and, or (b) if the Applicant is not the successful Tenderer, upon the earlier of (i) our receipt of a copy of the Beneficiary's notification to the Applicant of the results of the Tendering process; or (ii) thirty days after the end of the Tender Validity Period.

5. Consequently, any demand for payment under this guarantee must be received by us at the office indicated above onor before that date.

[signature(s)]

4. FORM OF TENDER SECURITY (TENDER BOND)

[TheSuretyshallfillin this Tender Bond Form in accordance with the instructions

indicated.] BOND NO._____

1. BY THIS BOND *[name of tenderer]* as Principal (hereinafter called "the Principal"), and *[name, legal title,and address of surety],***authorized to transact business in** *[name of country of Purchaser],* as Surety (hereinafter called "the Surety"), are held and firmly bound unto *[name of Purchaser]* as Obligee (hereinafter called "the Purchaser") in the sum of *[amount of Bond][amount in words]*,for the payment of which sum,well and truly to be made, we, the said Principal and Surety, bind ourselves, our successors and as signs, jointly and severally, firmly by these presents.

2. WHERE AS the Principal has submitted or will submit a written Tender to the Purchaser dated the dayof
_____, 20, for the supply of *[name of Contract]* (herein after called the "Tender").

3. NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that if the Principal:

   a) Has with drawn its Tender during the period of Tender validity set forth in the Principal's Letter of Tender ("the Tender Validity Period"), or any extension there to provided by the Principal; or

   b) Having been notified of the acceptance of its Tender by the Purchaser during the Tender Validity Period or any extension there to provided by the Principal;(i) failed to execute the Contract agreement; or (ii) hasfailedtofurnish the Performance Security, in accordance with the Instructions to tenderers ("ITT") of the Purchaser's Tendering document.

   then the Surety undertakes to immediately pay to the Purchaser up to the above amount upon receipt of the Purchaser's first written demand, without the Purchaser having to substantiate its demand, provided that in its demand the Purchaser shall state that the demand arises from the occurrence of any of the above events, specifying which event (s) has occurred.

4. The Surety here by agrees that its obligation will remain in full force and effect upto and including the date 30 days after the date of expiration of the Tender Validity Period set forth in the Principal's Letter of Tender or any extension thereto provided by the Principal.

5. IN TESTIMONY WHEREOF, the Principal and the Surety have caused these presents to be executed in their respective names this day of_____20.

Principal:_____ Surety:_____
Corporate Seal *(where appropriate)*

(Signature)
(Printed name and title)

(Signature)
(Printed name and title)

4. FORM OF TENDER - SECURING DECLARATION

[The Bidder shall complete this Form in accordance with the instructions indicated]

Date: ..... *[insert date (as day, month and year) of Tender Submission]*

Tender No.: ..... *[insert number of tendering process]*

To: ..... *[insert complete name of Purchaser]* I/We, the undersigned, declare

that:

1. I/We understand that, according to your conditions, bids must be supported by a Tender-Securing Declaration.

2. I/We accept that I/we will automatically be suspended from being eligible for tendering in any contract with the Purchaser for the period of time of [insert number of months or years] starting on [insert date], if we are in breach of ourobligation(s) under the bid conditions, because we–(a) have withdrawn our tender during the period of tender validity specified by us in the Tendering Data Sheet; or (b) having been notified of the acceptance of our Bid by the Purchaser during the period of bid validity, (i) fail or refuse to execute the Contract, if required, or (ii) fail or refuse to furnish the Performance Security, in accordance with the instructions to tenders.

3. I/We understand that this Tender Securing Declaration shall expire if we are not the successful Tenderer(s), upon the earlier of:
   a) Our receipt of a copy of your notification of the name of the successful Tenderer; or
   b) thirty days after the expiration of our Tender.

4. I/We understand that if Iam /we are/ in a Joint Venture, the Tender Securing Declaration must be in the name of the Joint Venture that submits the bid, and the Joint Venture has not been legally constituted at the time of bidding, the Tender Securing Declaration shall be in the names of all future partners as named in the letter of intent.

Signed:……..…….. Capacity/title (director or

partner or sole proprietor, etc.) …….…….....…….

Name:…….. Duly authorized to sign

the bid for and on behalf of: *[insert complete name of Tenderer]*

Dated on ……. day of ……., ……. *[Insert date of signing]* Seal or stamp

5. Appendix toTender

Schedule of Currency requirements

Summary of currencies of theTender for_____*[insert name of Section of the Works]*

Name of currency	***Amounts payable***
Local currency:_____	
Foreign currency #1:_____	
Foreign currency #2:_____	
Foreign currency #3:_____	
Provisional sums expressed in local currency _____	[*To be entered by the Procuring Entity*]

SECTION D -GENERAL CONDITIONS OF CONTRACT (GCC)

1. GENERALPROVISIONS

1.1 Definitions

In this Contract, except where context otherwise requires, the following terms shall be interpreted as indicated below. Words indicating persons or parties include corporations and other legal entities, except where the context requires otherwise.

"Accepted Contract Amount" means the amount accepted in the Letter of Acceptance for the execution and completion of the Works and the remedying of any defects.

"Base Date" means a date 30 day prior to the submission of tenders.

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

tender. **"Completion Date"** meansthedateofcompletionoftheWorksascertifiedbytheEngineer.

"Contract Price" means the price defined in the contract and there after as adjusted in accordance with the provisions of the Contract.

"Contract" means the agreement entered into between the Procuring Entity 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.

"Contractor's Documents" means the calculations, computer programs and other software, progress reports, drawings, manuals, models and other documents of a technical nature (if any) supplied by the Contractor under the Contract.

"Contractor's Equipment" means all apparatus, machinery, vehicles and other things required for the execution and completion of the Works and the remedying of any defects. However, Contractor's Equipment excludes Temporary Works, Procuring Entity's Equipment (if any), Plant, Materials and any other things intended to form or forming part of the Permanent Works.

"Contractor'sPersonnel" means the Contractor's Representative and all personnel whom the Contractor utilizes on Site, who may include the staff, labor and other employees of the Contractor and of each Subcontractor; and any other personnel assisting the Contractor in the execution of the Works.

"Contractor's Representative" means the person named by the Contractor in the Contractor appointed from time to timeby the Contractor who acts on behalf of the Contractor.

"Contractor" means the person(s) named as contractor in the Form of Tender accepted by the Procuring Entity.

"Cost" means expenditure reasonably incurred (or to be incurred) by the Contractor, whether on or off the Site, including overhead and similar charges, but does not include profit.

"Day" means a calendar day and **"year"** means 365 days.

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

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

"Defects Liability Certificate" means the certificate issued by Architect upon correction of defects by the Contractor.

"Defects Liability Period" means the period named in the Special Conditions of Contract and calculated from the Completion Date, within which the contractor is liable for any defects that may develop in the handed over works.

"Defects Notification Period" means the period for notifying defects in the Works oraSection(asthecasemaybe) under Sub-Clause 11.1 [Completion of Outstanding Work and Remedying Defects], whichextendsoverthedaysstated intheSpecialConditionsofContract.

"Drawings" means the drawings of the Works, as included in the Contract, and any additional and modified drawings issued by (or on behalf of) the Procuring Entity in accordance with the Contract.

"Final Payment Certificate" means the payment certificate issued under Sub-Clause 14.13 [Issue of Final Payment Certificate].

"Final Statement" means the statement defined in Sub-Clause 14.11

[ApplicationforFinalPaymentCertificate]. **"Force Majeure"** is defined in Clause19 [Force Majeure].

"Foreign Currency" means a currency of another country (not Kenya) in which part (or all) of the Contract Price is payable, but not the Local Currency.

"Goods" means Contractor's Equipment, Materials, Plant and Temporary Works, or any of them as appropriate.

"Interim Payment Certificate" means a payment certificate issued under Clause 14 [Contract Price and Payment], other than the Final Payment Certificate.

"Laws" means all national legislation, statutes, ordinances, and regulations and by-laws of any legally constituted public authority.

"Letter of Acceptance" means the letter of formal acceptance of a tender, signed by Procuring Entity, including any annexed memoranda comprising agreements between and signed by both Parties.

"Local Currency" means the currency of Kenya.

"Materials" means things of all kinds (other than Plant) intended to form or forming part of the Permanent Works, including the supply-only materials (if any) to be supplied by the Contractor under the Contract.

"Notice of Dissatisfaction" means the notice given by either Party to the other under Sub-Clause 20.3 indicating its dissatisfaction and intention to commence arbitration.

"Special Conditions of Contract" means the pages completed by the Procuring Entity entitled Special Conditions of Contract which constitute Part A of the Special Conditions.

"Party" means the Procuring Entity or the Contractor, as the context requires.

"Payment Certificate" means a payment certificate issued under Clause 14 [Contract Price and Payment].

"Performance Certificate" means the certificate issued under Sub-Clause 11.9 [Performance Certificate].

"Performance Security" means the security (or securities, if any) under Sub-Clause 4.2 [Performance

Security]. **"Permanent Works"** means the permanent works to be executed by the Contractor under the

Contract.

"Plant" means the apparatus, machinery and other equipment intended to form or forming part of the Permanent Works, including vehicles purchased for the Procuring Entity and relating to the construction or operation of the Works.

"Procuring Entity's Equipment" means the apparatus, machinery and vehicles (if any) made available by the

Procuring Entity for the use of the Contract or in the execution of the Works, as stated in the Specification; but does not include Plant which has not been taken over by the Procuring Entity.

"Procuring Entity's Personnel" means the Engineer, the Engineer, the assistants and all other staff, labor and other employees of the Architect and of the Procuring Entity; and any other personnel notified to the Contractor, by the Procuring Entity or the Engineer, as Procuring Entity's Personnel.

"Procuring Entity" means the Entity named in the Special Conditions of Contract.

"Engineer" is the person named in the Appendix to Conditions of Contract (or any other competent person appointed by the Procuring Entity and notified to the Contractor, to act in replacement of the Engineer) 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.

"Engineer" means the person appointed by the Procuring Entity to act as the Architect for the purposes of the Contract and named in the Special Conditions of Contract, or other person appointed from time to time by the Procuring Entity and notified to the Contractor

"Provisional Sum" means a sum (if any) which is specified in the Contract as a provisional sum, for the execution of any part of the Works or for the supply of Plant, Materials or services under Sub-Clause 13.5 [Provisional Sums].

"Retention Money" means the accumulated retention moneys which the Procuring Entity retains under Sub-Clause
14.3 [Application for Interim Payment Certificates] and pays under Sub-Clause 14.9 [Payment of Retention Money].

"Schedules" means the document(s) entitled schedules, completed by the Contractor and submitted with the Form of Tender, as included in the Contract.

"Section" means a part of the Works specified in the Special Conditions of Contract as a Section (if any)

"Site Investigation Reports" are those reports that may be included in the tendering documents which a ref actual and interpretative about the surface and sub-surface condition sat the Site.

"Site" means the places where the Permanent Works are to be executed, including storage and working areas, and to which Plant and Materials are to be delivered, and any other places as may be specified in the Contract as forming part of the Site.

"Specification" means the document entitled specification, as included in the Contract, and any additions and modifications to the specification in accordance with the Contract. Such document specifies the Works.

"Start Date" or "Commencement 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).

"Statement" means a statement submitted by the Contractor as part of an application, under Clause 14 [Contract Price and Payment], for a payment certificate.

"Subcontractor" means any person named in the Contract as a subcontractor, or any person appointed as a subcontractor, for a part of the Works.

"Taking-Over Certificate" means a certificate issued under Clause 10 [Procuring Entity's Taking Over].

"Temporary Works" means all temporary works of every kind (other than Contractor's Equipment) required on Site for the execution and completion of the Permanent Works and the remedying of any defects.

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

"Tender" means the Form of Tender and all other documents which the Contractor submitted with the Form of Tender, as included in the Contract.

"Tests after Completion" means the tests (if any) which are specified in the Contract and which are carried out in accordance with the Specification after the Works or a Section (as the case may be) are taken over by the Procuring Entity.

"Testson Completion" means the tests which are specified in the Contractor agreed by both Parties or instructed as a Variation, and which are carried out under Clause 9 [Tests on Completion] before the Works or a Section (as the case may be) are taken over by the Procuring Entity.

"Time for Completion" means the time for completing the Works or a Section (as the case may be) as stated in the Special Conditions of Contract (with any extension calculated from the Commencement Date.

"Unforeseeable" means not reasonably foreseeable by an experienced contractor by the Base Date.

"Variation" means any change to the Works, which is instructed or approved as a variation under Clause 13 [Variations and Adjustments].

"Works" means the items the Procuring Entity requires the Contractor to undertake as defined in the Appendix to Conditions of Contract. **"Works" may** also mean the Permanent Works and the Temporary Works, or either of them as appropriate.

1.2 Interpretation

In the Contract, except where the context requires otherwise:

a) Words indicating one gender include all genders;
b) words indicating the singular also include the plural and words indicating the plural also include the singular;
c) provisions including the word "agree", "agreed" or "agreement" require the agreement to be recorded in writing;
d) "written" or "in writing" means hand-written, type-written, printed or electronically made, and resulting in a permanent record; and

The marginal words and other headings shall not be taken into consideration in the interpretation of these Conditions.

1.3 Communications

1.3.1 Wherever these Conditions provide for the giving or issuing of approvals, certificates, consents, determinations, notices, requests and discharges, these communications shall be:

a) In writing and delivered by hand (against receipt), sent by mail or courier, or transmitted using any of the agreed systems of electronic transmission as stated in the Special Conditions of Contract; and
b) delivered, sentor transmitted to the addressf or the recipient's communications as stated in the Special Conditions of Contract. However:

   i) if the recipient gives notice of another address, communications shall thereafter be delivered accordingly; and
   ii) if the recipient has not stated otherwise when requesting an approval or consent, it may be sent to the addressfromwhichtherequestwasissued.

1.3.2 Approvals, certificates, consents and determinations shall not be unreasonably withheld or delayed.

When a certificate is issued to a Party, the certifier shall send a copy to the other Party. When a notice is issued to a Party, by the other Party or the Engineer, a copy shall be sent to the Architect or the other Party, as the case may be.

1.4 Law and Language

1.4.1 The Contract shall be governed by the laws of **Kenya.**

1.4.2 The ruling language ofthe Contract shall be **English.**

1.5 Priority of Documents

The documents forming the Contract are to be taken as mutually explanatory of one another. For the purposes of interpretation, the priority of the documents shall be in accordance with the following sequence:

a) The Contract Agreement,
b) The Letter of Acceptance,
c) The Special Conditions – Part A,
d) the Special Conditions – Part B
e) the General Conditions of Contract
f) the Form of Tender,
g) the Specifications and Bills of Quantities
h) the Drawings, and
i) the Schedules and any other documents forming part of the Contract.

If an ambiguity or discrepancy is found in the documents, the Architect shall issue any necessary clarification or instruction.

1.6 Contract Agreement

The Parties shall enter into a Contract Agreement within 14 days after the Contractor receives the Contract Agreement, unless the Special Conditions establish otherwise. The Contract Agreement shall be based upon the formannexed to the Special Conditions. The costs of stamp duties and similar charges (if any) imposed by law in connection with entry into the Contract Agreement shall be borne by the Procuring Entity.

1.7 Assignment

The Contractor shall not assign the whole or any part of the Contract or any benefit or interest in or under the Contract. However, the contractor:

a) May as sign the whole or any part with the prior consent of the Procuring Entity, and
b) may, as security in favor of a bank or financial institution, assign its right to moneys due, or to become due, under the Contract.

1.8 Care and Supply of Documents

1.8.1 The Specifications and Drawings shall be in the custody and care of the Procuring Entity.Unless otherwise stated in the Contract, two copies of the Contract and of each subsequent Drawings and Bills of Quantities shall be supplied to the Contractor, who may make or request further copies at the cost of the Contractor.

1.8.2 Each of the Contractor's Documents shall be in the custody and care of the Contractor, unless and until taken over bythe Procuring Entity. Unless otherwise stated in the Contract, the Contractor shall supply to the Architect two copies of each of the Contractor's Documents.

1.8.3 The Contractor shall keep, on the Site, a copy of the Contract, publications named in the Specification, the Contractor's Documents (if any), the Drawings and Variations and other communications given under the Contract.The Procuring Entity's Personnel shall have the right of access to all these documents at all reasonable times.

1.8.4 If a Party becomes aware of an error or defect in a document which was prepared for use in executing the Works, theParty shall promptly give notice to the other Party of such error or defect.

1.9 Timely provision of Drawings or Instructions

1.9.1 The Contractor shall give notice to the Architect whenever the Works are likely to be delayed or disrupted if any necessary drawing or instruction is not issued to the Contractor within a particular time, which shall be reasonable. The notice shall include details of the necessary drawing or instruction, details of why and by when it should be issued, and the nature and amount of the delay or disruption likely to be suffered if it is late.

1.9.2 If the Contractor suffers delay and/or incurs Cost as a result of a failure of the Architect to issue the notified drawing or instruction within a time which is reasonable and is specified in the notice with supporting details, the Contractor shall give a further notice to the Architect and shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to:

a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [Extension of Time for Completion], and

b) payment of any other associated costs accrued, which shall be included in the Contract Price.

1.9.3 After receiving this further notice, the Architect shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine these matters.

1.9.4 However, if and to the extent that the Architect failure was caused by any error or delay by the Contractor, including an error in, or delay in the submission of, any of the Contractor's Documents, the Contractor shall not be entitled to such extension of time, or costs accrued.

1.10 Procuring Entity's Use of Contractor's Documents

1.10.1 Asagreed between the Parties, the Contractor shall retain the copyright and other intellectual property rights in the Contractor's Documents and other design documents made by (or on behalf of) the Contractor.

1.10.2 The Contractor shall be deemed (by signing the Contract) to give to the Procuring Entity a non-terminable transferable non-exclusive royalty-free license to copy, use and communicate the Contractor's Documents, including making and using modifications of them. This license shall:

a) apply throughout the actual or intended working life (whichever is longer) of the relevant parts of the Works,
b) entitle any person in proper possession of the relevant part of the Works to copy, use and communicate the Contractor's Documents for the purposes of completing, operating, maintaining, altering, adjusting, repairing and demolishing the Works, and
c) in the case of Contractor's Documents which are in the form of computer programs and other software, permit their use on any computer on the Site and other places as envisaged by the Contract, including replacements of any computers supplied by the Contractor.

1.10.3 The Contractor's Documents and other design documents made by (or on behalf of) the Contractor shall not, without the Contractor's consent, be used, copied or communicated to a third party by (or on behalf of) the Procuring Entityf or purposes other than those permitted under Sub-Clause 1.10.2.

1.11 Contractor's Use of Procuring Entity's Documents

As agreed between the Parties, the Procuring Entity shall retain the copyright and other intellectual property rights in the Specification, the Drawings and other documents made by (or on behalf of) the Procuring Entity. The Contractor may, at his cost, copy, use, and obtain communication of these documents for the purposes of the Contract. They shall not, without the Procuring Entity's consent, be copied, used or communicated to a third party by the Contractor, except as necessary for the purposes of the Contract.

1.12 Confidential Details

1.12.1 The Contractor's and the Procuring Entity's Personnel shall ensure confidentiality at all times. The confidentiality shall survive termination or completion of the contract. They shall disclose all such confidential and other information as may be reasonably required in order to verify compliance with the Contract and allow its proper implementation.

1.12.2 The Contractor's and the Procuring Entity's Personnel shall also treat the details of the Contract as private and confidential, except to the extent necessary to carry out their respective obligations under the Contract or to comply with applicable Laws. Each of them shall not publish or disclose any particulars of the Works prepared by the other Party without the previous agreement of the other Party. However, the Contractor shall be permitted to disclose any publicly available information, or information otherwise required to establish his qualifications to compete for other projects.

1.13 Compliance with Laws

The Contractor shall, in performing the Contract, comply with applicable Laws. Unless otherwise stated in the Special Conditions of Contract:

a) The Procuring Entity shall have obtained (or shall obtain) the planning, zoning, building permitor similar permission for the Permanent Works, and any other permissions described in the Specifications as having been (or to be) obtained by the Procuring Entity; and the Procuring Entity shall indemnify and hold the Contractor harmless against and from the consequences of any failure to do so; and

b) the Contractor shall give all notices, pay all taxes, duties and fees, and obtain all permits, licenses and approvals, as required by the Laws in relation to the execution and completion of the Works and the remedying of any defects; and the Contractor shall indemnify and hold the Procuring Entity harmless against and from the consequences of any failure to do so, unless the Contractor is impeded to accomplish these actions and shows evidence of its diligence.

1.14 Joint and Several Liability

If the Contractor constitutes (under applicable Laws) a joint venture, consortium or other unincorporated grouping of two or more persons:

a) These persons shall be deemed to be jointly and severally liable to the Procuring Entity for the performance of the Contract;
b) these persons shall notify the Procuring Entity of their leader who shall have authority to bind the Contractor and each of these persons; and
c) the Contractor shall not alter its composition or legal status without the prior consent of the Procuring Entity.

1.15 Inspections and Audit by the Procuring Entity

Pursuant to paragraph 2.2(e). of Appendix B to the General Conditions, the Contractor shall permit and shall cause its subcontractors and sub-consultants to permit, the Public Procurement Regulatory Authority, Procuring Entity and/or persons appointed or designated by the Government of Kenya to inspect the Site and/or the accounts and records relating to the procurement process, selection and/or contract execution, and to have such accounts and records audited by auditors appointed by the Procuring Entity if requested by the Procuring Entity. The Contractor's and its Subcontractors' and sub-consultants' attention is drawn to Sub-Clause 15.6 (Fraud and Corruption) which provides, inter alia, that acts intended to materially impede the exercise ofthe Procuring Entity's inspection and audit rights constitute a prohibited practice subject to contract termination (as well as to a determination of in eligibility pursuant to the Procuring Entity's prevailing sanctions procedures).

2 THE PROCURING ENTITY

2.1 Right of Access to the Site

2.1.1 The Procuring Entity shall give the Contractor right of access to, and possession of, all parts of the Site within thetime (or times) stated in the **Special Conditions of Contract.** The right and possession may not be exclusive to the Contractor. If, under the Contract, the Procuring Entity is required to give (to the Contractor) possession ofanyfoundation, structure, plant or means of access, the Procuring Entity shall do so in the time and manner stated in the Specification. However, the Procuring Entity may withhold any such right or possession until the Performance Security has been received.

2.1.2 If no such time is stated in the Special Conditions of Contract, the Procuring Entity shall give the Contractor right of access to, and possession of, the Site within such times as required to enable the Contractor to proceed without disruption in accordance with the programme submitted under Sub-Clause 8.3 [Programme].

2.1.3 If the Contractor suffers delay and/or incurs Cost as a result of a failure by the Procuring Entity to give any such right or possession within such time, the Contractor shall give notice to the Architect and shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to:

a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [Extension of Time for Completion], and
b) payment of any such Cost-plus profit, which shall be included in the Contract Price.

2.1.4 After receiving this notice, the Architect shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine these matters.

2.1.5 However, if and to the extent that the Procuring Entity's failure was caused by any error or delay by the Contractor, including an error in, or delay in the submission of, any of the Contractor's Documents, the Contractor shall not be entitled to such extension of time, Cost or profit.

2.2 Permits, Licenses or Approvals

2.2.1 The Procuring Entity shall provide, at the request of the Contractor, such reasonable assistance as to allow the Contractor to obtain properly:

a) Copies of the Laws of Kenya which are relevant to the Contract but are not readily available, and
b) any permits, licenses or approvals required by the Laws of Kenya:

i) which the Contractor is required to obtain under Sub-Clause 1.13 [Compliance with Laws],
ii) for the delivery of Goods, including clearance through customs,
and
iii) for the export of Contractor's Equipment when it is removed from the Site.

2.3 Procuring Entity'sPersonnel

The Procuring Entity shall be responsible for ensuring that the Procuring Entity's Personnel and the Procuring Entity's other contractor son the Site:

a) co-operate with the Contractor's efforts under Sub-Clause 4.6 [Co-operation], and

b) take action ssimilar to those which the Contractor is required to take under sub-paragraphs (a), (b) and (c) ofSub-Clause 4.8 [Safety Procedures] and under Sub-Clause 4.18 [Protection of the Environment].

2.4 Procuring Entity's Financial Arrangements

The Procuring Entity shall make and maintain all necessary financial arrangements which will enable the Procuring Entity to pay the Contract Price punctually (as estimated at that time) in accordance with Clause14 [Contract Price and Payment].

3. THE ENGINEER

3.1 Architect Duties and Authority

3.1.1 The Procuring Entity shall appoint the Architect who shall carry out the duties as signed to him in the Contract. The Architect staff shall include suitably qualified Assistants and other professionals who are competent to carry out these duties. The Architect Name and Address shall be provided in the **Special Conditions of Contract.**

3.1.2 The Architect shall have no authority to amend the Contract.

3.1.3 The Architect May exercise the authority attributable to the Architect as specified in or necessarily to be implied from the Contract. If the Architectis required to obtain the approval of the Procuring Entity before exercising a specified authority, the requirements shall be as stated in the S**pecial Conditions of Contract**. The Procuring Entity shall promptly inform the Contractor of any change to the authority attributed to the Engineer.

3.1.4 However, whenever the Architect exercises a specified authority for which the Procuring Entity's approvalis required, then (for the purposes of the Contract) the contractor shall require the Architect toprovideevidence of such approval before complying with the instruction.

3.1.5 Except as otherwise stated in these Conditions:

a) Whenever carrying out duties or exercising authority, specified in or implied by the Contract, the Architect shallbedeemedtoactfortheProcuring Entity;

b) the Architect has no authority to relieve either Party of any duties, obligations or responsibilities under the Contract;

c) any approval, check, certificate, consent, examination, inspection, instruction, notice, proposal, request, test, or similar act by the Architect (including absence of disapproval) shall not relieve the Contractor from any responsibility he has under the Contract, including responsibility for errors, omissions, discrepancies and non-compliances; and

d) anyact by the Architect in response to a Contractor's request shall be notified in writing to the Contractor within 14 days of receipt.

3.1.6 The following provisions shall apply:

The Architect shall obtain the specific approval of the Procuring Entity before taking action under the-following Sub-Clauses of these Conditions:

a) Sub-Clause 4.12: agreeing or determining an extension of time and/or additional cost.

b) Sub-Clause 13.1: instructing a Variation, except;

i) In an emergency situation as determined by the Engineer, or

ii) If such a Variation would increase the Accepted Contract Amount by less than the percentage specified in the **Special Conditions of Contract.**

c) Sub-Clause 13.3: Approving a proposal for Variation submitted by the Contractor in accordance with Sub Clause 13.1 or 13.2.

d) Sub-Clause13.4: Specifying the amount payable in each of the applicable three currencies.

3.1.7 Not withstanding the obligation, as set out above, to obtain approval, if, in the opinion of the Engineer, an emergency occurs affecting the safety of life or of the Works or of adjoining property, he may, without relieving the Contractor of any of his duties and responsibility under the Contract, instruct the Contractor to execute all such work or to do all such things as may, in the opinion of the Engineer, be necessary to abate or reduce the risk. The Contractor shall forth with comply, despite the absence of approval of the Procuring Entity, with any such instruction of the Engineer. The Architect shall determine an addition to the Contract Price, in respect of such instruction, in accordance with Clause 13 and shall notify the Contractor accordingly, with a copy to the Procuring Entity.

3.2 Delegation by the Engineer

3.2.1 The Architect may from time to time assign duties and delegate authority to assistants and may also revoke such assignment or delegation. These assistants may include a resident Engineer, and/or independent inspectors appointed to inspect and/ or test items of Plant and/or Materials. The assignment, delegation or revocation shall be in writing and shall not take effect until copies have been received by both Parties. However, unless otherwise agreed by both Parties, the Architect shall not delegate the authority to determine any matter in accordance with Sub-Clause 3.5 [Determinations].

3.2.2 Each assistant, to whom duties have been assigned or authority has been delegated, shall only be authorized to issue instructions to the Contractor to the extent defined by the delegation. Any approval, check, certificate, consent, examination, inspection, instruction, notice, proposal, request, test, or similar act by an assistant, in accordance with the delegation, shall have the same effect as though the act had been an act of the Engineer. However:

a) Any failure to disapprove any work, Plant or Materials shall not constitute approval, and shall therefore not prejudice the right of the Architect to reject the work, Plant or Materials;

b) If the Contractor questions any determination or instruction of an assistant, the Contractor may refer the matter to the Engineer, who shall promptly confirm, reverse or vary the determination or instruction.

3.3 Instructions of the Engineer

3.3.1 The Architect may issue to the Contractor (at anytime) instructions and additional or modified Drawings which may benecessary for the execution of the Works and the remedying of any defects, all in accordance with the Contract. The Contractor shall only take instructions from the Engineer, or from an assistant to whom the appropriate authority has been delegated under Clause 3.2.1.

3.3.2 The Contractor shall comply with the instructions given by the Architect or delegated assistant, on any matter related to the Contract. Whenever practicable, their instructions shall be given in writing. If the Architec tor a delegated assistant:

a) Gives an oral instruction,

b) receives a written confirmation of the instruction, from (or on behalf of) the Contractor, within two working days after giving the instruction, and

c) does not reply by issuing a written rejection and/or instruction within two working days after receiving the confirmation,

Then the confirmation shall constitute the written instruction of the Architect or delegated assistant (as the case may be).

3.4 Replacement of the Engineer

IftheProcuring Entity intends to replace the Engineer, the Procuring Entity shall, in not less than 21 days before theintendeddateofreplacement, give notice to the Contractor of the name, address and relevant experience of the intended person to replace the Engineer.

3.5 Determinations

3.5.1 Whenever these Conditions provide that the Architect shall proceed in accordance with this Sub-Clause3.5 to agreeor determine any matter, the Architect shall consult with each Party in an endeavor to reach agreement. If agreement is not achieved, the Architect shall make a fair determination in accordance with the Contract, taking due regard of all relevant circumstances.

3.5.1 The Architect shall give notice to both Parties of each agree mentor determination, with supporting particulars, within 30 days from the receipt of the corresponding claim or request except when otherwise specified. Each Party shall give effect to each agreement or determination unless and until revised under Clause 20 [Claims, Disputes and Arbitration].

4 THE CONTRACTOR

4.1 Contractor's General Obligations

4.1.1 The Contractor shall design (to the extent specified in the Contract), execute and complete the Works in accordance with the Contract and with the Architect instructions, ands hall remedy any defects in the Works.

4.1.2 The Contractor shall provide the Plant and Contractor's Documents specified in the Contract, and all Contractor's Personnel, Goods, consumables and other things and services, whether of a temporary or permanent nature, required in and for this design, execution, completion and remedying of defects.

4.1.3 All equipment, material, and services to be incorporated in or required for the Works shall have their origin in any eligible source country.

4.1.4 The Contractor shall be responsible for the adequacy, stability and safety of all Site operations and of all methods of construction. Except to the extent specified in the Contract, the Contractor (i) shall be responsible for all Contractor's Documents, Temporary Works, and such design of each item of Plant and Materials as is required for the item to be in accordance with the Contract, and (ii) shall not otherwise be responsible for the designor specification of the Permanent Works.

4.1.5 The Contractor shall, whenever required by the Engineer, submit details of the arrangements and methods which the Contractor proposes to adopt for the execution of the Works. No significant alteration to these arrangements and methods shall be made without this having previously been notified to the Engineer.

4.1.6 If the Contract specifies that the Contractor shall design any part of the Permanent Works, then unless otherwise stated in the Special Conditions:

a) The Contractor shall submit to the Architect the Contractor's Documents for this part in accordance with the procedures specified in the Contract;

b) these Contractor's Documents shall be in accordance with the Specification and Drawings, shall be written in the language for communications defined in Sub-Clause 1.4 [Law and Language], and shall include additional information required by the Architect to add to the Drawings for co-ordination of each Party's designs;

c) the Contractor shall be responsible for this part and it shall, when the Works are completed, befit for such purposes for which the part is intended as are specified in the Contract; and

d) prior to the commencement of the Tests on Completion, the Contractor shall submit to the Architectthe "as-built" documents and, if applicable, operation and maintenance manuals in accordance with the Specification and in sufficient detail for the Procuring Entity to operate, maintain, dismantle, reassemble, adjust and repair this part of the Works. Such part shall not be considered to be completed for the purposes of taking-over under Sub-Clause 10.1 [Taking Over of the Works and Sections] until these documents and manuals have been submitted to the Engineer.

4.2 Performance Security

4.2.1 The Contractor shall obtain (at his cost) a Performance Security for proper performance, in the amount stated in the **Special Conditions of Contract** and denominated in the currency (ies) of the Contract or in a freely convertible currency acceptable to the Procuring Entity. If an amount is not stated in the Special Conditions of Contract, this Sub-Clause shall not apply.

4.2.2 The Contractor shall deliver the Performance Security to the Procuring Entity within 30 days after receiving the Notification of Award and shall send a copy to the Engineer. The Performance Security shall be issued by a reputable bank selected by the Contractor and shall be in the form annexed to the Special Conditions, as stipulated by the Procuring Entity in the Special Conditions of Contract, or in another form approved by the Procuring Entity.

4.2.3 The Contractor shall ensure that the Performance Security is valid and enforceable until the Contractor has executedand completed the Works and remedied any defects. If the terms of the Performance Security specify its expiry date, and the Contractor has not become entitled to receive

the Performance Certificate by the date 30 days prior to the expiry date, the Contractor shall extend the validity of the Performance Security until the Works have been completed and any defects have been remedied.

4.2.4 The Procuring Entity shall not make a claim under the Performance Security, except for amounts to which the Procuring Entity is entitled under the Contract.

4.2.5 The Procuring Entity shall indemnify and hold the Contractor harmless against and from all damages, losses and expenses (including legal fees and expenses) resulting from a claim under the Performance Security to the extent to which the Procuring Entity was not entitled to make the claim.

4.2.6 The Procuring Entity shall return the Performance Security to the Contractor within 14 days after receiving a copyof the Taking-Over Certificate.

4.2.7 Without limitation to the provisions of the rest of this Sub-Clause, whenever the Architect determines an addition or a reduction to the Contract Price as a result of a change in cost and/ or legislation, or as a result of a Variation, amounting to more than 25 percent of the portion of the Contract Price payable in a specific currency, the Contractor shall at the Architect request promptly increase, or may decrease, as the case may be, the value of the Performance Security in that currency by an equal percentage.

4.3 Contractor's Representative

4.3.1 The Contractor shall appoint the Contractor's Representative and shall give him all authority necessary to act on the Contractor's behalf under the Contract. The Contractor's Representative's Name and Address shall be provided in the **Special Conditions of Contract.**

4.3.2 Unless the Contractor's Representative **is named in the Contract**, the Contractor shall, prior to the Commencement Date, submit to the Architect for consent the name and particulars of the person the Contractor proposes to appoint as Contractor's Representative. If consent is with held or subsequently revoked in terms of Sub-Clause 6.9 [Contractor's Personnel], or if the appointed person fails to act as Contractor's Representative, the Contractor shall similarly submit the name and particulars of an other suitable person for such appointment.

4.3.3 The Contractor shall not, without the prior consent of the Engineer, revoke the appointment of the Contractor's Representative or appoint are placement.

4.3.4 The whole time of the Contractor's Representative shall be given to directing the Contractor's performance of the Contract. If the Contractor's Representative is to be temporarily absent from the Site during the execution of the Works, a suitable replacement person shall be appointed, subject to the Architect prior consent, and the Architect shall be notified accordingly.

4.3.5 The Contractor's Representative shall, on behalf of the Contractor, receive instructions under Sub-Clause 3.3 [Instructions of the Engineer].

4.3.6 The Contractor's Representative may delegate any powers, functions and authority to any competent person, and may at any time revoke the delegation. Any delegation or revocation shall not take effect until the Architect has received prior notice signed by the Contractor's Representative, naming the person and specifying the powers, functions and authority being delegated or revoked.

4.3.7 The Contractor's Representative shall be fluent in the language for communications defined in Sub-Clause1.4 [Law and Language]. If the Contractor's Representative's delegates are not fluent in the said language, the Contractor shall make competent interpreter savailable during all working hours in a number deemed sufficient by the Engineer.

4.4 Sub-contractors

4.4.1 The Contractor shall not subcontract the whole of the Works. The contractor may however subcontract the works as provided in Clause 34.2.

4.4.2 The Contractor shall be responsible for the acts or defaults of any Subcontractor, his agents or

employees, as if theyweret heacts or defaults of the Contractor. Unless otherwise stated in the Special Conditions:

a) The Contractor shall not be required to obtain consent to suppliers solely of Materials, or to a subcontract for which the Subcontractor is named in the Contract;
b) The prior consent of the Procuring Entity shall be obtained to other proposed Subcontractors;
c) the Contractor shall give the Procuring Entity not less than 14 days' notice of the intended date of the commencement of each Subcontractor's work, and of the commencement of such work on the Site; and
d) each subcontract shall include provisions which would entitle the Procuring Entity to require the subcontract to be assigned to the Procuring Entity under Sub-Clause 4.5 [Assignment of Benefit of Subcontract] (if or when applicable) or in the event of termination under Sub-Clause 15.2 [Termination by Procuring Entity].

4.4.3 The Contractor shall ensure that the requirements imposed on the Contractor by Sub-Clause 1.12 [Confidential Details] apply equally to each Subcontractor.

4.4.4 Wher epracticable, the Contractor shall give fair and reasonable opportunity for contractors from Kenya to be appointed as Subcontractors.

4.5 Assignment of Benefit of Subcontract

If a Subcontractor's obligations extend beyond the expiry date of the relevant Defects Notification Period and the Engineer, prior to this date, instructs the Contractor to assign the benefit of such obligations to the Procuring Entity, then the Contractor shall do so. Unless otherwise stated in the assignment, the Contractor shall have no liability to the Procuring Entity for the work carried out by the Subcontractor after the assignment takes effect.

4.6 Co-operation

4.6.1 The Contractor shall, as specified in the Contract or as instructed by the Engineer, allow appropriate opportunities for carrying out work to:

a) The Procuring Entity's Personnel,
b) Any other contractors employed by the Procuring Entity, and
c) The personnel of any legally constituted public authorities, who may be employed in the execution on or near the Site of any work not included in the Contract.

4.6.2 Any such instruction shall constitute a Variation if and to the extent that it cause sthe Contractor to suffer delays and/ortoincur Unforeseeable Cost. Services for these personnel and other contractors may include the use of Contractor's Equipment, Temporary Works or access arrangements which are the responsibility of the Contractor.

4.6.3 If, under the Contract, the Procuring Entity is required to give to the Contractor possession of any foundation, structure, plant or means of access in accordance with Contractor's Documents, the Contractor shall submit such documents to the Architect in the time and manner stated in the Specification.

4.7 Setting Out of the Works

4.7.1 The Contractor shall set out the Works in relation to original points, lines and levels of reference specified in the Contractor notified by the Engineer. The Contractor shall be responsible for the correct positioning of all parts of the Works, and shall rectify any error in the positions, levels, dimensions or alignment of the Works.

4.7.2 The Procuring Entity shall be responsible for any errors in these specified or notified items of reference, but the Contractor shall use reasonable efforts to verify their accuracy before they are used.

4.7.3 If the Contractor suffers delay and/or incurs Cost from executing work which was necessitated by an errorin these items of reference, and an experienced contractor could not reasonably have discovered such error and avoided this delay and/ or Cost, the Contractor shall give notice to the Architect and shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to:

a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [Extension of Time for Completion], and
b) payment of any such costs accrued, which shall be included in the Contract Price.

4.7.3 After receiving this notice, the Architect shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine (i) whether and (if so) to what extent the error could not reasonably have been discovered, and (ii) the matters described in sub-paragraphs (a) and (b) above related to thise.

4.8 Safety Procedures

The Contractor shall:
a) Comply with all applicable safety regulations,
b) Takec are for the safety of all persons entitled to be on the Site,
c) Use reasonable efforts to keep the Site and Works clear of unnecessary obstruction so as to avoid danger to these persons,
d) provide fencing, lighting, guarding and watching of the Works until completion and taking over under Clause 10 [Procuring Entity's Taking Over], and
e) provide any Temporary Works (including roadways, footways, guards and fences) which may be necessary, because of the execution of the Works, for the use and protection of the public and of owners and occupiers of adjacent land.

4.9 Quality Assurance

4.9.1 The Contractor shall institute a quality assurance system to demonstrate compliance with the requirements of the Contract.The system shall be in accordance with the details stated in the Contract. The Architect shall be entitledto audit any aspect of the system.

4.9.2 Details of all procedures and compliance documents shall be submitted to the Architectf or information before each design and execution stage is commenced. When any document of a technical nature is issued to the Engineer, evidence of the prior approval by the Contractor itself shall be apparent on the document itself.

Compliance with the quality assurance system shall not relieve the Contractor of any of his duties, obligations or responsibilities under the Contract.

4.10 Site Data

4.10.1 The Procuring Entity shall have made available to the Contractor for his information, prior to the Base Date, all relevant data in the Procuring Entity's possession on sub-surface and hydrological conditions at the Site, including environmental aspects. The Procuring Entity shall similarly make available to the Contractor all such data which come into the Procuring Entity's possession after the Base Date. The Contractor shall be responsible for interpreting all such data.

4.10.2 To the extent which was practicable (taking account of cost and time), the Contractor shall be deemed to have obtained all necessary information as to risks, contingencies and other circumstances which may influence or affect the Tender or Works. To the same extent, the Contractor shall be deemed to have inspected and examined the Site, its surroundings, the above data and other available information, and to have been satisfied before submitting the Tender as to all relevant matters, including (without limitation):

a) The form and nature of the Site, including sub-surface conditions,
b) the hydrological and climatic conditions,
c) the extent and nature of the work and Goods necessary for the execution and completion of the Works and the remedying of any defects,
d) the Laws, procedures and labour practices of Kenya, and
e) the Contractor's requirements for access, accommodation, facilities, personnel, power, transport, water and other services.

4.11 Sufficiency of the Accepted Contract Amount

4.11.1 TheContractor shall be deemed to:

a) Have satisfied itself as to the correctness and sufficiency of the Accepted Contract Amount, and

b) have based the Accepted Contract Amount on the data, interpretations, necessary information, inspections, examinations and satisfaction as to all relevant matters referred to in Sub-Clause 4.10 [Site Data].

4.11.2 Unless otherwise stated in the Contract, the Accepted Contract Amount covers all the Contractor's obligations under the Contract (including those under Provisional Sums, if any) and all things necessary for the proper execution and completion of the Works and the remedying of any defects.

4.12 Unforeseeable Physical Conditions

4.12.1 In this Sub-Clause, "physical conditions" means natural physical conditions and man-made and other physical obstructions and pollutants, which the Contractor encounters at the Site when executing the Works, including sub-surface and hydrological conditions but excluding climatic conditions.

4.12.2 If the Contractor encounters adverse physical conditions which he considers to have been Unforeseeable, the Contractor shall give notice to the Architect as soon as practicable.

4.12.3 This notice shal ldescribe the physical conditions, so that they can be inspected by the Architect and shall set out the reasons why the Contractor considers them to be Unforeseeable. The Contractor shall continue executing the Works, using such proper and reasonable measures as are appropriate for the physical conditions, and shall comply with any instructions which the Architect may give. If an instruction constitutes a Variation, Clause 13 [Variations and Adjustments] shall apply.

4.12.4 If and to the extent that the Contractor encounters physical conditions which are Unforeseeable, gives such a notice, and suffers delay and/or incurs Cost due to these conditions, the Contractor shall be entitled subject to notice under Sub-Clause 20.1 [Contractor's Claims] to:

a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [Extension of Time for Completion], and

b) payment of any such Cost, which shall be included in the Contract Price.

4.12.5 Upon receiving such notice and inspecting and/or investigating these physical conditions, the Architect shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine (i) whether and (if so) to what extent these physical conditions were Unforeseeable, and (ii) the matters described in sub-paragraphs (a) and (b) above related to this extent.

4.12.6 However, before additional Cost is finally agreed or determined under sub-paragraph (ii), the Architect may also review whether other physical conditions in similar parts of the Works (if any) were more favorable than could reasonably have been foreseen when the Contractor submitted the Tender. If and to the extent that these more favorable conditions were encountered, the Architect may proceed in accordance with Sub-Clause 3.5

[Determinations] to agree or determine the reductions in Cost which were due to these conditions, which may be included (as deductions) in the Contract Price and Payment Certificates. However, the net effect of all adjustments under sub-paragraph (b) and all these reductions, for all the physical conditions encountered in similar parts of the Works, shall not result in a net reduction in

the Contract Price.

4.12.7 The Architect shall take account of any evidence of the physical conditions foreseen by the Contractorwhen submitting the Tender, which shall be made available by the Contractor, but shall not be bound by the Contractor'sinterpretationofanysuchevidence.

4.13 Rights of Way and Facilities

Unless otherwise specified in the Contract the Procuring Entity shall provide effective access to and possession of the Site including special and/or temporary rights-of-way which are necessary for the Works. The Contractor shall obtain, at his risk and cost, any additional rights of way or facilities out side the Site which he may require for the purposes of the Works.

4.14 Avoidance of Interference

4.14.1 The Contractor shall not interfere unnecessarily or improperly with:

a) The convenience of the public, or

b) The access to and use and occupation of all roads and foot paths, irrespective of whether they are public or in the possession of the Procuring Entity or of others.

4.14.2 The Contractor shall indemnify and hold the Procuring Entity harmless against and from all damages, losses and expenses (including legal fees and expenses) resulting from any such unnecessary or improper interference.

4.15 Access Route

4.15.1 The Contractor shall be deemed to have been satisfied as to the suitability and availability of access routes to the Site at Base Date. The Contractor shall use reasonable efforts to prevent any road or bridge from being damaged by the Contractor's traffic or by the Contractor's Personnel. These efforts shall include the proper use of appropriate vehicles and routes.

4.15.2 Except as otherwise stated in these Conditions:

a) The Contractor shall (as be tween the Parties) be responsible for any maintenance which may be required for his use of access routes;

b) the Contractor shall provide all necessary signs or directions along access routes, and shall obtain any permission which may be required from the relevant authorities for his use of routes, signs and directions;

c) the Procuring Entity shall not be responsible for any claims which may arise from the use or otherwise of any access route;

d) the Procuring Entity does not guarantee the suitability or a vailability of particular access routes; and

e) Costs due to non-suitability or non-availability, for the use required by the Contractor, of access routes shall be borne by the Contractor.

4.16 Transport of Goods

Unless otherwise stated in the Special Conditions:

a) the Contractor shall give the Architect not less than 21 days' notice of the date on which any Plant or a major item of other Goods will be delivered to the Site;

b) the Contractor shall be responsible for packing, loading, transporting, receiving, unloading, storing and protecting all Goods and other things required for the Works; and

c) the Contractor shall indemnify and hold the Procuring Entity harmless against and from all damages, losses and expenses (including legal fees and expenses) resulting from thetransport of Goods and shall negotiate and pay all claims arising from their transport.

4.17 Contractor's Equipment

The Contractor shall be responsible for all Contractor's Equipment. When brought on to the Site, Contractor's Equipment shall be deemed to be exclusively intended for the execution of the Works. The Contractor shall not remove from the Site any major items of Contractor's Equipment without the consent of the Engineer. However, consent shall not be required for vehicles transporting Goods or Contractor's Personnel off Site.

4.18 Protection of the Environment

4.18.1 The contractor shall comply with the applicable environmental laws, regulations and policies.

4.18.2 The Contractor shall take all reasonable steps to protect the environment (both on and off the Site) and to limit damage and nuisance to people and property resulting from pollution, noise and other results of his operations.

4.18.3 The Contractors hall ensure that emissions, surfaced is charges and effluent from the Contractor's activities shall not exceed the values stated in the Specification or prescribed by applicable Laws.

4.19 Electricity, Water and Gas

4.19.1 The Contractor shall, except as stated below, be responsible for the provision of all power, water and other services he may require for his construction activities and to the extent defined in the Specifications, for the tests.

4.19.2 The Contractor shall be entitled to use for the purposes of the Works such supplies of electricity, water, gas and other services as may be available on the Site and of which details and prices are given in the Specifications.The Contractor shall, at his risk and cost, provide any apparatus necessary for his use of these services and for measuring the quantities consumed.

4.19.3 The quantities consumed and the amounts due (at these prices) for such services shall be agreed or determined by the Architect in accordance with Sub-Clause 2.5 [Procuring Entity's Claims] and Sub-Clause 3.5 [Determinations]. The Contractor shall pay these amounts to the Procuring Entity.

4.20 Procuring Entity's Equipment and Free-Issue Materials

4.20.1 The Procuring Entity shall make the Procuring Entity's Equipment (if any) available for the use of the Contractor in the execution of the Works in accordance with the details, arrangements and prices stated in the Specification. Unless otherwise stated in the Specification:

a) The Procuring Entitys hall be responsible for the Procuring Entity's Equipment, except that

b) the Contractor shall be responsible for each item of Procuring Entity's Equipment whilst any of the Contractor's Personnel is operating it, driving it, directing it or in possession or control of it.

4.20.1 The appropriate quantities and the amounts due (at such stated prices) for the use of Procuring Entity's Equipment shall be agreed or determined by the Architect in accordance with Sub-Clause 2.5 [Procuring Entity's Claims] and Sub-Clause3.5 [Determinations]. The Contractor shall pay these amounts to the Procuring Entity.

4.20.2 The Procuring Entity shall supply, free of charge, the “free-issue materials” (if any) in accordance with the details stated in the Specification. The Procuring Entity shall, at his risk and cost, provide these materials at the time and place specified in the Contract. The Contractor shall then visually inspect them and shall promptly give notice to the Architect of any shortage, defect or default in these materials. Unless otherwise agreed by both Parties, the Procuring Entity shall immediately

rectify the notified shortage, defector default.

4.20.3 After this visual inspection, the free-issue materials shall come under the care, custody and control of the Contractor. The Contractor's obligations of inspection, care, custody and control shall not relieve the Procuring Entity of liability for any shortage, defect or default not apparent from a visual inspection.

4.21 Progress Reports

4.21.1 Unless otherwise stated in the Special Conditions, monthly progress reports shall be prepared by the Contractor and submitted to the Architect in six copies. The first report shall cover the period up to the end of the first calendar month following the Commencement Date. Reports shall be submitted monthly thereafter, each within 7 days after the last day of the period to which it relates.

4.21.2 Reporting shall continue until the Contractor has completed all work which is known to be outstanding at the completion date stated in the Taking-Over Certificate for the Works. Each report shall include:

a) charts and detailed descriptions of progress, including each stage of design (if any), Contractor's Documents, procurement, manufacture, delivery to Site, construction, erection and testing; and including these stages for work by each nominated Subcontractor (as defined in Clause 5 [NominatedSubcontractors]),

b) photographs showing the status of manufacture and of progress on the Site;

c) for the manufacture of each main item of Plant and Materials, the name of the manufacturer, manufacture location, percentage progress, and the actual or expected dates of:

   i) commencement of manufacture,

   ii) Contractor's inspections,

   iii) tests, and

   iv) shipment and arrival at the Site;

d) the details described in Sub-Clause 6.10 [Records of Contractor's Personnel and Equipment];

e) copies of quality assurance documents, test results and certificates of Materials;

f) list of notices given under Sub-Clause 2.5 [Procuring Entity's Claims] and notices given under Sub- Clause 20.1 [Contractor's Claims];

g) safety statistics, including details of any hazardous incidents and activities relating to environmental aspects and public relations; and

h) comparison so factual and planned progress, with details of any events or circumstances which may jeopardize the completion in accordance with the Contract, and the measures being (or to be) adopted to overcome delays.

4.22 Security of the Site

Unless otherwise stated in the Special Conditions:

a) The Contractor shall be responsible for keeping unauthorized persons off the Site, and

b) authorized persons shall be limited to the Contractor's Personnel and the Procuring Entity's Personnel; and to any other personnel notified to the Contractor, by the Procuring Entity or the Engineer, as authorized personnel of the Procuring Entity's other contractors on the Site.

4.23 Contractor's Operations on Site

4.23.1 The Contractor shall confine his operations to the Site, and to any additional areas which may be obtained by the Contractor and agreed by the Architect as additional working areas. The Contractor shall take all necessary precautions to keep Contractor's Equipment and Contractor's Personnel within the Site and these additional areas, and to keep them off adjacentl and.

4.23.2 During the execution of the Works, the Contractor shall keep the Site free from all unnecessary obstruction and shall store or dispose of any Contractor's Equipment or surplus materials. The Contractor shall clear away and remove from the Site any wreckage, rubbish and Temporary Works which are no longer required.

4.23.3 Upon the issue of a Taking-Over Certificate, the Contractor shall clear away and remove, from that part of the Site and Works to which the Taking-Over Certificate refers, all Contractor's Equipment, surplus material, wreckage, rubbish and Temporary Works. The Contractor shall leave that part of the Site and the Works in a clean and safe condition. However, the Contractor may retain on Site, during the Defects Notification Period, such Goods as are required for the Contractor to fulfil obligations under the Contract.

4.24 Fossils

4.24.1 All fossils, coins, articles of value or antiquity, and structures and other remains or items of geological or archaeological interest found on the Site shall be placed under the care and authority of the Procuring Entity. The Contractor shall take reasonable precautions to prevent Contractor's Personnel or other persons from removing or damaging any of these findings.

4.24.2 The Contractor shall, upon discovery of any such finding, promptly give notice to the Engineer, who shall issue instructions for dealing with it. If the Contractor suffers delay and/or incurs Cost from complying with the instructions, the Contractor shall give a further notice to the Architect and shall be entitled subject to Sub- Clause 20.1 [Contractor's Claims] to:

a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [Extension of Time for Completion], and
b) payment of any such Cost, which shall be included in the Contract Price.
After receiving this further notice, the Architect shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine these matters.

5. NOMINATED SUBCONTRACTORS

5.1 Definition of "nominated Subcontractor"

In this Contract, "nominated Subcontractor" means a Subcontractor:

a) Who is nominated by the Procuring Entity, or
b) Contractor has nominated as a Subcontractor subject to Sub-Clause 5.2 [Objection to Notification].

5.2 Objection to Nomination

The Contractor shall not be under any obligation to employ a nominated Subcontractor against whom the Contractor raises reasonable objection by notice to the Procuring Entity as soon as practicable, with supporting particulars. An objection shall be deemed reasonable if it arises from (among other things) any of the following matters, unless the Procuring Entity agrees in writing to indemnify the Contractor against and from the consequences of the matter:

a) there are reasons to believe that the Subcontractor does not have sufficient competence, resources or financial strength;
b) the nominated Subcontractor does not accept to indemnify the Contractor against and from any negligence or misuse of Goods by the nominated Subcontractor, his agents and employees; or
c) the nominated Subcontractor does not accept to enter into a subcontract which specifies that, for the subcontracted work (including design, if any), the nominated Subcontractor shall:
    i) undertake to the Contractor such obligations and liabilities as will enable the Contractor to discharge hisobligations and liabilities under the Contract;
    ii) indemnify the Contractor against and from all obligations and liabilities arising under or in connection with the Contract and from the consequences of any failure by the Subcontractor to perform these obligations or to fulfil these liabilities, and
    iii) be paid only if and when the Contractor has received from the Procuring Entity payments

for sums due under the Subcontract referred to under Sub-Clause 5.3 [Payment to nominated Subcontractors].

5.3 Payments to nominated Subcontractors

The Contractor shall pay to the nominated Subcontractor the amounts shown on the nominated Subcontractor's invoices approved by the Contractor which the Architect certifies to be due in accordance with the subcontract. These amounts plus other charges shall be included in the Contract Price in accordance with sub-paragraph (b) of Sub-Clause 13.5 [Provisional Sums], except as stated in Sub-Clause 5.4 [Evidence of Payments].

5.4 Evidence of Payments

5.4.1 Before issuing a Payment Certificate which includes an amount payable to a nominated Subcontractor, the Architect may request the Contractor to supply reasonable evidence that the nominated Subcontractor has received all amounts due in accordance with previous Payment Certificates, less applicable deductions for retention or otherwise. Unless the Contractor:

(a) Submits this reasonable evidence to the Engineer, or

(b) i) Satisfies the Architect in writing that the Contractor is reasonably entitled to withhold or refuse to pay these amounts, and

ii) Submits to the Architect reasonable evidence that the nominated Subcontractor has been notified of the Contractor's entitlement, then the Procuring Entity may (at his sole discretion) pay, directto the nominated Subcontractor, part or all of such amounts previously certified (less applicable deductions) as are due to the nominated Subcontractor and for which the Contractor has failed to submit the evidence described in sub-paragraphs (a) or (b) above.The Contractor shall then repay, to the Procuring Entity, the amount which the nominated Subcontractor was directly paid by the Procuring Entity.

6. STAFF AND LABOR

6.1 Engagement of Staff and Labor

Except as otherwise stated in the Specification, the Contractor shall make arrangements for the engagement of all staff and labor, local or otherwise, and for their payment, feeding, transport, and, when appropriate, housing. The Contractor is encouraged, to the extent practicable and reasonable, to employ staff and labor with appropriate qualifications and experience from sources within Kenya.

6.2 Rates of Wages and Conditions of Labor

6.2.1 The Contractor shall pay rates of wages, and observe conditions of labor, which are not lower than those established for the trade or industry where the work is carried out. If no established rates or conditions are applicable, the Contractor shall pay rates of wages and observe conditions which are not lower than the general level of wages and conditions observed locally by Procuring Entity's whose trade or industry is similar to that of theContractor.

6.2.2 The Contractor shall inform the Contractor's Personnel about their liability to pay personal income taxes in Kenya in respect of such of their salaries, wages, allowances and any benefits as are subject to tax under the Laws of Kenya for the time being in force, and the Contractor shall perform such duties in regard to such deductions there of as may be imposed on him by such Laws.

6.3 Persons in the Service of Procuring Entity

The Contractor shall not recruit, or attempt to recruit, staff and labour from amongst the Procuring Entity's Personnel.

6.4 Lab or Laws

The Contractor shall comply with all the relevant labour Laws applicable to the Contractor's

Personnel, including Laws relating to their employment, employment of children, health, safety, welfare, immigration and emigration, and shall allow them all their legal rights. The Contractor shall require his employees to obey all applicable Laws, including those concerning safety at work.

6.5 Working Hours

Nowork shall be carried out on the Site on locally recognized days of rest, or outside the normal working hours stated in the **Special Conditions of Contract**, unless:

a) Otherwise stated in the Contract,
b) The Architect gives consent, or
c) The work is unavoidable, or necessary for the protection of life or property or for the safety of the Works, in which case the Contractor shall immediately advise the Engineer, provided that work done outside the normal working hours shall be considered and paid for as overtime.

6.6 Facilities for Staff and Labor

Except as otherwise stated in the Specification, the Contractor shall provide and maintain all necessary accommodation and welfare facilities on site for the Contractor's Personnel. The Contractor shall also provide facilities for the Procuring Entity's Personnel as stated in the Specifications. The Contractor shall not permit any of the Contractor's Personnel to maintain any temporary or permanent living quarters within the structures forming part of the Permanent Works.

6.7 Health and Safety

6.7.1 The Contractor shall at all times take all reasonable precautions to maintain the health and safety of the Contractor's Personnel. In collaboration with loca lhealth authorities, the Contractor shall ensure that medical staff, first aid facilities, sick bay and ambulance service are available at all times at the Site and at any accommodation for Contractor's and Procuring Entity's Personnel, and that suitable arrangements are made for all necessary welfare and hygiene requirements and for the prevention of epidemics.

6.7.2 The Contractor shall appoint an accident prevention officer at the Site, responsible for maintaining safety and protection against accidents. This person shall be qualified for this responsibility and shall have the authority to issue instructions and take protective measures to prevent accidents. Throughout the execution of the Works, the Contractor shall provide what ever is required by this person to exercise this responsibility and authority.

6.7.3 The Contractor shall send, to the Engineer, details of any accident as soon as practicable after itsoccurrence. The Contractor shall maintain records and make reports concerning health, safety and welfare of persons, and damage to property, as the Architect may reasonably require.

6.7.4 The Contractor shall conduct an awareness programme on HIV and other sexually transmitted diseases via an approved service provider and shall undertake such other measures taken to reduce the risk of the transfer of these diseases between and among the Contractor's Personnel and the local community, to promote early diagnosis and to assist affected individuals.

6.8 Contractor's Superintendence

6.8.1 Throughout the execution of the Works, and as long thereafter as is necessary to fulfil the Contractor's obligations, the Contractor shall provide all necessary super intendence to plan, arrange, direct, manage, inspect and test the work.

6.8.2 Superintendence shall be given by a sufficient number of persons having adequate knowledge of the language for communications (defined in Sub-Clause 1.4 [Law and Language]) and of the operations to be carried out (including the methods and techniques required, the hazards likely to be encountered and methods of preventing accidents), for the satisfactory and safe execution of the Works.

6.9 Contractor's Personnel

6.9.1 The Contractor's Personnel shall be appropriately qualified, skilled and experienced in their respective trades or occupations. The Contractors Key personnel shall be named in the Special Conditions of Contract. The Architect may require the Contractor to remove (or cause to be removed) any person employed on the Site or Works, including the Contractor's Representative if applicable, who:

a) Persists in any misconduct or lack of care,
b) Carries out duties in competently or negligently,
c) fails to conform with any provisions of the Contract,
d) persists in any conduct which is prejudicial to safety, health, or the protection of the environment, or
e) based on reasonable evidence, is determined to have engaged in Fraud and Corruption during the execution ofthe Works.

6.9.2 If appropriate, the Contractor shall then appoint (or cause to be appointed) a suitable replacement person.

6.10 Records of Contractor's Personnel and Equipment

The Contractor shall submit, to the Engineer, details showing the number of each class of Contractor's Personnel and of each type of Contractor's Equipment on the Site. Details shall be submitted each calendar month, in a form approved by the Engineer, until the Contractor has completed all work which is known to be outstanding at the completion date stated in the Taking-Over Certificate for the Works.

6.11 Disorderly Conduct

The Contractor shall at all times take all reasonable precautions to prevent any unlawful, riotous or disorderly conduct by or amongst the Contractor's Personnel, and to preserve peace and protection of persons and property on and near the Site.

6.12 Foreign Personnel

6.12.1 The Contractor shall not employ foreign personnel unless the contractor demonstrates that there are no Kenyans with the required skills.

6.12.2 The Contractor shall be responsible for the return of any foreign personnel to the place where they were recruited or to their domicile. In the event of the death in Kenya of any of these personnel or members of their families, the Contractor shall similarly be responsible for making the appropriate arrangements for their return or burial.

6.13 Supply of Water

The Contractor shall, having regard to local conditions, provide on the Sitea n adequate supply of drinking and other water for the use of the Contractor's Personnel.

6.14 Measures against Insect and Pest Nuisance

The Contractor shall a tall times take the necessary precautions to protect the Contractor's Personnel employed on the Site from insect and pest nuisance, and to reduce the danger to their health. The Contractor shall comply with all the regulations of the local health authorities, including use of appropriate insecticide.

6.15 Alcoholic Liquor or Drugs

The Contractor shall not, otherwise than in accordance with the Laws of Kenya, onsite, import, sell, give, barter or otherwise dispose of any alcoholic liquor or drugs, or permit or allow importation, sale, gift, barter or disposal there of by Contractor's Personnel.

6.16 Prohibition of Forced or Compulsory Labour

The Contractor shall not employ forced labor, which consists of any work or service, not voluntarily

performed, that is exacted from an individual under threat of force or penalty, and includes any kind of involuntary or compulsory labor, such as indentured labor, bonded labor or similar labor-contracting arrangements.

6.17 Prohibition of Harmful Child Labor

The Contractor shall not employ children in a manner that is economically exploitative, or is likely to be hazardous, or to interfere with, the child's education, or to be harmful to the child's health or physical, mental, spiritual, moral, or social development. Where the relevant labour laws of Kenya have provisions for employment of minors, the Contractor shall follow those laws applicable to the Contractor. Children below the age of 18 years shall not be employed in dangerous work.

6.18 Employment Records of Workers

The Contractor shall keep complete and accurate records of the employment of labour at the Site. The records shall include the names, ages, genders, hours worked and wages paid to all workers. These records shall be summarized on a monthly basis and submitted to the Engineer. These records shall be included in the details to be submitted by the Contractor under Sub-Clause 6.10 [Records of Contractor's Personnel and Equipment].

6.19 Workers' Organizations

The Contractor shall comply with the relevant labor laws that recognize workers' rights to form and to join workers' organizations of their choosing without interference.

6.20 Non-Discrimination and Equal Opportunity

The Contractor shall base the labour employment on the principle of equal opportunity and fair treatment and shall not discriminate with respect to aspects of the employment relationship, including recruitment and hiring, compensation (including wages and benefits), working conditions and terms of employment, access to training, promotion, termination of employ mentor retirement, and discipline.

7. PLANT, MATERIALS AND WORKMANSHIP

7.1 Manner of Execution

The Contractor shall carry out the manufacture/assemble of plant, the production and manufacture of Materials, and all other execution of the Works:

a) In the manner (if any) specified in the Contract,
b) in a proper workman like and careful manner, in accordance with recognized good practice, and
c) with properly equipped facilities and non-hazardous Materials, except as otherwise specified in the Contract.

7.2 Samples

The Contractor shall submit the following samples of Materials, and relevant information, to the Architect for consent prior to using the Material sin or for the Works:

a) manufacturer's standard samples of Materials and samples specified in the Contract, all at the Contractor's cost, and
b) additional samples instructed by the Architect as a Variation.

Each sample shall be labeled as to origin and intended use in the Works.

7.3 Inspection

7.3.1 The Procuring Entity's Personnel shall at all reasonable times:

a) Have full access to all parts of the Site and to all places from which natural Materials are

being obtained, and

b) during production, manufacture and construction (at the Site and elsewhere), be entitled to examine, inspect, measure and test the materials and workmanship, and to check the progress of manufacture of Plant and production and manufacture of Materials.

7.3.2 The Contractor shall give the Procuring Entity's Personnel full opportunity to carry out these activities, including providing access, facilities, permissions and safety equipment. No such activity shall relieve the Contractor from any obligation or responsibility.

7.3.3 The Contractor shall give notice to the Architect whenever any work is ready and before it is covered up, put out of sight, or packaged for storage or transport. The Architect shall then either carry out the examination, inspection, measurement or testing without unreasonable delay, or promptly give notice to the Contractor that the Architect does not require to do so. If the Contractor fails to give the notice, he shall, if and when required by the Engineer, uncover the work and there after reinstate and make good, all at the Contractor's cost.

7.4 Testing

7.4.1 This Sub-Clause shall apply to all tests specified in the Contract.

7.4.2 Except as otherwise specified in the Contract, the Contractor shall provide all apparatus, assistance, documents and other information, electricity, equipment, fuel, consumables, instruments, labor, materials, and suitably qualified and experienced staff, as are necessary to carry out the specified tests efficiently. The Contractor shall agree, with the Engineer, the time and placef ort he specified testing of any Plant, Materials and other parts of the Works.

7.4.3 The Architect may, under Clause 13 [Variations and Adjustments], vary the location or details of specified tests, or instruct the Contractor to carry out additional tests. If these varied or additional tests show that the tested Plant, Materials or workmanship is not in accordance with the Contract, the cost of carrying out this Variation shall be borne by the Contractor, not withstanding other provisions of the Contract.

7.4.4 The Architect shall give the Contractor not less than 24 hours' notice of the Architect intention to attend the tests. If the Architect does not attend at the time and place agreed, the Contractor may proceed with the tests, unless otherwise instructed by the Engineer, and the tests shall then be deemed to have been made in the Architect presence.

7.4.5 If the Contractor suffers delay and/ or incurs Cost from complying with these instructions or as a result of a delay for which the Procuring Entity is responsible, the Contractor shall give notice to the Architect and shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to:

a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [Extension of Time for Completion], and

b) payment of any such Cost-plus profit, which shall be included in the Contract Price.

7.4.6 After receiving this notice, the Architect shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine these matters.

7.4.7 The Contractor shall promptly forward to the Architect duly certified reports of the tests. When thespecified tests have be enpassed, the Architect shall endorse the Contractor's test certificate, or issue a certificate to him, to that effect. If the Architect has not attended the tests, he shall be deemed to have accepted the readings as accurate.

7.5 Rejection

7.5.1 If, as a result of an examination, inspection, measurement or testing, any Plant, Materials or workmanship is found to be defective or otherwise not in accordance with the Contract, the Architect may reject the Plant, Materials or workmanship by giving notice to the Contractor, with reasons. The Contractor shall then promptly make good the defect and ensure that the rejected item complies with the Contract.

7.5.2 If the Architect requires this Plant, Materials or workmanship to be retested, the tests shall be

repeated under the same terms and conditions. If the rejection and retesting cause the Procuring Entity to incur additional costs, the Contractor shall subject to Sub-Clause 2.5 [Procuring Entity's Claims] pay these costs to the Procuring Entity.

7.6 Remedial Work

7.6.1 Not withstanding any previous test or certification, the Architect may instruct the Contractorto:

a) Remove from the Site and replace any Plant or Materials which is not in accordance with the Contract,
b) remove and re-execute any other work which is not in accordance with the Contract, and
c) execute any work which is urgently required for the safety of the Works, whether because of an accident, unforeseen able event or otherwise.

7.6.2 The Contractor shall comply with the instruction within a reasonable time, which shall be the time (if any) specified in the instruction, or immediately if urgency is specified under sub-paragraph (c).

7.6.3 If the Contractor fails to comply with the instruction, the Procuring Entity shall be entitled to employ and pay other persons to carry out the work. Except to the extent that the Contractor would have been entitled to payment for the work, the Contractor shall subject to Sub-Clause 2.5 [Procuring Entity's Claims] pay to the Procuring Entity all costs arising from this failure.

7.6.4 If the contractor repeatedly delivers defective work, the Procuring Entity may consider termination in accordance with Clause 15.

7.7 Ownership of Plant and Materials

Except as otherwise provided in the Contract, each item of Plant and Materials shall become the property of the Procuring Entity at whichever is the earlier of the following times, free from liens and other encumbrances:

a) When it is in corporated in the Works;
b) when the Contractor is paid the corresponding value of the Plant and Materials under Sub-Clause 8.10 [Payment for Plant and Materials in Event of Suspension].

7.8 Royalties

Unless otherwise stated in the Specification, the Contractor shall pay all royalties, rents and other payments for:

a) Natural materials obtained from outside the Site, and
b) thedisposal of material from demolitions and excavations and of other surplus material (whether natural orman-made), except to the extent that disposal are as within the Site are specified in the Contract.

8. COMMENCEMENT, DELAYS AND SUSPENSION

8.1 Commencement of Works

8.1.1 Except as otherwise specified in the Special Conditions of Contract, the Commencement Date shall be the date at which the following precedent condition shave all been fulfilled and the Architect notification recording the agreement of both Parties on such fulfilment and instructing to commence the Work is received by the Contractor:

a) Signature of the Contract Agreement by both Parties, and if required, approval of the Contract by relevant authorities of Kenya;
b) except if otherwise specified in the Special Conditions of Contract, effective access to and possession of the Site given to the Contractor together with such permission(s) under (a) of Sub-Clause 1.13 [Compliance with Laws] as required for the commencement of the Works.
c) Receipt by the Contractor of the Advance Payment under Sub-Clause 14.2 [Advance Payment] provided that the corresponding bank guarantee has been delivered by the Contractor.

8.1.2 If the said Architect instruction is not received by the Contractor within 180 days from his receipt of the Letter of Acceptance, the Contractor shall be entitled to terminate the Contract under Sub-

Clause1 6.2 [Terminationby Contractor].

8.1.3 The Contractor shall commence the execution of the Works as soon as is reasonably practicable after the Commencement Date and shal lthen proceed with the Works with due expedition and without delay.

8.2 Time for Completion

The Contractor shall complete the whole of the Works, and each Section (if any), within the Time for Completion for the Works or Section (as the case may be), including:

a) Achieving the passing of the Testson Completion, and

b) completing all work which is stated in the Contract as being required for the Works or Section to be considered to be completed for the purposes of taking-over under Sub-Clause 10.1 [Taking Over of the Works and Sections].

8.3 Programme

8.3.1 The Contractor shall submit a detailed time programme to the Architect within1 4 days after receiving the notice under Sub-Clause 8.1 [Commencement of Works]. The Contractor shall also submit a revised programme whenever the previous programme is inconsistent with actual progress or with the Contractor's obligations. Each programme shall include:

a) The order in which the Contractor intends to carry out the Works, including the anticipated timing of each stage of design (if any), Contractor's Documents, procurement, manufacture of Plant, delivery to Site, construction, erection and testing,

b) each of these stages for work by each nominated Subcontractor (as defined in Clause 5 [Nominated Subcontractors]),

c) the sequence and timing of inspections and tests specified in the Contract, and

d) a supporting report which includes:

a general description of the methods which the Contractor intends to adopt, and of the major stages, in the execution of the Works, and

details showing the Contractor's reasonable estimate of the number of each class of Contractor's Personnel and of each type of Contractor's Equipment, required on the Site for each major stage.

8.3.2 Unless the Engineer, within 14 days after receiving a programme, gives notice to the Contractor stating the extent to which it does not comply with the Contract, the Contractor shall proceed in accordance with the programme, subject to his other obligations under the Contract. The Procuring Entity's Personnel shall be entitled to rely upon the programme when planning their activities.

8.3.3 The Contractor shall promptly give notice to the Architect of specific probable future events or circumstances which may adversely affect the work, increase the Contract Price or delay the execution of the Works.

8.3.4 If, at anytime, the Architect gives notice to the Contractor that a programme fails (to the extent stated) to comply with the Contractor to be consistent with actual progress and the Contractor's stated intentions, the Contractor shall submit a revised programme to the Architect in accordance with this Sub-Clause.

8.4 Extension of Time for Completion

8.4.1 The Contractor shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to an extension of the Time for Completion if and to the extent that completion for the purposes of Sub-Clause 10.1 [Taking Over of the Works and Sections] is or will be delayed by any of the following causes:

a) a Variation (unless an adjustment to the Time for Completion has been agreed under Sub-Clause 13.3 [Variation Procedure]) or other substantial change in the quantity of an item of work included in the Contract,

b) a cause of delay giving an entitlement to extension of time under a Sub-Clause of these Conditions,

c) exceptionally adverse climatic conditions,

d) Unforeseeable shortages in the availability of personnel or Goods caused by epidemic or governmental actions, or

e) any delay, impediment or prevention caused by or attributable to the Procuring Entity, the Procuring Entity's Personnel, or the Procuring Entity's other contractors.

8.4.2 If the Contractor considers itself to be entitled to an extension of the Time for Completion, the Contractor shall give notice to the Architect in accordance with Sub-Clause 20.1 [Contractor's Claims]. When determining each extension of time under Sub-Clause 20.1, the Architec tshall review previous determinations and may increase, but shall not decrease, the total extension of time.

8.5 Delays Caused by Authorities

If the following conditions apply, namely:

a) The Contractor has diligently followed the procedures laid down by the relevant legally constituted public authorities in Kenya,

b) These authorities delay or disrupt the Contractor's work, and

c) the delay or disruption was Unforeseeable, then this delay or disruption will be considered as a cause of delay under sub-paragraph (b) of Sub-Clause 8.4 [Extension of Time for Completion].

8.6 Rate of Progress

8.6.1 If, at anytime:

a) Actual progress is too slow to complete within the Time for Completion, and/or

b) Progress has fallen (or will fall) behind the current programme under Sub-Clause 8.3 [Programme], other than as a result of a cause listed in Sub-Clause 8.4 [Extension of Time for Completion], then the Architect may instruct the Contractor to submit, under Sub-Clause 8.3 [Programme], a revised programme and supporting report describing the revised methods which the Contractor proposes to adopt in order to expedite progress and complete within the Time for Completion.

8.6.2 Unless the Architect notifies otherwise, the Contractor shall adopt these revised methods, which mayrequire increases in the working hours and/or in the numbers of Contractor's Personnel and/or Goods, at the risk and cost of the Contractor. If these revised methods cause the Procuring Entity to incur additional costs, the Contractor shall subject to notice under Sub-Clause 2.5 [Procuring Entity's Claims] pay these costs to the Procuring Entity, in addition to delay damages (if any) under Sub-Clause 8.7 below.

8.6.3 Additional costs of revised methods including acceleration measures, instructed by the Architect to reduce delays resulting from causes listed under Sub-Clause 8.4 [Extension of Time for Completion] shall be paid by the Procuring Entity, without generating, however, any other additional payment benefit to the Contractor.

8.7 Delay Damages

8.7.1 If the Contractor fails to comply with Sub-Clause 8.2 [Time for Completion], the Contractor shall subject to notice under Sub-Clause 2.5 [Procuring Entity's Claims] pay delay damages to the Procuring Entity for this default. These delay damages shall be the sum stated in the **Special Conditions of Contract**, which shall be paid for everyday which shall elapse between the relevant Time for Completion and the date stated in the

Taking-Over Certificate. However, the total amount due under this Sub-Clause shall not exceed the maximum amount of delay damages (if any) stated in the Special Conditions of Contract.

8.7.2 These delay damages shall be the only damages due from the Contractor for such default, other than in the event of termination under Sub-Clause 15.2 [Termination by Procuring Entity] prior to completion of the Works. These damages shall not relieve the Contractor from his obligation to complete the Works, or from any other duties, obligations or responsibilities which he may have

under the Contract.

8.8 Suspension of Work

8.8.1 The Architect may at anytime instruct the Contractor to suspend progress of part or all of the Works. During such suspension, the Contractor shall protect, store and secure such part or the Works a gainst any deterioration, loss or damage.

8.8.2 The Architect may also notify the cause for the suspension. If and to the extent that the cause is notified and is the responsibility of the Contractor, the following Sub-Clauses 8.9, 8.10 and 8.11 shall not apply.

8.9 Consequences of Suspension

8.9.1 If the Contractor suffers delay and/or incurs Cost from complying with the Architect instructions under Sub- Clause 8.8 [Suspension of Work] and/or from resuming the work, the Contractor shall give notice to the Architect and shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to:

a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [Extension of Time for Completion], and

b) Payment of any such Cost, which shall be included in the Contract Price.

8.9.2 After receiving this notice, the Architect shall proceed in accordance with Sub-Clause3.5 [Determinations] to agree or determine these matters.

8.9.3 The Contractor shall not be entitled to an extension of time for, or to payment of the Cost incurred in, making good the consequences of the Contractor's faulty design, workmanship or materials, or of the Contractor's failure to protect, store or secure in accordance with Sub-Clause 8.8 [Suspension of Work].

8.10 Payment for Plant and Materials in Event of Suspension

The Contractor shall be entitled to payment of the value (as at the date of suspension) of Plant and/ or Materials which have not been delivered to Site, if:

a) The work on Plant or delivery of Plant and/ or Materials has been suspended for more than 30 days, and

b) the Contractor has marked the Plant and/or Materials as the Procuring Entity's property in accordance with the Architect instructions.

8.11 ProlongedSuspension

If the suspension under Sub-Clause 8.8 [Suspension of Work] has continued for more than 84 days, the Contractor may request the Architect permission to proceed. If the Architect does not give permission within 30 days after being requested to do so, the Contractor may, by giving notice to the Engineer, treat the suspension as an omission under Clause 13 [Variations and Adjustments] of the affected part of the Works. If the suspension affects the whole of the Works, the Contractor may give notice of termination under Sub-Clause 16.2 [Termination by Contractor].

8.12 Resumption of Work

After the permission or instruction to proceed is given, the Contractor and the Architect shall jointly examine the Works and the Plant and Materials affected by the suspension. The Contractor shall make good any deterioration or defect in or loss of the Works or Plant or Materials, which has occurred during the suspension after receivingf rom the Architec tan instruction to this effect under Clause 13 [Variations and Adjustments].

9. TESTS ON COMPLETION

9.1 Contractor's Obligations

9.1.1 The Contractor shall carry out the Tests on Completion in accordance with this Clause and Sub-Clause 7.4 [Testing], after providing the documents in accordance with sub-paragraph (d) of Sub-Clause 4.1 [Contractor's General Obligations].

9.1.2 The Contractor shall give to the Architect not less than 21 days' notice of the date after which the Contractor will be ready to carry out each of the Tests on Completion. Unless otherwise agreed, Tests on Completion shall be carried out within 14 days after this date, on such day or days as the Architect shall instruct.

9.1.3 In considering the results of the Tests on Completion, the Architect shall make allowances for the effect of any use of the Works by the Procuring Entity on the performance or other characteristics of the Works. As soon as the Works, or a Section, have passed any Tests on Completion, the Contractor shall submit a certified report of the resultsof these Tests to the Engineer.

9.2 Delayed Tests

9.2.1 If the Tests on Completion are being unduly delayed by the Procuring Entity, Sub-Clause 7.4 [Testing] (fifth paragraph) and/ or Sub-Clause 10.3 [Interference with Tests on Completion] shall be applicable.

9.2.2 If the Tests on Completion are being unduly delayed by the Contractor, the Architect may by notice require the Contractor to carry out the Tests within 21 days after receiving the notice. The Contractor shall carry out the Testson such day or days within that period as the Contractor may fix and of which he shall give notice to the Engineer.

9.2.3 If the Contractor fails to carryout the Tests on Completion within the period of 21 days, the Procuring Entity's Personnel may proceed with the Test sat the risk and cost of the Contractor. The Tests on Completion shall then be deemed to have been carried out in the presence of the Contractor and the results of the Tests shall be accepted asaccurate.

9.3 Retesting of related works

If the Works, or a Section, fail to pass the Tests on Completion, Sub-Clause 7.5 [Rejection] shall apply, and the Architect or the Contractor may require the failed Tests, and Tests on Completion on any related work, to be repeated under the same terms and conditions.

9.4 Failure to Pass Tests on Completion

9.4.1 If the Works, or a Section, fail to pass the Tests on Completion repeated under Sub-Clause 9.3 [Retesting], the Architect shall be entitled to:

a) Order further repetition of Tests on Completion under Sub-Clause 9.3; or

b) if the failure deprives the Procuring Entity of substantially the whole benefit of the Works or Section, reject the Works or Section (as the case may be), in which event the Procuring Entity shall have the same remedies as are provided in sub-paragraph (c) of Sub-Clause1 1.4 [Failure to Remedy Defects].

10. PROCURING ENTITY'S TAKING OVER

10.1 Taking Over of the Works and Sections

10.1.1 Except as stated in Sub-Clause 9.4 [Failure to Pass Tests on Completion], the Works shall be taken over by the Procuring Entity when (i) the Works have been completed in accordance with the Contract, including the matters described in Sub-Clause 8.2 [Time for Completion] and except as allowed in sub-paragraph (a) below, and (ii) a Taking-Over Certificate for the Works has been issued, or is deemed to have been issued in accordance with this Sub-Clause.

10.1.2 The Contractor may apply by notice to the Architect for a Taking-Over Certificate not earlier than 14 days before the Works will, in the Contractor's opinion, be complete and ready for taking over. If the Works are divided into Sections, the Contract or may similarly apply for a Taking-Over Certificate for each Section.

10.1.3 The Architect shall, within 30 days after receiving the Contractor's application:

a) Issue the Taking-Over Certificate to the Contract or, stating the date on which the Works or Section were completed in accordance with the Contract, except for any minor out standing work and defects which will not substantially affect the use of the Works or Section for their intended purpose (either until or whilst this work is completed and these defects are remedied); or

b) reject the application, giving reasons and specifying the work required to be done by the Contractor to enable the Taking-Over Certificate to be issued. The Contractor shall then complete this work before issuing a further notice undert his Sub-Clause.

10.1.4 If the Architect fails either to issue the Taking-Over Certificate or to reject the Contractor's application within the period of 30 days, and if the Works or Section (as the case may be) are substantially in accordance with the Contract, the Taking-Over Certificate shall be deemed to have been issued on thel ast day of that period.

10.2 Taking Over of Parts of the Works

10.2.1 The Architect may, at the sole discretion of the Procuring Entity, issue a Taking-Over Certificate for any part of the Permanent Works.

10.2.2 The Procuring Entity shall not use any part of the Works (other than as a temporary measure which is either specified in the Contract or agreed by both Parties) unless and until the Architect has issued a Taking-Over Certificate for this part. However, if the Procuring Entity does use any part of the Works before the Taking-Over Certificate is issued:

a) The part which is used shall be deemed to have been taken over as from the date on which it is used,

b) the Contractor shall cease to be liable for the care of such part as from this date, when responsibility shall pass to the Procuring Entity, and

c) if requested by the Contractor, the Architect shall issue a Taking-Over Certificate for this part.

10.2.3 After the Architect has issued a Taking-Over Certificate for a part of the Works, the Contractor shall be given the earliest opportunity to take such steps as may be necessary to carry out any outstanding Tests on Completion. The Contractor shall carry out these Tests on Completion as soon as practicable before the expiry date of the relevant Defects Notification Period.

10.2.4 If the Contractor incurs Cost as a result of the Procuring Entity taking over and/or using a part of the Works, other than such use as is specified in the Contractor agreed by the Contractor, the Contractor shall (i) give notice to the Architect and (ii) be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to payment of any such accrued costs, which shall be included in the Contract Price. After receiving this notice, the Architect shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine this accrued cost.

10.2.5 If a Taking-Over Certificate has been issued for a part of the Works (other than a Section), the delay damages there after for completion of the remainder of the Works shall be reduced. Similarly, the delay damages for the remainder of the Section (if any) in which this part is included shall also be reduced. For any period of delay after the date stated in this Taking-Over Certificate, the proportional reduction in these delay damages shall be calculated as the proportion which the value of the part so certified bears to the value of the Works or Section (as the case may be) as a whole. The Architect shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine these proportions. The provisions of this paragraph shall only apply to the daily rate of delay damages under Sub-Clause 8.7 [Delay Damages] and shall not affect the maximum amount of these damages.

10.3 Interference with Tests on Completion

10.3.1 If the Contractor is prevented, for more than 14 days, from carrying out the Tests on Completion by a cause for which the Procuring Entity is responsible, the Procuring Entity shall be deemed to have taken over the Works or Section (as the case may be) on the date when the Tests on Completion would otherwise have been completed.

10.3.2 The Architect shall then issue a Taking-Over Certificate accordingly, and the Contractor shall carry out the Tests on Completion as soon as practicable, before the expiry date of the Defects Notification Period. The Architect shall require the Tests on Completion to be carried out by giving 14 days' notice and in accordance with the relevant provisions of the Contract.

10.3.3 If the Contractor suffers delay and/or incurs Cost as a result of this delay in carrying out the Tests on Completion, the Contractor shall give notice to the Architect and shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to:

a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [Extension of Time for Completion], and

b) payment of any such accrued costs, which shall be included in the Contract Price.

10.3.4 After receiving this notice, the Architect shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine these matters.

10.4 Surfaces Requiring Reinstatement

Except as otherwise stated in a Taking-Over Certificate, a certificate for a Section or part of the Works shall not be deemed to certify completion of any ground or other surfaces requiring reinstatement.

11. DEFECTS LIABILITY

11.1 Completion of Outstanding Work and Remedying Defects

11.1.1 In order that the Works and Contractor's Documents, and each Section, shall be in the condition required by the Contract (fairwear and tear excepted) by the expiry date of the relevant Defects Notification Period or as soon as practicable there after, the Contractor shall:

a) complete any work which is outstanding on the date stated in a Taking-Over Certificate, within such reasonable time as is instructed by the Engineer, and

b) execute all work required to remedy defects or damage, as may be notified by (or on behalf of) the Procuring Entity on or before the expiry date of the Defects Notification Period for the Works or Section (as the case may be).

11.1.2 If a defect appears or damage occurs, the Contractor shall be notified accordingly by the Engineer.

11.2 Cost of Remedying Defects

11.2.1 All work referred to in sub-paragraph (b) of Sub-Clause 11.1 [Completion of Outstanding Work and Remedying Defects] shall be executed at the risk and cost of the Contractor, if and to the extent that the work is attributable to:

a) Any design for which the Contractor is responsible,

b) Plant, Materials or workmanship not being in accordance with the Contract, or

c) Failure by the Contractor to comply with any other obligation.

11.2.2 If and to the extent that such work is attributable to any other cause, the Contractor shall be notified promptly by (or on behalf of) the Procuring Entity, and Sub-Clause 13.3 [Variation Procedure] shall apply.

11.3 Extension of Defects Notification Period

11.3.1 The Procuring Entity shall be entitled subject to Sub-Clause 2.5 [Procuring Entity's Claims] to an extension of the Defects Notification Period for the Works or a Section if and to the extent that the Works, Section or a major item of Plant (as the case may be, and after taking over) cannot be used for the purposes for which they are intended by reason of a defect or by reason of damage attributable to the Contractor. However, a Defects Notification Period shall not be extended by more than two years.

11.3.2 If delivery and/ or erection of Plant and/ or Materials was suspended under Sub-Clause 8.8 [Suspension of Work] or Sub-Clause 16.1 [Contractor's Entitlement to Suspend Work], the Contractor's obligations under this Clause shall not appl yto any defectsor damage occurring more than two years after the Defects Notification Period for the Plant and/ or Materials would otherwise have expired.

11.4 Failure to Remedy Defects

11.4.1 If the Contractor fails to remedy any defect or damage within a reasonable time, a date may be fixed by the Engineer, on or by which the defect or damage is to be remedied. The Contractor shall be given reasonable notice of this date.

11.4.2 If the Contractor fails to remedy the defect or damage by this notified date and this remedial work was to be executed at the cost of the Contractor under Sub-Clause 11.2[Costo f Remedying Defects], the Procuring Entity may (at his option):

(a) Carry out the work itself or by others, in a reasonable manner and at the Contractor's cost, but the Contractor shall have no responsibility for this work; and the Contractor shall subject to Sub-Clause 2.5 [Procuring Entity's Claims] pay to the Procuring Entity the costs reasonably incurred by the Procuring Entity in remedying the defect or damage;

(b) Requirethe Architect to agree or determine a reasonable reduction in the Contract Price in accordance with Sub-Clause 3.5 [Determinations]; or

(c) if the defect or damage deprives the Procuring Entity of substantially the whole benefit of the Works or any major part of the Works, terminate the Contractas a whole, or in respect of such major part which cannot be put to the intended use. Without prejudice to any other rights, under the Contractor otherwise, the Procuring Entity shall then be entitled to recover all sums paid for the Works or for such part (as the case may be), plus financing costs and the cost of dismantling the same, clearing the Site and returning Plant and Materials to the Contractor.

11.5 Removal of Defective Work

If the defector damage cannot be remedied expeditiously on the Site and the Procuring Entity gives consent, the Contractor may remove from the Site for the purposes of repair such items of Plant as are defective or damaged. This consent may require the Contractor to increase the amount of the Performance Security by the full replacement cost of these items, or to provide other appropriate security.

11.6 Further Tests

11.6.1 If the work of remedying of any defector damage may affect the performance of the Works, the Architect may require the repetition of any of the tests described in the Contract. The requirement shall be made by notice within 14 days after the defect or damage is remedied.

11.6.2 These tests shall be carried out in accordance with the terms applicable to the previous tests, except that they shall be carried out at the risk and cost of the Party liable, under Sub-Clause 11.2 [Cost of Remedying Defects], for the cost of the remedial work.

11.7 Right of Access

Unti lthe Completion Certificate has been issued, the Contractor shall have such right of access to the Works as is reasonably required in order to comply with this Clause, except as may be inconsistent with the Procuring Entity's reasonable security restrictions.

11.8 Contractor to Search

The Contractor shall, if required by the Engineer, search for the cause of any defecton parts of the works that have already accepted, under the direction of the Engineer. Unless the defect is to be remedied at the cost of the Contractor under Sub-Clause 11.2 [Cost of Remedying Defects], the Cost of the search plus profit shall be agreed or determined by the Architect in accordance with Sub-Clause 3.5 [Determinations] and shall be included in the Contract Price.

11.9 Completion Certificate

11.9.1 Performance of the Contractor's obligations shall not be considered to have been completed until the Architect has issued the Completion Certificate to the Contractor, stating the date on which the Contractor completed his obligations under the Contract.

11.9.2 The Architect shall issue the Completion Certificate within 30days after the latest of the expiry dates of the Defects Liability Period, or as soon there after as the Contractor has supplied all the Contractor's Documents and completed and tested all the Works, including remedying any defects. A copy of the Completionn Certificate shall be issued to the Procuring Entity.

11.9.3 Only the Completion Certificate shall be deemed to constitute acceptance of the Works.

11.10 Unfulfilled Obligations

After the Completion Certificate has been issued, each Party shall remain liable for the fulfilment of any obligation which remains unperformed at that time. For the purposes of determining the nature and extent of unperformed obligations, the Contract shall be deemed to remain in force.

11.11 Clearance of Site

11.11.1 Upon receiving the Completion Certificate, the Contractor shall remove any remaining Contractor's Equipment, surplus material, wreckage, rubbish and Temporary Works from the Site.

11.11.2 If all these items have not been removed within 30 days after receipt by the Contractor of the Completion Certificate, the Procuring Entity may sell or otherwise dispose of any remaining items. The Procuring Entity shall be entitled to be paid the costs incurred in connection with, or attributable to, such sale or disposal and restoring the Site.

11.11.3 Any balance of the moneys from the sale shall be paid to the Contractor. If these moneys are less than the Procuring Entity's costs, the Contractor shall pay the outstanding balance to the Procuring Entity.

12. MEASUREMENT AN DEVALUATION

12.1 Works to be Measured

12.1.1 The Works shall be measured, and valued for payment, in accordance with this Clause. The Contractorshall show in each application under Sub-Clauses 14.3 [Application for Interim Payment Certificates], 14.10 [Statement on Completion] and 14.11 [Application for Final Payment Certificate] the quantities and other particulars detailing the amounts which he considers to be entitled under the Contract.

12.1.2 Whenever the Architect requires any part of the Works to be measured, reasonable notice shall be given to the Contractor's Representative, who shall:

a) promptly either attend or send another qualified representative to assist the Architect in making the measurement, and
b) supply any particulars requested by the Engineer.

12.1.3 If the Contractor fails to attend or send a representative, the measurement made by the Architect shall be accepted as accurate.

12.1.4 Except as otherwise stated in the Contract, wherever any Permanent Works are to be measured from records, these shall be prepared by the Engineer. The Contractor shall, as and when

requested, attend to examine and agreet her ecords with the Engineer, and shall sign the same when agreed. If the Contractor does not attend, the records shall be accepted as accurate.

12.1.5 If the Contractor examines and disagrees the records, and/ or does not sign them as agreed, then the Contractor shall give notice to the Architect of the respects in which the records are asserted to be inaccurate. After receiving this notice, the Architect shall review the records and either confirm or vary them and certify the paymentofthe undisputed part. If the Contractor does not so give notice to the Architect within 14 days after being requested to examine the records, they shall be accepted as accurate.

12.2 Method of Measurement

Except as otherwise stated in the Contract:

a) Measurement shall be made of the net actual quantity of each item of the Permanent Works, and
b) the method of measurement shall be in accordance with the Bill of Quantities or other applicable Schedules.

12.3 Evaluation

12.3.1 Except as otherwise stated in the Contract, the Architect shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine the value of workd one by evaluating each item of work, applying the measurement agreed or determined in accordance with the above Sub-Clauses 12.1 and 12.2 and the appropriate rate or price for the item.

12.3.2 For each item of work, the appropriate rate or price for the item shall be the rate or price specified for such item in the Contractor, if there is no such item, specified for similar work.

12.3.3 Any item of work included in the Bill of Quantities for which no rate or price was specified shall be considered as included in other rates and prices in the Bill of Quantities and will not be paid for separately.

12.3.4 However, for a new item of work, a new rate or price shall be appropriate for such item of work if:

a) The work is instructed under Clause13 [Variations and Adjustments],
b) no rate or price is specified in the Contract for this item, and
c) no specified rate or price is appropriate because the item of work is not of similar character, or is not executed under similar conditions, as any item in the Contract.

12.3.5 Each new rate or price shall be derived from any relevant rates or prices in the Contract. If no rates or prices are relevant for the new item of work, it shall be derived from the reasonable Cost of executing such work, prevailing market rates, together with profit, taking account of any other relevant matters.

12.3.6 Until such time as an appropriate rate or price is agreed or determined, the Architect shall determine a provisional rate or price for the purposes of Interim Payment Certificates as soon as the concerned work commences.

12.3.7 Where the contract price is different from the corrected tender price, in order to ensure the contractor is not paid less or more relative to the contract price (*which would be the tender price*), payment valuation certificates and variation orders on omissions and additions valued based on rates in the Bill of Quantities or schedule of rates in the Tender, will be adjusted by a plus or minus percentage. The percentage already worked out during tender evaluation is worked out as follows: *(corrected tender price– tender price)/ tender price X 100*.

12.4 Omissions

Whenever the omission of any work forms part (or all) of a Variation, the value of which has not been agreed, if:

a) The Contractor will incur (or has incurred) cost which, if the work had not been omitted, wouldhavebeen deemed to be covered by a sum forming part of the Accepted Contract Amount;
b) The omission of the work will result (or has resulted) in this sum not forming part of the Contract Price; and

c) this cost is not deemed to be included in the evaluation of any substituted work; then the Contractor shall give notice to the Architect accordingly, with supporting particulars. Upon receiving this notice, the Architect shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine this cost, which shall be included in the Contract Price.

13. VARIATIONS AND ADJUSTMENTS

13.1 Right to Vary

13.1.1 Variations may be initiated by the Architect at any time prior to issuing the Taking-Over Certificate for the Works, either by an instruction or by a request for the Contractor to submit a proposal. No Variation instructed by the Architect under this Clause shall in any way vitiate or in validate the Contract.

13.1.2 The Contractor shall execute and be bound by each Variation, unless the Contractor promptly gives notice to the Architect stating (with supporting particulars) that (i) the Contractor cannot readily obtain the Goods required for the Variation, or (ii) such Variation triggers a substantial change in the sequence or progress of the Works. Upon receiving this notice, the Architect shall cancel, confirm or vary the instruction.

13.1.3 Each Variation may include:

a) changes to the quantities of any item of work included in the Contract (however, such changes do not necessarily constitute a Variation),
b) changes to the quality and otherc haracteristics of any item of work,
c) changes to the levels, positions and/ or dimensions of any part of the Works,
d) omission of any work unless it is to be carried out by others,
e) any additional work, Plant, Materials or services necessary for the Permanent Works, including any associated Tests on Completion, boreholes and other testing and exploratory work, or
f) changes to the sequence or timing of the execution of the Works.

13.1.4 The Contractor shall not make any alteration and/or modification of the Permanent Works, unless and until the Architect instructs after obtaining approval of the Procuring Entity.

13.2. Variation Order Procedure

13.2.1 Priortoany Variation Order under Sub-Clause 13.1.4 the Architect shall notify the Contractor of the nature and form of such variation. As soon as possible after having received such notice, the Contractor shall submit to the Engineer:

a) A description of work, if any, to be performed and a programme for its execution, and
b) the Contractor's proposals for any necessary modifications to the Programme according to Sub-Clause 8.3 or to any of the Contractor's obligations under the Contract, and
c) the Contractor's proposals for adjustment to the Contract Price.

Following the receipt of the Contractor's submission the Architect shall, after due consultation with the Employer and the Contractor, decide as soon as possible whether or not the variation shall be carried out. If the Architect decides that the variation shall be carried out, he shall issue a Variation Order clearly identified as such in accordance with the Contractor's submission or as modified by agreement.

If the Architect and the Contractor are unable to agree the adjustment of the Contract Price, the provisions of Sub-Clause 13.2.2 shall apply.

13.2.2 Disagreement on Adjustment of the Contract Price

If the Contractor and the Architecture unable to agree on the adjustment of the Contract Price, the adjustment shall be determined in accordance with the rates specified in the Bills of Quantities or Schedule of Daywork Prices. If the rates contained in the Bills of Quantities or Dayworks Prices are not directly applicable to the specific work in question, suitable rates shall be established by the Architect reflecting the level of pricing in the Dayworks Prices. Where rates are not contained in

the said Prices, the amount shall be such as is in all the circumstances reasonable, reflecting a market price. Due account shall be taken of any over-or under-recovery of overheads by the Contractor in consequence of the variation. The Contractor shall also be entitled to be paid:

a) The cost of any partial execution of the Work srendered useless by any such variation,
b) Thecostof making necessary alterations to Plant already manufactured or in the course of manufacture or of any work done that has to be altered in consequence of such a variation,
c) any additional costs incurred by the Contractor by the disruption of the progress of the Works as detailed in the Programme, and
d) the net effect of the Contractor's financec osts, including interest, caused by the variation.

The Architect shall on this basis determine the rates or prices to enable on-account payment to be included in certificates of payment.

13.2.3 Contractor to Proceed

On receipt of a Variation Order, the Contractor shall forth with proceed to carry out the variation and be bound to these Conditions in so doing as if such variation was stated in the Contract. The work shall not be delayed pending the granting of an extension of the Time for Completion or an adjustment to the Contract Price under Sub-Clause31.3.

13.3 Value Engineering

13.3.1 TheContractor may, at anytime, submit to the Architect written proposal which (in the Contractor's opinion) will, if adopted, (i) accelerate completion, (ii) reduce the cost to the Procuring Entity of executing, maintaining or operating the Works, (iii) improve the efficiency or value to the Procuring Entity of the completed Works, or
(iv) otherwise be of benefit to the Procuring Entity.

13.3.2 The proposal shall be prepared at the cost of the Contractor and shall include the items listed in Sub-Clause 13.3 [Variation Procedure].

13.2.3 If a proposal, which is approved by the Engineer, includes a change in the design of part of the Permanent Works, then unless otherwise agreed by both Parties:

a) The Contractor shall design this part,
b) sub-paragraphs (a) to (d) of Sub-Clause 4.1 [Contractor's General Obligations] shall apply, and
c) if this change results in a reduction in the contract value of this part, the Architect shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine a fee, which shall be included in the Contract Price. This fee shall behalf (50%) of the difference between the following amounts:
   i) such reduction in contract value, resulting from the change, excluding adjustments under Sub-Clause
   13.8 [Adjustments for Changes in Legislation] and Sub-Clause 13.8 [Adjustments for Changes in Cost], and
   ii) the reduction (if any) in the value to the Procuring Entity of the varied works, taking account of any improvement in quality, anticipated life or operational efficiencies.

13.3.4 However, if the amount established in item 13.2.3 (c) (i) is less than amount established in item 13.2.3 (c (ii), there shall not be a fee. However, if the if the amount established in item 13.2.3 (c) (i) is more than amount established in item 13.2.3 (c (ii), it shall result in a price variation to the Procuring Entity.

13.4 Variation Procedure for Value Engineering proposal

13.4.1 If the Architect requests a proposal, prior to instructing a Variation, the Contractor shall respond in writinga s soon as practicable, either by giving reasons why he cannot comply (if this is the case) or by submitting:

a) A description of the proposed work to be performed and a programme for its execution,
b) the Contractor's proposal for any necessary modifications to the programme according to Sub-Clause 8.3 [Programme] and to the Time for Completion, and
c) the Contractor's proposal for evaluation of the Variation.

13.4.2 The Architect shall, as soon as practicable after receiving such proposal (under Sub-Clause 13.2 [Value Project Engineering] or otherwise), respond with approval, disapproval or comments. The Contractor shall not delay any work whilst a waiting a response.

13.4.3 Each instruction to execute a Variation, with any requirements for the recording of Costs, shall be issued by the Architect to the Contractor, who shall acknowledge receipt.

13.4.4 Each Variation shall be evaluated in accordance with Clause 12 [Measurement and Evaluation], unless the Architect instructs or approves otherwise in accordance with this Clause.

13.5 Paymentin Applicable Currencies

If the Contract provides for payment of the Contract Price in more than one currency, then whenever an adjustment is agreed, approved or determined as stated above, the amount payable in each of the applicable currencies shall be specified. For this purpose, reference shall be made to the actual or expected currency proportions of the Cost of the varied work, and to the proportions of various currencies specified for payment of the Contract Price.

13.6 Provisional Sums

13.6.1 Each Provisional Sum shall only be used, in whole or inpart, in accordance with the Architect instructions, and the Contract Price shall be adjusted accordingly. The total sum paid to the Contractor shall include onlysuch amounts, for the work, supplies or services to which the Provisional Sum relates, as the Architect shall have instructed. For each Provisional Sum, the Architect May instruct:

a) Work to be executed (including Plant, Materialso r services to be supplied) by the Contractor and valued under Sub-Clause 13.3 [Variation Procedure]; and/or

b) Plant, Materials or services to be purchased by the Contractor, from a nominated Subcontractor (as defined in Clause 5 [Nominated Subcontractors]) or otherwise; and for which there shall be included in the Contract Price:

   i) The actual amounts paid (or due to be paid) by the Contractor, and

   ii) a sum for overhead charges and profit, calculated as a percentage of these actual amounts by applying the relevant percentage rate (if any) stated in the appropriate Schedule. If there is no such rate, the percentage rate stated in **the Special Conditions of Contract** shall be applied.

13.6.2 The Contractor shall, when required by the Engineer, produce quotations, invoices, vouchers and accounts or receipts in substantiation.

13.7 Dayworks

13.7.1 For work of a minor or incidental nature, the Architect may instruct that a Variation shall be executed on a daywork basis. The work shall then be valued in accordance with the Daywork Schedule included in the Contract, and the following procedure shall apply. If a Daywork Schedule is not included in the Contract, this Sub-Clause shall not apply.

13.7.2 Before ordering Goods for the work, the Contractor shall submit quotations to the Engineer. When applying for payment, the Contractor shall submit invoices, vouchers and accounts or receipts for any Goods.

13.7.3 Except for any items for which the Daywork Schedule specifies that payment is not due, the Contractor shall delive reach day to the Architect accurate statements induplicate which shall include the following details of the resources used in executing the previous day's work:

a) The names, occupations and time of Contractor's Personnel,
b) the identification, type and time of Contractor's Equipment and Temporary Works, and
c) the quantities and types of Plant and Materials used.

13.7.4 One copy of each statement will, if correct, or when agreed, be signed by the Architect and returned to the Contractor. The Contractor shall then submit priced statements of these resources to the

Engineer, prior to their inclusion in the next Statement under Sub-Clause 14.3 [Application for Interim Payment Certificates].

13.8 Adjustments for Changes in Legislation

13.8.1 The Contract Price shall be adjusted to take account of any increase or decrease in Cost resulting from a change in the Laws of Kenya (including the introduction of new Laws and the repeal or modification of existing Laws) or in the judicial or official governmental interpretation of such Laws, made after the Base Date, which affect the Contractor in the performance of obligations under the Contract.

13.8.2 If the Contractor suffers (or will suffer) delay and/or incurs (or will incur) additional Cost as a result of these changes in the Laws or in such interpretations, made after the Base Date, the Contractor shall give notice to the Architect and shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to:

a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [Extension of Time for Completion], and
b) payment of any such Cost, which shall be included in the Contract Price.

13.8.3 After receiving this notice, the Architect shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine these matters.

13.8.4 Not withstanding the foregoing, the Contractor shall not be entitled to an extension of time if the relevant delay has already been taken into account in the determination of a previous extension of time and such Cost shall not be separately paid if the same shall already have been taken into account in the indexing of any inputs to the table of adjustment data in accordance with the provisions of Sub-Clause 13.8 [Adjustments for Changes in Cost].

13.9 Adjustments for Changes in Cost

13.9.1 In this Sub-Clause, "table of adjustment data" means the completed table of adjustment data for local and foreign currencies included in the Schedules. If there is no such table of adjustment data, this Sub-Clause shall not apply.

13.9.2 If this Sub-Clause applies, the amounts payable to the Contractor shall be adjusted for rises or falls in the cost of labor, Goods and other inputs to the Works, by the addition or deduction of the amounts determined by the formulae prescribed in this Sub-Clause. To the extent that full compensation for any rise or fall in Costs is not covered by the provisions of this or other Clauses, the Accepted Contract Amount shall be deemed to have included a mounts to cover the contingency of other rises and falls in costs.

13.9.3 The adjustment to be applied to the amount otherwise payable to the Contractor, as valued in accordance with the appropriate Schedule and certified in Payment Certificates, shall be determined from formulae for each of the currencies in which the Contract Price is payable. No adjustment is to be applied to work valued on the basis of Cost or current prices. The formulae shall be of the following general type:

Price Adjustment Formula

Prices shall be adjusted for fluctuations in the cost of inputs only if **provided for in the SCC.** If so provided, the amounts certified in each payment certificate, before deducting for Advance Payment, shall be adjusted by applying the respective price adjustment factor to the payment amounts due in each currency. A separate formula of the type specified below applies:

P = A + B Im/Io

where:

P is the adjustment factor for the portion of the Contract Price payable.

A and **B** a recoefficients **specified in the SCC,** representing then on adjustable and adjustable portions, respectively, of the Contract Price payable and

I m is the index prevailing at the end of the month being invoiced and **Io**c is the index prevailing 30 days before Bid opening for inputs payable.

NOTE: The sum of the two coefficients A and B should be 1 (one) in the formula for each currency. Normally, both coefficients shall be the same in the formulae for all currencies, since coefficient A, for the non adjustable portion of the payments, is a very approximate figure (usually 0.15) to take account of fixed cost elements or other nonadjustable components. The sum of the adjustments for each currency are added to the Contract Price.

13.9.4 The cost indices or reference prices stated in the table of adjustment data shall be used. If their source is in doubt, itshall be determined by the Engineer. Forth is purpose, reference shall be made to the values of the indices at stated dates (quoted in the fourth and fifth columns respectively of the table) for the purposes of clarification of the source; although these dates (and thus these values) may not correspond to the base cost indices.

13.9.5 Incases where the "currency of index" is not the relevant currency of payment, each index shall be converted into the relevant currency of payment at the selling rate, established by the Central Bank of Kenya, of this relevant currency on the above date for which the index is required to be applicable.

13.9.6 Until such time as each current cost index is available, the Architect shall determine a provisional index for the issue of Interim Payment Certificates. When a current cost index is available, the adjustment shall be recalculated accordingly.

13.9.7 If the Contractor fails to complete the Works within the Time for Completion, adjustment of prices there after shall be made using either (i) each index or price applicableo n the date 49 days prior to the expiry of the Time for Completion of the Works, or (ii) the current index or price, whichever is more favorable to the Procuring Entity.

13.9.8 The weightings (coefficients) for each of the factors of cost stated in the table(s) of adjustment data shall only be adjusted if they have been rendered unreasonable, unbalanced or in applicable, as a result of Variations.

14. CONTRACT PRICE AND PAYMENT

14.1 The Contract Price

14.1.1 Unless otherwise stated in the Special Conditions:

a) The value of the payment certificate shall be agreed or determined under Sub-Clause 12.3 [Evaluation] and be subject to adjustments in accordance with the Contract;

b) the Contractor shall pay all taxes, duties and fees required to be paid by him under the Contract, and the Contract Price shall not be adjusted for any of these costs except as stated in Sub-Clause 13.7 [Adjustments for Changes in Legislation];

c) any quantities which may be set out in the Bill of Quantities or other Schedule are estimated quantities and are not to be taken as the actual and correct quantities:

i) of the Works which the Contractor is required to execute, or

ii) for the purposes of Clause12 [Measurement and Evaluation]; and

d) the Contractor shall submit to the Engineer, within 30 days after the Commencement Date, a proposed breakdown of each lump sum price in the Schedules. The Architect may take account of the break down when preparing Payment Certificates but shall not be bound by it.

14.1.2 Notwithstanding the provisions of subparagraph (b), Contractor's Equipment, including essential spare parts there for, imported by the Contractor for the sole purpose of executing the Contract shall not be exempt from the payment of import duties and taxes upon importation.

14.2 Advance Payment

14.2.1 The Procuring Entity shall make an advance payment, as an interest-free loan for mobilization and cashflow support, when the Contractor submits a guarantee in accordance with this Clause. The total advance payment, the number and timing of instalments (if more than one), and the applicable currencies and proportions, shall be as stated in the **Special Conditions of Contract.**

14.2.2 Unless and until the Procuring Entity receives this guarantee, or if the total advance payment is not stated in the Special Conditions of Contract, this Sub-Clause shall not apply.

14.2.3 The Architect shall deliver to the Procuring Entity and to the Contractor an Interim Payment Certificate for the advance payment or its first instalment after receiving a Statement (under Sub-Clause 14.3 [Application for Interim Payment Certificates]) and after the Procuring Entity receives (i) the Performance Security in accordance with Sub-Clause 4.2 [Performance Security] and (ii) a guarantee in amounts and currencies equal to the a dvance payment. This guarantee shall be issued by a reputable bank or financial institutions elected by the Contractor and shall be in the form annexed to the Special Conditions or in another form approved by the Procuring Entity.

14.2.4 The Contractor shall ensure that the guarantee is valid and enforceable until the advance payment has been repaid, but its amount shall be progressively reduced by the amount repaid by the Contractor as indicated in the Payment Certificates. If the terms of the guarantee specify its expiry date, and the advance payment has not been repaid by the date 30 days prior to the expiry date, the Contractor shall extend the validity of the guarantee until the advance payment has been repaid.

14.2.5 Unless stated otherwise in **the Special Conditions of Contract**, the advance payment shall be repaid through percentage deductions from the interim payments determined by the Architect in accordance with Sub-Clause 14.6 [Issue of Interim Payment Certificates], as follows:

a) Deductions shall commence in the next interim Payment Certificate following that in which the total of all certified interim payments (excluding the advance payment and deductions and repayments of retention) exceeds 30 percent (30%) of the Accepted Contract Amount less Provisional Sums; and

b) deductions shall be made at the amortization rate stated in the **Special Conditions of Contract** of the amount of each Interim Payment Certificate (excluding the advance payment and deductions for its repayments as well as deductions for retention money) in the currencies and proportions of the advance payment until such time as the advance payment has been repaid; provided that the advance payment shall be completely repaid prior to the time when 90 percent (90%) of the Accepted Contract Amount less Provisional Sums has been certified for payment.

14.2.6 If the advance payment has not been repaid prior to the issue of the Taking-Over Certificate for the Works or prior to termination under Clause 15 [Termination by Procuring Entity], Clause 16 [Suspension and Termination by Contractor] or Clause 19 [Force Majeure] (as thec ase may be), the whole of the balance then outstanding shall immediately become due and in case of termination

under Clause 15 [Termination by Procuring Entity], except for Sub-Clause 14.2.7 [Procuring Entity's Entitlement to Termination for Convenience], payable by the Contractor to the Procuring Entity.

14.3 Application for Interim Payment Certificates

14.3.1 The Contractor shall submit a Statement (in number of copies indicated in the **Special Conditions of Contract**) to the Architect after the end of each month, in aform approved by the Engineer, showing in detail the amounts to which the Contractor considers itself to be entitled, together with supporting documents which shall include there porton the progress during this month in accordance with Sub-Clause4.21 [Progress Reports].

14.3.2 The Statement shall include the following items, as applicable, which shall be expressed in the various currencies in which the Contract Price is payable, in the sequence listed:

a) the estimated contract value of the Works executed and the Contractor's Documents produced up to the end of the month (including Variations but excluding items described in sub-paragraphs (b) to (g) below);

b) any amounts to be added and deducted for changes in legislation and changes in cost, in accordance with Sub-Clause 13.7 [Adjustments for Changes in Legislation] and Sub-Clause 13.8 [Adjustments for Changes in Cost];

c) any amount to be deducted for retention, calculated by applying the percentage of retention stated in **the Special Conditions of Contract** to the total of the above amounts, until the amount so retained by the Procuring Entity reaches the limit of Retention Money (if any) stated **in the Special Conditions of Contract**;

d) any amounts to be added for the advance payment and (if more than one instalment) and to be deducted for its repayments in accordance with Sub-Clause 14.2 [Advance Payment];

e) any amounts to be added and deducted for Plant and Materials in accordance with Sub-Clause 14.5 [Plant and Materials intended for the Works];

f) any other additions or deductions which may have become due under the Contractor otherwise, including those under Clause 20 [Claims, Disputes and Arbitration]; and

g) the deduction of amounts certified in all previous Payment Certificates.

14.4 Schedule of Payments

14.4.1 I fthe Contract includes a schedule of payments specifying the instalments in which the Contract Price will be paid, then unless otherwise stated in this schedule:

a) The instalments quoted in this schedule of payments shall be the estimated contract values for the purposes of sub-paragraph (a) of Sub-Clause 14.3 [Application for Interim Payment Certificates];

b) Sub-Clause 14.5 [Plant and Materials intended for the Works] shall not apply; and

c) If these instalments are not defined by reference to the actual progress achieved in executing the Works, and if actual progress is found to be less or more than that on which this schedule of payments was based, then the Architect may proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine revised instalments, which shall take account of the extent to which progress is less or more than that on which the instalments were previously based.

14.4.2 If the Contract does not include a schedule of payments, the Contractor shall submit non-binding estimates of the payments which he expects to become due during each quarterly period. The first estimate shall be submitted within 42 days after the Commencement Date. Revised estimates shall be submitted at quarterly intervals, until the Taking-Over Certificate has been issued for the Works.

14.5 Plant and Materials intended for the Works

14.5.1 If this Sub-Clause applies, Interim Payment Certificates shall include, under sub-paragraph (e) of Sub-Clause 14.3, (i) an amount for Plant and Materials which have been sent to the Site for incorporation in the Permanent Works, and (ii) a reduction when the contract value of such Plant

and Materials is included as part of the Permanent Works under sub-paragraph (a) of Sub-Clause 14.3 [Application for Interim Payment Certificates].

14.5.2 If the lists referred to in sub-paragraphs (b)(i) or (c)(i) below are not included in the Schedules, this Sub-Clause shall not apply.

14.5.3 The Architect shall determine and certify each addition if the following conditions a resatisfied:

a) The Contractor has:
   i) kept satisfactory records (including the orders, receipts, Costs and use of Plant and Materials) which are available for inspection, and
   (ii) submitted statement of the Cost of acquiring and delivering the Plant and Materials to the Site, supported by satisfactory evidence;

   and either:

b) the relevant Plant and Materials:
   i) are those listed in the Schedules for payment when shipped,
   ii) have been shipped to Kenya, enroute to the Site, in accordance with the Contract; and
   iii) are described in a clean shipped bill of lading or other evidence of shipment, which has been submitted to the Architect together with evidence of payment of freight and insurance, any other documents reasonably required, and a bank guarantee in a form and issued by an entity approved by the Procuring Entity in amounts and currencies equal to the amount due under this Sub-Clause: this guarantee may be in a similar form to the form referred to in Sub-Clause14.2 [Advance Payment] and shall be valid until the Plant and Materials are properly stored on Site and protected against loss, damage or deterioration; or

c) the relevant Plant and Materials:
   i) are those listed in the Schedules for payment when delivered to the Site, and
   ii) have been delivered to and are properly stored on the Site, are protected against loss, damage or deterioration and appear to be in accordance with the Contract.

14.5.4 The additional amount to be certified shall be the equivalent of eighty percent (80%) of the Architect determination of the cost of the Plant and Materials (including delivery to Site), taking account of the documents mentioned in this Sub-Clause and of the contract value of the Plant and Materials.

14.5.5 The currencies for this additional amount shall be the same as those in which payment will become due when the contract value is included under sub-paragraph (a) of Sub-Clause 14.3 [Application for Interim Payment Certificates]. At that time, the Payment Certificate shall include the applicable reduction which shall be equivalent to, and in the same currencies and proportions as, this additional amount for the relevant Plant and Materials.

14.6 Issue of Interim Payment Certificates

14.6.1 No amount will be certified or paid until the Procuring Entity has received and approved the Performance Security. Thereafter, the Architect shall, within 30 days after receiving a Statement and supporting documents, deliver to the Procuring Entity and to the Contractor an Interim Payment Certificate which shall state the amount which the Architect fairly determines to be due, with all supporting particulars for any reduction or withholding made by the Architect on the Statemen tif any.

14.6.2 However, prior to issuing the Taking-Over Certificate for the Works, the Architect shall not be bound to issue an Interim Payment Certificate in an amount which would (after retention and other deductions) be less than the minimum amount of Interim Payment Certificates (if any) stated **in the Special Conditions of Contract**. In this event, the Architect shall give notice to the Contractor accordingly.

14.6.3 An Interim Payment Certificate shall not be withheld for any other reason, although:

a) if anything supplied or work done by the Contractor is not in accordance with the Contract, the cost of rectification or replacement may be withheld until rectification or replacement has been completed; and/or

b) if the Contractor was or is failing to perform any work or obligation in accordance with the Contract, and had been so notified by the Engineer, the value of this work or obligation may be withheld until the work or obligation has been performed.

4.6.4 The Architect may in any Payment Certificate make any correction or modification that should properly be made to any previous Payment Certificate. A Payment Certificate shall not be deemed to indicate the Architect acceptance, approval, consent or satisfaction.

14.7 Payment

14.7.1 The Procuring Entity shall pay to the Contractor:

a) The advance payment shall be paid within 60 days after signing of the contract by both parties or within 60 days after receiving the documents in accordance with Sub-Clause 4.2 [Performance Security] and Sub- Clause 14.2 [Advance Payment], which ever is later;

b) The amount certified in each Interim Payment Certificate within 60 days after the Architect Issues Interim Payment Certificate; and

c) the amount certified in the Final Payment Certificate within 60 days after the Procuring Entity Issues Interim Payment Certificate; or after determination of any disputed amount shown in the Final Statement in accordance with Sub-Clause 16.2 [Terminationby Contractor].

14.7.2 Payment of the amount due in each currency shall be made into the bank account, nominated by the Contractor, in the payment country (forth is currency) specified in the Contract.

14.8 Delayed Payment

14.8.1 If the Contractor does not receive payment in accordance with Sub-Clause 14.7 [Payment], the Contractor shall be entitled to receive financing charges (simple interest) monthly on the amount unpaid during the period of delay. This period shall be deemed to commence on the date for payment specified in Sub-Clause 14.7 [Payment], irrespective (in the case of its sub-paragraph (b) of the date on which any Interim Payment Certificate isissued.

14.8.2 These financing charges shall be calculated at the annual rate of three percentage points above the mean rate of the Central Bank in Kenya of the currency of payment, or if not available, the inter bank offered rate, and shall be paid in such currency.

14.8.3 The Contractor shall be entitled to this payment without formal notice and certification, and without prejudice to any other right or remedy.

14.9 Payment of Retention Money

14.9.1 When the Taking-Over Certificate has been issued for the Works, the first half of the Retention Money shall be certified by the Architect for payment to the Contractor. If a Taking-Over Certificate is issued for a Section or part of the Works, a proportion of the Retention Money shall be certified and paid. This proportion shall behalf (50%) of the proportion calculated by dividing the estimated contract value of the Section or part, by the estimated final Contract Price.

14.9.2 Promptly after the latest of the expiry dates of the Defects Liability Periods, the outstanding balance of the Retention Money shall be certified by the Architect for payment to the Contractor. If a Taking-Over Certificate was issued for a Section, a proportion of the second half of the Retention Money shall be certified and paid promptly after the expiry date of the Defects Notification Period for the Section. This proportion shall behalf (50%) of the proportion calculated by dividing the estimated contract value of the Section by the estimated final Contract Price.

14.9.3 However, if any work remains to be executed under Clause 11 [Defects Liability], the Architects hall be entitled to withhold certification of the estimated cost of this work until it has been executed.

14.9.4 When calculating these proportions, no account shall be taken of any adjustments under Sub-Clause 13.7 [Adjustments for Changes in Legislation] and Sub-Clause13.8 [Adjustments for Changes in Cost].

14.9.5 Unless otherwise stated in the Special Conditions, when the Taking-Over Certificate has been issued for the Works and the first half of the Retention Money has been certified for payment by the Engineer, the Contractor shall be entitled to substitute a Retention Money Security guarantee, in the form annexed to the Special Conditions or in another form approved by the Procuring Entity and issued by a reputable bank or financial institution selected by the Contractor, for the second half of the Retention Money.

14.9.6 The Procuring Entity shall return the Retention Money Security guarantee to the Contractor within 14 days after receiving a copy of the Completion Certificate.

14.10 Statement at Completion

14.10.1 Within 84 days after receiving the Taking-Over Certificate for the Works, the Contractor shall submit to the Architect three copies of a Statement at completion with supporting documents, in accordance with Sub- Clause 14.3 [Application for Interim Payment Certificates], showing:

a) the value of all work done in accordance with the Contract up to the date stated in the Taking-Over Certificate for the Works,
b) any further sums which the Contractor considers to be due, and
c) an estimate of any other amounts which the Contractor considers will become due to him under the Contract. Estimated amounts shall be shown separately in this Statement at completion.

14.10.2 The Architect shall then certify in accordance with Sub-Clause 14.6 [Issue of Interim Payment Certificates].

14.11 Application for Final Payment Certificate

14.11.1 Within 60 days after receiving the Completion Certificate, the Contractor shall submit, to the Engineer, six copies of a draft final statement with supporting documents showing in detail in a form approved by the Engineer:

a) The value of all work done in accordance with the Contract, and
b) Any further sums which the Contractor considers to be due to him under the Contractor otherwise.

14.11.2 If the Architect disagrees with or cannot verify any part of the draft final statement, the Contractor shall submit such further information as the Architect may reasonably require within 30 days from receipt of said draft and shall make such changes in the draft as may be agreed between them. The Contractor shall then prepare and submit to the Architect the final statement as agreed. This agreed statement is referred to in these Conditions as the “Final Statement”.

14.11.3 However, if, following discussions between the Architect and the Contractor and any changes to the draft final statement which are agreed, it be comes evident that a dispute exists, the Architect shall deliver to the Procuring Entity (with a copy to the Contractor) an Interim Payment Certificate for the agreed parts of the draft final statement. Thereafter, if the dispute is finally resolved under Sub-Clause 20.4 [Obtaining Dispute Board's Decision] or Sub-Clause 20.5 [Amicable Settlement], the Contractor shall then prepare and submit to the Procuring Entity (with a copy to the Engineer) a Final Statement.

14.12 Discharge

When submitting the Final Statement, the Contractor shall submit a discharge which confirms that the total of the Final Statement represents full and final settlement of all moneys due to the Contractor under or in connection with the Contract. This discharge may state that it becomes effective when the Contractor has received the Performance Security and the out standing balance of this total, in which event the discharge shall be effective on such date.

14.13 Issue of Final Payment Certificate

14.13.1 Within 30days after receiving the Final Statement and discharge in accordance with Sub-Clause 14.11 [Application for Final Payment Certificate] and Sub-Clause 14.12 [Discharge], the Architect shall deliver, to the Procuring Entity and to the Contractor, the Final Payment Certificate which shall state:

a) The amount which he fairly determines is finally due, and
b) After giving credit to the Procuring Entity for all amounts previously paid by the Procuring Entity and for all sums to which the Procuring Entity is entitled, the balance (if any) due from the Procuring Entity to the Contractor or from the Contractor to the Procuring Entity, as the case may be.

14.13.2 If the Contractor has not applied for a Final Payment Certificate in accordance with Sub-Clause 14.11 [Application for Final Payment Certificate] and Sub-Clause 14.12 [Discharge], the Architect shall request theContractor to do so. If the Contractor fails to submit an application within a period of 30 days, the Architect shall issue the Final Payment Certificate for such amount as he fairly determines to be due.

14.14 Cessation of Procuring Entity's Liability

14.14.1 The Procuring Entity shall not be liable to the Contractor for any matter or thing under or in connection with the Contract or execution of the Works, except to the extent that the Contractor shall have included an amount expressly for it:

a) in the Final Statement and also,
b) (except for matters or things arising after the issue of the Taking-Over Certificate for the Works) in the Statement at completion described in Sub-Clause 14.10 [Statement at Completion].

14.14.2 However, this Sub-Clause shall not limit the Procuring Entity's liability under his in demnification obligations, or the Procuring Entity's liability in any case of fraud, deliberate default or reckless misconduct by the Procuring Entity.

14.15 Currencies of Payment

The Contract Price shall be paid in the currency or currencies named in the Schedule of Payment Currencies. If more than one currency is so named, payments shall be made as follows:

a) If the Accepted Contract Amount was expressed in Local Currency only:
   i) the proportions or amounts of the Local and Foreign Currencies, and the fixed rates of exchange to be used for calculating the payments, shall be as stated in the Schedule of Payment Currencies, except as otherwise agreed by both Parties;
   ii) payments and deductions under Sub-Clause 13.5 [Provisional Sums] and Sub-Clause 13.7 [Adjustments for Changes in Legislation] shall be made in the applicable currencies and proportions; and
   iii) otherpaymentsanddeductions under sub-paragraphs (a) to (d) of Sub-Clause 14.3 [Application for Interim Payment Certificates] shall be made in the currencies and proportions specified in sub- paragraph (a) (i) above;
b) payment of the damages specified in the Special Conditions of Contract, shall be made in the

currencies and proportions specified in the Schedule of Payment Currencies;

c) other payments to the Procuring Entity by the Contractor shall be made in the currency in which the sum was expended by the Procuring Entity, or in such currency as may be agreed by both Parties;

d) if any amount payable by the Contractor to the Procuring Entity in a particular currency exceeds the sum payable by the Procuring Entity to the Contractor in that currency, the Procuring Entity may recover the balance of this amount from the sums otherwise payable to the Contractor in other currencies; and

e) if no rates of exchange are stated in the Schedule of Payment Currencies, they shall be those prevailing on the Base Date and determined by the Central Bank of Kenya.

15. TERMINATION BY PROCURING ENTITY

15.1 Notice to correct any defects or failures

If the Contractor fails to carry out any obligation under the Contract, the Architect may by notice require the Contractor to make good the failure and to remedy it within 30 days.

15.2 Termination by Procuring Entity

15.2.1 The Procuring Entity shall be entitled to terminate the Contract if the Contractor breaches the contract based on following circumstances which shall include but not limited to:

a) fails to comply with Sub-Clause 4.2 [Performance Security] or with a notice under Sub-Clause 15.1 [Notice to Correct],

b) abandons the Works or otherwise plainly demonstrates the intention not to continue performance of his obligations under the Contract,

c) without reasonable excuse fails:

   i) to proceed with the Works in accordance with Clause 8 [Commencement, Delays and Suspension], or

   ii) to comply with a notice issued under Sub-Clause 7.5 [Rejection] or Sub-Clause 7.6 [Remedial Work], within 30 days after receiving it,

d) subcontracts the major part or whole of the Works or assigns the Contract without the consent of the Procuring Entity,

e) becomes bankrupt or insolvent, goes into liquidation, has a receiving or administration order made against him, compounds with his creditors, or carries on business under a receiver, trustee or manager for the benefit of his creditors, or if any act is done or event occurs which (under applicable Laws) has a similar effect to any of theseacts or events, or

f) gives or offers to give (directly or indirectly) to any person any bribe, gift, gratuity, commission or other thing of value, as an induce mentor reward:

i) for doing or for bearing to do any action in relation to the Contract, or

ii) for showing or for bearing to show favor or disfavor to any person in relation to the Contract, or

iii) if any of the Contractor's Personnel, agents or Subcontractors gives or offers to give (directly or indirectly) to any person any such induce mentor reward as is described in this sub-paragraph (f). However, lawful inducements and rewards to Contractor's Personnel shall not entitle termination, or

g) If the contract or repeatedly fails to remedy delivers defective work,

h) based on reasonable evidence, has engaged in Fraud and Corruption as defined in paragraph 2.2 of the Appendix B to these General Conditions, incompeting for or in executing the Contract.

15.2.2 In any of these events or circumstances, the Procuring Entity may, upon giving 14 days' notice to the Contractor, terminate the Contract and expel the Contractor from the Site. However, in the case of sub- paragraph (e) or (f) or (g) or (h), the Procuring Entity may by notice terminate the Contract immediately.

15.2.3 The Procuring Entity's election to terminate the Contract shall not prejudice any other rights of the Procuring Entity, under the Contractor otherwise.

15.2.4 The Contractor shall then leave the Site and deliver any required Goods, all Contractor's Documents, and other design documents made by or for him, to the Engineer. However, the Contractor shall use his best efforts to comply immediately with any reasonable instructions included in the notice (i) for the assignment of any subcontract, and (ii) for the protection of life or property or for the safety of the Works.

15.2.5 After termination, the Procuring Entity may complete the Works and/ or arrange for any other entities to do so. The Procuring Entity and these entities may then use any Goods, Contractor's Documents and other design documents made by or on behalf of the Contractor.

15.2.6 The Procuring Entity shall then give notice that the Contractor's Equipment and Temporary Works will be released to the Contractor at or near the Site. The Contractor shall promptly arrange their removal, at the risk and cost of the Contractor. However, if by this time the Contractor has failed to make a payment due to the Procuring Entity, these items may be sold by the Procuring Entity in order to recover this payment. Any balance of the proceeds shall then be paid to the Contractor.

15.3 Valuation at Date of Termination

Assoon as practicable after a notice of termination under Sub-Clause 15.2 [Termination by Procuring Entity] has taken effect, the Architect shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine the value of the Works, Goods and Contractor's Documents, and any other sums due to the Contractor for work executed in accordance with the Contract.

15.4 Payment after Termination

After a notice of termination under Sub-Clause 15.2 [Termination by Procuring Entity] has taken effect, the Procuring Entity may:

a) Proceed in accordance with Sub-Clause 2.5 [Procurin Entity's Claims],
b) withhold further payments to the Contractor until the costs of execution, completion and remedying of any defects, damages for delay in completion (if any), and all other costs incurred by the Procuring Entity, have been established, and/ or

c) recover from the Contractor any losses and damages incurred by the Procuring Entity and any extra costs of completing the Works, after allowing for any sum due to the Contractor under Sub-Clause 15.3 [Valuation at Date of Termination]. After recovering any such losses, damages and extra costs, the Procuring Entity shall pay any balance to the Contractor.

15.5 Procuring Entity's Entitlement to Termination for Convenience

The Procuring Entity shall be entitled to terminate the Contract, at any time at the Procuring Entity's convenience, by giving notice of such termination to the Contractor. The termination shall take effect 30 days after the later of the dates on which the Contractor receives this notice or the Procuring Entity returns the Performance Security. The Procuring Entity shall not terminate the Contract under this Sub-Clausein order to execute the Works itself or to arrange for the Works to be executed by another contractor or to avoid a termination of the Contract by the Contractor under Clause 16.2 [Termination by Contractor]. After this termination, the Contractor shall proceed in accordance with Sub-Clause 16.3 [Cessation of Work and Removal of Contractor's Equipment] and shall be paid in accordance with Sub-Clause 16.4 [Payment on Termination].

15.6 Fraud and Corruption

The Contractor shall ensure compliance with the Kenya Government's Anti-Corruption Laws and its prevailing sanctions.

15.7 Corrupt gifts and payments of commission

15.7.1 The Contractor shall not;

a) Offer or give or agree to give to any person in the service of the Procuring Entity any gift or consideration of any kind as an inducement or reward for doing or for bearing to door for having done or for borne to do any act in relation to the obtaining or execution of this or any

other Contract for the Procuring Entity or for showing or for bearing to show favor or disfavor to any person in relation to this or any other contract for the Procuring Entity.

b) Enter into this or any other contract with the Procuring Entity 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 there of have been disclosed in writing to the Procuring Entity.

15.7.2 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 and Asset Disposal Act (2015) and the Anti-Corruption and Economic Crimes Act (2003) of the Laws of Kenya.

16. SUSPENSION AND TERMINATION BY CONTRACTOR

16.1 Contractor's Entitlement to Suspend Work

16.1.1 If the Architect fails to certify in accordance with Sub-Clause 14.6 [Issue of Interim Payment Certificates] or Sub-Clause 14.7 [Payment],or not receiving instructions that would enable the contractor to proceed with the works in accordance with the program, the Contractor may, after giving not less than 30 days' notice to the Procuring Entity, suspend work (or reduce the rate of work) unless and until the Contractor has received the Payment Certificate, reasonable evidence or payment, as the case may bea nd as described in the notice.

16.1.2 The Contractor's action shall not prejudice his entitlements to financing charges under Sub-Clause 14.8 [Delayed Payment] and to termination under Sub-Clause 16.2 [Terminationby Contractor].

16.1.3 If the Contractor subsequently receives such Payment Certificate, evidence or payment (as described in the relevant Sub-Clause and in the above notice) before giving a notice of termination, the Contractor shall resume normal working as soon as is reasonably practicable.

16.1.4 If the Contractor suffers delay and/ori ncurs Cost as a result of suspending work (or reducing the rate of work) in accordance with this Sub-Clause, the Contractor shall give notice to the Architect and shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to:

a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [Extension of Time for Completion], and
b) payment of any such Cost-plus profit, which shall be included in the Contract Price.

16.2 After receiving this notice, the Architect shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine these matters.

16.3 Termination by Contractor

16.3.1 The Contractor shall be entitled to terminate the Contract if:

a) the Architect fails, within 60 days after receiving a Statement and supporting documents, to issue the relevant Payment Certificate,
b) the Contractor does not receive the amount due under an Interim Payment Certificate within 90 days after the expiry of the time stated in Sub-Clause1 4.7 [Payment] within which payment is to be made (except for deductions in accordance with Sub-Clause 2.5 [Procuring Entity's Claims]),
c) the Procuring Entity substantially fails to perform his obligations under the Contract in such manner as to materially and adversely affect the economic balance of the Contract and/or the ability of the Contractor to perform the Contract,
d) a prolonged suspension affects the whole of the Works as described in Sub-Clause 8.11 [Prolonged Suspension], or
e) the Procuring Entity becomes bankrupt or insolvent, goes into liquidation, has a receiving or administration order made against him, compounds with his creditors, or carries on business under a receiver, trustee or manager for the benefit of his creditors, or if any act is done or

event occurs which (under applicable Laws) has a similar effect to any of these acts or events.

f) the Contractor does not receive the Architect instruction recording the agreement of both Parties on the fulfilment of the conditions for the Commencement of Works under Sub-Clause 8.1 [Commencement of Works].

16.3.2 In any of these events or circumstances, the Contractor may, upon giving 14 days' notice to the Procuring Entity, terminate the Contract. However, in the case of sub-paragraph (f) or (g), the Contractor may by notice terminate the Contract immediately.

16.3.3 The Contractor's election to terminate the Contract shall not prejudice any other rights of the Contractor, under the Contractor otherwise.

16.4 Cessation of Work and Removal of Contractor's Equipment

After a notice of termination under Sub-Clause 15.5 [Procuring Entity's Entitlement to Termination for Convenience], Sub-Clause 16.2 [Termination by Contractor] or Sub-Clause 19.6 [Optional Termination, Payment and Release] has taken effect, the Contractor shall promptly:

a) cease all further work, except for such work as may have been instructed by the Architect for the protection of life or property or for the safety of the Works,
b) hand over Contractor's Documents, Plant, Materials and other work, for which the Contractor has received payment, and
c) remove all other Goods from the Site, except as necessary for safety, and leave the Site.

16.5 PaymentonTermination

After a notice of termination under Sub-Clause 16.2 [Termination by Contractor] has taken effect, the Procuring Entity shall promptly:

a) Return the Performance Security to the Contractor,
b) pay the Contractor in accordance with Sub-Clause 19.6 [Optional Termination, Payment and Release], and
c) pay to the Contractor the amount of any loss or damage sustained by the Contractor as a result of this termination.

17. RISK AND RESPONSIBILITY

17.1 Indemnities

17.1.1 The Contractor shall indemnify and hold harmless the Procuring Entity, the Procuring Entity's Personnel, and their respective agents, against and from all claims, damages, losses and expenses (including legal fees and expenses) in respect of:

a) Bodily injury, sickness, disease or death, of any person what so ever arising outo for in the course of or by reason of the Contractor's design (if any), the execution and completion of the Works and the remedying of any defects, unless attributable to any negligence, willful actor breach of the Contract by the Procuring Entity, the Procuring Entity's Personnel, or any of their respective agents, and
b) damage to or loss of any property, real or personal (other than the Works), to the extent that such damage or loss arises out of or in the course of or by reason of the Contractor's design (if any), the execution and completion of the Works and the remedying of any defects, unless and to the extent that any such damage or loss is attributable to any negligence, willful act or breach of the Contract by the Procuring Entity, the Procuring Entity's Personnel, their respective agents, or anyone directly or indirectly employed by any of them.

17.1.2 The Procuring Entity shall indemnify and hold harmless the Contractor, the Contractor's Personnel, and their respective agents, against and from all claims, damages, losses and expenses (including legal fees and expenses) in respect of (1) bodily injury, sickness, disease or death, which is attributable to any negligence, willful act or breach of the Contract by the Procuring Entity, the Procuring Entity's Personnel, or any of their respective agents, and (2) the matters for which liability may be excluded from insurance cover, as described in sub-paragraphs (d)(i), (ii) and (iii) of Sub-Clause 18.3 [Insurance Against Injury to Persons and Damage to Property], unless and to the extent that any such damage or loss is attributable to any negligence, willful actor breach of the

Contract by the contractor, the contractor's Personnel, their respective agents, or anyone directly or indirectly employed by any of them.

17.2 Contractor's Care of the Works

17.2.1 The Contractor shall take full responsibility for the care of the Works and Goods from the Commencement Date until the Taking-Over Certificate is issued (or is deemed to be issued under Sub-Clause 10.1 [Taking Over of the Works and Sections]) for the Works, when responsibility for the care of the Works shall pass to the Procuring Entity. If a Taking-Over Certificate is issued (or is so deemed to be issued) for any Section or part of the Works, responsibility for the care of the Section or part shall then pass to the Procuring Entity.

17.2.2 After responsibility has accordingly passed to the Procuring Entity, the Contractor shall take responsibility for the care of any work which is outstanding on the date stated in a Taking-Over Certificate, until this outstanding work has been completed.

17.2.3 If any loss or damage happens to the Works, Goods or Contractor's Documents during the period when the Contractorisresponsiblefor their care, from any cause not listed in Sub-Clause 17.3 [Procuring Entity's Risks], the Contractor shall rectify the loss or damage at the Contractor's risk and cost, so that the Works, Goods and Contractor's Documents conform with the Contract.

17.2.4 The Contractor shall be liable for any loss or damage caused by any actions performed by the Contractor after a Taking-Over Certificate has been issued. The Contractor shall also be liable for any loss or damage which occurs after a Taking-Over Certificate has been issued and which arose from a previous event for which the Contractor was liable.

17.3 Procuring Entity's Risks

The risks referred to in Sub-Clause 17.4 [Consequences of Procuring Entity's Risks] below, in so far as they directly affect the execution of the Works in Kenya, are:

a) War hostilities (whether war be declared or not),
b) rebellion, riot, commotion or disorder, terrorism, sabotage by persons other than the Contractor's Personnel,
c) explosive materials, ionizing gradiation or contamination by radio-activity, except as may be attributable to the Contractor's use of such explosives, radiation or radio-activity,
d) pressure waves caused by aircraft or other aerial devices traveling at sonic or supersonic speeds,
e) use or occupation by the Procuring Entity of any part of the Permanent Works, except as may be specified in the Contract,
f) design of any part of the Works by the Procuring Entity's Personnel or by others for whom the Procuring Entity is responsible, and
g) any operation of the forces of nature which is Unforeseeable or against which an experienced contractor could not reasonably have been expected to have taken adequate preventive precautions.

17.4 Consequences of Procuring Entity's Risks

17.4.1 If and to the extent that any of the risks listed in Sub-Clause 17.3 above results in loss or damage to the Works, Goods or Contractor's Documents, the Contractor shall promptly give notice to the Architect and shall rectify this loss or damage to the extent required by the Engineer.

17.4.2 If the Contractor suffers delay and/ or incurs Cost from rectifying this loss or damage, the Contractor shall give a further notice to the Architect and shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to:

(a) An extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [Extension of TimeforCompletion], and
(b) paymentofany such Cost, which shall be included in the Contract Price. In the case of sub-paragraphs (e)and

(g) of Sub-Clause 17.3 [Procuring Entity's Risks], Accrued Costs shall be payable.

17.4.3 After receiving this further notice, the Architect shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine these matters.

17.5 Intellectual and Industrial Property Rights

17.5.1 In this Sub-Clause, "infringement" shall refer to an infringement (or alleged infringement) of any patent, registered design, copyright, trade mark, trade name, trade secret or other intellectual or industrial property right relating to the Works; and "claim" shall refer to a claim (or proceedings pursuing a claim) alleging an infringement.

17.5.2 Whenever a Party does not give notice to the other Party of any claim within 30 days of receiving the claim, the first Party shall be deemed to have waived any right to indemnity under this Sub-Clause.

17.5.3 The Procuring Entity shall indemnify and hold the Contractor harmless against and from any claim alleging an infringement which is or was:

a) An un avoidable result of the Contractor's compliance with the Contract, or
b) A result of any Works be ingused by the Procuring Entity:
   i) for a purpose other than that indicated by, or reasonably to be inferred from, the Contract, or
   ii) in conjunction with anything not supplied by the Contractor, unless such use was disclosed to the Contractor prior to the Base Date or is stated in the Contract.

17.5.4 The Contractor shall indemnify and hold the Procuring Entity harmless again stand from any other claim which arises out of or in relation to (i) the manufacture, use, sale or import of any Goods, or (ii) any design for which the Contractor is responsible.

17.5.5 IfaPartyisentitledtobeindemnified under this Sub-Clause, the indemnifying Party may (at its cost) conduct negotiations for the settlement of the claim, and any litigation or arbitration which may arise from it. The other Party shall, at the request and cost of the indemnifying Party, assist in contesting the claim. This other Party (and its Personnel) shall not make any admission which might be prejudicial to the indemnifying Party, unless the indemnifying Party failed to take over the conduct of any negotiations, litigation or arbitration upon being requested to do so by such other Party.

17.5.6 For operation and maintenance of any plan to requipment installed, the contractor shall grant a non-exclusive and non-transferable license to the Procuring Entity under the patent, utility models ,or other intellectual rights owned by the contractor or a third party from whom the contract or has received the rights to grant sub-licenses and shall also grant to the Procuring Entity a non-exclusive and non-transferable rights (without the rights to sub-license) to use the know how and other technical information disclosed to the contract or under the contract. Nothing contained here-in shall be construed as transferring ownership of any patent, utility model, trademark, design, copy right, know-how or other intellectual rights from the contractor or any other third party to the Procuring Entity.

17.6 Limitation of Liability

17.6.1 Neither Party shall be liable to the other Party for loss of use of anyW orks, loss of profit, loss of any contractor for any in director consequential loss or damage which may be suffered by the other Party in connection with the Contract, other than as specifically provided in Sub-Clause 8.7 [Delay Damages]; Sub-Clause 11.2 [Cost of Remedying Defects]; Sub-Clause 15.4 [Payment after Termination]; Sub-Clause 16.4 [Payment on Termination]; Sub-Clause 17.1 [Indemnities]; Sub-Clause 17.4(b) [Consequences of Procuring Entity's Risks] and Sub-Clause 17.5 [Intellectual and Industrial Property Rights].

17.6.2 The total liability of the Contractor to the Procuring Entity, under or in connection with the Contract other than under Sub-Clause 4.19 [Electricity, Water and Gas], Sub-Clause 4.20 [Procuring Entity's Equipment and Free- Issue Materials], Sub-Clause 17.1 [Indemnities] and Sub-Clause 17.5 [Intellectual and Industrial Property Rights], shall not exceed the sum resulting from the

application of a multiplier (less or greater than one) to the Accepted Contract Amount, as stated in **the Special Conditions of Contract**, or (if such multiplier or other sum is not so stated) the Accepted Contract Amount.

17.6.3 This Sub-Clause shall not limit liability in any case of fraud, deliberate default or reckless misconduct by the defaulting Party.

17.7 Use of Procuring Entity's Accommodation/Facilities

17.7.1 The Contractor shall take full responsibility for the care of the Procuring Entity provided accommodation and facilities, if any, as detailed in the Specification, from the respective dates of hand-over to the Contractor until cessation of occupation (where hand-over or cessation of occupation may take place after the date stated in the Taking-Over Certificate for the Works).

17.7.2 If any loss or damage happens to any of the above items while the Contractor is responsible for their care arising from any cause whatsoever other than those for which the Procuring Entity is liable, the Contractor shall, at his own cost, rectify the loss or damage to the satisfaction of the Engineer.

18. INSURANCE

18.1 General Requirements for Insurances

18.1.1 In this Clause, "insuring Party" means, for each type of insurance, the Party responsible for effecting and maintaining the insurance specified in the relevant Sub-Clause.

18.1.2 Wherever the Contractor is the insuring Party, each insurance shall be effected with insurers and in terms approved by the Procuring Entity. These terms shall be consistent with any terms agreed by both Parties before the date of the Letter of Acceptance. This agreement of terms shall take precedence over the provisions of this Clause.

18.1.3 Wherever the Procuring Entity is the insuring Party, each insurance shall be effected with insurers and in terms acceptable to the Contractor. These terms shall be consistent with any terms agreed by both Parties before the date of the Letter of Acceptance. This agreement of terms shall take precedence over the provisions of this Clause.

18.1.4 If a policy is required to indemnify joint insured, the cover shall apply separately to each insured as though a separate policy had been issued for each of the joint insured. If a policy indemnifies additional joint insured, namely in addition to the insured specified in this Clause, (i) the Contractor shall act under the policy on behalf of these additional joint insured except that the Procuring Entity shall act for Procuring Entity's Personnel, (ii) additional joint insured shall not be entitled to receive payments directly from the insurer or to have any other direct dealings with the insurer, and (iii) the insuring Party shall require all additional joint insured to comply with the conditions stipulated in the policy.

18.1.5 Each policy insuring against loss or damage shall provide for payments to be made in the currencies required to rectify the loss or damage. Payments received from insurers shall be used for the rectification of the loss or damage.

18.1.6 The relevant insuring Party shall, within the respective periods stated in **the Special Conditions of Contract** (calculated from the Commencement Date), submit to the other Party:

a) Evidence that the insurances described in this Clause have been affected, and
b) copies of the policies for the insurances described in Sub-Clause 18.2 [Insurance for Works and Contractor's Equipment] and Sub-Clause 18.3 [Insurance against Injury to Persons and Damage to Property].

18.1.7 When each premium is paid, the insuring Party shall submit evidence of payment to the other Party. Whenever evidence or policies are submitted, the insuring Party shall also give notice to the Engineer.

18.1.8 Each Party shall comply with the conditions stipulated in each of the insurance policies. The insuring Party shall keep the insurers informed of any relevant changes to the execution of the Works and ensure that insurance is maintained in accordance with this Clause.

18.1.9 Neither Party shall make any material alteration to the terms of any insurance without the prior approval of the other Party. If an insurer makes (or at tempts to make) any alteration, the Party first notified by the insurer shall promptly give notice to the other Party.

18.1.10 If the insuring Party fails to effect and keep in force any of the insurances it is required to effect and maintain under the Contractor fails to provide satisfactory evidence and copies of policies in accordance with this Sub- Clause, the other Party may (at its option and without prejudice to any other right or remedy) effect insurance for the relevant coverage and pay the premiums due. The insuring Party shall pay the amount of these premiums to the other Party, and the Contract Price shall be adjusted accordingly.

18.1.11 Nothing in this Clause limits the obligations, liabilities or responsibilities of the Contractor or the Procuring Entity, under the other terms of the Contractor otherwise. Any amounts not insured or not recovered from the insurers shall be borne by the Contractor and/or the Procuring Entity.

18.1.12 Procuring Entity in accordance with these obligations, liabilitieso r responsibilities. However, if the insuring Party fails to effect and keep in force an insurance which is available and which it is required to effect and maintain under the Contract, and the other Party neither approves the omission nor effects insurance for the coverage relevant to this default, any moneys which should have been recoverable under this insurance shall be paid by the insuring Party.

18.1.13 Payments by one Party to the other Party shall be subject to Sub-Clause 2.5 [Procuring Entity's Claims] or Sub- Clause 20.1 [Contractor's Claims], as applicable.

18.1.14 The Contractor shall be entitled to place all insurance relating to the Contract (including, but not limited to the insurance referred to Clause 18) with insurers from any eligible source country.

18.2 Insurance for Works and Contractor's Equipment

18.2.1 The insuring Party shall insure the Works, Plant, Material sand Contractor's Documents for not less than the full reinstatement cost including the costs of demolition, removal of debris and professional fees and profit. This insurance shall be effective from the date by which the evidence is to be submitted under sub-paragraph (a) of Sub-Clause 18.1 [General Requirements for Insurances], until the date of issue of the Taking-Over Certificate for the Works.

18.2.2 The insuring Party shall maintain this insurance to provide cover until the date of issue of the Performance Certificate, for loss or damage for which the Contractor is liable arising from a cause occurring prior to the issue of the Taking-Over Certificate, and for loss or damage caused by the Contractor in the course of any other operations (including those under Clause 11 [Defects Liability]).

18.2.3 The insuring Party shall insure the Contractor's Equipment for not less than the full replacement value, including delivery to Site. For each item of Contractor's Equipment, the insurance shall be effective while it is being transported to the Site and until it is no longer required as Contractor's Equipment.

18.2.4 Unless otherwise stated in the Special Conditions, insurances under this Sub-Clause:

a) Shal lbe effected and maintained by the Contractor as insuring Party,

b) shall be in the joint names of the Parties, who shall be jointly entitled to receive payments from the insurers, payments being held or allocated to the Party actually bearing the costs of rectifying the loss or damage,

c) shall cover all loss and damage from any cause not listed in Sub-Clause 17.3 [Procuring Entity's Risks],

d) shall also cover, to the extent specifically required in the tendering documents of the Contract, loss or damage to a part of the Works which is attributable to the use or occupation by the Procuring Entity of another part of the Works, and loss or damage from the risks listed in sub-

paragraphs (c), (g) and (h)of Sub-Clause 17.3 [Procuring Entity's Risks], excluding (in each case) risks which are not insurable at commercially reasonable terms, with deductibles per occurrence of not more than the amount stated **in the Special Conditions** of Contract (if an amount is not so stated,t his sub-paragraph (d) shall not apply), and

e) may however exclude loss of, damage to, and reinstatement of:
   i) a part of the Works which is in a defective condition due to a defect in its design, materials or workmanship (but cover shall include any other parts which are lost or damaged as a direct result of this defective condition and not as described in sub-paragraph (ii) below),
   ii) apart of the Works which is lost or damaged inorder to reinstate any other part of the Works if this other part is in a defective condition due to a defect in its design, materials or workmanship,
   iii) apart of the Works which has been taken over by the Procuring Entity, except to the extent that the Contractor is liable for the loss or damage, and
   iv) Goods while they are not in Kenya, subject to Sub-Clause 14.5 [Plant and Materials intended for the Works].

18.2.5 If, more than one year after the Base Date, the cover described in sub-paragraph (d) above ceases to be available at commercially reasonable terms, the Contractor shall (as insuring Party) give notice to the Procuring Entity, with supporting particulars. The Procuring Entity shall then (i) be entitled subject to Sub-Clause 2.5 [Procuring Entity's Claims] to payment of an amount equivalent to such commercially reasonable terms asthe Contractor should have expected to have paid for such cover, and (ii) be deemed, unless he obtains the cover at commercially reasonable terms, to have approved the omission under Sub-Clause 18.1 [General Requirements for Insurances].

18.3 Insurance against Injury to Persons and Damage to Property

18.3.1 The insuring Party shall insure against each Party's liability for any loss, damage, death or bodily injury which may occur to any physical property (except things insured under Sub-Clause 18.2 [Insurance for Works and Contractor's Equipment]) or to any person (except persons insured under Sub-Clause 18.4 [Insurance for Contractor's Personnel]), which may arise out of the Contractor's performance of the Contract and occurring before the issue of the Performance Certificate.

18.3.2 This insurance shall be for a limit per occurrence of not less than the amount stated in **the Special Conditions of Contract**, with no limit on the number of occurrences. If an amount is not stated in the **Special Conditions of Contract**, this Sub-Clause shall not apply.

18.3.3 Unless otherwise stated in the Special Conditions, the insurances specified in this Sub-Clause:

a) Shall be effected and maintained by the Contractor as insuring Party,
b) shall be in the joint names of the Parties,
c) shall be extended to cover liability for all loss and damage to the Procuring Entity's property (except things insured under Sub-Clause 18.2) arising out of the Contractor's performance of the Contract, and
d) may however exclude liability to the extent that it arises from:
   i) the Procuring Entity's right to have the Permanent Works executed on, over, under, in or
   ii) through any land, and to occupy this land for the Permanent Works,
   iii) damage which is an unavoidable result of the Contractor's obligations to execute the
   iv) Works and remedy any defects, and
   v) a cause listed in Sub-Clause 17.3 [Procuring Entity's Risks], except to the extent that cover is available at commercially reasonable terms.

18.4 Insurance for Contractor's Personnel

18.4.1 The Contractor shall effect and maintain insurance against liability for claims, damages, losses and expenses (including legal fees and expenses) arising from injury, sickness, disease or death of any person employed by the Contractor or any other of the Contractor's Personnel.

18.4.2 The insurance shall cover the Procuring Entity and the Architect against liability for claims, damages, losses and expenses (including legal fees and expenses) arising from injury, sickness, disease or death of any person employed by the Contractoror any othe rof the Contractor's

Personnel, except that this insurance may exclude losses and claims to the extent that they arise from any act or neglect of the Procuring Entity or of the Procuring Entity's Personnel.

18.4.3 The insurance shall be maintained in full force and effect during the whole time that these personnel are assisting in the execution of the Works. For a Subcontractor's employees, the insurance may be effected by the Subcontractor, but the Contractor shall be responsible for compliance with this Clause.

19. FORCE MAJEURE

19.1 Definition of Force Majeure

19.1.1 In this Clause, "Force Majeure" means an exceptional event or circumstance:

a) Which is beyond a Party's control,
b) Which such Party could not reasonably have provided against before entering into the Contract,
c) which, having arisen, such Party could not reasonably have avoided or over come, and
d) which is not substantially attributable to the other Party.

19.1.2 Force Majeure may include, but is not limited to, exceptional events or circumstances of the kind listed below, s olong as conditions (a) to (d) above are satisfied:

a) war, hostilities (whether war be declared or not), invasion, act of foreign enemies,
b) rebellion, terrorism, sabotage by persons other than the Contractor's Personnel, revolution, insurrection, military or usurped power, or civil war,
c) riot, commotion, disorder, strike or lock out by persons other than the Contractor's Personnel,
d) munitions of war, explosive materials, ionizing radiation or contamination by radio-activity, except as maybeattributabletotheContractor'suseofsuchmunitions, explosives, radiation or radio-activity, and
e) natural catastrophes such as earthquake, hurricane, typhoon or volcanic activity.

19.2 Notice of Force Majeure

19.2.1 If a Party is or will be prevented from performing its substantial obligations under the Contract by Force Majeure, then it shall give notice to the other Party of the event or circumstances constituting the Force Majeure and shall specify the obligations, the performance of which is or will be prevented. The notice shall be given within 14 days after the Party became aware, or should have become aware, of the relevant event or circumstance constituting Force Majeure.

19.2.2 The Party shall, having given notice, be excused performance of its obligations for so long as such Force Majeure prevents it from performing them.

19.2.3 Not withstanding any other provision of this Clause, Force Majeure shall not apply to obligations of either Party to make payments to the other Party under the Contract.

19.3 Duty to Minimize Delay

Each Party shall at all times use all reasonable endeavors to minimize any delay in the performance of the Contract as a result of Force Majeure. A Party shall give notice to the other Party when it ceases to be affected by the Force Majeure.

19.4 Consequences of Force Majeure

19.4.1 If the Contractor is prevented from performing his substantial obligations under the Contract by Force Majeure of which notice has been given under Sub-Clause 19.2 [Notice of Force Majeure], and suffers delay and/ or incurs Cost by reason of such Force Majeure, the Contractor shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to:

a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [Extension of Time for Completion], and
b) if the event or circumstance is of the kind described in sub-paragraphs (i) to (iv) of Sub-Clause 19.1 [Definition of Force Majeure] and, in sub-paragraphs (ii) to (iv), occurs in Kenya, payment of any such Cost, including the costs of rectifying or replacing the Works and/or Goods damaged or destroyed by Force Majeure, to the extent they are not indemnified through the insurance policy referred to in Sub- Clause18.2 [Insurance for Works and Contractor's

Equipment].

19.4.2 After receiving this notice, the Architect shall proceed in a ccordance with Sub-Clause 3.5 [Determinations] to agree or determine these matters.

19.5 Force Majeure Affecting Subcontractor

If any Subcontractor is entitled under any contract or agreement relating to the Works to relief from force majeure on terms additional to or broader than those specified in this Clause, such additional or broader force majeure events or circumstances shall not excuse the Contractor's non-performance or entitle him to relief under this Clause.

19.6 Optional Termination, Payment and Release

19.6.1 If the execution of substantially all the Works in progress is prevented for a continuous period of 84 days by reason of Force Majeure of which notice has been given under Sub-Clause 19.2 [Notice of Force Majeure], or for multiple periods which total more than 140 days due to the same notified Force Majeure, then either Party may give to the other Party a notice of termination of the Contract. In this event, the termination shall take effect 7 days after the notice is given, and the Contractor shall proceed in accordance with Sub-Clause 16.3 [Cessation of Work and Removal of Contractor's Equipment].

19.6.2 Upon such termination, the Architect shall determine the value of the work done and issue a Payment Certificate which shall include:

a) theamountspayableforanyworkcarriedoutforwhichapriceisstatedintheContract;
b) the Cost of Plant and Materials ordered for the Works which have been delivered to the Contractor, or of which the Contractor is liable to accept delivery: this Plant and Materials shall become the property of (and be at the risk of) the Procuring Entity when paid for by the Procuring Entity, and the Contractor shall place the same at the Procuring Entity'sdisposal;
c) other Cost or liabilities which in the circumstances were reasonably and necessarily incurred by the Contractor in the expectation of completing the Works;
d) the Cost of removal of Temporary Works and Contractor's Equipment from the Site and the return of these items to the Contractor's works in his country (or to any other destination at no greater cost); and
e) the Cost of repatriation of the Contractor's staff and lab or employed wholly in connection with the Works at the date of termination.

19.7 Release from Performance

Not withstanding any other provision of this Clause, if any event or circumstance outside the control of the Parties (including, but not limited to, Force Majeure) arises which makes it impossible or unlawful for either or both Parties to fulfil its or their contractual obligations or which, under the law governing the Contract, entitles the Parties to be released from further performance of the Contract, then upon notice by either Party to the other Partyofsucheventorcircumstance:

a) The Parties shall be discharged from further performance, without prejudice to the rights of either Party in respect of any previous breach of the Contract, and
b) The sum payable by the Procuring Entity to the Contractor shall be the same as would have been payable under Sub-Clause 19.6 [Optional Termination, Payment and Release] if the Contract had been terminated under Sub-Clause 19.6.

20. SETTLEMENT OF CLAIMS AND DISPUTES

20.1 Contractor's Claims

20.1.1 If the Contractor considers itself to be entitled to any extension of the Time for Completion and/or any additional payment, under any Clause of these Conditions or otherwise in connection with the Contract, the Contractor shall give Notice to the Engineer, describing the event or circumstance giving rise to the claim. The notice shall be given as soon as practicable, and not later than 30 days

after the Contractor became aware, or should have become aware, of the event or circumstance.

20.1.2 If the Contractor fails to give notice of a claim within such period of 30 days, the Time for Completion shall not be extended, the Contractor shall not be entitled to additional payment, and the Procuring Entity shall be discharged from all liability in connection with the claim. Otherwise, the following provisions of this Sub-Clause shall apply.

20.1.3 The Contractor shall also submit any other notices which are required by the Contract, and supporting particulars for the claim, all as relevant to such event or circumstance.

20.1.4 TheContractorshallkeepsuch contemporary records as may be necessary to substantiate any claim, either on the Site or at an other location acceptable to the Engineer. Without admitting the Procuring Entity's liability, the Architect may, after receiving any notice under this Sub-Clause, monitor the record-keeping and/ or instruct the Contractor to keep further contemporary records. The Contractor shall permit the Architect to inspect all these records and shall (if instructed) submit copies to the Engineer.

20.1.5 Within 42days after the Contractor became aware (or should have become aware) of the event or circumstance giving rise to the claim, or within such other period as may be proposed by the Contractor and approved by the Engineer, the Contractor shall send to the Architect fully detailed claim which includes full supporting particulars of the basis of the claim and of the extension of time and/ or additional payment claimed. If the event or circumstance giving rise to the claim has a continuing effect:

a) This fully detailed claim shall be considered as interim;
b) The Contractor shall send further interim claims at monthly intervals, giving the accumulated delay and/ or amount claimed, and such further particulars as the Architect may reasonably require; and
c) The Contractor shall send a final claim within 30 days after the end of the effects resulting from the eventor circumstance, or within such other period as may be proposed by the Contractor and approved by the Engineer.

20.1.6 Within 42 days after receiving a Notice of a claim or any further particulars supporting a previous claim, or within such other period as may be proposed by the Architect and approved by the Contractor, the Architect shall respond with approval, or with disapproval and detailed comments. He may also request any necessary further particulars but shall nevertheless give his response on the principles of the claim within the above defined time period.

20.1.7 Within the above defined period of 42 days, the Architect shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine (i) the extension (if any) of the Time for Completion (before or after its expiry) in accordance with Sub-Clause 8.4 [Extension of Time for Completion], and/or (ii) the additional payment (if any) to which the Contractor is entitled under the Contract.

20.1.8 Each Payment Certificate shall include such additional payment for any claim as has been reasonably substantiated as due under the relevant provision of the Contract.Unless and until the particulars supplied are sufficient to substantiate the whole of the claim, the Contractor shall only be entitled to payment for such part of the claim as he has been able to substantiate.

20.1.9 If the Architect does not respond within the time frame defined in this Clause, either Party may consider that the claim is rejected by the Architect and any of the Parties may refer the dispute for amicable settlement in accordance with Clause 20.3.

20.1.10 The requirements of this Sub-Clause are in addition to those of any other Sub-Clause which may apply to a claim. If the Contractor fails to comply with this or another Sub-Clause in relation to any claim, any extension of time and/ or additional payment shall take account of the extent (if any) to which the failure has prevented or prejudiced proper investigation of the claim, unless the claim is excluded under the second paragraph of this Sub-Clause 20.3.

20.2 Procuring Entity's Claims

20.2.1 If the Procuring Entity considers itself to be entitled to any payment under any Clause of these Conditionsor otherwise in connection with the Contract, and/or to any extension of the Defects Notification Period, the Procuring Entity or the Architect shall give notice and particulars to the Contractor. However, notice is not required for payments due under Sub-Clause 4.19 [Electricity, Water and Gas], under Sub-Clause 4.20 [Procuring Entity's Equipment and Free-Issue Materials], or for other services requested by the Contractor.

20.2.2 The notice shall be given as soon as practicable and no longer than 30 days afte rthe Procuring Entity became aware, or should have become aware, of the event or circumstances giving rise to the claim. A notice relating to any extension of the Defects Notification Period shall be given before the expiry of such period.

20.2.3 The particulars shall specify the Clause or other basis of the claim and shall include substantiation of the amount and/or extension to which the Procuring Entity considers itself to be entitled in connection with the Contract. The Architect shall then proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine (i) the amount (if any) which the Procuring Entity is entitled to be paid by the Contractor, and/ or (ii) the extension (if any) of the Defects Notification Period in accordance with Sub-Clause 11.3 [Extension of Defects Notification Period].

20.2.4 This amount may be included as a deduction in the Contract Price and Payment Certificates. The Procuring Entity shall only be entitled to set off against or make any deduction from an amount certified in a Payment Certificate, or to otherwise claim against the Contractor, in accordance with this Sub-Clause.

20.3 Amicable Settlement

Where a notice of a claim has been given, both Parties shall attempt to settle the dispute amicably before the commencement of arbitration. However, unless both Parties agree otherwise, the Party giving a notice of a claim in accordance with Sub-Clause 20.1 above should move to commence arbitrationa fter 60 days from the day on which a notice of a claim was given, even if no attempt at an amicable settlement has been made.

20.4 Matters that may be referred to arbitration

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:

a) Whether or not the issue of an instruction by the Architect is empowered by these Conditions.
b) Whether or not a certificate has been improperly withheld or is not in accordance with these Conditions.
c) Any dispute arising in respect risks arising from matters referred to in Clause 17.3 and Clause 19.
e) 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 Procuring Entity and the Contractor agree otherwise in writing.

20.5 Arbitration

20.5.1 Any claim or dispute between the Parties arising out of or in connection with the Contract not settled amicably in accordance with Sub-Clause 20.3 shall be finally settled by arbitration.

20.5.2 No arbitration proceedings shall be commenced on any claim or dispute where notice of a claim or dispute 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.

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

20.5.4 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 a ward any sums which ought to have been the subject of or included in any certificate.

20.5.5 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 require mentor notice had been given.

20.5.6 The arbitrators shall have full power to open up, review and revise any certificate, determination, instruction, opinion or valuation of the Engineer, relevant to the dispute. Nothing shall disqualify representatives of the Parties and the Architect from being called as a witness and giving evidence before the arbitrators on any matter whatsoever relevant to the dispute.

20.5.7 Neither Party shall be limited in the proceedings before the arbitrators to the evidence, or to the reasons for dissatisfaction given in its Notice of Dissatisfaction.

20.5.7 Arbitration may be commenced prior to or after completion of the Works. The obligations of the Parties, and the Architect shall not be altered by reason of any arbitration being conducted during the progress of the Works.

20.5.8 Thetermsofthere muneration of each or all the members of Arbitration shall be mutually agreed upon by the Parties when agreeing the terms of appointment. Each Party shall be responsible for paying one-half of this remuneration.

20.6 Arbitration with National Contractors

20.6.1 If the Contractis with national contractors, arbitration proceedings will be conducted in accordance with the Arbitration Laws ofKenya. In case of any claim or dispute, such claim or 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, on the request of the applying party, 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

20.6.2 The institution written to first by the aggrieved party shall take precedence over all other institutions.

20.7 Arbitration with Foreign Contractors

20.7.1 Arbitration with foreign contractors shall be conducted in accordance with the arbitration rules of the United Nations Commission on International Trade Law (UNCITRAL); or with proceedings administered by the International Chamber of Commerce (ICC) and conducted under the ICC Rules of Arbitration; by one or more arbitrators appointed in accordance with said arbitration rules.

20.7.2 The place of arbitration shall be a location specified in the **SCC;** and the arbitration shall be conducted in the language for communications defined in Sub-Clause1.4 [Law and Language].

20.8 Alternative Arbitration Proceedings

Alternatively, the Parties may refer the matter to the Nairobi Centre for International Arbitration (NCIA) which offers a neutral venue for the conduct of national and international arbitration with commitment to providing institutional support to the arbitral process.

20.9 Failureto Comply with Arbitrator's Decision

20.9.1 The award of such Arbitrator shall be final and binding up on the parties.

20.9.2 In the even tthat a Party fails to comply with a final and binding Arbitrator's decision, then the other Party may, without prejudice to any other rights it may have, refer the matter to a competent court of law.

20.10 Contract operations to continue

Notwithstanding any reference to arbitration herein,

1.1.1 the parties shall continue to perform their respective obligations under the Contract unless they otherwise agree; and

1.1.2 the Procuring Entity shall pay the Contractor any monies due the Contractor.

20.11

Section IX - Special Conditions of Contract

The following Special Conditions shall supplement the GCC. Whenever there is a conflict, the provisions here in shall prevail over those in the GCC.

Part A - Contract Data

Conditions	Sub-Clause	Data
Procuring Entity's name and address	Heading	*Insert*- AS STIPULATED ABOVE
Name and Reference No. of the Contract	Heading and 3.1.1	*Insert* as STIPULATED ABOVE
Engineers Name and address	Heading and 3.1.1	*Insert*- NAROK COUNTY GOVT
Contractor's Representative's name	4.3.1	*[insert the name of the Contractor's Representative agreed by the Procuring Entity prior to Contract signature]*
Key Personnel names	16.9.1	*[insert the name of each Key Personnel agreed by the Procuring Entity prior to Contract signature]*
Time for Completion Defects Notification Period Sections Electronic transmission systems	1.1. 1.1 1.1 1.3	_____days *If Sections are to be used, refer to Table: Summary of Sections below* _____days *If Sections are to be used, refer to Table: Summary of Sections below* As per main contact
Time for the Parties entering into a Contract Agreement	1.6	Within 30days
Commencement Date	8.1.1	N/A
Time for access to the Site	2.1	No later than the Commencement Date, and not later than _____days after Commencement Date AS per the appointment
Architect Duties and Authority	3.1.6 (b) (ii)	Variations resulting in an increase of the Accepted Contract Amount in excess of_____% shall require approval of the Procuring Entity.

Performance Security	4.2.1	The performance security will be in the form of a ____ *[insert either one of "demand guarantee" or "performance bond"]* in the amount(s) of *[insert related figure(s)]* percent of the Accepted Contract Amount and in the same currency(ies) of the Accepted Contract Amount.
Normal working hours	6.5	Specify
Delay damages for the Works	8.7 & 14.15(b)	_____ % of the Contract Price per day. *If Sections are to be used, refer to Table: Summary of Sections below*
Maximum amount of delay damages	8.7	_____% of the final Contract Price.
Provisional Sums	13.5. (b)(ii)	*[If there are Provisional Sums, insert a percentage for adjustment of Provisional Sums}* --- %
Adjustments for Changes in Cost	13.8	Period "n" applicable to the adjustment multiplier "Po":_____*[Insert the period if differentfrom one (1) month;if period "n" is one (1) month, insert "not applicable''}*
Total advance payment	14.2.1	10% Percentage of the Accepted Contract Amount payable in the currencies and proportions in which the Accepted Contract Amount is payable *[Insert number and timing of installment sif applicable]*
Repayment amortization rate of advance payment	14.2.5 (b)	---10 %
Percentage of Retention	14.3.2 (c)	---10 %
Limit of Retention Money	14.3.2 (c)	___10 % of the Accepted Contract Amount
Plant and Materials	14.5(b)(i)	If Sub-Clause 14.5 applies: Plant and Materials for payment Free on Board _____*[list].*
	14.5(c)(i)	PlantandMaterialsforpaymentwhendelivered to theSite_____*[list].*
Minimum Amount of Interim Payment Certificates	14.6	25% oftheAcceptedContract Amount.
Publishing source of commercial interest rates for financial charges in case of delayed payment	14.8	Specify_____5 %_rate per month of delayed payment.
Maximum total liability of the Contractor to the Procuring Entity	17.6	*[Select one of the two options below as appropriate}* Theproductof_____*[insert a multiplier less or greater than one}* times the Accepted Contract Amount, *or* _ _ _ _ _ _ _*[insertamountofthemaximumtotal liability]*

Periods for submission of isurance: a. evidence of insurance. b. Relevant policies	18.1	*[Insert period for submission of evidence of insurance and policy. Period may be from 14 days to 30 days.}* days ___ days
Maximum amount of deductibles for insurance of the Procuring Entity's risks	18.2.4 (d)	*[Insert maximum amount of deductibles}*
Minimum amount of third-party msurance	18.3	*[Insert amount of third-party insurance}*

The place of arbitration 20.7.2 *NAIROBI*

SECTION E: GENERAL SPECIFICATION OF MATERIALS AND WORKS

Extent of Contract Works

1. The work covered by this specification includes the supply, delivery, installation, setting to work, commissioning to the satisfaction of the engineer and maintenance for a period of twelve months of a ICT WORKS

2. Regulations and Standards

The equipment shall comply with all relevant statutory instruments and regulations current at the date of tender and in particular the following:

1. I.E. E Wiring Regulations
2. Regulation under the Electric Power Act
3. Factories Act
4. Any special regulations issued by the local Electricity or Water Undertakings
5. Kenya Bureau of Standards (K.B.S)

The equipment and all components shall comply with all relevant KBS standards and codes of practice or other equal and approved standards specifications and codes. Where the equipment or part of it complies with other internationally recognized standards which are less stringent than British standards or Codes of practice, then the difference is to be stated in writing and must accompany the tender submission.

3. Conformity with the specification.

The equipment to be supplied shall conform in all respects to the specifications. Unless another standard is specifically mentioned in the specification, all materials and practices employed in the works must, where such standards exist be in accordance with the current KBS standards or code of practices or in accordance with such other authorized standard appropriate to the country of manufacture as in the opinion of the Engineer ensures equivalent or higher quality. .

Alternative which deviate in any respect from the specifications may only be submitted in addition to the main offer required by the Specification. Such alternative must be fully detailed and the price indicated may be considered for adoption after the comparison of quotation submitted in accordance with the Specifications.

4. Information required with Tenders

Each tender shall be accompanied by 2 sets of technical manual showing general arrangement and typical details of the equipment offered.
All tender documents and any communications thereof shall be in English language.

5. Site Conditions

The contractor is deemed to have visited the site and if unable to locate it to apply to the Engineer for directions to enable him to do so. The contractor is deemed to have acquainted himself therewith as to its nature, position, means of access, etc and no claim in the connection will be allowed. No claim will be allowed for traveling or other expenses which may be incurred by the contractor in visiting the site or preparing a tender for the contract works.

6 Tropicalisation of Components

All components shall fully be tropicalised and protected against mould growth.

7 Surface finish

All ferrous metal work shall be either painted or processed to give a rust proof coating. Ferrous metal work to be painted shall first to be either shot blasted or thoroughly wire brushed to remove all scale and oxide and immediately given one brushed coat or two sprayed coats of primer.

After not less than four hours, one brushed or two sprayed undercoats followed by one brushed or two sprayed finishing coats of heat and oil resisting quality paint shall be applied.

Successive coats of paint shall be slightly differing shades. Interior surfaces of electrical equipment enclosures shall be finished white and all external surfaces shall be finished grey (Bs 2660, colour 9-097)

Engine crank cases shall not be painted internally unless the paint is resistant to the lubricating oil.

8. Recording Drawings

The Contractor shall provide to the engineer four sets of the following drawings:

a) Where indicated a building drawing showing details of cable entries, pipe entries and ducts required.

b) A general arrangement drawing showing the principal dimensions of all equipmens and Layout

c) A general arrangement and layout of all workstations, Servers, cameras, Alarms etc.

d) A schematic and wiring diagram(s).

9. <u>Maintenance Manual</u>

Upon practical completion of the Contract works the Contractor shall furnish to the Engineer four copies of Manuals. The manuals shall be printed on good quality paper International A4 size and shall have stiff covers of durable materials.

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, as may be applicable to the contract works, the following and any other items listed in the text of the specification hereinafter:

a) System Description
b) Equipments
c) Operation
d) Procedure of Fault Finding
f) Emergency Procedures
g) Maintenance and Servicing periods and Procedures
i) Colour coding legend for all services
j) Schematic and wiring Diagrams of plant, Apparatus and Switchgear
k) Record Drawings, true too scale, reduced to international A4 size
l) Lists of primary and secondary spares

The Manual is to be specially prepared for the contract works and Manufacture's standard descriptive literature and plant operating instruction cards will not be accepted for inclusion unless exceptionally approved by the engineer. The contractor shall, however, affix such cards, if suitable, adjacent to plant and apparatus. One spare set of all such cards shall be furnished to the electrical Engineer.
The maker's name, the rating of the set, the contract number, the location of the site and the year of installation shall appear on the front covers.

10. Factory Tests

The qquipments shall be tested as a unit at the manufacturer's workshop (or elsewhere by agreement) for output and performance generally in accordance with the requirements of BS 649 and as 2613.
The Engineer shall be given adequate notice in writing of the date and time of the work tests and he, or his representative shall if he so desires, be present at such tests and given all reasonable facilities for his own inspections during the course of the tests.
Whether or not the Engineer or his representative attends the tests, he shall be furnished, by the Contractor, with copies of all relevant tests certificates.

11. Installation

Installation of all plant and equipment shall be carried out by the contractor under adequate supervision from skilled staff provided by the plant and equipments manufacturer or his appointed agent.

Plant or equipment which are shipped before the relevant test certificate has been approved by the Engineer shall be shipped at the contractor's own risk and should the test certificate not be approved, new tests may be ordered by the Engineer at the contractor's expense.

12. Spare parts

The contractor shall submit with his tender a separate priced list of recommended spare parts including any optional extras which he recommends should be purchased for the set and its control equipment and are not supplied as standard with the unit. The initial spares required at handover shall be deemed to have been included in the tender pricing.

13. Tools

A complete set of tools and general and special testing equipment shall be provided, including grease and oil guns, necessary for the normal maintenance of the set and its controls.
The tools shall be of the best quality, the spanners being of chrome vanadium steel, and shall be contained in a suitable robust steel tool box with lid fitted with a lock and two keys. All tools and testing equipment may be used by the Contractor in the execution of the contract works but will not be accepted as part of the Contract works by the Engineer unless they are handed over in clean and undamaged condition, in perfect working order and effectively in new condition.

14. Maintenance period

The Contractor shall maintain the complete set and associated control equipment forming the unit for a period of twelve calendar months from the date that the unit is put into commission and regular use.

During this maintenance period, the contractor shall at his own expense.

a) Make good any defects in the unit and replace any parts that fail or show signs of weakness or undue wear in consequences of faulty design, workmanship, or materials.

b) Visit the site with all diligence and attend to any such defect that arises within 48 hours of receiving notification of the defect.

c) Carry out regular examination and services of the unit at the intervals laid down by the manufacturer, or every three months, whichever is the sooner, the service examination to include all necessary adjustments, greasing, oiling, cleaning, changing of lubricating oils (where necessary) to keep the unit in sound and efficient working order.

d) Instruct the maintenance personnel in the proper operation, care and maintenance of the set and its equipment.

If during the maintenance period the unit is or is likely to be out of use for a period greater than 48 hours, due to the unit or part thereof developing a defect attributable to faulty design, workmanship or materials, or due to neglect of maintenance by the Contractor, the Contractor shall at his own expense immediately provide and install on free loan a suitable temporary unit for use until the required repair or replacement has been satisfactorily undertaken and the original set (or its replacement) put to proper working order.

At the end of the twelve months period of maintenance the Contractor shall (in addition to normal servicing work) carry out a compressive examination and test of the set and its auxiliaries, to ensure that the unit is in proper working order and in satisfactory condition for handing over to the Engineer whose representative shall be present at such examination and test.

15. Maintenance Contract.

The Contractor may be called upon to enter maintenance contract with the Employer for the servicing the installations after the expiry of the initial maintenance period. The Contractor shall indicate his willingness to carry out this service at the time of tendering and shall ensure that component personnel are available locally to be called at short notice.

16. Transport and Storage

All plant equipment shall, during transportation, be suitably packed, crated and protected to minimize the possibility of damage, and prevent corrosion or other deterioration.

On arrival at site all plant and equipment shall be examined and any damage to parts and protective priming coats made good before storage or installation.

VOLUME I:

ELECTRICAL SERVICES (Electrical Installation, I.C.T, Nurse Call System, U.P.S, Synchronized Generators and Hospital Passenger Lifts)

1: GENERAL ELECTRICAL INSTALLATION WORKS

SECTION F: PARTICULAR SPECIFICATIONS

SHOP DRAWINGS

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

RECORD DRAWINGS

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

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

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

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

REGULATIONS AND STANDARDS

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

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

SETTING OUT WORK

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

POSITIONS OF ELECTRICAL PLANT AND APPARATUS

The routes of cables and approximate positions of switchboards etc, as shown on the

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

MCB DISTRIBUTION PANELS AND CONSUMER UNITS

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

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

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

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

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

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

FUSED SWITCHGEAR AND ISOLATORS

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

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

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

Isolators shall be load breaking/fault making isolators.

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

CONDUITS AND CONDUIT RUNS

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

All conduit shall be black rigid super high impact heavy gauge class 'A' PVC in accordance with KS 04 – 179: 1988 and IEE Regulations. No conduit less than 20mm in diameter shall be used anywhere in this installation.
Conduit shall be installed buried in plaster work and floor screed except when run on wooden or metal surface when they will be installed surface supported with saddles every 600mm. Conduit run in chases shall be firmly held in position by means of substantial pipe hooks driven into wooden plugs.

The Sub-contractors attention is drawn to the necessity of keeping all conduits entirely separate from other piping services such as water and no circuit connections will be permitted between conduits and such pipes.
All conduits systems shall be arranged wherever possible to be self-draining to switch boxes and conduit outlet points for fittings:

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

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

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

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

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

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

The drawings provided with these specifications indicate the appropriate positions only of points and switches, and it shall be the Sub-Contractors responsibility to mark out and

centre on site the accurate positions where necessary in consultation with the Architect and the Engineer. The sub-contractor alone shall be responsible for the accuracy of the final position.

CONDUIT BOXES AND ACCESSORIES

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

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

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

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

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

LABELS

Labels fitted to switches and fuse boards;-

1 Shall be Ivorine engraved black on white.

2 Shall be secured by R.H brass screws of same manufacturing throughout.

3 Shall be indicated on switches:-

3.1 Reference number of switch

3.2 Special current rating

3.3 Item of equipment controlled

4 Shall indicate on MCB panels

a) Reference number
b) Type of board, i.e.; lighting, sockets, etc

.

c) Size of cable supplying panel

d) where to isolate feeder cable

5 Shall be generally not less than 75mm x 50mm.

EARTHING

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

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

b) At all main distribution panels and main service positions a 25mm x 3mm minimum cross sectional area Copper tape shall be provided and all equipment including the lead sheath and armouring of cables, distribution boards and metal frames shall be bonded thereto.

c) The earth tape in Sub-clause (ii) shall be connected by means of a copper tape or cable of suitable cross sectional area to an earth electrode which shall be a copper earth rod (see later sub-clause).

d) 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

e) Where the earth electrode is located outside the building a removable test link shall be provided inside the building as near as possible to the point of entry to the tape, for isolating the earth electrode for testing purposes.

f) Earthing of sub-main equipment shall be deemed to be satisfactory where the sub-main cables are M.I.C.S. or conduit with separate earth wire, and installation is carried out in accordance with the figures stated in the current edition of the I.E.E Regulations.

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

h) Earth plates will not be permitted

i) Where an earth rod is used the earth resistance shall be tested in the manner described in the current edition of the IEE Regulations, by the Sub-Contractor in the presence of the Engineer and the Sub-Contractor shall be responsible for the supply of all test equipment.

j) Where copper tape is fixed to the building structure it structure it shall be by means of purpose made non-ferrous saddles which space the conductor away from the structure a minimum distance of 20mm. Fixings, shall be made using purpose made plugs; No fixings requiring holes to be drilled through the tape will be accepted.

k) Joints in copper tape shall be tinned before assembly riveted with a minimum of two copper rivets and seated solid.

12 Where holes are drilled in the earth tape for connection to items of equipment the effective cross sectional area must not be less than required to comply with the IEE regulations.

13 Bolts, nuts and washers for any fixing to the earth tape must be of non-ferrous material.

14 Attention is drawn to the need for the earthing metal parts of lighting fittings and for bonding ball joint suspension in lighting fittings.

CABLES AND FLEXIBLE CORDS

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

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

The successful Sub-Contractor will, at the Engineers discretion be required to submit samples of cables for the Engineers approval; the Engineer reserves the right to call for the cables of an alternative manufacture without any extra cost being incurred.
P.V.C. Insulated cables shall be 500/1000 volt grade. No cables smaller than 1.5mm² shall be used unless otherwise specified. The installation and the finish of cables shall be as detailed in later clauses. The colour of cables shall conform to the details stated in the "Cable Braid and insulation Colours" Clause.

ARMOURED P.V.C. INSULATED AND SHEATHED CABLES:

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

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

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

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

CABLE SUPPORTS, MARKERS AND TILES

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

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

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

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

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

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

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

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

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

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

PVC INSULATED CABLES

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

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

HEAT RESISTING CABLES

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

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

FLEXIBLE CORDS

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

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

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

CABLE ENDS AND PHASE COLOURS

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

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

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.

INSULATION COLOUR CABLE END MARKER

Main and Sub-Main

a) Phase	Red	Red
b) Neutral	Black	Black

i) Sub-Circuits
Single Phase

a) Phase	Red
b) Neutral	Black

SUB-CIRCUIT WIRING

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

Lighting circuits P. V.C. cable 1.5mm² for all lighting circuits indicated on the drawing.
Power circuits P.V.C cable (minimum sizes).

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

b) 2.5mm² for one 15Amp socket.

c) 2.5mm² for maximum of ten switched 13 Amp sockets wired from 30 Amp MCB. The wiring sizes for lighting circuits and sockets are shown on the drawings. In such cases, the sizes shown on the drawings shall prevail over the sizes specified.

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

SPACE FACTOR

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

INSULATION

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

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

LIGHTING SWITCHES

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

SOCKETS AND SWITCHED SOCKETS

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

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

FUSED SPUR BOXES

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

COOKER OUTLETS

These shall be flush mounted with 13-A switched socket outlet and neon indicator Lamps. The cooker control units shall be as manufactured by "M.K. Electrical Company Ltd", or other approved equal KS 04 – 247: 1988

CONNECTORS

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

LAMPHOLDERS

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

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

LAMPS

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

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

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

LIGHTING FITTINGS AND STREET LIGHTING LANTERNS

This Sub-Contract shall include for the provision, handling charges, taking the delivery, safe storage, wiring (including internal wiring) assembling and erecting of all lighting fittings shown on the drawings.
All fittings and pendants shall be fixed to the conduit boxes with brass R/H screws. These to be in line with metal finish of fittings. The lighting fittings are detailed for the purpose of establishing a high standard of finish and under no circumstances will substitute fittings be permitted.
In case of rectangular shaped ceiling fittings, the extreme ends of the fittings shall be secured to suitable support in addition to the central conduit box fittings. Supports shall be provided and fixed by the Sub-Contractor.

The whole of the metal work of each lighting fittings shall be effectively bonded to earth. In the case of ball and/or knuckle joints short lengths of flexible cable shall be provided, bonded to the metal work on either side of the joints. If the above provisions are not made by the manufacturers -, the Sub-contractor shall include cost of additional work necessary in his tender. See “Flexible Cords” clause for details of internal wiring of lighting fittings. Minimum size of internal wiring shall be 20/0.20mm (23/0067). Each lighting fitting shall be provided with number type and size of lamps as detailed on the drawings. It is to be noted that some fittings are suspended as shown on the drawings.

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

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

POSITIONS OF POINTS AND SWITCHES

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

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

STREET/SECURITY OUTDOOR LIGHTING COLUMNS:

The column shall be at a minimum of 225mm in the ground on 75mm thick concrete foundations and the pole upto 150mm shall be surrounded with concrete. The top bracket and plain section of the columns shall be common to and interchangeable with all brackets with maximum mismatching tolerance of 3mm between any pole and bracket. After manufacture and before erection the columns shall be treated with an approved mordant solution which shall be washed off and

the whole allowed to dry. Thereafter, the columns shall be painted with one undercoat and two coats of gloss paint to an approved colour. All columns shall be complete with fused cut-outs.

TIMING CONTROL SWITCH

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

WIRING SYSTEM FOR STREETLIGHTING

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

METAL CONTROL PILLAR

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

CURRENT OPERATED EARTH LEAKAGE CIRCUIT BREAKER

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

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

M.V. SWITCHBOARD AND SWITCHGEAR

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

The switchboard shall comprise the equipment shown on the drawings together with all current

transformers, auxiliary fuses, labels, small wiring and interconnections necessary for the

satisfactory operation of the switchboard

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

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

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

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

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

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

Mounting arrangements shall be such that individual complete fuse switches may be disconnected and withdrawn when necessary without extensive dismantling work. When switches are arranged in their formation all necessary horizontal and vertical barriers shall be provided to ensure segregation from adjacent units. Means of locking the switch in the “OFF” position shall be provided.

STEEL CONDUITS AND STEEL TRUNKING

Conduits shall be of heavy gauge class “B” welded to Standard specification KS 04-180:1985. In no case will conduit smaller than 20mm diameter be used on the works. Conduits installed within buildings shall be black 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 galvanised conduits shall also be galvanised or otherwise as approved by the service engineer.

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

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

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

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

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

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

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

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

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

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

Conduit and trunking shall be mechanically and electrically continuous. Conduit shall be tightly screwed between the various lengths so that they butt at the socketed joints. The internal edges of conduit and all fittings shall be smooth, free from burrs and other defects. Oil and any other insulating substance shall be removed from the screw threads; where conduits terminate in fuse-gear, distribution boards, adaptable boxes, non-spouted switchboxes, etc., they shall, unless otherwise stated, be connected thereto by means of smooth bore male brass bushes, compression washers and sockets. All exposed threads and abrasions shall be painted using an oil paint for black enameled tubing and galvanizing paint for galvanized tubing immediately after the conduits are erected. All bends and sets shall be made cold without altering the section of the conduit. The inner radius of the bed shall not be less than four (4) times the outside diameter of the conduit. Not more than two right angle bends will be permitted without the inter-position of a draw-in-box. Where straight runs of conduit are installed, draw-in-boxes shall be provided at distances not exceeding 15mm. No tees, elbows, sleeves, either of inspection or solid type, will be permitted.

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

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

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

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

All adaptable boxes and lids of the same size shall be interchangeable.
Boxes used on surface work are to be tapped or drilled to line up with the conduit fixed in distance type saddles allowing clearance between the conduit and wall without the need for setting the conduit.

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

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

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

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

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

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

TESTING ON SITE

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

1 Tests shall be carried out to prove that all single pole switches are installed in the
'live' conductor.

2 Tests shall be carried out to prove that all socket outlets and switched socket outlets are connected to the 'live' conductor in the terminal marked as such, and that each earth pin is effectively bonded to the earth continuity system. Tests shall be carried out to verify the continuity of all conductors of each 'ring' circuit.

3 Phase tests shall be carried out on completion of the installation to ensure that correct phase sequence is maintained throughout the installation. Triplicate copies of the results of the above tests shall be provided within 14 days of the witnessed tests and the Sub-contractor will be required to issue to the service engineer the requisite certificate upon completion as required by the regulations referred to above.

(d) Any faults, defects or omissions or faulty workmanship, incorrectly positioned or installed parts of the installation made apparently by such inspections or tests shall be rectified by the Sub-contractor at his own expense.

(e) The Sub-contractor shall provide accurate instruments and apparatus and all labour required to carry out the above tests. The instruments and apparatus shall be made available to the services engineer to enable him to carry out such tests as he may require.

The Sub-contractor shall generally attend on other contractors employed on the project and carry out such electrical tests as may be necessary.

The Sub-contractor shall test to the services engineer's approval and as specified elsewhere in this specification or in standards and regulations already referred to, all equipment, plant and apparatus forming part of the works and before connecting to any power or other supply and setting to work.

Where such equipment, etc., forms part of or is connected to a system whether primarily or of an electrical nature or otherwise (e.g. air conditioning system) the Sub-contractor shall attend on and assist in balancing, regulating testing and commissioning, or if primarily an electrical or other system forming part of works, shall balance, regulate, test and commission the system to the service engineer's approval.

APPENDIX TO GENERAL SPECIFICATIONS OF MATERIALS AND WORKS

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

a) Government Electrical Specifications No. 1 and No. 2.

b) All requirements of Kenya Power and Lighting Company Limited, and Communications Authority of Kenya (CAK).

SECTION G: EVALUATION UNDER ELECTRICAL WORKS

TENDER EVALUATION CRITERIA

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

1. Determination of Responsiveness
2. Detailed Technical Examination
3. Combination of Technical and Tender Sums Comparison

STAGE 1- DETERMINATION OF RESPONSIVENESS

A) PRELIMINARY EXAMINATION

This stage of evaluation shall involve examination of the pre-qualification conditions 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 may include the following:

i) Category of Registration with N.C.A 3 and above in the relevant trade;
ii) Class of Licenses with the relevant statutory bodies e.g. Energy Regulatory Commission, County Government, and Water Management Boards etc;
iii) Proof of payment for tender document;
iv) Provision of Bid Security;
v) Dully filled Form of Tender;
vi) Any other conditions included in the advertisement notice/Invitation letter.

Note:

The bid security shall be in accordance with of Instruction to Tenderers which states as follows:

- **Clause 19.1** of Instruction to Tenderers,"the tenderers shall furnish as part of his tenders a tender surety in the amount stated in the tender document in the Appendix to Instructions to Tenderers".

- **Clause 19.2** of Instruction to Tenderers, "the unconditional Tender surety shall be in Kenya shillings and be in form of a certified cheque, bank draft, an irrevocable letter of credit or a guarantee from a reputable Bank/ Insurance approved by PPOA located in the Republic of Kenya. The format of the surety shall be in accordance with the sample form included in the tender documents and the tender surety shall be valid for **150 days** from the date of tender opening".

- **Clause 19.2** of Instruction to Tenderers: "For the purposes of this clause, a substantially responsive tender is one which conforms to all terms and condition and specifications of the tender document without material deviation or reservation and has a valid Bank/Insurance guarantee".

The employer may seek further clarification/confirmation if necessary to confirm authenticity/compliance of any condition of the tender.

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

NOTE: ALL COPIES OF DOCUMENTS PROVIDED MUST BE CERTIFIED BY COMMISSIONER OF OTHS and ALL PAGES OF THE COMPLETE TENDER DOCUMENT SUBMITTED MUST BE PAGENATED/SERIALISED

B) COMPLETENESS OF TENDER DOCUMENT

The tender document shall be examined based on clause 2.2 of the Instruction to Tenderers which states as follows:

In accordance with clause 2.2 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 sub clause 2.1 of Instruction to Tenderers and adequacy of resources to effectively carry out the subject contract. The tenderers shall be required to fill the Standards Forms provided for the purposes of providing the required information. The tenderers may also attach the required information if they so desire.

The award of points for the **STANDARD FORMS** considered in this section shall be as shown below

	PARAMETER	**MAXIMUM POINTS**
(i)	Statement of compliance	3
(ii)	Tender Questionnaire	5
(iii)	Confidential Business Questionnaire	5
(iv)	Key personnel	15
(v)	Contract Completed in the last Five (5) years	15
(vi)	Schedules of on-going projects	10
(vii)	Schedules of contractors equipment	10
(viii)	Audited Financial Report for the last 3 years	10
(ix)	Evidence of Financial Resources	10
(x)	Name, Address and Telephone of Banks **(**Contractor to provide**)**	5
(xi)	Litigation History	2
(xii)	Sanctity of the tender document as in accordance with clause 5 of instruction to tenderer	10
	TOTAL	**100**

The detailed scoring plan shall be as shown in table 1 below: -

TABLE 1

Item	Description	Point Scored	Max. Point	
i.	**Statement of Compliance** • Signed and stamped ---------- 3 • Signed but not stamped or vice versa ---------- 2 • Not Signed nor stamped ---------- 0		**3**	
ii.	**Tender Questionnaire Form** • Completely filled ---------- 5 • Partially filled ---------- 3 • Not filled ---------- 0		**5**	
iii.	**Confidential Business Questionnaire Form** • Completely filled ---------- 5 • Partially filled ---------- 3 • Not filled ---------- 0		**5**	
iv	**Key Personnel (Attach evidence)**			**15**
	Director of the firm • Holder of degree in Electrical Engineering field ---------- 4 • Holder of Diploma in Electrical Engineering field ---------- 2 • Holder of trade test certificate in relevant Engineering field-------- 1 • No relevant certificate ---------- 0		**4**	
	At least 1No. degree/diploma of key personnel in relevant Engineering field • With over 10 years relevant experience ---------- 4 • With over 5 years relevant experience---------- 2 • With under 5 years relevant experience ---------- 1		**4**	
	At least 1No certificate holder of key personnel in relevant Engineering field • With over 10 years relevant experience---------- 3 • With over 5 years relevant experience ---------- 2 • With under 5 years relevant experience ----------1		**3**	
	At least 2No artisan (trade test certificate in relevant Engineering field) • Artisan with over 10 years relevant experience ---------- 2 • Artisan with under 10 years relevant experience ---------- 1 • Non skilled worker with over 10 years relevant experience ----- 1		**4**	
v	**Contract completed in the last five (5) years (Max of 5 No. Projects**) • Project of similar nature, complexity and magnitude ---------- 3 • Project of similar nature but of lower value than the one in consideration ---------- 2 • No completed project of similar nature ---------- 0		**15**	

vi	**On-going projects (Max of 5 No. Projects)** • Project of similar nature, complexity and magnitude -------- 2 • Project of similar nature but of lower value than the one in consideration ---------- 1 • No ongoing project of similar nature - ---------- 0		**10**	
vii	**Schedule of contractors equipment and transport (proof or evidence of ownership)** • Means of transport (Vehicle) ---------- 4 • No means of transport ---------- 0		4	**10**
	For each specific equipment required in the installation of the Work being tendered for. (Maximum No. of equipment to be considered – 3 No.---------- 2		6	
viii	**Financial report** **Audited financial report (last three (3) years)** • Turn over greater or equal to 5 times the cost of the project ---10 • Turn over greater or equal to 3 times the cost of the project --- 6 • Turn over greater or equal to the cost of the project ---------- 4 • Turn over below the cost of the project ---------- 2		**10**	
ix	**Evidence of Financial Resources (cash in hand, lines of credit, over draft facility etc)** • Has financial resources equal or above the cost of the project ----10 • Has financial resources below the cost of the project ----------5 • Has not indicated sources of financial resources ---------- 0		**10**	
x	**Name, Address and Telephone of Banks (Contractor to provide)** • Provided ---------- 5 • Not provided ---------- 0		**5**	
xi	**Litigation History** • Filled ---------- 2 • Not filled ---------- 0		**2**	
xii	**Sanctity of the tender document** • Having the document intact (not tempered with in any way) ---10 • Having mutilated or modified the tender document ---------- 0		**10**	
	TOTAL		**100**	

Any bidder who scores 80 points and above shall be considered for further evaluation

STAGE 2 - TECHNICAL EVALUATION

A) COMPLIANCE WITH TECHNICAL SPECIFICATIONS

In this section, the bid will be analyzed to determine compliance with General and Particular technical specifications for the works as indicated in the tender document.

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

Where the Equipment proposed by the tenderer differs with the models specified in the tender document, it is mandatory that the brochures/catalogues of the same be submitted with the tender document highlighting the catalogues Numbers of the proposed items. Such brochures/catalogues should indicate comprehensive relevant data of the proposed equipment/items which should include but not limited to the following:

a) Standards of manufacture

b) Performance ratings/characteristics

c) Material of manufacture

d) Electrical power ratings and

e) Any other necessary requirements (Specify)

Following the above analyses, where the proposed equipment are found not to satisfy the specifications, the tender will be deemed Non – Responsive and will not be evaluated further.

B) TECHNICAL EXAMINATION

In this section, the information provided in the Technical Schedule or Brochures attached will be analyzed for bidders who have qualified from **STAGE 2A** above and points awarded as shown below to a maximum of 100 points

TABLE 2

Item	Description	Score	Max. Score
	Technical schedule/Brochures • Relevant Manufacturer Brochures for items in the technical schedule with equipments to be supplied highlighted and meets specification (Where alternative are to supplied ---------- 100 or • Completely filled Technical Schedule indicating Brand, Model/ Country of origin as per specification in the tender ---------- 100 • Relevant Manufacturer Brochures for items in the technical schedule with equipments to be supplied not highlighted but within range of those specified and meets specifications ---------- 75 or • Completely filled Technical Schedule indicating items as specified in the tender but with less than 100% and above 75% of items in the technical schedule provided ---------- 75 • Relevant Manufacturer Brochures for items in the technical schedule with equipments to be supplied but between 50% and less than 75% of items highlighted and within range of those specified and meets specifications---------- 60 or • Completely filled Technical Schedule indicating items as specified in the tender but between 50% and 75% of items in the technical schedule provided ---------- 60 • Relevant Manufacturer Brochures for between 25% and less than 50% of items in the technical schedule with equipment to be supplied highlighted and meets specifications---------- 50 or • For between 25% and 50% of technical schedule filled indicating Brand/Model/Country of origin for the items considered as specified in the tender ---------- 50 • Less than 25% provided or no technical data provided, either in form of brochures or filling of Technical Schedule. ---------- 0		**100**
	TOTAL		**100**

Any bidder who scores 80 points and above shall be considered for further evaluation

STAGE 3 - FINANCIAL EVALUATION

The evaluation shall be in two sections
1. Preliminary examinations and
2. Tender sum Comparisons

A) PRELIMINARY EXAMINATIONS

The preliminary examination in the Financial Evaluation shall be in accordance with clause 26 of Instruction to Tenderers.

The parameter to be considered under this section includes the following:

a) Arithmetic errors and comparison of rates

(1) Arithmetic Errors

The bid shall be checked for arithmetic errors based on the rates and the total sums indicated in the bills of quantities.

a) Confirmation shall be sought in writing from the tenderers whose tender sums will be determined to have a significant arithmetic error to their disadvantage, to confirm whether they stand by their tender sums. The error shall be treated as per **clause 24 of Instructions to Tenderers**.

Non compliance with the above shall lead to **automatic disqualification from further evaluation.**

Discount if any shall be treated as an error in pursuant to **clause 26.3** of Instructions to Tenderers

(2) Comparison of rates

The evaluation committee will compare rates from different bidders and note consistency of rates and front loading. The evaluation committee will judge and make an appropriate decision giving evidence.

SECTION H – ELECTRICAL BILLS OF QUANTITIES

A. Notes and Sample Items for Preparing a Bill of Quantities

1. These Notes for Preparing a Bill of Quantities are intended only as information for the Procuring Entity or the person drafting the Tender Documents. Priced Bills of Quantities shall be part and parcel of the Contract Documents.

2. The objectives and purpose of the Bills of Quantities are to provide sufficient information on the specifications, descriptions and quantities of Works to be performed to enable tenders to be prepared efficiently and accurately and when a contract has been entered into, to provide a priced Bill of Quantities for use in the periodic valuation of Works executed. Inorder to attain these objectives, Works should be itemized in the Bill of Quantities insufficient detail to distinguish between the different classes of Works, or between Works of the same nature carried outin different locations or in other circumstances which may give rise to different considerations of cost. Consistent with these requirements, the layout and content of the Bill of Quantities should be as simple and clear as possible.

3. The Bills of Quantities should be divided generally into thef ollowing sections:

a) Preambles
b) Preliminary items
c) Work Items
c) Daywork Schedule; and
d) Provisionalitems
e) Summary.

4. NOTES TO PREPARING PREAMBLES

4.1 The Preambles should include only those items that constitute the cost of the works but would not be priced separately as they are expected to be included in the unit prices. Care should be taken to ensure that these items are not are petition of the conditions of contract. The Preambles should indicate the inclusiveness of the unit prices and should state the methods of measurement that have been adopted in the preparation of the Bill of Quantities, that are to be used for the measurement of any part of the Works. The units of measurement and abbreviations should be defined and any mandatory national units defined and described. The methods of and procedure for re- measurement should be described in the Preambles.

4.2 Units of Measurement - The following units of measurement and abbreviations shall be used, unless other national units are mandatory in Kenya.

nit	Abbreviation	Unit	Abbreviation
cubic meter	m^3 or cu m	millimetre	mm

4.3 The Bills of Quantities shall be read in conjunction with the Instructions to Tenders, General and Special Conditions of Contract, Technical Specifications, and Drawings.

4.4. The quantities given in the Bills of Quantities are estimated and partly provisional and are given to provide a common basis for tendering. The basis of payment will be the actual quantities of work ordered and carried out, as measured by the Contractor and verified by the Architect and valued at the rates and prices tender in the priced.

Bills of Quantities, where applicable, and otherwise at such rates and prices as the Architect may fix within the terms of the Contract.

4.5. The rates and prices tender in the priced Bills of Quantities shall, except in so far as it is otherwise provided under the Contract, include all Constructional Plant, labour, supervision, materials, erection, maintenance, insurance, profit, taxes, and duties, together with all general risks, liabilities, and obligations set out or implied in the Contract.

4.6. Arateorprice shall be entered against each item in the priced Bill of Quantities, whether quantities are stated or not. The cost of Items against which the Contractor has failed to enter a rate or price shall be deemed to be covered by other rates and prices entered in the Bill of Quantities.

4.7. The whole cost of complying with the provisions of the Contract shall be included in the Items provided in the priced Bills of Quantities, and where no Items are provided, the cost shall be deemed to be distributed among the ratesand prices entered for the related Items of Work.

4.8. General directions and descriptions of work and materials are not necessarily repeated nor summarized in the Bills of Quantities. References to the relevant sections of the Contract documents shall be made before entering prices agains teach item in the priced Bills of Quantities.

4.9 Provisional Sums and contingency sums included and so designated in the Bills of Quantities shall be expended in whole or in part at the direction and discretion of the Architect in accordance with Sub-Clause13.5 and Clause 13.6 of the General Conditions of contract.

4.10 In preparing the Bills of Quantities, notes should be removed as they are intended to guide the person preparing the Tender Documents. The Contractor must allow in his rates for any costs associated with and complying with the requirements in the Preambles.

4.11 Should a tenderer/contractor not price any item in any section of the Bills of Quantities including Preliminary items, it will be assumed that he/she has spread its cost in other areas that he/she will have priced. Therefore, the itemor items will be executed without any additional costs or without being treated like variations.

5. NOTES ON PREPARING BILLS OF QUANTITIES

5.1 The Preliminary Items should be limited to tangible items that should be priced by the tenderer, are identifiable and can be priced separately and included in the interim valuations precisely. Such items may include such items as site office, notice boards, and other temporary works, otherwise items such as security for the Works which are primarily part of the Contractor's obligations should be included in the Contractor's rates.

5.2 The work items in the Bills of Quantities should be grouped into sections to distinguish between those parts of the Works which by nature, location, access, timing, or any other special characteristics may give rise to different methods of construction, or phasing of the Works, or considerations of cost. Such groups could be ground excavations, structures, external works, services, etc. General items common to all parts of the Works may be grouped as a separate section in the Bill of Quantities.

5.3 Quantities should be computed net from the Drawings, unless directed otherwise in the Contract, and no allowance should be made for bulking, shrinkage or waste. Quantitiesshouldberoundedupwhereappropriate.

5.4 Where the measured items a redeemed not to be exact because of the likelihood that the scope can change during the execution of the works, such items could be subject to re-measurement, the word **"provisional"** should be used to identify such cases. Where whole sections of the work items fall in this class, for example foundations, they should be labelled "Provisional Quantities" or "Provisional Items" so that the Tenderer/Contractor is advised up front that such items are subject to re-measurement to done before such work is cover-up.

5.5 All items that have not been measured and therefore not subject tot enders pricing should be listed in the Bills of Quantities as **Provisional Sums** for particular item or class of Work, which may be subject to a nominated subcontract or separate measurements at a later date during the execution of the works. For example, if it is deemed not possible to measure electrical works before going to tender because detail designs are not ready, a provisional sum can be allowed in the Bills of Quantities for "Installation of Electrical Works" to be executed later when actual design details are completed. To the extent not covered above, there should be in the Bills of Quantities a general provision for physical and financial contingencies made as a "Provisional Sum for Contingencies" and "Provisional Sum for Fluctuations". The inclusion of such provisional sums often facilitates budgetary approval by avoiding the need to request periodic supplementary approvals as the future need arises.

5.6 Provisional sums to cover specialized works normally carried out by Nominated Sub Contractors should be avoided and instead Bills of Quantities of the specialized Works should be included as a section of the main Bills of Quantities to be priced by the Main Contractor. The Main Contractor should be required to indicate the name(s) of the specialized firms he proposes to engage to carry out the specialized Works as his approved domestic sub-contractors. Only provisional sums to cover specialized Works by statutory authorities should be included in the Bills of Quantities.

5.7 A Daywork Schedule should be included if the probability of unforeseen work, outside the items included in the Bill of Quantities, is relatively high. To facilitate checking by the Procuring Entity of the realism of rates quoted by the tenderers,

the Daywork Schedule should normally comprise:

i) A list of the various classes of labor, and materials for which basic.

ii) Daywork rates and prices for various categories of labor are to be inserted by the tenderer, together with a statement of the conditions under which the Contractor will be paid for Work executed on a Daywork basis.

iii) A percent a get o be entered by the tenderer agains teach basic Day work item.

iv) Subtotal amount for labor, materials and plant representing the Contractor's profit, overheads, supervision and other charges.

5.8 The Summary should contain a tabulation of the separate parts of the Bills of Quantities carried forward, with provisional sums for Daywork, Provisional sums and Contingencies, and provision for Total Costing. The last line should allow for tenderer to indicate any discounts before arriving at a total cost carried forward to the Form of Tender.

BILLS OF QUANTITIES

(a) Preambles

1. The method of measurement of completed work for payment shall be in accordance with *[insert the name of a standard reference guide, or full details of the methods to be used]*.

2. The Site is situated in NAROK COUNTY It is approximately150Kilometers from Nairobi.

3. The Contractor shall obtain the Architect's approval on the siting of all temporary buildings, spoil heaps, temporary access path, and storage of materials. The Contractor shall also obtain the Architect approval and direction regarding the use of any materials found on the Site.

4. The drawings used in the preparation of these Bills of Quantities can be inspected at the offices of the Procuring Entityor Procuring Entity's Representative during normal working hours. Two sets of the Working Drawings shall be provided to the contractor, but additional copies shall be provided at a cost to be determined by the Engineer.

5. The Contractor shall allow for the payment of all bank charges in connection with the procurement of Bank Guarantees and stamp charges in connection with this contract Agreement.

6. The Contractor shall carry out the various sections of the Works in such an order as the Architect May direct. The Procuring Entity reserves the right to occupy the Works by sections on completion provided that such occupation is considered to be both practical and reasonable and will not interfere with the Works. The Contractor shall allow any costs associated with such occupation.
7. The main Contractor will be fully responsible for paying his Sub-Contractor but the Procuring Entity reserves the right in very exceptional circumstances to make such payments direct in the interests of the project where the completion thereof might be jeopardized by any dispute or vicariousness between the Contractor and the Sub-Contractor involve.

8. The Contractor shall complete and deliver the Works in the period inserted in the Form of Tender as his time for completion of the Works from the date for Possession, to be agreed with the Engineer. The Contract Period is presumed to have been calculated making due allowance for seasonal inclement weather conditions. Noclaimfor extension of time due to the normal in clement weather for this area shall be entertained.

9. The Contractor shall, upon receiving instructions to proceed with the Works, draw up a Programme and Progress Chart setting out the order in which the Works are to be carried out, with the appropriate dates there of. This Chart shall be agreed with the Architect and no deviation from the order set out in it will be permitted without the written consent of the Engineer. The Contractor will be responsible for arranging the above programme with all his sub-Contractors and Specialties. The Contractor shall allow in his rates for carrying out this exercise, and for updating it as required.

10. The Contractor shall submit to the Architect on the first day of each week or such longer period as the Architect from time to time direct, a Progress Report and any information for the proceeding period, showing the progress during the period and the up-to-date cumulative progresson all important items of each section or portion of the Works.

11. The Contractor shall arrange for photographs of the Site to be taken by a professional photographer approved by the Engineer.The Photographs shall provide a record of the Site and adjacent are as prior to the commencement of the Works and shall cover such portion of the works in progress and completion as the Architect shall direct. All prints shall be full plate size, unmounted, and marked on the reverse side with the date of exposure, identification reference and brief description. The copyright of all photographs shall be vested in the Procuring Entity. The negatives and four prints from each negative shall be delivered to the Architect within two weeks of exposure.

12. Figured dimensions are to be followed in preference to dimensions scaled from the Drawings, but whenever possible dimensions are to be taken on the Site or from the buildings. Before any work is commenced by Sub- Contractors or Specialist Firms, dimensions must be checked on the site comparable dimensions shown on the drawings. The Contractor shall be responsible for the accuracy of such dimensions.

13. Prior to commencement of any work the Contractor is to ascertain from the relevant Authorities the exact position, depth and level of all existing electric cables, waterpipes or other services in the are aand he shall make whatever provisions may be required by the Authorities concerned for the support and protection of such services. Any damage or disturbance caused to any services shall be reported immediately to the Architect and the relevant Authority and shall be made good to their satisfaction at the Contractor's expense. Where appropriate the Contractor shall open up the ground in advance of the main work by hand digging if necessary, to locate precisely the position and details of the services which are likely to affect his operations.

14. The Contractor shall include in his prices for the transport of materials, workmen, etc./, to and from the site of the proposed works, at such hours and by such route as are permitted by the Authorities.

15. The Contractor will be required to make good, at his own expense and damage he may cause to the present road surface and pavements within or beyond the boundary of the Site, during the period of the works. All existing paths, storm water channels, etc., that may be destroyed or damaged during the progress of the Works shall be reinstated by the Contractor to the satisfaction of the Engineer.

16. The Contractor is to allow for complying with all instructions and regulations of the Police Authorities.

17. All water shall be fresh, clean and pure, free from earthly, vegetable or organic matter, acid or alkaline substance in solution. The Contractor shall provide at his own risk and cost all water for use in connection with the Works, (including works of sub–contractors). If need be, he shall make arrangements with the Local Water Authority for the installation of a separate meter for all water used by him throughout the Contract and pay all cost and fees in connection therewith. He shall also provide temporary storage tanks and tubing, etc., as may be necessary, and clear away at completion.

18. The Contractor shall provide all artificial lighting and power for his own use on the Works, (including Sub – Contractor's) including all temporary connections, wiring, fittings, etc., and clearing away on completion. The Contractor shall pay all fees and obtain all permits in connection there with.

19. The Contractor shall constantly keep on the Works a Literate English-speaking Agent or Representative, competent and experienced in the kind of work involved, who shall giveh is whole time to the superintendence of the works. (Including works of sub – contractors). Such Agent or Representative shall receive on behalf of the Contractordirections and instruction from the Engineer, and such directions and instructions shall be deemed to be given to the contractor in accordance with the Conditions of Contract. The Agent shall not be replaced without the specific approval of the Engineer.

20. The Contractor shall ensure that the safety of his work people and all authorized visitors to the site are protected at all times. In particular, there shall be the proper provision of guard–rails to scaffolding, protection against falling materials, tools on site, dust, nail and other sharp objects. The site shall be kept tidy and clear of dangerous rubbish. The Architect shall be empowered to suspend work on site should it be considered this condition is not being observed and no claim arising from such suspension will be allowed.

21. The are as available to the Contractor for workyards, offices and other facilities shall be directed by the Architect and any existing features to remain shall be protected from damage throughout the Contract Period and handed back in good condition when they are vacated at the end of the Contract. If additional areas are required, the contractorshallsourcethenatowncost.

22. The Contractor shall give the Architect reasonable notice of the intention to set out or take levels for any part of the Works so that arrangements may be made for checking the work. The accuracy of setting out and leveling shall be within the tolerances specified in the Specifications or on the Drawings. The checking of setting out or leveling by the Architect shall not relieve the Contractor of his duties or responsibilities under the Contract.

23. The Contractor must take steps necessary to safe guard and shall beheld fully responsible for any damage caused to existingand adjacent property, including buildings that are not a subject of demolition. He shall make good at his own cost damage to persons and property caused there on, and he shall indemnify the Procuring Entity against any loss or claim that may arise.

24. The Contractor shall take such steps and exercise such care and diligence as to minimize nuisance arising from dust, noise or any other cause to the occupiers of the existing and adjacent property. He must provide such temporary and special screens and tarpaulins or gummy bags, hoarding, barriers, warning signs etc. as he considers necessary and sufficient for the protection of the existing and adjacent property and or prevention of nuisance etc. as directed by Engineer.

25. The Contractors attention is drawn to the standards levy order which was amended on 15thOctober 1998.Legal notice No.154 of 1998. The Contractor is required to pay a monthly level of 0.2% of his factory price of construction works with effect from January 1999. Tenderer shall allow for this in the build-upo f his rates.

26. The Contractor shall provide temporary sheds, offices meshrooms, sanitary, accommodation and other temporary buildings for the use of the contractor and sub-contractors, including lighting furniture equipment and attendance.

27. Contractor shall provide/build labor camp sat areas to be agreed with the Engineer. Labor camps shall be complete with sanitary accommodation and fencing gates.

28. The Contractor must provide the necessary toilet facilities to the requirement and satisfaction of the Health Authorities and maintain the same in a thoroughly clean and sanitary condition and pay all conservancy fees during the period of the Works and remove when no longer required.

29. The Contractor shall provide at his own risk and cost all watching and lighting as necessary to safeguard the Works, Plant and materials against damage and theft.

30. The Contractor shall provide all necessary hoists, tackle, plant, equipment, vehicles, tools and appliances of every description for the due and satisfactory completion of the Works and shall remove the same on completion. All such plant, tools and equipment shall comply with all regulations in force throughout the period of the Contract and shall be altered or adopted during the Contract period as may be necessary to comply with any amendments in or additions to such regulations.

31. Provide, erect and maintain all necessary scaffolding, sufficiently strong and efficient for the due performance of the works, including Sub-Contract Works, provide special scaffolding as required by Sub-Contractors, alter and adopt all scaffolding as and when required during the Works, and remove on completion. No scaffolding is measured here in after and the Contractor must allow in his rates for this.

32. The Contractor shall take all necessary precautions such as temporaryf encing, hoarding fans, planked footways, guard–rails gantries screen, etc., for the safe custody of the Works, materials and public protection and adjacent properties.

33. Cover up all and protect from damage, including damage from in clement weather, all finished work and unfixed materials, including that of Sub-Contractors, etc., to the satisfaction of the Architect until the completion ofthe Contract.

34. The Contractor shall, after completion of the works, at his own expense, remove and clear away all surplus excavated demolition materials, plant, rubbish and unused materials and shall leave the whole of the Site and Works in a clean and tidy state to the satisfaction of the Engineer, sheds, camps, etc. Particular care shall be taken toleavecleanallfloors and windows and tore move all paint and cement all rubbis hand dirt as it accumulates. The Contractor is to find his own dump and shall pay all charges in connection there with.

35. Concrete test cubes shall be prepared in a set of three, as described including testing fees, labor and materials, making molds, transport, handling, etc. Allow in your rates for making at least four cubes on each occasion, from different batches; the concrete being taken from the point of deposit.

36. The Contractors hall furnish at the earliest possible opportunity before work commences, and at his own cost, any samples of materials and workmanship that may be called for by the Architect for the approval or rejection, and any further samples in the case of rejection, until such samples are approved by the Engineer.

Such samples, when approved, shall be the minimum standard for the work to which they apply. The proceduref or submitting samples of materials for testing or approval and the method of marking for identification shall be as laid down by the Engineer.The Contractor shall allow in his Tender for such samples and tests, including those in connection with his Sub-Contractors work.

37. The Contractors attention is drawn to the Finance Bill of the year 2000/2001 on withholding tax on contractual payment section 35(7)(i)(ii) which became effective on 1st July 2000. A 3% withholding tax will be applicable to all in terim payments exceeding Kshs…….....……. for work done in respect of building or civil works. The contractor shall allow for any costs arising resulting there from in the build-up of rates.

38. Blasting will only be allowed with the express permission of the Architect in writing. All blasting operations shall be carried out at the Contractor's sole risk and cost, in accordance with any Government regulations in force for the time being, and any special regulations laid down by the Architect governing the use and storage of explosives.

39. The National Construction Authority is a state corporation established under the national construction authority Act No.14 of 2011. The broad Mandate of the Authority is to over see the construction industry and coordinate its development. The National Construction Authority Regulations 2014 with an effective date of 6thJune 2014, regulation 25, - Allow 0.5% of the tender sum/contract sum for construction levy.

40. The Contractor attention is drawn to Finance Bill of 1993 where VATwas introduced in all contracts for construction services. The tenderer is also drawn to VATAct Cap 476 clause 19(9). The tenderer must allow for VAT1.19 as instructed else where.

41. The contractor shall allow and pay for all insurance to cover risks and indemnities required Items 17 and 18 of the Conditions of contract and also specified in the Special Conditions of Contract.

BILL NO. 1 - PRELIMINARY ITEMS

ITEM	DESCRIPTION	QTY	UNIT	UNIT RATE KES	AMOUNT KES
1	Discrepancies clause				
2	Conditions of sub-contract Agreement clause				
3	Payment's clause				
4	Site location clause				
5	Scope of Contract Works clause				
6	Extent of the Contractor's Duties clause				
7	Firm price contract clause				
8	Variation clause				
9	Prime cost and provisional sum clause (insert profit and attendance which is a percentage of expended PC or provisional sum.)				
10	Bond clause				
11	Government Legislation and Regulations clause				
12	Import Duty and Value Added Tax clause (Note this clause applies for materials supplied only. VAT will also be paid by the sub-contractor as allowed in the summary page)				
13	Insurance company Fees clause				
14	Provision of services by the Main contractor clause				
15	Samples and Materials Generally clause				
	SUB-TOTAL CARRIED TO PAGE Elec:H-6				

ITEM	DESCRIPTION	QTY	UNIT	UNIT RATE KES	AMOUNT KES
16	Supplies clause				
17	Bills of Quantities clause				
18	Contractor's Office in Kenya clause				
19	Builder's Work clause				
20	Setting to work and Regulating system clause				
21	Identification of plant components clause				
22	Working Drawings clause				
23	Record Drawings (As Installed) and Instructions clause				
24	Maintenance Manual clause				
25	Hand over clause				
26	Painting clause				
27	Testing and Inspection – manufactured plant clause				
28	Testing and Inspection – Installation clause				
29	Storage of Materials clause				
30	Initial Maintenance clause				
	SUB-TOTAL CARRIED TO PAGE Elec:H-6				

ITEM	DESCRIPTION	QTY	UNIT	UNIT RATE KES	AMOUNT KES
31	Attendance Upon Tradesmen, etc. (Insert percentage only) clause				
32	Local and other Authorities notices and fees clause				
33	Temporary Works clause				
34	Patent Rights clause				
35	Mobilization and Demobilization Clause				
36	Extended Preliminaries Clause				
37	Allow for profit and Attendance for the above				
38	Amendment to Scope of Sub-contract Works Clause				
39	Contractor Obligation and Employers Obligation clause				
40					
	SUB-TOTAL CARRIED TO PAGE Elec:H-6				

ITEM	DESCRIPTION	QTY	UNIT	UNIT RATE KES	AMOUNT KES
a)	ubtotal brought forward from page **Elec:**H-3				
b)	ubtotal brought forward from page **Elec:**H-4				
c)	ubtotal brought forward from page **Elec:**H-5				
	TOTAL FOR PRELIMINARIES CARRIED FORWARD TO ELECTRICAL PRICE MAIN SUMMARY Page				

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
	Elec: BILL No.1 **HOSPITAL BLOCK-GROUND FLOOR** **Supply, install, test and commission the following: -**				
1.1	**LIGHTING POINTS AND SWITCHES**				
1.01	Lighting points wired in 3x1.5 mm^2 PVC/SC on cables drawn in 20 mm Ǿ concealed HG PVC conduits complete with all necessary accessories but excluding switches for:				
	i) One way switching	310	No.		
	ii)Two way switching	152	No.		
1.02	10A moulded ivory white switch plates as MK range or approved equivalent as follows:				
	i) One gang one way	83	No .		
	ii) Two gang one way	10	No.		
	iii) One gang two way	39	No.		
	iv)Two gang two way	10	No.		
	v) Intermediate	10	No.		
1.2	**LIGHTING FITTINGS**				
1.2.1	Lighting fittings complete with lamps of appropriate wattage and colour rendering and fixing materials as follows:				
i)	1 x 36w 1200 mm LED Equivalent fluorescent fitting complete with clear acrylic diffuser as Phillips or Approve Equivalent	45	No		
ii)	600x600mm, 40W Diffused L.E.D panel as PHILIPS or Equal and approved	260	No		
iii)	2x 34w 300 x1200 mm fluorescent luminaire with hinged TP (a) prismatic diffuser sealed to IP65 as Thorn invincible Cat No. FINVRZ 234 2L P or approved equivalent	2	No		
iv)	3W GU10 CoreLine recessed L.E.D Downlight of 75dia Cut Cat No-910500453199 as PHILIPS or Equal and approved	50	No		
v)	Self-contained single sided EXIT sign with 8W fluorescent lamp for maintained emergency lighting for 3 hour duration as	10	No		
vi)	Surface mounted 2D Type IP65 LED light fitting for Wash Room as Phillips or approved equivalent	37	No.		
	Total carried to Elec: Bill No 1 **Collection Page**				

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
vii)	Bulk head fitting with aluminium alloy body and poly carbonate diffuser for 2 x9W PL PolyC or approved equivalent	45	No		
viii)	1 x 36W, 1200mm single batten HPF corrosion proof fluorescent fittings as Thorn or approved equivalent	10	No		
1.3	**POWER POINTS.**				
1.3.1	Socket outlet power points comprising wiring in 3 x 2.5mm^2 PVC/SC copper cables drawn in 25mm Ø concealed HG PVC conduits including all conduit accessories but excluding plates	255	No		
1.3.2	13A moulded socket outlet plates as Crabtree or approved equivalent as follows				
	a) Single switched	15	No		
	b) Twin switched	240	No		
1.3.3	Extract fan power point comprising wiring in 3 x 2.5mm^2 PVC/SC CU cables drawn in 25mm Concealed HG/SC CU cables drawn in 25mmØ concealed HG PVC conduits	6	No.		
1.3.4	Hand drier power point comprising wiring in 3 x 2.5mm^2 PVC/SC CU cables drawn in 25mmØ concealed HG PVC	10	No.		
1.3.5	Air conditioning power point comprising wiring in 3 x 4.0mm^2 PVC/SC CU cables drawn in 25mmØ concealed PVC HG	2	No.		
1.3.6	X-ray & Screening power point comprising wiring in 5 x 4.0mm^2 PVC/SC CU cables drawn in 32mm Φ concealed HG	4	No.		
1.3.7	X-ray viewer's lamp power point comprising wiring in 3 x 1.5mm^2 PVC/sc CU cables drawn in 25mm Φ concealed HG	2	No.		
	Total carried to Elec: Bill No 1 Collection Page				

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
1.3.8	20A, DP switched for item above as Crabtree or approved equivalent	18	No.		
1.3.9	32A SP isolator for items above Crabtree or approved	6	No.		
1.3.10	X-ray viewer's lamp power point comprising wiring in 3 x 2.5mm^2 PVC/sc CU cables drawn in 25mm Φ concealed HG PVC conduits	1	No.		
1.4	**FIRE ALARM SYSTEM**				
1.4.1	Fire alarm points comprising wiring in 1.5mm^2 heat resistant screened cables drawn in 20mmØ concealed HG PVC conduits	150	No.		
1.4.2	Addresable Manual Fire Alarm 'Break Glass' Call points as Menvier or approved equivalent.	15	No.		
1.4.3	150mmØ Fire Alarm Sounders as MENVIER or approved equivalent.	15	No.		
1.4.4	4-Loop Addressable Fire Alarm Main control panel as Menvier or approved equivalent.	1	No.		
1.4.5	Addressable Photoelectric Smoke Detector as Menvier or Approved Equivalent.	120	No.		
1.4.6	Self -contained single sided exit sign with 8W fluorescent lamp for non-maintained emergency lighting for 3 hour duration as Thorn FFX 3 or approved equivalent.	8	No.		
1.5	**DISTRIBUTION BOARDS & SUB-MAINS CABLES**				
1.5.1	16 way TPN flush mounted Distribution Board DB-G1, G2 & G3 Complete with 125A integral isolator as Crabtree or Approved Equivalent	3	No.		
1.5.2	MCBs for Items above as follows:-				
	i) 10A SP	45	No.		
	ii) 32A SP	34	No.		
	ii) 20A SP	10	No.		
	iii) SP Blanking plates	8	No.		
1.5.3	Sub-mains cables consisting of 25mm^2 4C CU armoured cables from Sub-switch board 'M1' to DB G1, G2 & G3	150	LM		
1.5.4	10 Way TPN flush mounted distribution board DB 'G4' G5 G6 complete with 100A integral isolator as Crabtree or Approved Equivalent	3	No.		
1.5.5	MCBs for items above as follows:-				
	i) 10A SP	12	No.		
	ii) 32A SP	2	No.		
	iii) SP Blanking plates	3	No.		
	Total carried to Elec: Bill No 1 **Collection Page**				

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
1.5.6	Sub-mains cables consisting of 16mm^2 4C CU armoured cables from switchboard 'M2' to DB- G4, G5 & G6	180	LM		
1.5.7	12 Way TPN flush mounted distribution board DB G3 complete with 100A integral isolator as Crabtree or Approved Equivalent	2	No.		
1.5.8	MCBs as follows:-				
	i) 10A SP	16	No.		
	ii) 32A SP	6	No.		
	iii) 20A SP	7	No.		
	iii) SP Blanking plates	7	No.		
1.5.9	Sub-mains cables consisting of 25mm^2 4C CU armoured cables from switchboard 'M2' to DB G7	80	LM		
1.5.10	Sub-mains cables consisting of 50mm^2 4C CU armoured cables from switchboard 'M2' to XRAY MACHINE	150	LM		
1.5.11	Sub-mains cables consisting of 50mm^2 4C CU armoured cables from switchboard 'M2' to MRI Machine	160	LM		
1.6	**TELEPHONE AND TELEVISION OUTLET**				
1.6.1	Data/Telephone outlet points comprising 25mm Φ concealed HG PVC conduits complete with draw wire, complete with Dual RJ 45 Cat 6(angled) outlet plate As SEIMON.	71	No.		
1.6.2	Television output points comprising 25mmØ HG PVC conduits complete with T.V co-axial socket outlet As M.K	5	No.		
1.6.3	250 X 250 X 150mm G.I Fully Recessed Telephone Draw box	3	No		
1.6.4	50mmØ PVC HG conduit linking the Draw Boxes	50	LM		
1.6.5	250mm x 50mm Two compartment powder coated G.I skirting Trunking complete with all associated accessories.	145	LM		
1.6.6	C.C.T.V points comprising draw wire in concealed 20mmØ HG PVC Conduits all emanating from the security office	11	No.		
1.6.7	Access control points comprising draw wire in concealed 20mmØ HG PVC Conduits all emanating from the computer	6	No.		
1.6.8	Lift emergency intercom points comprising draw wire in concealed 20mmØ HG PVC Conduits running from the lift shaft ground floor level to the security office	30	LM		
1.7	**EXTERNAL LIGHTING**				
1.7.1	20A 240V 3P contactor for switching external lights AS TELEMECANIC complete with Housing and all accessories.	3	No.		
1.7.2	Photocell control unit and wired to energize the contactors complete with a D.P override switch As Thorn QPK.	1	No.		
	Total carried to Elec: Bill No 1 **Collection Page**				

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
1.8	**Cable Tray & Trunking system**				
1.8.1	250x50mm PVC 2-compartment **a** PVC trunking made complete with cover, screws etc.	620	LM		
1.8.2	250x50mm PVC corner bends for the trunking above.	150	No		
1.8.3	PVC Punched outlet plates on the trunking for twin socket outlets.	180	No		
1.8.4	PVC Punched outlet plates on the trunking for data/telephone outlet plates.	80	No		
1.8.5	300x50mm Steel galvanised paforated Cable tray mounted on the ceiling complete with all accessories	260	LM		
1.8.6	200x50mm Steel galvanised paforated Cable tray mounted on the ceiling complete with all accessories	260	LM		
Total carried to Elec: Bill No 1 **Collection Page**					

Item	Description	Amount KES
	Elec: BILL No.1 COLLECTION PAGE	
1	TOTAL B/F Page Elec:H-7…….	
2	TOTAL B/F Page Elec:H-8……	
3	TOTAL B/F Page Elec:H-9……	
4	TOTAL B/F Page Elec:H-10……	
5	TOTAL B/F Page Elec:H-11……	
	Total for Elec: Bill No 1 C/F to Electrical Bills summary Page Elec:H-50	

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
	Elec: BILL No.2				
	HOSPITAL BLOCK-FIRST FLOOR				
	Supply, install, test and commission the				
2.1	**LIGHTING POINTS AND SWITCHES**				
2.1.1	Lighting points wired in 3 x 1.5mm^2 PVC/SC CU cables drawn in 20mm Φ concealed HG PVC conduits complete with all necessary accessories but excluding switches for:-				
	i) One way switching	324	No.		
	ii) Two way switching	94	No.		
	10A, moulded ivory white switch plates as MK Range or approved equivalent as follows:-				
	i) One gang one way	60	No.		
	ii) Two gang one way	10	No.		
	iii) One gang two way	35	No.		
	iv) Two gang two way	3	No.		
	v) Intermediate switch	7	No.		
	vi) One gang one way sparkless, splash proof mercury type switch.	6	No.		
2.2	**LIGHTING FITTINGS**				
2.2.1	Lighting fittings complete with lamps of appropriate wattage and colour rendering and fixing materials as follows:-				
i)	1 x 36w 1200 mm LED Equivalent fluorescent fitting complete with clear acrylic diffuser as Phillips or Approve Equivalent	35	No		
ii)	600x600mm, 40W Diffused L.E.D panel as PHILIPS or Equal and approved	280	No		
iii)	2x 34w 300 x1200 mm fluorescent luminaire with hinged TP (a) prismatic diffuser sealed to IP65 as Thorn invincible Cat No. FINVRZ 234 2L P or approved equivalent	8	No		
iv)	3W GU10 CoreLine recessed L.E.D Downlight of 75dia Cut Cat No-910500453199 as PHILIPS or Equal and approved	42	No		
v)	Self-contained single sided EXIT sign with 8W fluorescent lamp for maintained emergency lighting for 3 hour duration as	4	No		
vi)	Surface mounted 2D Type IP65 LED light fitting for Wash Room as Phillips or approved equivalent	39	No.		
	2 x 36W, 1200mm single batten HPF corrosion proof fluorescent fittings as Thorn or approved equivalent	10	No		
	Total carried to Elec: Bill No 2 **Collection Page**				

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
2.3	**POWER POINTS**				
2.3.1	Socket outlet power points comprising wiring in 3 x 2.5mm^2 PVC/SC on cables drawn in 25mm Φ concealed HG PVC conduits including all conduit accessories but excluding plates	250	No.		
2.3.2	13A moulded socket outlet plates as Crabtree or approved equivalent as follows:				
i)	Twin switched	235	No.		
ii)	Twin switch but sparkless splash proof mercury type	15	No.		
2.3.3	Fume cupboard powder points comprising wiring in 3 x 4.0mm^2 PVC/SC CU cables drawn in 32mm Φ concealed HG	2	No.		
2.3.4	Extract fan power point comprising wiring in 3 x 2.5mm^2 PVC/SC CU cables drawn in 25mm Φ concealed HG conduits.	6	No.		
2.3.5	Hand drier power points comprising wiring in 3 x 2.5mm^2 PVC/SC CU cables drawn in 25mm Φ concealed HG PVC conduits.	6	No.		
2.3.6	20A DP switched for items above as Crabtree or approved equivalent	16	No.		
2.3.7	Air conditioner unit power point comprising wiring in 5 x 10mm^2 PVC/SC CU cables drawn in 32mm Φ concealed HG PVC conduits.	7	No.		
2.3.8	32A TP isolators for Item Nos. 3.12, 3.13 & 3.14 as Crabtree or approved equivalent.	7	No.		
2.3.9	63A TP isolators for item No. 3.15 as Crabtree or approved equivalent.	2	No.		
2.3.10	Sterilizer power points comprising wiring in 5 x 6.0mm^2 PVC/SC CU cables drawn in 32mm Φ concealed HG PVC conduits.	2	No.		
2.3.11	Auto clave machine power points comprising wiring in 5 x 6.0mm^2 PVC/SC CU cables drawn in 32mm Φ concealed HG PVC conduits.	2	No.		
2.3.12	Supply/Extract fan power points comprising wiring in 5 x 4.0mm^2 PVC/SC CU cables drawn in 32mm Φ concealed HG PVC conduits.	2	No.		
	Total carried to Elec: Bill No 2 **Collection Page**				

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
2.4	**FIRE ALARM SYSTEM**				
2.4.1	Fire alarm points comprising wiring in 1.5mm^2 heat resistant screened cables drawn in 20mm Φ concealed HG PVC conduits	115	No.		
2.4.2	Addressable fire alarm 'Break Glass' call points as MENVIER or approved equivalent.	12	No.		
2.4.3	150mm Φ Fire Alarm Sounders as MENVIER or approved equivalent.	12	No.		
2.4.4	Addressable Photoelectric smoke detector as Menvier or approved Equivalent	90	No		
2.4.5	2-Loop Addressable Repeater control panel as Menvier or approved equivalent.	1	No.		
Total carried to Elec: Bill No 2 **Collection Page**					-

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
2.5	**TELEPHONE & TELEVISION**				
2.5.1	Data/Telephone outlet points comprising 25mm Φ concealed HG PVC conduits complete with draw wire, all emanating from the P.A.B.X/Computer room.	45	No.		
2.5.2	Television outlet points comprising 25mm Φ HG PVC conduits complete with T.V co-axial socket outlet as M.K	10	No.		
2.5.3	250 X 250 X 150mm G.I Fully Recessed Telephone Draw box	6	No		
2.5.4	50mmØ PVC HG conduit linking the Draw Boxes	120	LM		
2.5.5	C.C.T.V points comprising draw wire in concealed 20mm HG PVC Conduits all emanating from the security office	17	No.		
2.6	**DISTRIBUTION BOARDS & SUB-MAINS**				
2.6.1	16 Way 125A TPN flush mounted distribution board DBs F1, F2 & F3 as Crabtree or approved equivalent.	3	No.		
2.6.2	MCBs for items above as Crabtree or approved equivalent as follows:-				
i)	10A, SP	29	No.		
ii)	30A, SP	15	No.		
iii)	20A, SP	18	No.		
iii)	32A, TP	15	No.		
iv)	60A, TP	2	No.		
v)	SP Blanking plates	13	No.		
Total carried to Elec: Bill No 2 **Collection Page**					

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
2.6.3	Sub-mains cables comprising of wiring in 35mm^2 4C armoured CU cables from switchboard M1 to DBs F1, F2 & F3.	300	LM		
2.6.4	10 way 100A TPN flush mounted distribution board DB 'F4 F5 & F6' as Crabtree or approved equivalent.	3	No.		
2.6.5	MCBs for items above as Crabtree and as follows:				
i)	10A, SP	6	No.		
ii)	32A, SP	1	No.		
iii)	20A, SP	2	No.		
iv)	SP Blanking plates	3	No.		
2.6.6	Sub-mains cables comprising of wiring in 16mm^2 4C armoured cables from switchboard M2 to DB- F4, F5 & F6	150	M		
2.6.1	**THEATRE LAMPS.** Self Maintained Theatre Emergency Surgical Shadowless Operation Light /LED operation theatre light ceiling mounted operating lamp hospital equipment with colour tempreture 3500-5000k, of 2 Main rotating Arm. Each Arm having 5 LED Panels complete with control panels As HOSPEDIA LED 50 DOUBLE DOME or Approved Equivalent	8	No.		
2.7	**Cable Tray & Trunking system**				
2.7.1	250x50mm PVC 2-compartment **a** PVC trunking made complete with cover, screws etc.	320	LM		
2.7.2	250x50mm PVC corner bends for the trunking above.	140	No		
2.7.3	PVC Punched outlet plates on the trunking for twin socket outlets.	180	No		
2.7.4	PVC Punched outlet plates on the trunking for data/telephone outlet plates.	80	No		
2.7.5	300x50mm Steel galvanised paforated Cable tray mounted on the ceiling complete with all accessories	210	LM		
2.7.6	200x50mm Steel galvanised paforated Cable tray mounted on the ceiling complete with all accessories	210	LM		
	Total carried to Elec: Bill No 2 **Collection Page**				

Item	Description	Amount KES
	Elec: BILL No.2 COLLECTION PAGE	
1	TOTAL B/F Page Elec:H-13…….	
2	TOTAL B/F Page Elec:H-14…….	
3	TOTAL B/F Page Elec:H-16…….	
5	TOTAL B/F Page Elec:H-17…….	
6	TOTAL B/F Page Elec:H-18…….	
	Total for Elec: Bill No 2 C/F to Electrical Bills summary Page Elec:H-50	**-**

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
	Elec: BILL No.3 **HOSPITAL BLOCK- SECOND FLOOR** **Supply, install, test and commission the following:**				
3.1	**LIGHTING POINTS AND SWITCHES**				
3.1.1	Lighting points wired in 3 x 1.5mm^2 PVC/SC CU cables drawn in 20mmØ concealed HG PVC conduits complete with all necessary accessories but excluding switches for:-				
	i) One way switching	261	No.		
	ii) Two way switching	85	No.		
	10A, moulded ivory white switch plates as MK Range or approved equivalent as follows:- i) One gang one way	55	No.		
	ii) Two gang one way	24	No.		
	iii) One gang two way	35	No.		
	iv) Two gang two way	4	No.		
	v) Intermediate switch	6	No.		
3.2	**LIGHTING FITTINGS**				
3.2.1	Lighting fittings complete with lamps of appropriate wattage and colour rendering and fixing materials as follows:-				
i)	1 x 36w 1200 mm LED Equivalent fluorescent fitting complete with clear acrylic diffuser as Phillips or Approve Equivalent	25	No		
ii)	600x600mm, 40W Diffused L.E.D panel as PHILIPS or Equal and approved	220	No		
iii)	2x 34w 300 x1200 mm fluorescent luminaire with hinged TP (a) prismatic diffuser sealed to IP65 as Thorn invincible Cat No. FINVRZ 234 2L P or approved equivalent	8	No		
iv)	3W GU10 CoreLine recessed L.E.D Downlight of 75dia Cut Cat No-910500453199 as PHILIPS or Equal and approved	56	No		
v)	Self-contained single sided EXIT sign with 8W fluorescent lamp for maintained emergency lighting for 3 hour duration as	6	No		
vi)	Surface mounted 2D Type IP65 LED light fitting for Wash Room as Phillips or approved equivalent	29	No.		
	Total carried to Elec: Bill No 3 **Collection Page**				

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
vii)	1 x 36W, 1200mm single batten HPF corrosion proof fluorescent fittings as Thorn or approved equivalent	2	No		
3.3	**POWER POINTS**				
3.3.1	Socket outlet power points comprising wiring in 3 x 2.5mm^2 PVC/SC CU cables drawn in 25mmØ concealed HG PVC conduits including all conduit accessories but excluding plates	185	No.		
3.3.2	13A moulded socket outlet plates as Crabtree or approved equivalent as follows: Twin switched	185	No.		
3.3.3	Hand drier power points comprising wiring in 3 x 2.5mm^2 PVC/SC/CU cables drawn in 25mmØ concealed HG PVC conduits	5	No.		
3.3.4	20A DP switches for item above	5	No.		
3.4	**FIRE ALARM SYSTEM**				
3.4.1	Fire Alarm points comprising wiring in 1.5mm^2 heat resistant cables drawn in 20mmØ concealed HG PVC conduits	93	No.		
3.4.2	Addresable Photoelectric Smoke Detector.	75	No.		
3.4.3	2-Loop Addressable Repeater control panel as Menvier or approved equivalent.	1	No.		
3.4.4	Addressable Fire Alarm 'Break Glass' call points as MENVIER or approved equivalent.	11	No.		
3.4.5	150mmØ Fire Alarm sounders as MENVIER or approved equivalent.	6	No.		
Total carried to Elec: Bill No 3 **Collection Page**					

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
3.5	**TELEPHONE & TELEVISION**				
3.5.1	Telephone outlet points comprising 25mmØ concealed HG PVC conduits complete with draw wire.	50	No.		
3.5.2	Television cord outlet points comprising 25mmØ HG PVC conduits complete with T.V co-axial socket outlet as M.K	50	No.		
	250 X 250 X 150mm G.I Fully Recessed Telephone Draw box	3	No		
3.5.3	C.C.T.V points comprising draw wire in concealed 20mm Ø HG PVC Conduits all emanating from the security office	2	No.		
3.5.4	50mmØ PVC HG conduit linking the Draw Boxes	180	LM		
3.6	**DISTRIBUTION BOARDS & SUB-MAINS**				
3.6.1	16 way TPN flush mounted distribution board DB S1 S2 & S3 complete with 125A integral isolator as Crabtree or approved equivalent.	3	No.		
3.6.2	MCBs for item bove as Crabtree or approved equivalent as follows:-				
i)	10A, SP	30	No.		
ii)	32A, SP	50	No.		
iii)	SP Blanking plates	13	No.		
3.6.3	10way TPN flush mounted distribution board DB S4, S5 & S6 complete with 100A integral isolator as Crabtree or approved equivalent.	3	No.		
3.6.4	MCBs for Item aboveas Crabtree or approved equivalent as follows:-				
i)	10A, SP	15	No.		
ii)	32A, SP	30	No.		
iii)	SP Blanking plates	6	No.		
	Total carried to Elec: Bill No 3 **Collection Page**				

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
3.6.5	Sub-mains cables comprising of wiring in 25mm^2 4C CU armoured cables in 50m Φ HG PVC conduit from switchboard M1 to DB S1 S2 & S3.	350	LM		
3.6.6	Sub-mains cables comprising wiring in 16mm^2 4C CU armoured cables in 38 mmØ HG PVC conduits from switchboard M2 to DB-S4, S5 & S6.	150	LM		
3.7	**Cable Tray & Trunking system**				
3.7.1	250x50mm PVC 2-compartment **a** PVC trunking made complete with cover, screws etc.	450	LM		
3.7.2	250x50mm PVC corner bends for the trunking above.	140	No		
3.7.3	PVC Punched outlet plates on the trunking for twin socket outlets.	185	No		
3.7.4	PVC Punched outlet plates on the trunking for data/telephone outlet plates.	80	No		
3.7.5	300x50mm Steel galvanised paforated Cable tray mounted on the ceiling complete with all accessories	250	LM		
3.7.6	200x50mm Steel galvanised paforated Cable tray mounted on the ceiling complete with all accessories	250	LM		
	Total carried to Elec: Bill No 3 **Collection Page**				

Item	Description	Amount KES
	Elec: BILL No.3 COLLECTION PAGE	
1	TOTAL B/F Page Elec:H-20……..	
2	TOTAL B/F Page Elec:H-21……..	
3	TOTAL B/F Page Elec:H-22……..	
4	TOTAL B/F Page Elec:H-23……..	
Total for Elec: Bill No 3 C/F to Electrical Bills summary Page Elec:H-50		

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
	Elec: BILL No.4 **Supply, install, test and commission the**				
4.1	**HOSPITAL BLOCK- THIRD FLOOR**				
4.1.1	Lighting points wired in 3 x 1.5mm^2 PVC/SC CU cables drawn in 20mm Φ concealed HG PVC conduits complete with all necessary accessories but excluding switches for:-				
i)	One way switching	127	No.		
ii)	Two way switching	70	No.		
	10A, moulded ivory white switch plates as MK Range or approved equivalent as follows:-				
i)	One gang one way	72	No.		
ii)	Two gang one way	11	No.		
iii)	One gang two way	22	No.		
iv)	Two gang two way	3	No.		
v)	Intermediate switch	7	No.		
4.2	**LIGHTING FITTINGS**				
4.2.1	Lighting fittings complete with lamps of appropriate wattage and colour rendering and fixing materials as follows:-				
i)	2 x 36w 1200 mm LED Equivalent fluorescent fitting complete with clear acrylic diffuser as Phillips or Approve Equivalent	16	No		
ii)	600x600mm, 40W Diffused L.E.D panel as PHILIPS or Equal and approved	221	No		
iii)	2x 34w 300 x1200 mm fluorescent luminaire with hinged TP (a) prismatic diffuser sealed to IP65 as Thorn invincible Cat No. FINVRZ 234 2L P or approved equivalent	5	No		
iv)	3W GU10 CoreLine recessed L.E.D Downlight of 75dia Cut Cat No-910500453199 as PHILIPS or Equal and approved	26	No		
v)	Self-contained single sided EXIT sign with 8W fluorescent lamp for maintained emergency lighting for 3 hour duration as	12	No		
vi)	Surface mounted 2D Type IP65 LED light fitting for Wash Room as Phillips or approved equivalent	55	No.		
vii)	1 x 36W, 1200mm single batten HPF corrosion proof fluorescent fittings as Thorn or approved equivalent	6	No		
	Total carried to Elec: Bill No 4 **Collection Page**				**0**

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
4.3	**POWER POINTS**				
4.3.1	Socket outlet power points comprising wiring in 3 x 2.5mm^2 PVC/SC CU cables drawn in 25mm Φ concealed HG PVC conduits including all conduit accessories but excluding plates	222	No.		
4.3.2	13A moulded socket outlet plates as Crabtree or approved equivalent as follows: Twin switched	222	No.		
4.3.3	Fume Cupboard extract fan power point comprising wiring in 5 x 4mm^2 PVC/SC CU cables drawn in 32mm Φ concealed HG PVC conduits.	1	No.		
4.3.4	32A TP Isolator for item above as Crabtree or approved equivalent.	1	No.		
4.3.5	Hand drier power points comprising wiring in 3 x 2.5mm^2 PVC/SC/CU cables drawn in 25mm Φ concealed HG PVC conduits	20	No.		
4.3.6	20A DP switches for item No. 5.10 as Crabtree or approved equivalent.	20	No.		
4.4	**FIRE ALARM SYSTEM**				
4.4.1	Fire alarm comprising wiring in 1.5mm^2 heat resistant cables drawn in 20mm Φ concealed HG PVC conduits	89	No.		
4.4.2	Addressable Alarm 'Break Glass' call points as MENVIER or approved equivalent.	11	No.		
4.4.3	150mm Φ Fire Alarm Sounders as MENVIER or approved equivalent	6	No.		
4.4.4	Addressable Photoelectric smoke Detector.	72	No.		
Total carried to Elec: Bill No 4 **Collection Page**					

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
4.5	**TELEPHONE & TELEVISION**				
4.5.1	Telephone outlet points comprising 25mm Φ concealed HG PVC conduits complete with draw wire.	80	No.		
4.5.2	Television cord outlet points comprising 25mm Φ HG PVC conduits complete with T.V co-axial socket outlet as M.K	17	No.		
4.5.3	250 X 250 X 150mm G.I Fully Recessed Telephone Draw box	3	No		
4.5.4	C.C.T.V points comprising draw wire in concealed 20mm HG PVC Conduits all emanating from the security office	20	No.		
4.5.5	50mmØ PVC HG conduit linking the Draw Boxes	150	LM		
4.6	**DISTRIBUTION BOARDS & SUB-MAINS**				
4.6.1	16-Way TPN flush mounted distribution board complete with 125A integral Isolator D.B. T1, T2 & T3 as Crabtree or approved equivalent.	3	No.		
4.6.2	MCBs for items above as Crabtree or approved equivalent as follows:-				
i)	10A, SP	35	No.		
ii)	32A, SP	35	No.		
iii)	SP Blanking plates	18	No.		
	Total carried to Elec: Bill No 5 **Collection Page**				**0**

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
4.6.3	10 way TPN flush mounted distribution board DB T4, T5 & T6 complete with 100A integral isolator as Crabtree or approved equivalent.	3	No.		
4.6.4	MCBs for Items as Crabtree or approved equivalent as				
i)	10A, SP	3	No.		
ii)	32A, SP	15	No.		
iii)	Blanking plates	8	No.		
4.6.5	Sub-mains cables comprising wiring in 25mm^2 4C CU armoured cables in 50mm Φ HG PVC conduit, Cable Trays and service duct from switchboard M1 to DB T1 T2 & T3	380	LM		
4.6.6	Sub-mains cables comprising wiring in 16mm^2 4C CU armoured cables in 50mm Φ HG PVC conduit, Cable Trays and service duct from switchboard M2 To DB T4, T5 & T6	150	LM		
4.7	**Cable Tray & Trunking system**				
4.7.1	250x50mm PVC 2-compartment **a** PVC trunking made complete with cover, screws etc.	220	LM		
4.7.2	250x50mm PVC corner bends for the trunking above.	140	No		
4.7.3	PVC Punched outlet plates on the trunking for twin socket outlets.	180	No		
4.7.4	PVC Punched outlet plates on the trunking for data/telephone outlet plates.	80	No		
4.7.5	300x50mm Steel galvanised paforated Cable tray mounted on the ceiling complete with all accessories	210	LM		
4.7.6	200x50mm Steel galvanised paforated Cable tray mounted on the ceiling complete with all accessories	210	LM		
	Total carried to Elec: Bill No 4 **Collection Page**				

Item	Description	Amount KES
	Elec: BILL No.4 COLLECTION PAGE	
1	TOTAL B/F Page Elec:H-25…….	
2	TOTAL B/F Page Elec:H-26…….	
3	TOTAL B/F Page Elec:H-27 …….	
4	TOTAL B/F Page Elec:H-28……..	
	Total for Elec: Bill No 4 C/F to Electrical Bills summary Page Elec:H-50	

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
	Elec: BILL No.5				
5.1	**HOSPITAL BLOCK- FOURTH FLOOR**				
	Supply, install, test and commission the				
5.1.1	Lighting points wired in 3 x 1.5mm^2 PVC/SC CU cables drawn in 20mm Φ concealed HG PVC conduits complete with all necessary accessories but excluding switches for:-				
i)	One way switching	186	No.		
ii)	Two way switching	12	No.		
	10A, moulded ivory white switch plates as MK Range or approved equivalent as follows:-				
i)	One gang one way	72	No.		
ii)	Two gang one way	11	No.		
iii)	One gang two way	22	No.		
iv)	Two gang two way	3	No.		
v)	Intermediate switch	7	No.		
5.2	**LIGHTING FITTINGS**				
	Lighting fittings complete with lamps of appropriate wattage and colour rendering and fixing materials as follows:-				
i)	2 x 36w 1200 mm LED Equivalent fluorescent fitting complete with clear acrylic diffuser as Phillips or Approve Equivalent	16	No		
ii)	600x600mm, 40W Diffused L.E.D panel as PHILIPS or Equal and approved	150	No		
iii)	2x 34w 300 x1200 mm fluorescent luminaire with hinged TP (a) prismatic diffuser sealed to IP65 as Thorn invincible Cat No. FINVRZ 234 2L P or approved equivalent	5	No		
iv)	3W GU10 CoreLine recessed L.E.D Downlight of 75dia Cut Cat No-910500453199 as PHILIPS or Equal and approved	30	No		
v)	Self-contained single sided EXIT sign with 8W fluorescent lamp for maintained emergency lighting for 3 hour duration as	6	No		
vi)	Surface mounted 2D Type IP65 LED light fitting for Wash Room as Phillips or approved equivalent	25	No.		
vii)	1 x 36W, 1200mm single batten HPF corrosion proof fluorescent fittings as Thorn or approved equivalent	3	No		
	Total carried to Elec: Bill No 5 **Collection Page**				

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
5.3	**POWER POINTS**				
5.3.1	Socket outlet power points comprising wiring in 3 x 2.5mm^2 PVC/SC CU cables drawn in 25mm Φ concealed HG PVC conduits including all conduit accessories but excluding plates	110	No.		
5.3.2	13A moulded socket outlet plates as Crabtree or approved equivalent as follows:				
	Twin switched	110	No.		
5.3.3	Hand drier power points comprising wiring in 3 x 2.5mm^2 PVC/SC/CU cables drawn in 25mm Φ concealed HG PVC conduits	4	No.		
5.3.4	20A DP switches for item as Crabtree or approved equivalent.	4	No.		
5.4	**FIRE ALARM SYSTEM**				
5.4.1	Fire alarm comprising wiring in 1.5mm^2 heat resistant cables drawn in 20mm Φ concealed HG PVC conduits	50	No.		
5.4.2	Addressable Alarm 'Break Glass' call points as MENVIER or approved equivalent.	10	No.		
5.4.3	150mm Φ Fire Alarm Sounders as MENVIER or approved equivalent	3	No.		
5.4.4	Addressable Photoelectric smoke Detector.	37	No.		
	Total carried to Elec: Bill No 5 **Collection Page**				**0**

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
5.5	**TELEPHONE & TELEVISION**				
5.5.1	Telephone outlet points comprising 25mm Φ concealed HG PVC conduits complete with draw wire.	50	No.		
5.5.2	Television cord outlet points comprising 25mm Φ HG PVC conduits complete with T.V co-axial socket outlet as M.K	10	No.		
	250 X 250 X 150mm G.I Fully Recessed Telephone Draw box	3	No		
5.5.3	C.C.T.V points comprising draw wire in concealed 20mm HG PVC Conduits all emanating from the security office	10	No.		
5.5.4	50mmØ PVC HG conduit linking the Draw Boxes	150	LM		
5.6	**DISTRIBUTION BOARDS & SUB-MAINS**				
5.6.1	16-Way TPN flush mounted distribution board complete with 125A integral Isolator D.B. F1 F2 F3 as Crabtree or approved equivalent.	3	No.		
	MCBs for items above as Crabtree or approved equivalent as follows:-				
i)	10A, SP	35	No.		
ii)	32A, SP	35	No.		
iii)	SP Blanking plates	18	No.		
	Total carried to Elec: Bill No 5 **Collection Page**				

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
5.6.2	10 way TPN flush mounted distribution board DB F4 F5 F6 complete with 100A integral isolator as Crabtree or approved equivalent.	3	No.		
5.6.3	MCBs for Items as Crabtree or approved equivalent as				
i)	10A, SP	15	No.		
ii)	32A, SP	20	No.		
iii)	Blanking plates	8	No.		
5.6.4	Sub-mains cables comprising wiring in 25mm^2 4C CU armoured cables in 50mm Φ HG PVC conduit, Cable Trays and service duct from Sub switchboard M1 to DB F1-F3	200	LM		
5.6.5	Sub-mains cables comprising wiring in 16mm^2 4C CU armoured cables in 50mm Φ HG PVC conduit and service duct from Sub-switchboard M2 TO DBs F4-F6	120	LM		
5.7	**Cable Tray & Trunking system**				
5.7.1	250x50mm PVC 2-compartment **a** PVC trunking made complete with cover, screws etc.	145	LM		
5.7.2	250x50mm PVC corner bends for the trunking above.	140	No		
5.7.3	PVC Punched outlet plates on the trunking for twin socket outlets.	180	No		
5.7.4	PVC Punched outlet plates on the trunking for data/telephone outlet plates.	80	No		
5.7.5	300x50mm Steel galvanised paforated Cable tray mounted on the ceiling complete with all accessories	210	LM		
5.7.6	200x50mm Steel galvanised paforated Cable tray mounted on the ceiling complete with all accessories	210	LM		
	Total carried to Elec: Bill No 5 **Collection Page**				

Item	Description	Amount KES
	Elec: BILL No.5 COLLECTION PAGE	
1	TOTAL B/F Page Elec:H-30…….	
2	TOTAL B/F Page Elec:H-31…….	
3	TOTAL B/F Page Elec:H-32…….	
4	TOTAL B/F Page Elec:H-33……..	
	Total for Elec: Bill No 5 C/F to Electrical Bills summary Page Elec:H-50	

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
	Elec: BILL No.6 **MASTER ANTENNA TELEVISION SYSTEM (MATV)** **Supply, install, test and commission the following:**				
6.01	Extendable aerial support mast to be fixed on the roof	1	Item		
6.02	Master Bracket / U bolts	1	Item		
6.03	14Db in the line amplifier (booster)	2	No.		
6.04	High gain UHF Antenna	2	No.		
6.05	High gain VHF antenna	2	No.		
6.06	12 way splitter unit as Eillies or approved equivalent	5	No.		
6.07	TV cable complete with 37 No. metal plugs for the 37 No., T.V outlets	1	Lot		
6.08	Power Supply, protection wiring to the amplifier from DB.	2	No		
6.09	Combiner units as Ellies or approved equivalent.	4	No.		
6.10	5A high voltage guard as Sollatec.	2	No.		
6.11	Security lock box.	2	No.		
	LIFT SHAFT, & ROOF SPACE				
6.12	Lighting points wired in 3 x 1.5mm^2 PVC/SC CU cables drawn in 20mm Φ concealed HG PVC conduits complete with all necessary accessories but excluding switches for TWO way switching	15	No.		
6.13	10A, moulded ivory white switch plates as MK Range or approved equivalent as follows:-				
	i) One gang two way	5	No.		
	ii) Intermediate switch	4	No.		
6.14	Lighting fittings complete with lamps of appropriate wattage and colour rendering and fixing materials as follows:-				
	i) 1 x 36W, 1200mm corrosion proof fluorescent fittings as Thorn or approved equivalent	6	No.		
	ii) 1 x 36W, 1200mm Bare fluorescent fittings as Thorn or approved equivalent	6	No.		
	iii)1 x 36W, 1200mm corrosion proof fluorescent fitting complete with Acrylic Diffuser as Thorn Europroof.	3	No		
	POWER POINTS				
6.15	Socket outlet power points comprising wiring in 3 x 2.5mm^2 PVC/SC CU cables drawn in 25mm Φ concealed HG PVC conduits including all conduit accessories but excluding plates	10	No.		
6.16	13A moulded socket outlet plates as Crabtree or approved equivalent as follows:				
	i)Twin switched	12	No.		
	Total carried to Elec: Bill No 6 **Collection Page**				

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
6.17	40A, TPN isolators as MEM or approved equivalent.-for lift machines complete with wiring comprising 5 X 10mm Sqr pvc/sc CU cable drawn in 38mm dia HG PVC conduits including all accessories.	2	No		
6.18	16A, TPN isolators as MEM or approved equivalent.-for lift machines controls complete with wiring comprising 5 X 2.5mm Sqr pvc/sc CU cable drawn in 38mm dia HG PVC conduits including all accessories.	2	No		
	DISTRIBUTION BOARDS & SUB-MAINS				
6.19	8-Way TPN flush mounted distribution board complete with 100A integral Isolator D.B. L1 & L2 as Crabtree or approved equivalent.	2	No		
6.20	MCBs for items 6.19 above as Crabtree or approved equivalent as follows:-				
	i)10A, SP	2	No		
	ii)32A, SP	2	No		
	iii)40A, TP	2	No		
	iv)20A, TP	2	No		
	v)Blanking plates	4	No		
6.21	Sub-mains cables comprising wiring in 16mm^2 4C CU armoured cables in 50mm Φ HG PVC conduit and service duct from switchboard M2 to DB L1 & L2	38	LM		
6.22	Fire alarm comprising wiring in 1.5mm^2 heat resistant screened cables drawn in 20mm Φ concealed HG PVC conduits	3	No		
6.23	Photo-Electric smoke detectors as MENVIER or approved equivalent.(on the shaft)	3	No		
	**C)--FIRE BOOSTER PUMP **				
6.24	a) 4-Way TPN flush mounted distribution board complete with 100A integral Isolator D.B. B. for the Booster Pumps as Crabtree or approved equivalent.	1	No		
	b) M.CBs mounted on items above.				
	i) 40A, TP	2	No		
6.24	Sub-mains cables comprising wiring in 10mm^2 4C CU armoured cables in 50mm Φ HG PVC conduit and service duct from switchboard M1 to DB B.	20	LM		
6.25	a) 10-Way TPN flush mounted distribution board complete with 100A integral Isolator D.B. C. for the Medical Gases Plant as Crabtree or approved equivalent.	1	No.		
	b) M.CBs mounted on item 6.25-a above.				
	i) 16A, TP	4	No		
	ii) 16A, SP	2	No		
	iii) 10A, SP	4	No		
6.26	Sub-mains cables comprising wiring in 16mm^2 4C CU armoured cables in 50mmØ HG PVC conduit and service duct from switchboard M2 to DB C above.	24	LM		
6.27	Power points comprising wiring in 5 x 4mm^2 PVC/SC CU cables drawn in 32mmØ concealed HG PVC conduits including all conduit accessories for vaccum plant,compressor,& Driers.	6	No		
6.28	16A TPN isolator for items above	6	No.		
	Total carried to Elec: Bill No 6 **Collection Page**				

Item	Description	Amount KES
	Elec: BILL No.6 COLLECTION PAGE	
1	TOTAL B/F Page Elec:H-36……..	
2	TOTAL B/F Page Elec:H-37……..	
	Total for Elec: Bill No 5 C/F to Electrical Bills summary Page Elec:H-50	

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
	Elec: BILL No.7 **LIGHTNING PROTECTION** **Supply, install, test and commission the following:**				
7.1.1	Air termination 3 x 2.5mm copper tape on the roof, including copper saddles at 1500mm intervals and bonding to metal work in the roof all as FURSE	350	LM		
7.1.2	Copper lightning arrester (Air termination), stem, and base on the roof, with the base fastened squarely on the ridge of the roof, inclusive of the base clamps and all fixing materials.	7	No.		
7.1.3	Down-link conductors consisting of 3x25mm copper tape, including copper saddles at 1500mm intervals.	120	LM		
7.1.4	Test clamps as FURSE	7	No.		
7.1.5	Earthing with 15mm diameter, 1800mm long copper earth rods complete with driving head and clamps in the ground around the building; connected to the test clamp.	7	No.		
7.1.6	All other fixing materials.	1	Lot		
	Total for Elec: Bill No 7 C/F to Electrical Bills summary Page Elec:H-50				

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
	Elec: BILL No.8 **MORTUARY BLOCK** **Supply, install, test and commission the following:**				
8.1	**LIGHTING POINTS & SWITCHES**				
8.1.1	Lighting points wired in 3 x 1.5mm^2 SC/PVC CU cables drawn in 20mm Φ concealed HG PVC conduits complete with all necessary accessories but excluding switches and fittings				
i)	One way switching	129	No.		
ii)	Two way switching	16	No.		
8.1.2	10A, moulded ivory white switch plates as MEM range or approved equivalent as follows:-				
i)	10A One gang one way	21	No.		
ii)	10A Two gang one way	2	No.		
iii)	10A One gang two way	16	No.		
iv)	10A One gang one way micro switch	8	No.		
iv)	10A Two gang two way	1	No.		
v)	Intermediate switch	3	No.		
8.2	**LIGHTING FITTINGS**				
8.2.1	Lighting fittings complete with lamps of appropriate wattage and colour rendering and fixing materials as follows:-				
i)	1 x 36W, 1200mm HPF bare batten fluorescent fitting as Thorn or approved equivalent.	8	No.		
ii)	1 x 18W, 600mm bare batten fluorescent fitting as Thorn or approved equivalent	3	No.		
iii)	1x 36W, 1200mm LED waterproof fluorescent fitting with GRP body and acrylic diffuser as Thorn LU Europroof.	10	No.		
iv)	1 x 36W, 1200mm HPF fluorescent fitting with white finished steel Body and Aluminium reflector system as Thorn Surface Quattro.	6	No.		
v)	2 x 36W, 1200mm HPF fluorescent fitting with clear acrylic diffuser as Thorn Diffuserlux general purpose.	56	No.		
vi)	600x600mm, 40W Diffused L.E.D panel as PHILIPS or Equal and approved	20	No		
	Total carried to Elec: Bill No 8 **Collection Page**				

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
vi)	Bulkhead luminaire with moulded Glass Diffuser & Die cast Alumium base complete with 16W PL lamp as Fitzgerald Defa Protect Oval.	20	No.		
vii)	Spherical screw luminaire with opal Glass and 16W compact fluorescent lamp as Thorn or approved equivalent.	6	No.		
8.3	**POWER POINTS**				
8.3.1	Socket outlet power points comprising wiring in 3 x 2.5mm^2 PVC/SC CU cables drawn in 25mm Φ concealed HG PVC conduits including all conduit accessories but excluding	28	No.		
8.3.2	13A moulded socket outlet plates as Crabtree or approved equivalent as follows:				
i)	Single switched	6	No.		
ii)	Twin switched	30	No.		
iii)	Twin switched splash proof.	3	No.		
8.3.3	5 x 10mm^2 PVC/SC CU cables drawn in 25mm Φ concealed HG PVC conduits for the cold room isolators.	10	No.		
8.3.4	20A, TPN isolators as Legrand or approved equivalent.-for item above	10	No.		
8.3.5	5 x 4mm^2 PVC/SC CU cables drawn in 25mm Φ concealed HG PVC conduits for A/C Units & Centrifugal extract Fans and isolators..	6	No.		
8.3.6	20A, TPN isolators as Legrand or approved equivalent.-for item above	6	No.		
8.3.7	5 x 4mm^2 PVC/SC CU cables drawn in 25mm Φ concealed HG PVC conduits for extract fan	1	No.		
	16A, TPN isolators as Legrand or approved equivalent.-for item above.	1	No.		
8.3.8	20A 1 way flush mounted Grid switch for post-mortem Lamp.	2	No.		
8.4	**FIRE ALARM SYSTEM**				
8.4.1	Fire alarm comprising wiring in 1.5mm^2 heat resistant screened cables drawn in 20mm Φ concealed HG PVC	31	No.		
8.4.2	Manual Fire Alarm 'Break Glass' call points as MENVIER or approved equivalent.	3	No.		
8.4.3	150mm Φ electronic fire alarm sounders as MENVIER or approved equivalent.	4	No.		
	Total carried to Elec: Bill No 8 **Collection Page**				**0**

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
8.4.4	4- Zone conventional Fire alarm control panel as MENVIER or approved equivalent.	1	No.		
8.4.5	Photo-Electric smoke detectors as MENVIER or approved equivalent.	28	No.		
8.5	**DISTRIBUTION BOARDS & SUB-MAINS**				
8.5.1	16 way 160A TPN flush mounted distribution Board as Crabtree or approved equivalent.	2	No.		
8.5.2	MCBs for item above as Crabtree or approved equivalent as follows:				
i)	10A, SP	6	No.		
ii)	32A, SP	5	No.		
iii)	32A TP	8	No.		
iv)	60A TP	1	No.		
v)	16A TP	2	No.		
vi)	20A, SP	2	No.		
vii)	TP Blanking plates	4	No.		
8.5.3	Sub-mains cables comprising wiring in 25mm2 4C CU armoured cables in 100mm Φ HG PVC duct from	50	LM		
8.5.4	Telephone cord outlet points comprising 25mm Φ conduits complete with draw-wire	7	No.		
8.5.5	250 X 250 X 150mm G.I Fully Reccessed Telephone Draw	3	No		
8.5.6	50mmØ PVC HG conduit linking the Draw Boxes	60	LM		
8.5.7	Allow for Liason with KPLC for separate installation of Tariff Meter				
8.5.8	Type tested Form 3B Floor Standing Sub-board for the Non Maintained Power Supply fully wired for one incoming MCCB and 6No. TP outgoing feeders with 400A rated four pole copper busbars. The following outgoing feeders in the Switchboard i) 400A TP Main Incommer MCCB - 1No ii) 250A TP MCCB - 1No ii) 100A TP MCCB - 2No iii) 63A SP MCCB - 2No iv) 40A SP MCCB - 1No v) Space for KPLC CT vi) Space for KPLC 3-Phase Meter.	1	Item		
8.6	**EXTERNAL LIGHTING**				
8.6.1	20A 240V 3P contactor for switching external lights AS TELEMECANIC complete with Housing and all accessories.	1	No		
8.6.2	Photocell control unit and wired to energize the contactors complete with a D.P override switch As QPK.	1	No		
	Total carried to Elec: Bill No 8 **Collection Page**				

Item	Description	Amount KES
	Elec: BILL No.8 COLLECTION PAGE	
1	TOTAL B/F Page Elec:H-40 ……..	
2	TOTAL B/F Page Elec:H-41……..	
3	TOTAL B/F Page Elec:H-42……..	
	Total for Elec: Bill No 8 C/F to Electrical Bills summary Page Elec:H-50	

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
	Elec: BILL No.9 **EXTERNAL PARKING LIGHTING** **Supply, install, test and commission the**				
9.1	Slim Post Top Lantern for 125 W MBF Lamps with aluminium base with black/white polyester coat finish and H.P.S anti-cyclic ignitor as Thorn GAMMA SIX cat No.QG 6B 1125.4 complete with wiring in 2.5mm^2 twin with earth sheathd cable for a length of up to 7	40	No		
9.2	5 M street lighting column constructed from heavy gauge steel pipe and alumininum painted for post Top lamp mounting	40	No		
9.3	Earthing after every third pole Column to standards	17	No		
9.4	4 M column for mounting the photocell unit	2	No		
9.5	A photocell unit to fit 70-75 Lux switch on level and 1.5 Maximum diffrential and as Thorn Q.P.K and wired to energise the contactor	2	No.		
9.6	40A 30mA E.L.C.B as SIEMENS	2	No		
9.7	4mm2 2-core P.V.C/S.W.A/P.V.C copper cable	800	LM		
9.8	Trenching to a minimum depth of 0.7M	800	LM		
9.9	Tiling with "HATARI-DANGER" Tiles	1	Lot		
9.10	Back Filling	800	LM		
9.11	Cable Glands For 4mm^2 2 core PVC/SWA/PVC cables	90	No		
9.12	50mm Ø super impact HG Duct with 100mm concrete	156	LM		
9.13	40A DP MCCB as MEM or approved equivalent to fitted in the control pillars	2	No		
9.14	6-Way Consumer Unit fitted in the control pillars	2	No		
9.15	30A 240V contactor as TELEMECANIQUE or approved equivalent.	2	No		
	Total carried to Elec: Bill No 9 **Collection Page**				

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
9.16	15A SP MCB	10	No		
9.17	2A HRC Fuse	2	No		
9.18	5A HRC Fuse	64	No		
9.19	5A Porcelain Fuse Carrier Block	64	No		
9.20	Free Standing Fully Weatherproof Metalclad Feeder Pillar for housing the street lighting switchgear and Controls.	2	NO		
Total carried to Elec: Bill No 9 **Collection Page**					

Item	Description	Amount KES
	Elec: BILL No.9 COLLECTION PAGE	
1	TOTAL B/F Page Elec:H-44……	
2	TOTAL B/F Page Elec:H-45……..	
	Total for Elec: Bill No 9 C/F to Electrical Bills summary Page Elec:H-50	0

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
	Elec: BILL No.10 **SWITCH GEAR, FEEDER CABLES & DUCTING.** **Supply, install, test and commission the following: -**				
10.1	**MAIN LV-BOARD** Modular type Tested, free standing floor mounted cubicle for both rear and front access, metal clad 14swg, 415 mains L.V meterboard manufuctured to BS EN60 439-1, form 2b seperation for the Non-Maintained Power Supply fully wired with the following: i) 1600A four pole busbars ii) Space for 1No KPLC Bulk Meter with viewing Perspex window iii) Space For 3No.K.P.L.C C.T's for bulk metering iv) Space for 3 phase KPLC Cut-out fuse iii) C.T's for Ammeter complete with selector switch for all iv) 1No 1600A Ammeter vi) 1No 0-500V Voltmeter complete with selector switch, 5A 1600A TP ACB main Incomer, adjustable and with trip coil as crabtree or equal and approved The following outgoing feeders in the Meterboard i) 630A TP MCCB for the maintained Sub-board M2- 1No ii) 1600A Adjustable MCCB for the PFC bank - 1No iii) 630A TP MCCB- 1No - UPS SUB-Board iv) 160A TP MCCB - 2No v) 400A TP MCCB - 1No- Kitchen & Laundrry Sub-Baord vi) 63A TP MCCB - 1No - Water Booster Pump vii) 63A TP MCCB - 1No - Street Lights ix) 40A SP MCCB - 1No - Gate House & Switch Room x) 1200A TP MCCB for Sub-Board M1 - 1No -Main Hospital xii) 1600A TPN A.V.R Manual ByPass Unit- 1No	1	Item		
10.2	600KVAR P.f correction Bank, complete with Capacitors, Main MCCB, HRC Fuses, Contactors, P.F Regulator & All other associated items & accessories.	1	No		
10.3	**SUB-SWITCHBOARD "M-1"** Modular type Tested, free standing floor mounted cubicle Sub-SwitchBoard for both rear and front access, metal clad 14swg, 415 mains L.V meterboard manufuctured to BS EN60 439-1, form 2b seperation for the **Non-Maintained** Power Supply fully wired with the following: The following outgoing feeders in the Switchboard i) 1200A TP MCCB - 1No Main Incomer ii) 100A TP MCCB -16No iii) 63A TP MCCB - 3No iv) 40A TP MCCB - 3No v) 32A SP MCCB - 1No vi) 1200A four pole busbars vii) 1200A four pole busbars 1200A TP ACB Incomer, adjustable and with trip coil as crabtree or equal and approved AMF board complete with Manual BY-PASS Switch Fire mans switch	1	Lot		
	Total carried to Elec: Bill No 10 **Collection Page**				

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
10.4	**SUB-SWITCHBOARD "M-2"** Modular type Tested, free standing floor mounted cubicle Sub-SwitchBoard for both rear and front access, metal clad 14swg, 415 mains L.V meterboard manufuctured to BS EN60 439-1, form 2b seperation for the **Maintained P**ower Supply fully wired with the following: The following outgoing feeders in the Switchboard i) 630A TP Main Incommer MCCB - 1No ii) 160A TP MCCB - 1No ii) 100A TP MCCB - 12No iii) 63A SP MCCB - 4No iv) 40A SP MCCB - 1No v) 32A SP MCCB - 1No vi) 630A four pole busbars	1	Item		
10.5	**SUB-MAINS & FEEDER CABLES**				
10.5.1	16mm^2 2-C PVC/SWA/PVC copper cable running from M-1 to C.U-T for Street Lighting.	45	Lm		
10.5.2	95mm^2 4-C PVC/SWA/PVC copper cable running from M-1 to Control Boards of for X-ray, CT Scan equipment in main hospital.	120	Lm		
10.5.3	120mm^2 4-C PVC/SWA/PVC copper cable running from M-1 to D.B-X for MRI equipment in main hospital.	120	Lm		
10.5.4	300mm^2 4-C PVC/SWA/PVC copper cable running from M-1 to Sub-Board M2 in main hospital.	120	Lm		
10.6	**DUCTS & MANHOLES**				
10.6.1	50mmØ PVC Ducts	245	Lm		
10.6.2	100mmØ PVC Ducts	180	Lm		
10.6.3	200mmØ PVC Ducts	250	Lm		
10.6.4	Concrete surround at road crossings	150	Lm		
10.6.5	1200 x 900 x 600 Manhole complete with cover	4	No		
10.6.6	900 x 600 x 600 Manhole complete with cover	4	No		
10.6.7	600 x 600 x 600 Manhole complete with cover	25	No		
10.6.8	300 x 300 x 300 Manhole complete with cover	8	No		
10.6.9	Standard cable LOOP-IN BOX	8	No		
10.6.10	Earthing of all cable loop-in boxes & distribution boards to K.P.L.C standards	1	Lot		
10.6.11	300 x 50 mm perforated G.I cable raiser Tray for power & Data/voice complete with all associated accessories	48	LM		
	Total C/F to Elec: Bill 10 collection Page				

Item	Description	Amount KES
	Elec: BILL No.10 COLLECTION PAGE	
1	TOTAL B/F Page Elec:H-47……..	
2	TOTAL B/F Page Elec:H-48…….	
	Total for Elec: Bill No. 10 C/F to Electrical Price summary page Elec:H-50	

Item	Description	Amount KES
	ELECTRICAL BILLS SUMMARY PAGE	
1	**TOTAL FOR BIIL No. 1 B/F Page Elec:H-12 ……**	
2	**TOTAL FOR BIIL No. 2 B/F Page Elec:H-19……**	
3	**TOTAL FOR BIIL No. 3 B/F Page Elec:H-24……**	
4	**TOTAL FOR BIIL No. 4 B/F Page Elec:H-29 ……**	
5	**TOTAL FOR BIIL No. 5 B/F Page Elec:H-34……**	
6	**TOTAL FOR BIIL No. 6 B/F Page Elec:H-38……**	
7	**TOTAL FOR BIIL No. 7 B/F Page Elec:H-39……**	
8	**TOTAL FOR BIIL No. 8 B/F Page Elec:H-43……**	
9	**TOTAL FOR BIIL No.9 B/F Page Elec:H-46……**	
10	**TOTAL FOR BIIL No. 10 B/F Page Elec:H49……**	
	TOTAL FOR ELECTRICAL WORKS C/F TO ELECTRICAL PRICE SUMMARY PAGE Elec:H-51	-

Item	Description	Amount KES
	ELECTRICAL PRICE SUMMARY PAGE	
A.	**PRELIMINARIES AND GENERAL CONDITIONS B/F FROM Elec:H-6 ……**	
B	**SUB-TOTAL FOR ELECTRICAL WORKS B/F FROM BILLS SUMMARY PAGE Elec:H-50……**	
C	**SUB-TOTAL (*Without V.A.T*)**	
D	**Add 16% V.A.T**	
E	**Add CONTIGENCY SUM**	**2,500,000.00**
TOTAL COST FOR ELECTRICAL SERVICES WORKS CARRIED TO ELECTRICAL PRICE SUMMARY PAGE EPS*P01*		

2: I.C.T

(Structured Cabling, IP-CCTV, Intruder Alarm, Access Control & IP-Telephony)

SECTION F: I.C.T PARTICULAR SPECIFICATIONS

PART 1

1.00 PARTICULAR SPECIFICATIONS

1.01 DESCRIPTION OF THE SITE

The site of the proposed works is located in Narok County-Narok Town

1.02 DESCRIPTION OF THE PROJECT

The works comprise the Supply, Installation, Testing and Commissioning of a new I.P P.A.B.X, Telephone Instruments and Structured cabling works.

1.03 CLIMATIC CONDITIONS

Maximum Temperature:		41.4.^{0}C
Minimum Temperature	:	13.9^{0}C
Relative humidity range	:	40% - 90%
Atmospheric salt content:		Less than 0.002%
Dust in Atmosphere:		Relatively dusty conditions prevail
Longitude (approximately):		39^0 38′ E
Latitude (approximately):		00^0 28′ S
Altitude:		1104m above sea level

Solar Radiation, February Mean Max 543 Langleys

Extremely heavy rains fall at certain periods of the year and the contractor shall be deemed to have taken account of this factor both in his prices and his planning of the execution of the contract works.

Equipment de-rating factors for the temperature and altitude shall be stated.

1.04 BOND FOR E.P.A.B.Xs WITH PROVISIONAL TYPE APPROVAL

Where the E.P.A.B.X offered for this tender does not possess full type approval from C.A.K but has provisional type approval, the tendered will be required to submit the name of a separate surety who will be willing to be bound to the Kenya Government in an amount equal to the full value of the E.P.A.B.X project for a period of 18 months from the date the E.P.A.B.X is commissioned into service. The surety will be subject to the approval of the

government.

1.05 REGULATIONS

The contractor shall, in the execution and completion of the works in the detailed design for which he is responsible comply with the provisions of the following as necessary and relevant:

- Communication Authority of Kenya (C.A.K)
- The Kenya Communications Act
- The Electronic Power Act and the Rules made there under.
- The Kenya Power and Lighting Company Limited's Bye-Laws.
- The current edition of the "Regulations for the Electric Equipment of Buildings" issued by the Institution of Electrical Engineers.
- The requirements of the Chief Inspector of Factories for the Kenya Government.
- Kenya Bureau of Standards (KBS) Standard Specifications and Codes of Practice, or other equal and approved standard specifications and codes.
- The Bye-Laws of the Local Authority.
- Any other regulations applicable to Electric and Electronic Installations or Communications systems in Kenya.
- The Employer's Safety Regulations.

1.06 POSITION OF SERVICES AND EQUIPMENT

The route services and approximate positions of apparatus are shown on the contract drawings but their exact positions shall be determined by approved dimensional details on working drawings or on site by the Project .Manager.

The contractor shall ascertain on site that his work will not foil other services or furniture and all services through the ducts must be readily accessible for maintenance and arranged to allow maximum access along the ducts. Any work which has to be redone due to negligence in this respect will be the contractor's responsibility.

1.07 SETTING TO WORK AND REGULATING SYSTEMS

The contractor shall carry out such tests of the contract works as are required by KeBS Standard Specifications and Codes of Practice, I.E.E Regulations or equal and approved codes, or the competent Authority.

No testing or commissioning shall be undertaken except in the presence of and to the satisfaction of the P.M. unless approved otherwise by him (contractor's own preliminary and proving tests are exempted).

The contractor shall include in his tender for the costs for testing and commissioning the contract works as herein described. He shall submit for approval to the P.M. a suitable programme for testing and commissioning. The P.M. and the Employer shall be given ample warning as to the dates on which testing and commissioning will take place.

The proving of any system of plant or equipment as to compliance with the specification shall not be approved by the P.M. except at his discretion until tests have been carried out under operating conditions appertaining to the most onerous conditions specified except where the time taken to obtain such conditions is unreasonable or exceeds 12 months after practical completion of the contract works.

1.08 IDENTIFICATION OF PLANT AN COMPONENTS

The contractor shall supply and install identification labels to all plant and to all switches and items of control equipment with, where no excessive heating is involved, white Traffolyte or equal labels engraved in block lettering denoting the name/function and/or section controlled. Where heating is likely to distort Traffolyte approved aluminium labels with stamped or engraved lettering shall be used.

The labels shall be mounted on equipment and in most suitable positions. They shall be in English or in internationally understood symbols capable of being read without difficulty. The labels shall conform to descriptions used on record drawing. Details of the lettering of the labels and the method of mounts or supporting shall be forwarded to the P.M. for approval prior to manufacture.

1.09 WORKING DRAWINGS

The contractor shall prepare such working Drawings as may be necessary. The working Drawings shall be completed in such detailed not only that the contract works can be executed on site but also that the P.M can approve the contractor's designs and intentions in execution of the contract works.

Approved working drawings shall not be departed from except where provided for. Approval by the P.M. 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 elsewhere associated therewith or with the works.

1.10 RECORD DRAWINGS

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

Record Drawing shall include but are not restricted to the following drawings or information:-

- Working Drawings amended as necessary but titled "Record Drawings" and certified as a true record of the as installed" contract works.

- Fully dimensioned drawings of all plant and apparatus.

- System Schematic and trunking diagrams showing all salient information relating to control and instrumentation.

- Wiring diagrams of individual plant, apparatus and switch and control boards. These diagrams to include these particular to individual plant or apparatus and else where applicable those applicable to system operation as a whole.

One reproducible copy of the Record Drawings of the contract works and Schematic Diagrams shall be provided not later that one month afterwards.

Notwithstanding the contractor's obligation referred to above, if the contractor fails to produce to the P.M.'s approval of the Record Drawings, within one month of partial or Practical Completion the Employer shall be at liberty to have these drawings produced by others. The cost of obtaining the necessary information shall be deducted from the outstanding payments due to the contractor.

1.11 TESTS

Both on completion of his work and at the end of the guarantee period the contractor shall carry out such tests as may be required in the presence of the P.M. or his representative, or the competent Authority and shall provide all necessary Instruments, labour and materials to do so. The Contractor shall pay such charges related to such tests if any.

1.12 QUALITY OF MATERIALS

Materials and apparatus required for the complete installation as called for in the specifications or Contract Drawings shall be supplied by the contractor unless specified otherwise.

Unless otherwise specified all materials (including equipment, fittings, cables) shall be new, of the best quality and approved origin.

1.13. TRAINING

In the direction and to the satisfaction of the P.M. the contractor shall arrange for the training of the attendant console operators, users and the administrators at the site or the contractor's office on the workings of the EPABX. The cost of such training shall be included in the contractor's prices.

1.14 EQUIPMENT GUARANTEE

The contractor shall undertake in writing to rectify free of charge, all faults arising from faulty components, materials, design or workmanship by the manufacturer or contractor whichever is applicable. This liability shall be for a minimum period of one calendar year from the date of acceptance of the equipment. Twelve months limitation

notwithstanding, the period of liability shall not end until all defects which appear during the liability period have been rectified.

1.15 PATENT RIGHTS

The contractor shall fully indemnify the Government of Kenya, against any action, claim or proceeding relating to infringement of any patent or design rights, and shall pay any royalties which may be payable in respect of any article or any part thereof which shall have been supplied by the contractor to the P.M. and in like manner the government of Kenya shall fully indemnify the contractor against any such action, claim on proceeding for infringement or alleged infringement under the works the design thereof which shall have been supplied by the P.M. to the contractor, but this indemnity shall apply to the works only, and any permission or request to manufacture to the order of the P.M. shall not relieve the contractor from liability should he manufacture for, or supply to other buyers.

PART 2

a. Section Includes: Equipment, materials, labor, and services to provide telephone and data distribution system including but not limited to:

1) Telephone and data cabling terminations
2) Optical fiber and terminations
3) Data/voice outlets
4) Terminal blocks/cross-connect systems
5) Equipment racks and cabinets
6) System testing
7) Documentation and submissions
8) Surface trunking, cable ladder,
9) Core switch, edge switches

b. Provide all equipment, materials, labor, and services, not specifically mentioned or shown, which may be necessary to complete or perfect all parts of the installation. Ensure that they are in compliance with requirements stated or reasonably inferred by the contract documents.

1. REFERENCES

a. Design, manufacture, test, and install telecommunications cabling networks per manufacturer's requirements and in accordance with NFPA-70 (*National Electrical Code*®)/IEE Regulations, state codes, local codes, requirements of authorities having jurisdiction, and particularly the following standards: ANSI/NECA/BICSI-568 -- Standard for Installing Commercial Building Telecommunications Cabling ANSI/TIA/EIA Standards.

1) ANSI/TIA/EIA-568-B.1 – Commercial Building Telecommunications Cabling Standard, Part 1: General Requirements
2) ANSI/TIA/EIA-568-B.2 – Commercial Building Telecommunications Cabling Standard, Part 2: Balanced Twisted Pair Cabling Components
3) ANSI/TIA/EIA-568-B.3 -- Optical Fiber Cabling Components Standard
4) ANSI/TIA/EIA-569-A – Commercial Building Standard for Telecommunications Pathways and Spaces

5) ANSI/TIA/EIA-606(A) -- The Administration Standard for the Telecommunications Infrastructure of Commercial Buildings

6) ANSI/TIA/EIA-607(A) – Commercial Building Grounding and Bonding Requirements for Telecommunications

7) ANSI/TIA/EIA-526-7 -- Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant

8) ANSI/TIA/EIA-526-14A -- Measurement of Optical Power Loss of Installed Multimode Fiber Cable Plant

(9) ANSI/TIA/EIA-758(A) -- Customer-Owned Outside Plant Telecommunications Cabling Standard

(10) ISO/IEC 1101 *Amendment 2*

b. Local codes, rules, regulations, and ordinances governing the work, are as fully part of the specifications as if herein repeated or hereto attached. If the contractor should note items in the drawings or the specifications, construction of which would be code violations, promptly call them to the attention of the Project Manager in writing. Where the requirements of other sections of the specifications are more stringent than applicable codes, rules, regulations, and ordinances, the specifications shall apply.

1. PERMITS, FEES, AND CERTIFICATES OF APPROVAL

a. The Contractor to include the cost of application and pay for building permit

b. As prerequisite to final acceptance, supply to the client certificates of inspection from an inspection agency acceptable to the owner and approved by local municipality and utility company serving the Project Manager.

2. SYSTEM DESCRIPTION

a. A telecommunications cabling system generally consists of one telecommunications outlet in each workstation, wall telephones in common and power socket outlet.

b. The typical work area consists of a single-gang plate with two standards compliant work area outlets.

c. One work area outlet consists of one (1) four-pair data Category 6A cables or above, installed from work area outlet to the data cabinet. Terminate data cables on modular patch panels located in the appropriate data cabinet.

4. One work area outlet consists of one (1) four-pair screened (ScTP) cable installed from work area outlet to the data termination rack in the cabinet. Terminate data cables on rack mounted modular patch panels.

2.1. Vertical/horizontal copper backbone cabling consists of multiple pair unshielded twisted-pair installed from the main cross-connect (MC) to the horizontal cross-connect (HC) and/or from the MC to the intermediate cross-connect (IC) to the HC.

2.2. Vertical/horizontal backbone cabling consists of 62.5/125 µm multimode optical fiber cable installed from the MC to the HC and/or from the MC to the IC to the HC.

g. Vertical/horizontal backbone cabling consists of 50/125 µm multimode optical fiber cable installed from the MC to the HC and/or from the MC to the IC to the HC. *Specification Note: State what this backbone will be utilized for. Examples are voice telecommunications service, premises switching equipment, data communications, etc.*

3. SUBMITTALS

a. Submit to the P.M shop drawings, product data (including cut sheets and catalog information), and samples required by the contract documents. Submit shop drawings, product data, and samples with such promptness and in such sequence as to cause no delay in the work or in the activities of separate contractors. The engineer will indicate approval of shop drawings, product data, and samples submitted to the engineer by stamping such submittals "APPROVED" with a stamp. Submitted shop drawings shall be initialed or signed by the contractor, showing the date and the contractor's legitimate firm name.

1) By submitting shop drawings, product data, and samples, the contractor represents that he or she has carefully reviewed and verified materials, quantities, field measurements, and field construction criteria related thereto. It also represents that the contractor has checked, coordinated, and verified that information contained within shop drawings, product data, and samples conform to the requirements of the work and of the contract documents. The engineer/designer remains responsible for the design concept expressed in the contract documents as defined herein.

2) The P.M approval of shop drawings, product data, and samples submitted by the contractor shall not relieve the contractor of responsibility for deviations from requirements of the contract documents, unless the contractor has specifically informed the engineer/designer in writing of such deviation at time of submittal, and the engineer/designer has given written approval of the specific deviation. The contractor shall continue to be responsible for deviations from requirements of the contract documents not specifically noted by the contractor in writing, and specifically approved by the engineer in writing.

3) The P.M approval of shop drawings, product data, and samples shall not relieve the contractor of responsibility for errors or omissions in such shop drawings, product data, and samples.

4) The P.M review and approval, or other appropriate action upon shop drawings, product data, and samples, is for the limited purpose of checking for conformance with information given and design concept expressed in the contract documents. The engineer's review of such submittals is not conducted for the purpose of determining accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the contractor as required by the contract documents.

The review shall not constitute approval of safety precautions or of construction means, methods, techniques, sequences, or procedures. The P.M approval of a specific item shall not indicate approval of an assembly of which the item is a component.

b. Shop drawings: Submit the following:

Coordinate with Part 2.**Backbone (riser) diagrams**

1) System block diagram, indicating interconnection between system components and subsystems
2) Interface requirements, including connector types and pin-outs, to external systems and systems or components not supplied by the contractor Fabrication drawings for custom-built equipment

c. Product Data -- Provide catalog cut sheets and information for the following:
Coordinate with Part 2.

1) Wire, cable, and optical fiber
2) Outlets, jacks, faceplates, and connectors
3) All metallic and nonmetallic raceways, including surface raceways, outlet boxes, and fittings
4) Terminal blocks and patch panels
5) Enclosures, racks, and equipment housings
6) Over-voltage protectors
7) Splice housings

d. Samples-- Submit samples as required by the Engineer.

e. Project record drawings:

1) Submit project record drawings at conclusion of the project and include:

(a) Approved shop drawings
(b) Plan drawings indicating locations and identification of work area outlets, nodes, data cabinet rooms, and backbone (riser) cable runs
(c) Cross-connect schedules including entrance point, main cross-connects, intermediate cross-connects, and horizontal cross-connects.
(d) Labeling and administration documentation
(e) Warranty documents for equipment.
(f) Copper certification test result printouts and diskettes.
(g) Optical fiber power meter/light source test results.
(h) Operation and maintenance manuals:

4. **QUALITY ASSURANCE**

4.1. The contractor shall have worked satisfactorily for a minimum of five (5) years on systems of this type and size.

4.2. Upon request by the P.M, furnish a list of references with specific information regarding type of project and involvement in providing of equipment and systems.

4.3. Equipment and materials of the type for which there are independent standard testing requirements, listings, and labels, shall be listed and labeled by the independent testing laboratory.

4.4. Where equipment and materials have industry certification, labels, or standards (i.e., NEMA - National Electrical Manufacturers Association), this equipment shall be labeled as certified or complying with standards.

4.5. Material and equipment shall be new, and conform to grade, quality, and standards specified. Equipment and materials of the same type shall be a product of the same manufacturer throughout.

4.6. Subcontractors shall assume all rights and obligations toward the contractor that the contractor assumes toward the client and P.M.

5. WARRANTY

5.1. Unless otherwise specified, unconditional guarantee shall be in writing for the materials, equipment, and workmanship for a period of not less than fifteen (15) years from date of commissioning of the project for active components.

5.2. Transfer manufacturer's warranties to the owner in addition to the General System Guarantee. Submit these warranties on each item in list form with shop drawings. Detail specific parts within equipment that are subject to separate conditional warranty. Warranty proprietary equipment and systems involved in this contract during the guarantee period. Final payment shall not relieve you of these obligations.

6. **DELIVERY, STORAGE, AND HANDLING**

6.1. Protect equipment during transit, storage, and handling to prevent damage, theft, soiling, and misalignment. Coordinate with the client for secure storage of equipment and materials. Do not store equipment where conditions fall outside manufacturer's recommendations for environmental conditions. Do not install damaged equipment; remove from site and replace damaged equipment with new equipment.

7. SEQUENCE AND SCHEDULING

7.1. Submit schedule for installation of equipment and cabling. Indicate delivery, installation, and testing for conformance to specific job completion dates. As a minimum, dates are to be provided for bid award, installation start date, completion of station cabling, completion of riser cabling, completion of testing and labeling, cutover, completion of the final punch list, start of demolition, owner acceptance, and demolition completion.

8. USE OF THE SITE

8.1. Access to building wherein the work is performed shall be as directed by the P.M.

The client will occupy the premises during the entire period of construction for conducting his or her normal business operations. Cooperate with the client to minimize conflict and to facilitate the owner's operations.

Schedule necessary shutdowns of plant services with the main contractor, and obtain written permission from the client.

Proceed with the work without interfering with ordinary use of streets, aisles, passages, exits, and operations of the client.

PART 3 - PRODUCTS

1. MANUFACTURERS

Provide products of manufacturers as named in individual articles. Where no manufacturer is specified, provide products of manufacturers in compliance with requirements.

2. FABRICATION

Fabricate custom-made equipment with careful consideration given to aesthetic, technical, and functional aspects of equipment and its installation.

3. SUITABILITY

Provide products that are suitable for intended use, including, but not limited to environmental, regulatory, and electrical.

4. VOICE/DATA TELECOMMUNICATIONS SERVICE BACKBONE CABLE

a. Solid copper, 24 AWG, 100 Ω balanced twisted-pair (UTP) backbone cable, with mechanical and transmission performance specifications that meet or exceed ANSI/TIA/EIA-568-B.2

b. Multimode 62.5/125 µm diameter tight-buffered optical fiber, with fiber counts as indicated on drawings, with mechanical and transmission performance specifications that meet or exceed ANSI/TIA/EIA-568-B.3

5. VOICE TELECOMMUNICATIONS STATION CABLE

a. Solid copper, 24 AWG, 100 Ω balanced twisted-pair (UTP) Category 6A cables with four individually twisted-pairs, which meet or exceed the mechanical and transmission performance specifications in ANSI/TIA/EIA-568-B.2 up to 100 MHz.

6. DATA STATION CABLE (Copper)

a. Solid copper, 24 AWG, 100 Ω balanced twisted-pair (UTP) Category 6A cables with four individually twisted-pairs, which meet or exceed the mechanical and transmission performance specifications in ANSI/TIA/EIA-568-B.2 up to 100 MHz.

b. Solid copper, 24 AWG, 100 Ω balanced twisted-pair, screened (ScTP) cables with four individually twisted-pairs, which meet or exceed the mechanical and transmission performance specifications in ANSI/TIA/EIA-568-B.2 (Annex K) up to 100 MHz.

7. DATA STATION CABLE (Optical Fiber)

a. Multimode 62.5/125 µm diameter tight-buffered optical fiber, with the required number of fiber counts, with mechanical and transmission performance specifications that meet or exceed ANSI/TIA/EIA-568-B.3

8. UNDERGROUND TELECOMMUNICATIONS CABLE (Copper)
If you have copper cables installed outside between buildings, be certain to specify overvoltage protectors on both ends of the cable. See article, OVERVOLTAGE PROTECTORS.

Solid copper, 24 AWG 100 Ω balanced twisted-pair, gel-filled duct cable, in sizes as indicated on the drawings, which meet or exceed the mechanical and transmission performance specifications listed in ANSI/TIA/EIA-568-B.2 and ANSI/TIA/EIA-758(A).

9. UNDERGROUND TELECOMMUNICATIONS CABLE (Optical Fiber)
Singlemode 8.7 µm to 10 µm diameter, armored, gel-filled optical fiber, with number of usable fibers as shown on drawings, which meet or exceed the mechanical and transmission performance specifications listed in ANSI/TIA/EIA-568-B.3 and ANSI/TIA/EIA-758(A).

10. VOICE/DATA – COPPER & OPTICAL FIBER WORK AREA OUTLETS
Edit for items that will actually be used on the project.
Pick a color for the faceplate and each type of jack, or make them all one color.

Determine which pinning standard is to be used, T568A, T568B, or USOC. If not otherwise specified, specify T568A. Use either 10c with SC connectors or 10d (1) for ST connectors. SC connectors are preferred. Use ST connectors to match existing cable plant if required.

Single-gang mounting plate with two (2) openings containing the following devices:
a. Data Outlet - 8-pin modular, category 6e, unkeyed, black, pinned to either T568 (A or B) standards.
b. Optical Fiber Connectors – simplex ST - ST adapter.
Provide two optical fiber adapters for each faceplate

11. VOICE/DATA WORK AREA OUTLETS (Copper only)
Single-gang mounting plate with four (4) openings containing the following devices:
Data Outlet - 8-pin modular, Category 6e, unkeyed, black, pinned to either T568 (A or B) standards.

12. VOICE ONLY WORK AREA OUTLET
Single-gang faceplate with 8-pin modular, category 6A, unkeyed, ivory telephone jack, pinned to either T568 (A or B) standards

13. TERMINATION BLOCKS
For items that will actually be used on the project: Coordinate with MC, IC and HC layout drawing.
a. Product(s) as approved by the P.M: Wiring blocks are to be in following configurations:
1) List dimensional configurations
2) ER – List pairs categorized for PBX portion of ER and pairs field terminated for backbone and CO portion of ER
Provide wiring troughs between ER frame sections.

14. PATCH PANELS

Specification Note: Alter quantities to match job requirements.
19 in. rack mountable, 24-port 8-pin modular to insulation displacement connector (IDC) meeting Category 6e performance standards, and pinned to either T568 (A or B) standards. Typical examples of IDC connections are the 110, BIX, and Krone.

15. WALL MOUNTED OPTICAL FIBER PATCH PANELS
Specification Note: Alter quantities to match job requirements
Wall-mounted optical fiber termination panel with 12-fiber capacity, hinged door, cable strain relief, slack storage, and two 6-port SC or approved alternative connector panels with adapters and provisions for two splice trays.

6. RACK MOUNTED OPTICAL FIBER TERMINATION PANEL
Specification Note: Alter size to match job requirements. Coordinate with connector type.
19 in. rack mounted 72-port rack-mounted optical fiber termination panel with cable strain relief, grounding lugs, slack storage and three 12-port duplex SC or approved alternative connector panels with adapters and provisions for six (6) splice trays.

17. SPLICE TRAYS
Sized for single mode and multimode fibers, nonmetallic with clear plastic cover, 12-fiber splice capacity and compatible with splice enclosure and splicing method.

18. OPTICAL FIBER CONNECTORS
Ceramic tipped field installed 568SC connectors, which meet or exceed the performance specifications in ANSI/TIA/EIA-568-B.3. Various alternative field installed connector designs, which meet or exceed the performance specifications in ANSI/TIA/EIA-568-B.3 (Annex A).

19. OPTICAL FIBER JUMPERS
Dual 62.5/125-µm (*and/or single mode*) optical fiber jumper cable, 1 m long with 3.0 mm Duplex 568SC optical fiber connectors on each end.
Dual 62.5/125-µm (*and/or single mode*) optical fiber jumper cable, 1 m long with approved alternative duplex optical fiber connectors on each end.

20. OPTICAL FIBER PIGTAILS
62.5/125 µm (*and/or single mode*) optical fiber pigtail 1 m long with 3.0 mm single 568 SC optical fiber connectors on one end

21. OPEN FRAME EQUIPMENT RACK
Open frame, 19 in. equipment rack, 7 foot 6 in. overall height with flange base, mounting rails drilled front and back and tapped to EIA standards, and a front-rack mountable 10 outlet multiple outlet electrical strip or 42u enclosed glazed.

22. EQUIPMENT RACKS/CABINETS
Specification Note: Use 19 in. or change to 23 in. as required. If using wall-mounted racks or cabinets, add required specifications here. Add and delete features as required.
a. The 19 in. equipment rack shall have the following minimum requirements:

- 77 in. (44 rack spaces) of panel space
- Welded frame construction
- Locking front and rear doors
- Adjustable front and back equipment mounting rails drilled and tapped to EIA standards
- 10 position electrical outlet strip
- Removable side panels
- Top mounted, thermostatically controlled exhaust fan
- Smoked acrylic front door.

23. LISTED BUILDING ENTRANCE PROTECTORS
Use when copper cables are run outside of building.

Use appropriate protector modules.
Building entrance terminal utilizing a two (2) foot fuse link between the outside cable plant splice and the protector module with IDC type input and output terminals, 100-pair capacity and female mounting base, equipped with 230 volt solid state protector modules. Provide sufficient protector modules to completely populate all building entrance terminals.

24. SPLICE HOUSING
Use this or something else. Delete splice modules if used for optical fiber cables.
a. Encapsulated, re-enterable splice housing, sized as required with bonding straps, accessories, end caps and encapsulant as required
b. Splice modules (such as 710 series or MS^2) for use within splice housing

25. SPARES
Change quantities to suit job size. Edit to match that which is actually specified.
a. Furnish the following spare equipment and parts:
Terminal block connectors, if required

Test set cords, if required
Install one test cord set in each telecommunications closet
Five (5) percent of base bid quantity of each type of jack shall be provided
Five (5) percent of base bid quantity of each type of outlet

Five thousand (5000) ft of each type of station cable
One thousand (1000) ft of one-pair cross-connect wire for each telecommunications closet
One thousand (1000) ft of two-pair cross-connect wire for each telecommunications closet
Five (5) percent of base bid quantity of protector modules

EXECUTION
1. PRE-INSTALLATION SITE SURVEY
a. Prior to start of systems installation, meet at the project site with the P.M and representatives of trades performing related work to coordinate efforts. Review areas of potential interference and resolve conflicts before proceeding with the work. Facilitation with the Client will be necessary to plan the crucial scheduled completions of the equipment room and telecommunications closets.
b. Examine areas and conditions under which the system is to be installed. Do not proceed with the work until satisfactory conditions have been achieved.

2. HANDLING AND PROTECTION OF EQUIPMENT AND MATERIALS
a. Be responsible for safekeeping of your own, such as equipment and materials, on the job site. The client assumes no responsibility for protection of above named property against fire, theft, and environmental conditions.

3. PROTECTION OF OWNER'S FACILITIES
a. Effectively protect the client's facilities, equipment, and materials from dust, dirt, and damage during construction.
b. Remove protection at completion of the work.

4. INSTALLATION
Receive, check, unload, handle, store, and adequately protect equipment and materials to be installed as part of the contract. Store in areas as directed by the owner's representative. Include delivery, unloading, setting in place, fastening to walls, floors, ceilings, or other

structures where required, interconnecting wiring of system components, equipment alignment and adjustment, and other related work whether or not expressly defined herein.

Install materials and equipment in accordance with applicable standards, codes, requirements, and recommendations of national, state, and local authorities having jurisdiction, and *National Electrical Code*® (NEC) and with manufacturer's printed instructions.

Adhere to manufacturer's published specifications for pulling tension, minimum bend radii, and sidewall pressure when installing cables.

1) Where manufacturer does not provide bending radii information, minimum-bending radius shall be 15 times cable diameter. Arrange and mount equipment and materials in a manner acceptable to the P.M and the client.

e. Penetrations through floor and fire-rated walls shall utilize intermediate metallic conduit (IMC) or galvanized rigid conduit (GRC) sleeves and shall be fire stopped after installation and testing, utilizing a fire stopping assembly approved for that application.

f. Install station cabling to the nearest telecommunications room (TR), unless otherwise noted.
g. Installation shall conform to the following basic guidelines:
1) Use of approved wire, cable, and wiring devices
2) Neat and uncluttered wire termination

h. Attach cables to permanent structure with suitable attachments at intervals of 1200-1500mm. Support cables installed above removable ceilings.

i. Install adequate support structures for 10 foot of service slack at each TR.

j. Support riser cables every floor and at top of run with cable grips.
1) Limit number of four-pair data riser cables per grip to fifty (50)

k. Install cables in one continuous piece. Splices shall not be allowed except as indicated on the drawings or noted below:

l. Provide over voltage protection on both ends of cabling exposed to lightning or accidental contact with power conductors.

Specification Note: *Insert any other specific installation requirements here, such as hook and latch fasteners instead of cable ties, etc.*

5. GROUNDING
Edit as required.
a. Grounding shall conform to ANSI/TIA/EIA 607(A) – *Commercial Building Grounding and Bonding Requirements for Telecommunications, National Electrical Code*®, ANSI/NECA/BICSI-

568 and manufacturer's grounding requirements as minimum.

b. Bond and ground equipment racks, housings, messenger cables, and raceways.

c. Connect cabinets, racks, and frames to single-point ground which is connected to building ground system via #6 AWG green insulated copper grounding conductor.

6. LABELING

Use 6d if the type of termination block permits labels. Otherwise use 6e.
Use 6g if the owner does not have a standard for outlet numbering.
Use 6h if required. Alter time as requested.

Labeling shall conform to ANSI/TIA/EIA-606(A) standards. In addition, provide the following:
a. Label each outlet with permanent self-adhesive label with minimum 3/16 in. high characters.
b. Label each cable with permanent self-adhesive label with minimum, 1/8 in. high characters, in the following locations:

1) Inside receptacle box at the work area.
2) Behind the communication closet patch panel or punch block.

c. Use labels on face of data patch panels. Provide facility assignment records in a protective cover at each telecommunications closet location that is specific to the facilities terminated therein.

d. Use color-coded labels for each termination field that conforms to ANSI/TIA/EIA-606(A) standard color codes for termination blocks.

e. Mount termination blocks on color-coded backboards.

f. Labels shall be machine-printed. Hand-lettered labels shall not be acceptable.
g. Label cables, outlets, patch panels, and punch blocks with room number in which outlet is located, followed by a single letter suffix to indicate particular outlet within room, i.e., S2107A, S2107B. Indicate riser cables by an R then pair or cable number.

h. Mark up floor plans showing outlet locations, type, and cable marking of cables. Turn these drawings over to the owner two (2) weeks prior to move in to allow the owner's personnel to connect and test owner-provided equipment in a timely fashion.

i. Three (3) sets of as-built drawing shall be delivered to the owner within four (4) weeks of acceptance of project by the owner. A set of as-built drawings shall be provided to the owner in magnetic media form (3.5” floppy disks) and utilizing CAD software that is acceptable to the owner. The magnetic media shall be delivered to the owner within six (6) weeks of acceptance of project by owner.

7. TESTING

Testing shall conform to ANSI/TIA/EIA-568-B.1 standard. Testing shall be accomplished using level IIe or higher field testers.

Test each pair and shield of each cable for opens, shorts, grounds, and pair reversal. Correct grounded, and reversed pairs. Examine open and shorted pairs to determine if problem is

caused by improper termination. If termination is proper, tag bad pairs at both ends and note on termination sheets.

1) Perform testing of copper cables with tester meeting ANSI/TIA/EIA-568-B.1 requirements.

2) If copper backbone cable contains more than one (1) percent bad pairs, remove and replace entire cable.

Use 2 or 3 as required.

3) If copper cables contain more than the following quantity of bad pairs, or if outer sheath damage is cause of bad pairs, remove and replace the entire cable:

CABLE SIZE	MAXIMUM BAD PAIRS
<100	1
101 to 300	1 – 3
301 to 600	3 – 6
>601	6

4) If horizontal cable contains bad conductors or shield, remove and replace cable.
Initially test optical cable with a light source and power meter utilizing procedures as stated in ANSI/TIA/EIA-526-14A: *OFSTP-14A Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant* and ANSI/TIA/EIA-526-7 *Measurement of Optical Power Loss of Installed Single mode Fiber Cable Plant*. Measured results shall be plus/minus 1 dB of submitted loss budget calculations. If loss figures are outside this range, test cable with optical time domain reflectometer to determine cause of variation. Correct improper splices and replace damaged cables at no charge to the owner.

1) Cables shall be tested at 850 and 1300 nm for multimode optical fiber cables. Cables shall be tested at 1310 and 1550 nm for single mode optical fibers.

2) Testing procedures shall utilize "Method B" – One jumper reference.

3) Bi-directional testing of optical fibers is required.

d. Perform optical time domain reflectometer (OTDR) testing on each fiber optic conductor. Measured results shall be plus/minus 1 dB of submitted loss budget calculations.

1) Submit printout for each cable tested.

2) Submit 3.5 in. disks with test results and program to view results.

e. Where any portion of system does not meet the specifications, correct deviation and repeat applicable testing at no additional cost.

FIELD QUALITY CONTROL

a. Employ job superintendent during the course of the installation to provide coordination of work of this specification and of other trades, and provide technical information when requested by other trades. This person shall maintain current RCDD® (Registered Communications Distribution Designer) registration and shall be responsible for quality control during installation, equipment set-up, and testing.

b. At least 30 percent of installation personnel shall be *BICSI Registered Telecommunications Installers*. Of that number, at least 15 percent shall be registered at the *Technician Level*, at least 40 percent shall be registered at the *Installer Level 2*, and the balance shall be registered at the *Installer Level 1*.

Specification Note: Use this or insert manufacturer's requirements for installer qualifications to meet extended warranty program requirements.
c. Installation personnel shall meet manufacturer's training and education requirements for implementation of extended warranty program.

B. PARTICULAR SPECIFICATIONS FOR STRUCTURED CABLING

2.0 DESCRIPTION OF THE PROJECT

The works to be carried out comprise the following;

i) Proposed supply, installation, testing and commissioning of a structured cabling system to cater for computer data points and telephone points.
ii) Configure and set up the structured cabling system to be used on LAN,
iii) Produce test result, warranty certification, reports and as installed drawings. The Network will be capable of supporting approximately 320data/voice points.
iii) Supply, install appropriate telephone cables to interconnect the data cabinets to the I.P P.A.B.X. The works shall include inter-wiring, programming and activating all voice points.

3.0 REGULATIONS

The contractor shall, in execution and completion of the works in the detailed design for which he is responsible, comply with the provisions of the following as necessary and relevant;

a) ISO/IEC, C.A.K, ATM CENELEC 11801
b) ANSI/EIA/TIA 56
c) Latest Edition of IEE Regulation
d) Kenya Bureau of Standards
e) Electric Power Act and Rules made there under.

4.0 WORKING DRAWINGS

The Contractor shall submit to the Project Manager working drawings for the proposed system for approval. The drawings will show the locations of and identifiers for all cable routing and terminations, telecommunication outlets/connectors. Location of core switch and Edge switches.

5.0 NETWORK CABINETS

a) To be located on each floor in designated rooms as indicated in the electrical drawings.

b) Must be metallic (appropriately sized as specified in the BQ) with a front clear glass, free standing, complete with lock and key and the following accessories;

- Cable Management channel rack
- Cable support hooks
- Cable support rings and straps
- Cable duct cover
- Feed through cable panels
- Vented equipment shelving
- Blank filler panels

- Hinged wall mounted brackets
- Glass viewing window
- Colored Designation strips
- Management lock and key
- Cooling extractor fans
- Caster wheels
- Inbuilt 2-gang power socket outlet

6.0 ACTIVE CONTROL EQUIPMENTS AT THE NETWORK CORE

The active control equipment at the core should have the following features:

a. Backplane/switch fabric Bandwidth Capacity of 150 GBPS or more.
b. IEEE 802.3 compliant for power over Ethernet
c. IEEE 802.1 based security compliant
d. SNMP compliant for security
e. Layer 2/3/4 switch
f. Should support Gigabit Ethernet to the desktop
g. Should have at least 10-slots or higher chassis
h. The core switches should have two links to each floor configured in active/active configuration. The links should deliver 2GBPS throughput when all ports are active.
i. The core switch should have redundant power supply, redundant fan tray and redundant CPU/ supervisor engine installed
j. Fiber cable linking stacks on each floor to the core should be connected to 1000Base X(GBIC) port on the core switch.
k. Should be installed with the latest version of system software at the time of delivery.
l. Should support Quality of service for various applications.

7.0 ACTIVE CONTROL EQUIPMENTS AT THE LAN EDGE

Active control equipments at the LAN Edge should have the following features

a) Active control equipments at the LAN Edge should support 10/100/1000 MBPS on all ports (RJ45) and Gigabit to the desktop connectivity
b) The equipments should have at least two 1000BaseXGigabit uplink ports for terminating backbone Fiber.
c) The equipments should support layer 3 routing.
d) Should support IEEE 802.1, SSH, SNMP.
e) Switch Fabric forwarding Bandwidth of 64GBPS or more.
f) More than 12,000MAC addresses should be available on each switch .
g) The switches should have 24/48 ports of 10/100/1000 MBPS.
h) Each stack on the edge will have two links of Fiber to the core switch, totaling two fiber terminations from the core switch to the stack.
i) Should support Jumbo frames.
j) Total stack throughput bandwidth of 64 GBPS or more.
k) Active Equipments at the LAN Edge should be quoted with a minimum of **One year of warranty** covering free replacement of parts and units.

8.0 NETWORK MANAGEMENT SYSTEM

Bidders must propose the manufacturers Network Management system for centralized configuration, maintenance and trouble shooting of active equipments. Third party stand alone systems should not be offered as part of the solution. Features and functionalities of thesystem should include the following:

a) Should be compatible with Microsoft windows/Linux operating systems
b) Graphical User Interface for central Management and network viewing
c) Network discovery and inventory management
d) VLAN, multicast, security and load-balancing/fail over configuration
e) Downloading and saving of log file from the device flash memory
f) Centralized upgrade/backup and archiving of active devices
g) Export of network topology to JPEG or other standard formats.
h)

9.0 CABLES

9.1 UTP CABLE

The UTP cable must be category 6A compliant UTP cable, with the following specifications;

a) 4-pair cables with 100 ohm impedance.
b) Compliant to standards such as TIA/EIA – 268-B. 2-1 and IEC 61156-5
c) Made of polyeletin insulation
d) Pulling force should support up to 50N/mm^2

9.2 OPTICAL FIBRE CABLE

The fibre cable must be 8 core multimode fibre with the following specifications:-

a)Cable size: 8 cores.
b) Termination: SC Duplex connectors.
c) Graded Index: Nominal 62.5/125 micron

10.0 CAT 6A PATCH PANELS

The Contractor shall provide factory made patch panels, cat 6A complete with rear cable management and front designation strips, 110 PCB mounted connectors and integral RJ mounted jack sockets.

11.0 FIBER PATCH PANELS

All Backbone Fiber links to individual floors should be terminated on Fiber Patch Panels. Connector interfaces should support ST, Sc simplex, Sc duplex, FC, LC or MT-RJ.

12.0 BACK BONE

Backbone cabling inclusive of switches and all necessary accessories shall be carried out in readiness for the termination of edge switches.

The Backbone cabling shall be flexible and allow for easy 'add ons' for future expansions. Hence enough capacity shall be allowed for future expansion.

13.0 EDGE/FLOOR SWITCHES

These shall be per floor and have enough capacity for expansion

14.0 ADDITIONAL NOTES

Tenderers should take note of the following

a) The network should be capable of carrying data, voice and video. QoS should be considered as part of installation and configuration of the network.
b) All active LAN equipments should be from the same manufacturer for seamless integration, management and maintenance.
c) Each floor should have a telecommunication Closet to house the necessary structured cabling components and active equipments.

5.0 BROCHURES AND TECHNICAL LITERATURE

Tenderers **must** enclose together with their submitted bids brochures detailing technical Literature and specifications of the active components of the structured cabling system. The brochures shall be used to evaluate the suitability of these components.

Any bid submitted without the brochures shall be considered technically non-responsive, and may subsequently be disqualified.

PART 4

4.00 CCTV TECHNICAL SPECIFICATIONS

4.01 EXTENT OF WORKS FOR SECURITY SURVEILLANCE SYSTEM

The security surveillance system should consider the following.

IP CCTV Camera. The cameras specified should be able to cover the distance with clear pictures. Consider whether there shall be need to support the fixed digital cameras with the Pan, Tilt and Zoom Cameras or not. Highly sensitive areas should be covered with more cameras able to take pictures of any person coming in both from the front and the rear. The resolution of the cameras should be able to give motion pictures that are clear.
LED Monitors. The color monitors must be of high resolution and preferably of plasma screen. The size of the monitor should be big enough to allow the operators make correct deductions both in real time operation and during playbacks.
IP Network Video Recording. The recording multiplexer resolution has to be equally high for the monitor to display the with a high resolution.

The IP Surveillance system should be able to support the following
● IP based recording system with motion detection.

● Digital zooming into recorded images/ life view

●Multi-level password protection and logging facilities

●Integrates with access control, burglar control, burglar alarms and

Fire alarm system and other building management systems as may be specified by the engineer.

●Image compression for remote web live and playback viewing incase of IP.

●Multi display monitors

●Automatic daily archiving to hard drive or optical drive.

●Fully adjustable digital video motion detection with exclusion /inclusion multi regions per camera.

●Efficient video collection, storage and retrieval.

●Advanced and instant search capability

●Digitally signed recordings, with audit trails of all operator actions and system event.

● Storage capacity of the Network Video Recorder. Space to provide at least three months continuous recording and back up for automatic archiving for one year and redundancy

● Infra red illuminators in poor lighting conditions

- Able to interface with other systems on the ground
- Support IP and PoE connectivity.

4.02 WORKING DRAWINGS

The Contractor shall submit to the Project Manager working drawings for the proposed system for approval. The drawings will show the locations for all cameras, cable routing and terminations, telecommunication outlets/connectors, location of NVR, monitors, core switch and Edge switches.

4.03 MINIMUM ALLOWABLE TECHNICAL SPECIFICATIONS FOR THE CCTV SYSTEM

4.03.1 GENERAL SPECIFICATIONS FOR THE CAMERAS

The cameras are classified into two main types

a) Fixed cameras –
These cameras have a fixed area of view depending on its angle of view and the focal length of the lens used.
They can be used in door and outdoor depending on the requirements. When used out door, the cameras are housed in a weather proof housing of IP66. Those used indoor come with different shapes of housings. The exview housings are used for cameras covering long distances like corridors and the dome housings are used for common areas like lobbies, security desks etc.

b) Pan Tilt and Zoom Cameras
These cameras are only used to support the static cameras. They are useful as they are able to pan 360 degrees, tilt over 90 degrees and zoom into an object for Min 16 times and above.
The cameras shall be indoor type and outdoor type with PoE/ 240V main supply with the appropriate power adaptors, 50Hz field frequency and operating according to the CCIR standard with minimum resolution of 2megapixels.

The camera shall be fixed on sliding rail track on the ceiling slab or walls as directed by the Electrical Engineer with an appropriate bracket.

It shall be possible to control the lens and the pan only head remotely via a remote control box at the control room. The Camera must be able to be controlled by a CCTV keyboard

They shall be linked to the Television Monitors and the Control Equipment through CAT 6 A cables as appropriate and according to the project Engineers instructions.

The mounting height and position of cameras shall be such that the desired coverage shall be achieved as distinctly as possible.

The digital signal processing (DSP) camera shall be aesthetically styled. The DSP chip will enable advanced video processing and manipulation to be carried out in the

camera head.

4.04 MINIMUM REQUIREMENTS FOR THE PROPOSED CCTV SYSTEM

The cameras shall have the following minimum specifications but cameras with higher specifications shall be accepted:

a) IP Bullet camera

- 4MP Darkfighter PoE Full HD Outdoor IP Bullet Camera with Infrared- as described in the Bills of quantities
- Built in Infrared 25 meters minimum
- imaging sensor – 1/2.8'' minimum
- Wide Dynamic Range – 120dB
- Motorized Varifocal Auto Iris lens
- Day and night vision; Minimum illumination 0.08lux (colour), 0lux (B/W) IR on
- Focal Length – 3~8mm
- IP network capable
- PoE capability
- H.264 video compression
- Accessible edge storage with 64GB internal MicroSD card slot
- True day and night vision capability
- Tampering detection, Face detection, Audio Detection, Motion detection and event triggered alarm processing.
- Masking Capability,
- Vandal proof IK-10 rating housing
- Weather proof IP66 rating
- ONVIF Compliant

(State make and type, and enclose catalogues)

b) IP Dome CCTV Camera

- 4 Mega Pixel POE Full HD IP Dome Camera with Infrared-as described in the Bills of quantities
- Built in Infrared 20 meters minimum
- imaging sensor – 1/2.8'' minimum
- Wide Dynamic Range – 120dB
- Motorized Varifocal Auto Iris lens
- Day and night vision; Minimum illumination 0.1lux (colour), 0lux (B/W) IR on
- Focal Length – 3~8mm
- IP network capable
- PoE capability
- H.264 video compression
- Accessible edge storage with 64GB internal MicroSD card slot
- True day and night vision capability
- Tampering detection, Face detection, Audio Detection, Motion detection and event triggered alarm processing
- Masking Capability,
- Vandal proof IK-10 rating housing
- Weather proof IP66 rating
- ONVIF Compliant

(State make and type, and enclose catalogues)

c) Mini Dome/Fisheye CCTV Camera

- 5 Mega Pixel POE Full HD IP as described in the Bills of quantities
- imaging sensor – 1/2'' minimum
- Wide Dynamic Range – 120dB
- angular field of view of atleast H:180°; V:180°; D:180°
- Day and night vision; Minimum illumination 0.5lux (colour), 0lux (B/W) IR on
- IP network capable
- PoE capability
- H.264 video compression
- Accessible edge storage with 64GB internal MicroSD card slot
- True day and night vision capability
- Tampering detection, Audio Detection, Motion detection and event triggered alarm processing
- Masking Capability,
- Vandal proof IK-10 rating housing
- Weather proof IP66 rating
- ONVIF Compliant

(State make and type, and enclose catalogues)

d) IP Box CCTV Camera

- 4 Mega Pixel Full HD IP box Camera as described in the Bills of quantities
- imaging sensor – 1/2.8'' minimum
- Wide Dynamic Range – 120dB
- Auto Iris lens
- Day and night vision; Minimum illumination 0.1lux (colour), 0lux (B/W) IR on
- Focal Length – 3~8mm
- IP network capable
- PoE capability
- H.264 video compression
- Accessible edge storage with 64GB internal MicroSD card slot
- True day and night vision capability
- Tampering detection, Face detection, Audio Detection, Motion detection and event triggered alarm processing
- Masking Capability,
- Vandal proof IK-10 rating housing
- Weather proof IP66 rating
- ONVIF Compliant

(State make and type, and enclose catalogues)

e) IP PTZ CCTV Camera

- 4 Mega Pixel Full HD IP Dome Camera with Infrared as described in the Bills of quantities
- Built in Infrared 100 meters minimum
- imaging sensor – 1/2.8'' minimum
- Wide Dynamic Range – 120dB
- Varifocal Auto Iris lens
- Minimum Adjustable digital zoom 16x, optical zoom 32x
- Day and night vision; Minimum illumination 0.1lux (colour), 0lux (B/W) IR on

- Focal Length – 4.5~130mm
- IP network capable
- PoE capability
- H.264 video compression
- Accessible edge storage with 64GB internal MicroSD card slot
- True day and night vision capability
- Tampering detection, Face detection, Audio Detection, Motion detection and event triggered alarm processing
- Masking Capability,
- Vandal proof IK-10 rating housing
- Weather proof IP66 rating
- Heater, Blower and Defog
- Auto tracking
- ONVIF Compliant

(State make and type, and enclose catalogues)

4.05 MOUNTING BRACKETS

The Brackets shall:

Be suitable for wall or ceiling mounting of a single camera.
Be at least 5.5"length
Have an auto lock facility.

4.06 CAMERA HOUSING

The camera housing shall:
Be IP66 rated with integral cable management.
Be Weatherproof and constructed from aluminium with epoxy coating.

4.07 COLOR VIDEO MONITORS

The monitor should be capable of providing high levels of picture quality 10MHz bars visible at low brightness and reliability stable synchronization, black level clamping, low sensitivity and high stability.

The monitors shall be high performance color video monitors for monitoring scenes from the above cameras and viewing playback scenes from the video cassette recorders. The monitors shall be located at places to be shown on site by the project manager.

The monitor shall give stable and interference free pictures of scenes being viewed. It shall also conform to the following specifications:

Type	: LED; 50,000hours panel life
System	: NTSC/PAL
Screen size	: 40”
Resolution	: 1,920 x 1, 080
Display Colour	: 16.0 million
Brightness	: 350cd/m^2
Contrast Ratio	: 5,000:1
Video input signal	: 1.0 V pk-pk
Power consumption	: Not more than 80W
Power input	: 240V 50HZ
Interface	: VGA, DVI, HDMI, RGB, Audio, Video

(State make and type, and enclose catalogues)

4.08 NETWORK VIDEO RECORDER

The network video recorder shall have the following minimum requirements:

- 64 Channels & 32 Channels as described in the Bills of Quantities
- Recording speeds of at least 400Mbps
- Gigabit Ethernet connection
- Multi screen Display: Full/4/9/16 way or as appropriate.
- 10 Hot swap HDDs each of 4TB minimum capacity
- external storage support capability
- VGA/HDMI local monitor
- Redundant hot swap power supply
- Network management/viewer software
- In built intelligent video analysis
- H.264,MPEG,MJPEG Compression
- ONVIF compatibility
- Web viewer supported
- PoE enabled
- Smart Video Search Feature for streamlined Investigations
- Recording resolution of 5MP
- IP address filtering, user access log, authentication and encryption
- Auto Launch of Video on specified Alarms/Events
- LED status indicator
- CE,UL certification

(State make and type, and enclose catalogues)

4.09 CCTV MANAGEMENT SOFTWARE

CCTV management software with the following minimum specifications:-

- Event Recording Scheme
- Operate Motion-Detector-Recording
- NTSC-PAL video recording.
- Be capable of recording real time images at full resolution and frames rate.
- Features for connection for alarm system Automatic Recycling
- Users' passwords.
- Input, Output, Audio Alert Facilities
- Remote Viewing Facilities, TCP/IP, INTERNET, ISDN, modem
- Capability of streaming into the client's existing LAN / WAN infrastructure
- Ability to quickly search through thousands of hours of recorded video information
- Event-triggered video recording to reduce storage requirements
- Masks out disturbing areas, or areas of no interest, within the specified region
- Identifies & immediately alerts user to potential security breaches
- Features should be able to be used at very low frame rates
- Easy calibration for specific applications
- Color-matching matches user-specified colour to the video image
- Functions in outside environments with changing light conditions:
- Auto-learning of background feature
- Object saliency and object Consistency mechanisms to filter out phantom objects
- "Out of Focus" condition is user-calibrated by level of focus

- Automatic self-test of camera validity
- Motion Trajectory Analyzer provides advanced analysis of the motion of objects
- Seamless integration into Enterprise security knowledge management solution.
- Analysis of stationary objects

(State make and type, and enclose catalogues)

PART 5

5.00 ACCESS CONTROL - SYSTEM

5.01 THE INTELLIGENT SYSTEM CONTROLLER

The controller is the main item for control access system, when specifying, the engineer has to bear the following.

The controller shall have a built in power supply, with a battery back up facility and sufficient power to drive the number of doors with access control.

The control should be able to provide time zoning, extensive door monitoring, logging of all events and hardware alarms – output.

User's parameters shall be done locally in the stand alone via a portable and easy to use compact programme using the English Languages Software.

The controller should be able to use the proximity cards or the magnetically encoded keys as identifiers as specified by the engineer.

It shall have the following features

- Bi- processor Central Processing Unit
- With lead battery back up with four (4 hrs) hours autonomy incase of network failure.
- Autonomous clock/calendar chip with automatic management of regular/daylight saving time with autonomy of one hour.
- Management of peer to peer connection with other servers and as a consequence a high decision making capability and full operative autonomy.
- Up to 2500 transactions stored on a removable cartridge with a flash EPROM memory.

The server as specified by the Engineer should be able to store the transactions for a minimum of two months. The speed of the server to be such that the programming and communication between the card readers and other interface units is fast.

5.02 BIOMETRIC (FINGER) AND PROXIMITY CARD READER

-shall have biometric state of the art finger print reader

-Be Bi-directional and meets requirements for HID Proximity cards (standard ISO/ABA 125 KHz, up to 4cm of distance).

-Have Alphanumeric Liquid Crystal Display (LCD), back lit, with two lines of 16 characters each, for the visualization of time data, guide messages for the user, and service messages.

-Should have 2 multicolor LED: Green for the access granted, Red for invalid transaction, Yellow for Echelon Service function.

-Variable Tones for valid/invalid transactions.

-Have a USB Port, RS-485 communication interface, contactless read/write smart card technology

Lon Works cabling Interface should be done using unshielded twisted pair cable in free topology. (Transceiver FTT10A, 78Kbps)
-Meets IP31 level of protection
-atleast 500 fingerprint user capacity
-atleast 500 valid cards capacity
-It should be able rated to operate within 0ºC ÷ +50ºC temperature range
-It should be rated to operate up to a relative humidity 95% without condensation or as otherwise specified by the engineer for special cases.
-Must meet all laid down international Electromagnetic Compatibility standards

5.03 PROXIMITY CARD

The cards shall be of a biometric type and that can accommodate a customer logo, photographs and text should they be required and they shall have a high coercively magnetic strip.

5.04 MAGNETIC DOOR CONTACTS

They shall be of the magnetic reed switch and with appropriate magnet able to handle at least a minimum of 200KN and also of the normally open type

5.05 2- DOOR ACCESS CONTROLLER

The controller shall be capable of controlling 1No.(one) or 2 No.(two) doors in a stand – alone mode.
The controller shall have a built in power supply, with a battery back up facility and sufficient power to drive two locks.
The control should be able to provide time zoning, extensive door monitoring, logging of all events and hardware alarms – output.
Users parameters shall be done locally in the stand alone via a portable and easy to use compact programme using the English Languages Software.
The controller should be able to use the magstripe cards or the magnetically encoded keys as identifiers.
The card readers shall have a Pin-pad.
The power for the reader and for the electric lock shall be supplied via the controller.

5.06 MAGESTRIPS CARD

The cards shall be of a type that can accommodate a customer logo, photographs and text should they be required and they shall have a high coercivity magnetic strip.

5.07 DOOR CONTACTS

They shall be of the magnetic reed switch and the appropriate magnet and also of the normally open type.

5.08 HAND HELD METAL DETECTOR

Should meet the following minimum requirements

- Contact free inspection
- Extremely high detection performance
- Audible and vibrating alert
- Automatic zero compensation
- LED for visual metal detection
- Sensitivity of between 11cm to 40cm detection distance in air

- Meet DIN EN ISO9002 quality standard, VDE 0848 TEIL4 and A3 security standards

5.09 UNINTERRUPTIBLE POWER SUPPLY (UPS)

This shall be an on-line Un-interruptible power supply with output rating able to provide power to the security surveillance system and controlled access system for a minimum of 8 hours incase of power failure.

It shall be microprocessor- based so that both output voltage and frequency are closely regulated and continuously monitored and also provide system diagnostic and shut down protection functions. It shall feature a maintenance by-pass to enable normal routine maintenance operations to be performed without interruptions to the system.

It shall be fitted with both visual and audible alarms to indicate any change in equipment status such as:

input power problems
ups faults
ups overload
battery discharging

Other parameters are:

Input supply:	240VAC50HZ
Power factor:	0.7 lag at full load
Current limit:	125% of the normal
Output voltage:	240V AC 50 HZ
Output voltage tolerance:	2%
Output frequency tolerance	: 0.05%

5.12 Access control Server Controller

a) Bi-processor CPU68EN302, including a Motorola 68000 (32 Bit architecture) and Ethernet communication processor.
b) 1 MByte FLASH to download the application firmware.
c) MByte FLASH EPROM on a removable cartridge for the download of the permanent database and for the transist and events buffer. Optional memory with 8 Mbytes Flash Memory Available.
d) 1MByte RAM for the activity.
e) Management of up to 12 Temakeys terminals
f) Management of upto 64 I/O
g) Upto 10,000 cards and 2,500 transactions stored on a removable cartridge with flash EPROM memory.
h) Management of peer to peer connection with the other tema server and as a consequence high decision making capability and full operative autonomy.
i) Autonomous clock/calendar chip with automatic management of regular /daylight saving time with autonomy of 1.000 hrs in case of power failure.
j) Lead battery back up with full functionality for 4 hours in case of network failure and signaling o the battery status.

5.13 Biometric Clocking Machine

-shall have biometric state of the art finger print reader

-Be Bi-directional and meets requirements for HID Proximity cards (standard ISO/ABA 125 KHz, up to 4cm of distance).

-Have Alphanumeric Liquid Crystal Display (LCD), back lit, with two lines of 16 characters each, for the visualization of time data, guide messages for the user, and service messages.

-Should have 2 multicolor LED: Green for the access granted, Red for invalid transaction, Yellow for Echelon Service function.
-Variable Tones for valid/invalid transactions.
-Have a USB Port, RS-485 communication interface, contactless read/write smart card technology
Lon Works cabling Interface should be done using unshielded twisted pair cable in free topology. (Transceiver FTT10A, 78Kbps)
-Meets IP31 level of protection
-atleast 1,000 fingerprint user capacity
-atleast 1,000 valid cards capacity
-It should be able rated to operate within $0^{o}C \div +50^{o}C$ temperature range
-It should be rated to operate up to a relative humidity 95% without condensation or as otherwise specified by the engineer for special cases.
-Must meet all laid down international Electromagnetic Compatibility standards

SECTION G: I.C.T EVALUATION CRITERIA

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

1. Determination of Responsiveness
2. Detailed Technical Examination
3. Combination of Technical and Tender Sums Comparison

STAGE 1- DETERMINATION OF RESPONSIVENESS

A) PRELIMINARY EXAMINATION

This stage of evaluation shall involve examination of the pre-qualification conditions 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 may include the following:

i) Category of Registration with N.C.A 3 and above in ICT works;
ii) Class of Licenses with the relevant statutory bodies e.g. C.A.K , Energy Regulatory Commission, County Government, and Water Management Boards etc;
iii) Proof of payment for tender document;
iv) Provision of Bid Security;
v) Dully filled Form of Tender;
vi) Any other conditions included in the advertisement notice/Invitation letter.

Note:

The bid security shall be in accordance with Instruction to Tenderers which states as follows:

- **Clause 19.1** of Instruction to Tenderers,"the tenderers shall furnish as part of his tenders a tender surety in the amount stated in the tender document in the Appendix to Instructions to Tenderers".

- **Clause 19.2** of Instruction to Tenderers, "the unconditional Tender surety shall be in Kenya shillings and be in form of a certified cheque, bank draft, an irrevocable letter of credit or a guarantee from a reputable Bank/ Insurance approved by PPOA located in the Republic of Kenya. The format of the surety shall be in accordance with the sample form included in the tender documents and the tender surety shall be valid for **150 days** from the date of tender opening".

- **Clause 23.2** of Instruction to Tenderers: "For the purposes of this clause, a substantially responsive tender is one which conforms to all terms and condition and specifications of the tender document without material deviation or reservation and has a valid Bank/Insurance guarantee".

The employer may seek further clarification/confirmation if necessary to confirm authenticity/compliance of any condition of the tender.

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

NOTE: ALL COPIES OF DOCUMENTS PROVIDED MUST BE CERTIFIED BY COMMISSIONER OF OTHS and ALL PAGES OF THE COMPLETE TENDER DOCUMENT SUBMITTED MUST BE PAGENATED/SERIALISED

B) COMPLETENESS OF TENDER DOCUMENT

The tender document shall be examined based on clause 2.2 of the Instruction to Tenderers which states as follows:

In accordance with clause 2.2 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 sub clause 2.1 of Instruction to Tenderers and adequacy of resources to effectively carry out the subject contract. The tenderers shall be required to fill the Standards Forms provided for the purposes of providing the required information. The tenderers may also attach the required information if they so desire.

The award of points for the **STANDARD FORMS** considered in this section shall be as shown below

	PARAMETER	**MAXIMUM POINTS**
(i)	Statement of compliance	3
(ii)	Tender Questionnaire	5
(iii)	Confidential Business Questionnaire	5
(iv)	Key personnel	15
(v)	Contract Completed in the last Five (5) years	15
(vi)	Schedules of on-going projects	10
(vii)	Schedules of contractors equipment	10
(viii)	Audited Financial Report for the last 3 years	10
(ix)	Evidence of Financial Resources	10
(x)	Name, Address and Telephone of Banks **(**Contractor to provide**)**	5
(xi)	Litigation History	2
(xii)	Sanctity of the tender document as in accordance with clause 5 of instruction to tenderer	10
	TOTAL	**100**

The detailed scoring plan shall be as shown in table 1 below: -

TABLE 1

Item	Description	Point Scored	Max. Point	
i.	**Statement of Compliance** • Signed and stamped ---------- 3 • Signed but not stamped or vice versa ---------- 2 • Not Signed nor stamped ---------- 0		**3**	
ii.	**Tender Questionnaire Form** • Completely filled ---------- 5 • Partially filled ---------- 3 • Not filled ---------- 0		**5**	
iii.	**Confidential Business Questionnaire Form** • Completely filled ---------- 5 • Partially filled ---------- 3 • Not filled ---------- 0		**5**	
iv	**Key Personnel (Attach evidence)**			**15**
	Director of the firm • Holder of degree in Information Technology field ---------- 4 • Holder of Diploma in Information Technology field ---------- 3 • Holder of trade test certificate in I.T field----------1 • No relevant certificate ---------- 0		**4**	
	At least 1No. degree/diploma of key personnel in relevant Engineering field • With over 10 years relevant experience ---------- 4 • With over 5 years relevant experience---------- 2 • With under 5 years relevant experience ---------- 1		**4**	
	At least 1No certificate holder of key personnel in relevant Engineering field • With over 10 years relevant experience---------- 3 • With over 5 years relevant experience ---------- 2 • With under 5 years relevant experience ----------1		**3**	
	At least 2No artisan (trade test certificate in relevant Engineering field) • Artisan with over 10 years relevant experience ---------- 2 • Artisan with under 10 years relevant experience ---------- 1 • Non skilled worker with over 10 years relevant experience ----- 1		**4**	
v	**Contract completed in the last five (5) years (Max of 5 No. Projects**) • Project of similar nature, complexity and magnitude ---------- 3 • Project of similar nature but of lower value than the one in consideration ---------- 2 • No completed project of similar nature ---------- 0		**15**	

vi	**On-going projects (Max of 5 No. Projects)** • Project of similar nature, complexity and magnitude -------- 2 • Project of similar nature but of lower value than the one in consideration ---------- 1 • No ongoing project of similar nature - ---------- 0		**10**	
vii	**Schedule of contractors equipment and transport (proof or evidence of ownership)** • Means of transport (Vehicle) ---------- 4 • No means of transport ---------- 0		4	**10**
	For each specific equipment required in the installation of the Work being tendered for. (Maximum No. of equipment to be considered – 3 No.---------- 2		6	
viii	**Financial report** **Audited financial report (last three (3) years)** • Turn over greater or equal to 5 times the cost of the project ---10 • Turn over greater or equal to 3 times the cost of the project --- 6 • Turn over greater or equal to the cost of the project ---------- 4 • Turn over below the cost of the project ---------- 2		**10**	
ix	**Evidence of Financial Resources (cash in hand, lines of credit, over draft facility etc)** • Has financial resources equal or above the cost of the project ----10 • Has financial resources below the cost of the project ----------5 • Has not indicated sources of financial resources ---------- 0		**10**	
x	**Name, Address and Telephone of Banks (Contractor to provide)** • Provided ---------- 5 • Not provided ---------- 0		**5**	
xi	**Litigation History** • Filled ---------- 2 • Not filled ---------- 0		**2**	
xii	**Sanctity of the tender document** • Having the document intact (not tempered with in any way) ---10 • Having mutilated or modified the tender document ---------- 0		**10**	
	TOTAL		**100**	

Any bidder who scores 80 points and above shall be considered for further evaluation

STAGE 2 - TECHNICAL EVALUATION

A) COMPLIANCE WITH TECHNICAL SPECIFICATIONS

In this section, the bid will be analyzed to determine compliance with General and Particular technical specifications for the works as indicated in the tender document.

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

Where the Equipment proposed by the tenderer differs with the models specified in the tender document, it is mandatory that the brochures/catalogues of the same be submitted with the tender document highlighting the catalogues Numbers of the proposed items. Such brochures/catalogues should indicate comprehensive relevant data of the proposed equipment/items which should include but not limited to the following:

a) Standards of manufacture

b) Performance ratings/characteristics

c) Material of manufacture

d) Electrical power ratings and

e) Any other necessary requirements (Specify)

Following the above analyses, where the proposed equipment are found not to satisfy the specifications, the tender will be deemed Non – Responsive and will not be evaluated further.

B) TECHNICAL EXAMINATION

In this section, the information provided in the Technical Schedule or Brochures attached will be analyzed for bidders who have qualified from **STAGE 2A** above and points awarded as shown below to a maximum of 100 points

TABLE 2

Item	Description	Score	Max. Score
	Technical schedule/Brochures • Relevant Manufacturer Brochures for items in the technical schedule with equipments to be supplied highlighted and meets specification (Where alternative are to supplied ---------- 100 or • Completely filled Technical Schedule indicating Brand, Model/ Country of origin as per specification in the tender ---------- 100 • Relevant Manufacturer Brochures for items in the technical schedule with equipments to be supplied not highlighted but within range of those specified and meets specifications ---------- 75 or • Completely filled Technical Schedule indicating items as specified in the tender but with less than 100% and above 75% of items in the technical schedule provided ---------- 75 • Relevant Manufacturer Brochures for items in the technical schedule with equipments to be supplied but between 50% and less than 75% of items highlighted and within range of those specified and meets specifications---------- 60 or • Completely filled Technical Schedule indicating items as specified in the tender but between 50% and 75% of items in the technical schedule provided ---------- 60 • Relevant Manufacturer Brochures for between 25% and less than 50% of items in the technical schedule with equipment to be supplied highlighted and meets specifications---------- 50 or • For between 25% and 50% of technical schedule filled indicating Brand/Model/Country of origin for the items considered as specified in the tender ---------- 50 • Less than 25% provided or no technical data provided, either in form of brochures or filling of Technical Schedule. ---------- 0		**100**
	TOTAL		**100**

Any bidder who scores 80 points and above shall be considered for further evaluation

STAGE 3 - FINANCIAL EVALUATION

The evaluation shall be in two sections
1. Preliminary examinations and
2. Tender sum Comparisons

A) PRELIMINARY EXAMINATIONS

The preliminary examination in the Financial Evaluation shall be in accordance with clause 26 of Instruction to Tenderers.

The parameter to be considered under this section includes the following:

a) Arithmetic errors and comparison of rates

(1) Arithmetic Errors

The bid shall be checked for arithmetic errors based on the rates and the total sums indicated in the bills of quantities.

a) Confirmation shall be sought in writing from the tenderers whose tender sums will be determined to have a significant arithmetic error to their disadvantage, to confirm whether they stand by their tender sums. The error shall be treated as per **clause 24 of Instructions to Tenderers**.

Non compliance with the above shall lead to **automatic disqualification from further evaluation.**

Discount if any shall be treated as an error in pursuant to **clause 26.3** of Instructions to Tenderers

(2) Comparison of rates

The evaluation committee will compare rates from different bidders and note consistency of rates and front loading. The evaluation committee will judge and make an appropriate decision giving evidence.

SECTION H -I.C.T BILLS OF QUANTITIES

A. Notes and Sample Items for Preparing a Bill of Quantities

1. These Notes for Preparing a Bill of Quantities are intended only as information for the Procuring Entity or the person drafting the Tender Documents. Priced Bills of Quantities shall be part and parcel of the Contract Documents.

2. The objectives and purpose of the Bills of Quantities are to provide sufficient information on the specifications, descriptions and quantities of Works to be performed to enable tenders to be prepared efficiently and accurately and when a contract has been entered into, to provide a priced Bill of Quantities for use in the periodic valuation of Works executed. Inorder to attain these objectives, Works should be itemized in the Bill of Quantities insufficient detail to distinguish between the different classes of Works, or between Works of the same nature carried outin different locations or in other circumstances which may give rise to different considerations of cost. Consistent with these requirements, the layout and content of the Bill of Quantities should be as simple and clear as possible.

3. The Bills of Quantities should be divided generally into thef ollowing sections:

   a) Preambles
   b) Preliminary items
   c) Work Items
   c) Daywork Schedule; and
   d) Provisionalitems
   e) Summary.

4. NOTES TO PREPARING PREAMBLES

4.1 The Preambles should include only those items that constitute the cost of the works but would not be priced separately as they are expected to be included in the unit prices. Care should be taken to ensure that these items are not are petition of the conditions of contract. The Preambles should indicate the inclusiveness of the unit prices and should state the methods of measurement that have been adopted in the preparation of the Bill of Quantities, that are to be used for the measurement of any part of the Works. The units of measurement and abbreviations should be defined and any mandatory national units defined and described. The methods of and procedure for re- measurement should be described in the Preambles.

4.2 Units of Measurement - The following units of measurement and abbreviations shall be used, unless other national units are mandatory in Kenya.

nit	Abbreviation	Unit	Abbreviation
cubic meter	m^3 or cu m	millimetre	mm

4.3 The Bills of Quantities shall be read in conjunction with the Instructions to Tenders, General and Special Conditions of Contract, Technical Specifications, and Drawings.

4.4. The quantities given in the Bills of Quantities are estimated and partly provisional and are given to provide a common basis for tendering. The basis of payment will be the actual quantities of work ordered and carried out, as measured by the Contractor and verified by the Architect and valued at the rates and prices tender in the priced.

Bills of Quantities, where applicable, and otherwise at such rates and prices as the Architect may fix within the terms of the Contract.

4.5. The rates and prices tender in the priced Bills of Quantities shall, except in so far as it is otherwise provided under the Contract, include all Constructional Plant, labour, supervision, materials, erection, maintenance, insurance, profit, taxes, and duties, together with all general risks, liabilities, and obligations set out or implied in the Contract.

4.6. Arateorprice shall be entered against each item in the priced Bill of Quantities, whether quantities are stated or not. The cost of Items against which the Contractor has failed to enter a rate or price shall be deemed to be covered by other rates and prices entered in the Bill of Quantities.

4.7. The whole cost of complying with the provisions of the Contract shall be included in the Items provided in the priced Bills of Quantities, and where no Items are provided, the cost shall be deemed to be distributed among the ratesand prices entered for the related Items of Work.

4.8. General directions and descriptions of work and materials are not necessarily repeated nor summarized in the Bills of Quantities. References to the relevant sections of the Contract documents shall be made before entering prices agains teach item in the priced Bills of Quantities.

4.9 Provisional Sums and contingency sums included and so designated in the Bills of Quantities shall be expended in whole or in part at the direction and discretion of the Architect in accordance with Sub-Clause13.5 and Clause 13.6 of the General Conditions of contract.

4.10 In preparing the Bills of Quantities, notes should be removed as they are intended to guide the person preparing the Tender Documents. The Contractor must allow in his rates for any costs associated with and complying with the requirements in the Preambles.

4.11 Should a tenderer/contractor not price any item in any section of the Bills of Quantities including Preliminary items, it will be assumed that he/she has spread its cost in other areas that he/she will have priced. Therefore, the itemor items will be executed without any additional costs or without being treated like variations.

5. NOTES ON PREPARING BILLS OF QUANTITIES

5.1 The Preliminary Items should be limited to tangible items that should be priced by the tenderer, are identifiable and can be priced separately and included in the interim valuations precisely. Such items may include such items as site office, notice boards, and other temporary works, otherwise items such as security for the Works which are primarily part of the Contractor's obligations should be included in the Contractor's rates.

5.2 The work items in the Bills of Quantities should be grouped into sections to distinguish between those parts of the Works which by nature, location, access, timing, or any other special characteristics may give rise to different methods of construction, or phasing of the Works, or considerations of cost. Such groups could be ground excavations, structures, external works, services, etc. General items common to all parts of the Works may be grouped as a separate section in the Bill of Quantities.

5.3 Quantities should be computed net from the Drawings, unless directed otherwise in the Contract, and no allowance should be made for bulking, shrinkage or waste. Quantitiesshouldberoundedupwhereappropriate.

5.4 Where the measured items a redeemed not to be exact because of the likelihood that the scope can change during the execution of the works, such items could be subject to re-measurement, the word **"provisional"** should be used to identify such cases. Where whole sections of the work items fall in this class, for example foundations, they should be labelled "Provisional Quantities" or "Provisional Items" so that the Tenderer/Contractor is advised up front that such items are subject to re-measurement to done before such work is cover-up.

5.5 All items that have not been measured and therefore not subject tot enders pricing should be listed in the Bills of Quantities as **Provisional Sums** for particular item or class of Work, which may be subject to a nominated subcontract or separate measurements at a later date during the execution of the works. For example, if it is deemed not possible to measure electrical works before going to tender because detail designs are not ready, a provisional sum can be allowed in the Bills of Quantities for "Installation of Electrical Works" to be executed later when actual design details are completed. To the extent not covered above, there should be in the Bills of Quantities a general provision for physical and financial contingencies made as a "Provisional Sum for Contingencies" and "Provisional Sum for Fluctuations". The inclusion of such provisional sums often facilitates budgetary approval by avoiding the need to request periodic supplementary approvals as the future need arises.

5.6 Provisional sums to cover specialized works normally carried out by Nominated Sub Contractors should be avoided and instead Bills of Quantities of the specialized Works should be included as a section of the main Bills of Quantities to be priced by the Main Contractor. The Main Contractor should be required to indicate the name(s) of the specialized firms he proposes to engage to carry out the specialized Works as his approved domestic sub-contractors. Only provisional sums to cover specialized Works by statutory authorities should be included in the Bills of Quantities.

5.7 A Daywork Schedule should be included if the probability of unforeseen work,

outside the items included in the Bill of Quantities, is relatively high. To facilitate checking by the Procuring Entity of the realism of rates quoted by the tenderers, the Daywork Schedule should normally comprise:

i) A list of the various classes of labor, and materials for which basic.

ii) Daywork rates and prices for various categories of labor are to be inserted by the tenderer, together with a statement of the conditions under which the Contractor will be paid for Work executed on a Daywork basis.

iii) A percent a get o be entered by the tenderer agains teach basic Day work item.

iv) Subtotal amount for labor, materials and plant representing the Contractor's profit, overheads, supervision and other charges.

5.8 The Summary should contain a tabulation of the separate parts of the Bills of Quantities carried forward, with provisional sums for Daywork, Provisional sums and Contingencies, and provision for Total Costing. The last line should allow for tenderer to indicate any discounts before arriving at a total cost carried forward to the Form of Tender.

ICT BILLS OF QUANTITIES

(a) Preambles

1. The method of measurement of completed work for payment shall be in accordance with *[insert the name of a standard reference guide, or full details of the methods to be used]*.

2. The Site is situated in NAROK COUNTY It is approximately150Kilometers from Nairobi.

3. The Contractor shall obtain the Architect's approval on the siting of all temporary buildings, spoil heaps, temporary access path, and storage of materials. The Contractor shall also obtain the Architect approval and direction regarding the use of any materials found on the Site.

4. The drawings used in the preparation of these Bills of Quantities can be inspected at the offices of the Procuring Entityor Procuring Entity's Representative during normal working hours. Two sets of the Working Drawings shall be provided to the contractor, but additional copies shall be provided at a cost to be determined by the Engineer.

5. The Contractor shall allow for the payment of all bank charges in connection with the procurement of Bank Guarantees and stamp charges in connection with this contract Agreement.

6. The Contractor shall carry out the various sections of the Works in such an order as the Architect May direct. The Procuring Entity reserves the right to occupy the Works by sections on completion provided that such occupation is considered to be both practical and reasonable and will not interfere with the Works. The Contractor shall allow any costs associated with such occupation.
7. The main Contractor will be fully responsible for paying his Sub-Contractor but the Procuring Entity reserves the right in very exceptional circumstances to make such payments direct in the interests of the project where the completion thereof might be jeopardized by any dispute or vicariousness between the Contractor and the Sub-Contractor involve.

8. The Contractor shall complete and deliver the Works in the period inserted in the Form of Tender as his time for completion of the Works from the date for Possession, to be agreed with the Engineer. The Contract Period is presumed to have been calculated making due allowance for seasonal inclement weather conditions. Noclaimfor extension of time due to the normal in clement weather for this area shall be entertained.

9. The Contractor shall, upon receiving instructions to proceed with the Works, draw up a Programme and Progress Chart setting out the order in which the Works are to be carried out, with the appropriate dates there of. This Chart shall be agreed with the Architect and no deviation from the order set out in it will be permitted without the written consent of the Engineer. The Contractor will be responsible for arranging the above programme with all his sub-Contractors and Specialties. The Contractor shall allow in his rates for carrying out this exercise, and for updating it as required.

10. The Contractor shall submit to the Architect on the first day of each week or such longer period as the Architect from time to time direct, a Progress Report and any information for the proceeding period, showing the progress during the period and the up-to-date cumulative progresson all important items of each section or portion of the Works.

11. The Contractor shall arrange for photographs of the Site to be taken by a professional photographer approved by the Engineer.The Photographs shall provide a record of the Site and adjacent are as prior to the commencement of the Works and shall cover such portion of the works in progress and completion as the Architect shall direct. All prints shall be full plate size, unmounted, and marked on the reverse side with the date of exposure, identification reference and brief description. The copyright of all photographs shall be vested in the Procuring Entity. The negatives and four prints from each negative shall be delivered to the Architect within two weeks of exposure.

12. Figured dimensions are to be followed in preference to dimensions scaled from the Drawings, but whenever possible dimensions are to be taken on the Site or from the buildings. Before any work is commenced by Sub- Contractors or Specialist Firms, dimensions must be checked on the site comparable dimensions shown on the drawings. The Contractor shall be responsible for the accuracy of such dimensions.

13. Prior to commencement of any work the Contractor is to ascertain from the relevant Authorities the exact position, depth and level of all existing electric cables, waterpipes or other services in the are aand he shall make whatever provisions may be required by the Authorities concerned for the support and protection of such services. Any damage or disturbance caused to any services shall be reported immediately to the Architect and the relevant Authority and shall be made good to their satisfaction at the Contractor's expense. Where appropriate the Contractor shall open up the ground in advance of the main work by hand digging if necessary, to locate precisely the position and details of the services which are likely to affect his operations.

14. The Contractor shall include in his prices for the transport of materials, workmen, etc./, to and from the site of the proposed works, at such hours and by such route as are permitted by the Authorities.

15. The Contractor will be required to make good, at his own expense and damage he may cause to the present road surface and pavements within or beyond the boundary of the Site, during the period of the works. All existing paths, storm water channels, etc., that may be destroyed or damaged during the progress of the Works shall be reinstated by the Contractor to the satisfaction of the Engineer.

16. The Contractor is to allow for complying with all instructions and regulations of the Police Authorities.

17. All water shall be fresh, clean and pure, free from earthly, vegetable or organic matter, acid or alkaline substance in solution. The Contractor shall provide at his own risk and cost all water for use in connection with the Works, (including works of sub–contractors). If need be, he shall make arrangements with the Local Water Authority for the installation of a separate meter for all water used by him throughout the Contract and pay all cost and fees in connection therewith. He shall also provide temporary storage tanks and tubing, etc., as may be necessary, and clear away at completion.

18. The Contractor shall provide all artificial lighting and power for his own use on the Works, (including Sub – Contractor's) including all temporary connections, wiring, fittings, etc., and clearing away on completion. The Contractor shall pay all fees and obtain all permits in connection there with.

19. The Contractor shall constantly keep on the Works a Literate English-speaking Agent or Representative, competent and experienced in the kind of work involved, who shall giveh is whole time to the superintendence of the works. (Including works of sub – contractors). Such Agent or Representative shall receive on behalf of the Contractordirections and instruction from the Engineer, and such directions and instructions shall be deemed to be given to the contractor in accordance with the Conditions of Contract. The Agent shall not be replaced without the specific approval of the Engineer.

20. The Contractor shall ensure that the safety of his work people and all authorized visitors to the site are protected at all times. In particular, there shall be the proper provision of guard–rails to scaffolding, protection against falling materials, tools on site, dust, nail and other sharp objects. The site shall be kept tidy and clear of dangerous rubbish. The Architect shall be empowered to suspend work on site should it be considered this condition is not being observed and no claim arising from such suspension will be allowed.

21. The are as available to the Contractor for workyards, offices and other facilities shall be directed by the Architect and any existing features to remain shall be protected from damage throughout the Contract Period and handed back in good condition when they are vacated at the end of the Contract. If additional areas are required, the contractorshallsourcethenatowncost.

22. The Contractor shall give the Architect reasonable notice of the intention to set out or take levels for any part of the Works so that arrangements may be made for checking the work. The accuracy of setting out and leveling shall be within the tolerances specified in the Specifications or on the Drawings. The checking of setting out or leveling by the Architect shall not relieve the Contractor of his duties or responsibilities under the Contract.

23. The Contractor must take steps necessary to safe guard and shall beheld fully responsible for any damage caused to existingand adjacent property, including buildings that are not a subject of demolition. He shall make good at his own cost damage to persons and property caused there on, and he shall indemnify the Procuring Entity against any loss or claim that may arise.

24. The Contractor shall take such steps and exercise such care and diligence as to minimize nuisance arising from dust, noise or any other cause to the occupiers of the existing and adjacent property. He must provide such temporary and special screens and tarpaulins or gummy bags, hoarding, barriers, warning signs etc. as he considers necessary and sufficient for the protection of the existing and adjacent property and or prevention of nuisance etc. as directed by Engineer.

25. The Contractors attention is drawn to the standards levy order which was amended on 15thOctober 1998.Legal notice No.154 of 1998. The Contractor is required to pay a monthly level of 0.2% of his factory price of construction works with effect from January 1999. Tenderer shall allow for this in the build-upo f his rates.

26. The Contractor shall provide temporary sheds, offices meshrooms, sanitary, accommodation and other temporary buildings for the use of the contractor and sub-contractors, including lighting furniture equipment and attendance.

27. Contractor shall provide/build labor camp sat areas to be agreed with the Engineer. Labor camps shall be complete with sanitary accommodation and fencing gates.

28. The Contractor must provide the necessary toilet facilities to the requirement and satisfaction of the Health Authorities and maintain the same in a thoroughly clean and sanitary condition and pay all conservancy fees during the period of the Works and remove when no longer required.

29. The Contractor shall provide at his own risk and cost all watching and lighting as necessary to safeguard the Works, Plant and materials against damage and theft.

30. The Contractor shall provide all necessary hoists, tackle, plant, equipment, vehicles, tools and appliances of every description for the due and satisfactory completion of the Works and shall remove the same on completion. All such plant, tools and equipment shall comply with all regulations in force throughout the period of the Contract and shall be altered or adopted during the Contract period as may be necessary to comply with any amendments in or additions to such regulations.

31. Provide, erect and maintain all necessary scaffolding, sufficiently strong and efficient for the due performance of the works, including Sub-Contract Works, provide special scaffolding as required by Sub-Contractors, alter and adopt all scaffolding as and when required during the Works, and remove on completion. No scaffolding is measured here in after and the Contractor must allow in his rates for this.

32. The Contractor shall take all necessary precautions such as temporaryf encing, hoarding fans, planked footways, guard–rails gantries screen, etc., for the safe custody of the Works, materials and public protection and adjacent properties.

33. Cover up all and protect from damage, including damage from in clement weather, all finished work and unfixed materials, including that of Sub-Contractors, etc., to the satisfaction of the Architect until the completion ofthe Contract.

34. The Contractor shall, after completion of the works, at his own expense, remove and clear away all surplus excavated demolition materials, plant, rubbish and unused materials and shall leave the whole of the Site and Works in a clean and tidy state to the satisfaction of the Engineer, sheds, camps, etc. Particular care shall be taken toleavecleanallfloors and windows and tore move all paint and cement all rubbis hand dirt as it accumulates. The Contractor is to find his own dump and shall pay all charges in connection there with.

35. Concrete test cubes shall be prepared in a set of three, as described including testing fees, labor and materials, making molds, transport, handling, etc. Allow in your rates for making at least four cubes on each occasion, from different batches; the concrete being taken from the point of deposit.

36. The Contractors hall furnish at the earliest possible opportunity before work commences, and at his own cost, any samples of materials and workmanship that may be called for by the Architect for the approval or rejection, and any further samples in the case of rejection, until such samples are approved by the Engineer.

Such samples, when approved, shall be the minimum standard for the work to which they apply. The proceduref or submitting samples of materials for testing or approval and the method of marking for identification shall be as laid down by the Engineer.The Contractor shall allow in his Tender for such samples and tests, including those in connection with his Sub-Contractors work.

37. The Contractors attention is drawn to the Finance Bill of the year 2000/2001 on withholding tax on contractual payment section 35(7)(i)(ii) which became effective on 1st July 2000. A 3% withholding tax will be applicable to all in terim payments exceeding Kshs…….....……. for work done in respect of building or civil works. The contractor shall allow for any costs arising resulting there from in the build-up of rates.

38. Blasting will only be allowed with the express permission of the Architect in writing. All blasting operations shall be carried out at the Contractor's sole risk and cost, in accordance with any Government regulations in force for the time being, and any special regulations laid down by the Architect governing the use and storage of explosives.

39. The National Construction Authority is a state corporation established under the national construction authority Act No.14 of 2011. The broad Mandate of the Authority is to over see the construction industry and coordinate its development. The National Construction Authority Regulations 2014 with an effective date of 6thJune 2014, regulation 25, - Allow 0.5% of the tender sum/contract sum for construction levy.

40. The Contractor attention is drawn to Finance Bill of 1993 where VATwas introduced in all contracts for construction services. The tenderer is also drawn to VATAct Cap 476 clause 19(9). The tenderer must allow for VAT1.19 as instructed else where.

41. The contractor shall allow and pay for all insurance to cover risks and indemnities required Items 17 and 18 of the Conditions of contract and also specified in the Special Conditions of Contract.

BILL NO. 1 – ICT PRELIMINARY ITEMS

ITEM	DESCRIPTION	QTY	UNIT	UNIT RATE KES	AMOUNT KES
1	Discrepancies clause				
2	Conditions of sub-contract Agreement clause				
3	Payment's clause				
4	Site location clause				
5	Scope of Contract Works clause				
6	Extent of the Contractor's Duties clause				
7	Firm price contract clause				
8	Variation clause				
9	Prime cost and provisional sum clause (insert profit and attendance which is a percentage of expended PC or provisional sum.)				
10	Bond clause				
11	Government Legislation and Regulations clause				
12	Import Duty and Value Added Tax clause (Note this clause applies for materials supplied only. VAT will also be paid by the sub-contractor as allowed in the summary page)				
13	Insurance company Fees clause				
14	Provision of services by the Main contractor clause				
15	Samples and Materials Generally clause				
	SUB-TOTAL CARRIED TO PAGE Ict:H-4				

ITEM	DESCRIPTION	QTY	UNIT	UNIT RATE KES	AMOUNT KES
16	Supplies clause				
17	Bills of Quantities clause				
18	Contractor's Office in Kenya clause				
19	Builder's Work clause				
20	Setting to work and Regulating system clause				
21	Identification of plant components clause				
22	Working Drawings clause				
23	Record Drawings (As Installed) and Instructions clause				
24	Maintenance Manual clause				
25	Hand over clause				
26	Painting clause				
27	Testing and Inspection – manufactured plant clause				
28	Testing and Inspection – Installation clause				
29	Storage of Materials clause				
30	Initial Maintenance clause				
	SUB-TOTAL CARRIED TO PAGE Ict:H-4				

ITEM	DESCRIPTION	QTY	UNIT	UNIT RATE KES	AMOUNT KES
31	Attendance Upon Tradesmen, etc. (Insert percentage only) clause				
32	Local and other Authorities notices and fees clause				
33	Temporary Works clause				
34	Patent Rights clause				
35	Mobilization and Demobilization Clause				
36	Extended Preliminaries Clause				
37	Allow for profit and Attendance for the above				
38	Amendment to Scope of Sub-contract Works				
39	Clause Contractor Obligation and Employers Obligation clause				
40	**Other preliminaries.** To ensure that equipments are provided to specifications allow for factory visit of Gensets and Voltage Stabilizers for 5 No. persons (2 Electrical Engineers Architect, and 2 Client representative) to visit the manufacturing factory to verify the specifications and witness all the relevant factory tests before approval of shipping. The cost of the visit to includes but not limited to: - a) Visa processing fees b) Return air-tickets to and from the factory. c) Any transfer fees d) Local transport both in Nairobi and the city of destination. e) Accommodation at a hotel/resort not less than 4 stars in rating. Any other incidental costs for smooth facilitation of the trip	1	sum	**3,000,000.00**	**3,000,000.00**
	SUB-TOTAL CARRIED TO PAGE Ict:H-4				

ITEM	DESCRIPTION	QTY	UNIT	UNIT RATE KES	AMOUNT KES
a)	Subtotal brought forward from page **Ict:**H-1				
b)	Subtotal brought forward from page **Ict:**H-2				
c)	Subtotal brought forward from page **Ict:**H-3				
	TOTAL FOR PRELIMINARIES **CARRIED FORWARD TO PRICE MAIN SUMMARY Page Ict:H-36**				

MAIN HOSPITAL BLOCK

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
	ICT: BILL No.1 **STRUCTURED CABLING INSTALLATIONS** **Supply, install, test and commission the following: -** **(PRICE TO BE EXCLUSIVE OF V.A.T)** **MAIN HOSPITAL- GROUND FLOOR**				
1.1	**HORIZONTAL CABLING**				
1.1.1	CAT 6 4 pair 24 AWG Siemon UTP cable or Approved Equivalent	59	Rolls		
1.1.2	Siemon, CAT 6 face plate complete with Single CAT 6 Angled module RJ 45 key stones 45^0 exit MX6-(02) or Approved Equivalent	220	No.		
1.1.3	Siemon UTP CAT 6 24 port patch panels (HD6 – 24) or Approved Equivalent	5	No.		
1.1.4	CAT 6 UTP Cable pulling , per 305 meters.	1	Lot		
1.1.5	Siemon UTP CAT 6 RJ 45 – RJ 45 patch cord, 1m or Approved Equivalent	440	No.		
1.1.6	Siemon UTP CAT 6 RJ45 – RJ 45 patch cord, 3M or Approved Equivalent	220	No.		
1.1.7	Printed self laminated wrap cable markers, to be installed at both cable ends.	1	Lot		
1.1.8	Termination of CAT 6 UTP horizontal cables on both Ends	440	Points		
1.2	**CABINETS**				
1.2.1	42U metal powder coated high gauge cabinet, glass door, 4 twins, 800mm deep, 5 shelves, 4 funs, lockable (two spare keys) vertical cable management complete with **Vertical 100mm wide Trunking**, **5No Twin 13A Socket outlets** wired as 1 spur circuit to a **32A 3 Pin Isolator** mounted on the trunking	2	No.		
1.3	**ACTIVE EQUIPMENT**				
1.3.1	Cisco Catalyst 9200 Series **48 port Full 30W PoE+ C9200L-48P-4G Layer 3 Switch - 48 X Gigabit Ethernet Network,** 4 X Gigabit Ethernet Uplink - Manageable - Twisted Pair, Optical Fiber - Modular - 3 Layer Supported	5	No.		
1.3.2	Indoor 802.11ax Wi-Fi Access Point as **RUCKUS R750** INDOOR ACCESS POINT with One 2.5Gbps Ethernet port and one 1Gbps Ethernet port P.O.E	8	No		
	Total C/F to ICT: BILL No. 1 Collection page				

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
1.3.3	Cisco SFP Interconnector for Router configaration to be connected on the back of the 2 SFP ports behind the C9200L switch with P.O.E	1	No		
1.3.6	Cable organizer-2U with cover for data patched panels.	6	No.		
1.4	**BACKBONE CABLING**				
1.4.1	48 way fibre optic patch panel complete with connectors Siemon or Approved Equivalent	5	No		
1.4.2	1M Factory Terminated Fibre optic patch cords complete with connectors to be used inside cabinet Siemon or Approved Equivalent	8	No.		
1.4.3	4 pair single-mode fibre optic cable linking Server room to Cisco Switch on Ground Floor	100	LM		
Total C/F to ICT: BILL No. 1 Collection page					

Item	Description	Amount in KES
	ICT: BILL No 1 COLLECTION PAGE	
1	TOTAL AMOUNT B/F PAGE ICT:H-5……	
2	TOTAL AMOUNT B/F PAGE ICT:H-6 ……	
	Total For ICT: Bill No. 1 C/F to Bills Summary page ICT:H-35	

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
	ICT: BILL No.2 **STRUCTURED CABLING INSTALLATIONS** **Supply, install, test and commission the following: -** **(PRICE TO BE EXCLUSIVE OF V.A.T)** **MAIN HOSPITAL- FIRST FLOOR**				
2.1	**HORIZONTAL CABLING**				
2.2.1	CAT 6 4 pair 24 AWG Siemon UTP cable or Approved Equivalent	40	Rolls		
2.2.2	Siemon, CAT 6 face plate complete with Single CAT 6 Angled module RJ 45 key stones 45^0 exit MX6-(02) or Approved Equivalent	150	No.		
2.2.3	Siemon UTP CAT 6 24 port patch panels (HD6 – 24) or Approved Equivalent	5	No.		
2.2.4	CAT 6 UTP Cable pulling , per 305 meters.	1	Lot		
2.2.5	Siemon UTP CAT 6 RJ 45 – RJ 45 patch cord, 1m or Approved Equivalent	300	No.		
2.2.6	Siemon UTP CAT 6 RJ45 – RJ 45 patch cord, 3M or Approved Equivalent	150	No.		
2.2.7	Printed self laminated wrap cable markers, to be installed at both cable ends.	1	Lot		
2.2.8	Termination of CAT 6 UTP horizontal cables on both Ends	300	Points		
2.2	**CABINETS**				
2.2.1	42U metal powder coated high gauge cabinet, glass door, 4 twins, 800mm deep, 5 shelves, 4 funs, lockable (two spare keys) vertical cable management complete with **Vertical 100mm wide Trunking**, **5No Twin 13A Socket outlets** wired as 1 spur circuit to a **32A 3 Pin Isolator** mounted on the trunking	1	No.		
2.3	**ACTIVE EQUIPMENT**				
2.3.1	Cisco Catalyst 9200 Series **48 port Full 30W PoE+ C9200L-48P-4G Layer 3 Switch - 48 X Gigabit Ethernet Network,** 4 X Gigabit Ethernet Uplink - Manageable - Twisted Pair, Optical Fiber - Modular - 3 Layer Supported	4	No.		
2.3.2	Indoor 802.11ax Wi-Fi Access Point as **RUCKUS R750** INDOOR ACCESS POINT with One 2.5Gbps Ethernet port and one 1Gbps Ethernet port P.O.E	8	No		
Total C/F to ICT: BILL No. 2 Collection page					

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
2.3.3	Cisco SFP Interconnector for Router configaration to be connected on the back of the 2 SFP ports behind the C9200L switch with P.O.E	1	No		
2.3.6	Cable organizer-2U with cover for data patched panels.	6	No.		
2.4	**BACKBONE CABLING**				
2.4.1	48 way fibre optic patch panel complete with connectors Siemon or Approved Equivalent	4	No		
2.4.2	1M Factory Terminated Fibre optic patch cords complete with connectors to be used inside cabinet Siemon or Approved Equivalent	8	No.		
2.4.3	4 pair single-mode fibre optic cable linking Server room to Cisco Switch on First Floor	100	LM		
Total C/F to ICT: BILL No. 2 Collection page					

Item	Description	Amount in KES
	ICT: BILL No 2 COLLECTION PAGE	
1	TOTAL AMOUNT B/F PAGE ICT:H-8……	
2	TOTAL AMOUNT B/F PAGE ICT:H-9 ……	
	Total For ICT: Bill No. 2 C/F to Bills Summary page ICT:H-35	

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
	ICT: BILL No. 3 **STRUCTURED CABLING INSTALLATIONS** **Supply, install, test and commission the following: -** **(PRICE TO BE EXCLUSIVE OF V.A.T)** **MAIN HOSPITAL-SECOND FLOOR**				
3.1	**HORIZONTAL CABLING**				
3.3.1	CAT 6 4 pair 24 AWG Siemon UTP cable or Approved Equivalent	35	Rolls		
3.3.2	Siemon, CAT 6 face plate complete with Single CAT 6 Angled module RJ 45 key stones 45^0 exit MX6-(02) or Approved Equivalent	120	No.		
3.3.3	Siemon UTP CAT 6 24 port patch panels (HD6 – 24) or Approved Equivalent	4	No.		
3.3.4	CAT 6 UTP Cable pulling , per 305 meters.	1	Lot		
3.3.5	Siemon UTP CAT 6 RJ 45 – RJ 45 patch cord, 1m or Approved Equivalent	240	No.		
3.3.6	Siemon UTP CAT 6 RJ45 – RJ 45 patch cord, 3M or Approved Equivalent	120	No.		
3.3.7	Printed self laminated wrap cable markers, to be installed at both cable ends.	1	Lot		
3.3.8	Termination of CAT 6 UTP horizontal cables on both Ends	240	Points		
3.2	**CABINETS**				
3.2.1	42U metal powder coated high gauge cabinet, glass door, 4 twins, 800mm deep, 5 shelves, 4 funs, lockable (two spare keys) vertical cable management complete with **Vertical 100mm wide Trunking**, **5No Twin 13A Socket outlets** wired as 1 spur circuit to a **32A 3 Pin Isolator** mounted on the trunking	1	No.		
3.3	**ACTIVE EQUIPMENT**				
3.3.1	Cisco Catalyst 9200 Series **48 port Full 30W PoE+ C9200L-48P-4G Layer 3 Switch - 48 X Gigabit Ethernet Network,** 4 X Gigabit Ethernet Uplink - Manageable - Twisted Pair, Optical Fiber - Modular - 3 Layer Supported	3	No.		
3.3.2	Indoor 802.11ax Wi-Fi Access Point as **RUCKUS R750** INDOOR ACCESS POINT with One 2.5Gbps Ethernet port and one 1Gbps Ethernet port P.O.E	3	No		
Total C/F to ICT: BILL No. 3 Collection page					

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
3.3.3	Cisco SFP Interconnector for Router configaration to be connected on the back of the 2 SFP ports behind the C9200L switch with P.O.E	1	No		
3.3.6	Cable organizer-2U with cover for data patched panels.	6	No.		
3.4	**BACKBONE CABLING**				
3.4.1	48 way fibre optic patch panel complete with connectors Siemon or Approved Equivalent	3	No		
3.4.2	1M Factory Terminated Fibre optic patch cords complete with connectors to be used inside cabinet Siemon or Approved Equivalent	6	No.		
3.4.4	4 pair single-mode fibre optic cable linking Server room to Cisco Switch on Second Floor	100	LM		
Total C/F to ICT: BILL No. 3 Collection page					

Item	Description	Amount in KES
	ICT: BILL No 3 COLLECTION PAGE	
1	TOTAL AMOUNT B/F PAGE ICT:H-11……	
2	TOTAL AMOUNT B/F PAGE ICT:H-12……	
	Total For ICT: Bill No. 3 C/F to ICT: Bills Summary page ICT:H-35	

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
	ICT: BILL No. 4 **STRUCTURED CABLING INSTALLATIONS** **Supply, install, test and commission the following: -** **(PRICE TO BE EXCLUSIVE OF V.A.T)** **MAIN HOSPITAL- THIRD FLOOR**				
4.1	**HORIZONTAL CABLING**				
4.4.1	CAT 6 4 pair 24 AWG Siemon UTP cable or Approved Equivalent	25	Rolls		
4.4.2	Siemon, CAT 6 face plate complete with Single CAT 6 Angled module RJ 45 key stones 45^0 exit MX6-(02) or Approved Equivalent	90	No.		
4.4.3	Siemon UTP CAT 6 24 port patch panels (HD6 – 24) or Approved Equivalent	3	No.		
4.4.4	CAT 6 UTP Cable pulling , per 305 meters.	1	Lot		
4.4.5	Siemon UTP CAT 6 RJ 45 – RJ 45 patch cord, 1m or Approved Equivalent	180	No.		
4.4.6	Siemon UTP CAT 6 RJ45 – RJ 45 patch cord, 3M or Approved Equivalent	90	No.		
4.4.7	Printed self laminated wrap cable markers, to be installed at both cable ends.	1	Lot		
4.4.8	Termination of CAT 6 UTP horizontal cables on both Ends	180	Points		
4.2	**CABINETS**				
4.2.1	42U metal powder coated high gauge cabinet, glass door, 4 twins, 800mm deep, 5 shelves, 4 funs, lockable (two spare keys) vertical cable management complete with **Vertical 100mm wide Trunking**, **5No Twin 13A Socket outlets** wired as 1 spur circuit to a **32A 3 Pin Isolator** mounted on the trunking	2	No.		
4.3	**ACTIVE EQUIPMENT**				
4.3.1	Cisco Catalyst 9200 Series **48 port Full 30W PoE+ C9200L-48P-4G Layer 3 Switch - 48 X Gigabit Ethernet Network,** 4 X Gigabit Ethernet Uplink - Manageable - Twisted Pair, Optical Fiber - Modular - 3 Layer Supported	4	No.		
4.3.2	Indoor 802.11ax Wi-Fi Access Point as **RUCKUS R750** INDOOR ACCESS POINT with One 2.5Gbps Ethernet port and one 1Gbps Ethernet port P.O.E	3	No		
Total C/F to ICT: BILL No. 4 Collection page					

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
4.3.3	Cisco SFP Interconnector for Router configaration to be connected on the back of the 2 SFP ports behind the C9200L switch with P.O.E	1	No		
4.3.6	Cable organizer-2U with cover for data patched panels.	6	No.		
4.3.7	1U 1.6/3.8kW Single-Phase 100–240V Basic Power Distribution Unit, 14 Outlets (12 C13 & 2 C19), C20 16A Input, 1U Rack-Mount as Tripp-lite or Approved equivalent (To be mounted inside Data Cabinets above	11	No		
4.3.8	15 kW IT load Huawei Fusion Module 800, Smart Small Data Center of Configuration 5* , complete with 20KVA UPS, 2+0 Precision Air Conditioning Cooling, Single Power Input loop, 1 PDU, 14-UPS output complete with Door state Sensor, Water leak Sensor, Stand Alone CCTV,	1	No		
4.4	**BACKBONE CABLING**				
4.4.1	48 way fibre optic patch panel complete with connectors Siemon or Approved Equivalent	4	No		
4.4.2	1M Factory Terminated Fibre optic patch cords complete with connectors to be used inside cabinet Siemon or Approved Equivalent	8	No.		
4.4.3	4 pair single-mode fibre optic cable linking edge switches in cabinet in server room	150	LM		
Total C/F to ICT: BILL No. 4 Collection page					

Item	Description	Amount in KES
	ICT: BILL No 4 COLLECTION PAGE	
1	TOTAL AMOUNT B/F PAGE ICT:H-14 ……	
2	TOTAL AMOUNT B/F PAGE ICT:H-15 ……	
	Total For ICT: Bill No. 4 C/F to ICT: Bills Summary page ICT:H-35	

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
	ICT: BILL No. 5 **STRUCTURED CABLING INSTALLATIONS** **Supply, install, test and commission the following: -** **(PRICE TO BE EXCLUSIVE OF V.A.T)** **MAIN HOSPITAL**				
5.1	**HORIZONTAL CABLING**				
5.5.1	CAT 6 4 pair 24 AWG Siemon UTP cable or Approved Equivalent	25	Rolls		
5.5.2	Siemon, CAT 6 face plate complete with Single CAT 6 Angled module RJ 45 key stones 45^0 exit MX6-(02) or Approved Equivalent	90	No.		
5.5.3	Siemon UTP CAT 6 24 port patch panels (HD6 – 24) or Approved Equivalent	5	No.		
5.5.4	CAT 6 UTP Cable pulling , per 305 meters.	1	Lot		
5.5.5	Siemon UTP CAT 6 RJ 45 – RJ 45 patch cord, 1m or Approved Equivalent	180	No.		
5.5.6	Siemon UTP CAT 6 RJ45 – RJ 45 patch cord, 3M or Approved Equivalent	90	No.		
5.5.7	Printed self laminated wrap cable markers, to be installed at both cable ends.	1	Lot		
5.5.8	Termination of CAT 6 UTP horizontal cables on both Ends	180	Points		
5.2	**CABINETS**				
5.2.1	42U metal powder coated high gauge cabinet, glass door, 4 twins, 800mm deep, 5 shelves, 4 funs, lockable (two spare keys) vertical cable management complete with **Vertical 100mm wide Trunking**, **5No Twin 13A Socket outlets** wired as 1 spur circuit to a **32A 3 Pin Isolator** mounted on the trunking	1	No.		
5.3	**ACTIVE EQUIPMENT**				
5.3.1	Cisco Catalyst 9200 Series **48 port Full 30W PoE+ C9200L-48P-4G Layer 3 Switch - 48 X Gigabit Ethernet Network,** 4 X Gigabit Ethernet Uplink - Manageable - Twisted Pair, Optical Fiber - Modular - 3 Layer Supported	2	No.		
5.3.2	Indoor 802.11ax Wi-Fi Access Point as **RUCKUS R750** INDOOR ACCESS POINT with One 2.5Gbps Ethernet port and one 1Gbps Ethernet port P.O.E	2	No		
	Total C/F to ICT: BILL No. 1 Collection page				

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
5.3.3	Cisco SFP Interconnector for Router configaration to be connected on the back of the 2 SFP ports behind the C9200L switch with P.O.E	1	No		
5.3.6	Cable organizer-2U with cover for data patched panels.	5	No.		
5.4	**BACKBONE CABLING**				
5.4.1	48 way fibre optic patch panel complete with connectors Siemon or Approved Equivalent	4	No		
5.4.2	1M Factory Terminated Fibre optic patch cords complete with connectors to be used inside cabinet Siemon or Approved Equivalent	8	No.		
5.4.4	4 pair single-mode fibre optic cable linking edge switches in cabinet in server room	50	LM		
Total C/F to ICT: BILL No. 1 Collection page					

Item	Description	Amount in KES
	ICT: BILL No 5 COLLECTION PAGE	
1	TOTAL AMOUNT B/F PAGE ICT:H-17……	
2	TOTAL AMOUNT B/F PAGE ICT:H-18 ……	
	Total For ICT: Bill No. 5 C/F to ICT: Bills Summary page ICT:H-35	

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
	ICT: BILL No. 6 **MAIN HOSPITAL- IP PABX INSTALLATION & TELEPHONY** **Supply, install, test and commission the following: -** **(PRICE TO BE EXCLUSIVE OF V.A.T)**				
6.1	KX-NS1000UK Panasonic **IP PBX-640 IP phones/960 Analog Extns,600 lines**	1	No		
6.2	KX-NS0111X M-DSP Unit for VOIP GW, Conference and Voice Mail	1	Lot		
6.3	KX-NSM010X-E. LicensePanasonic E- License Capacity Expansion from 31 to 600 IP extension	1	Lot		
6.4	KX-NSM520X-E. License Panasonic E- License Activate 20 IP-PT or SIP-MLT	4	No		
6.5	KX-NSM116X-E. LicensePanasonic E- License Activate 16ch H.323 IP-GW or 16ch SIP-Trunk	1	No		
6.6	KX-NT553X-BPanasonic Proprietary IP Phone Line LCD,24 Self Labelling, POE, Gigabit	1	No		
6.7	KX-NT505XB Panasonic IP DSS console with 48BLF keys	1	No		
6.8	KX-NSA301WJ-E. License Panasonic E- License Supervisor License for call Centre 1 user	1	Lot		
6.9	KX-NT551X-B Panasonic Proprietary IP phone, 1LCD,8PF- Key, POE, Gigabit, Black (call center users)	6	No		
6.10	RP-TCA430E- Panasonic Headset Headset for ITS/dect (Reception users)	5	No		
6.11 a)	KX-HDV130XB Panasonic Sip Phone 2× 16 LCD, POE,2 Ethernet ports,2 SIP ACCTS	500	No		
6.12	KX-NT630XB 3.6 Inches Monochrome LCD,24 key Labelling, SRTP - Executive users	50	No		
6.13	NEO GATE TG400 4ch GSM gateway for SIP trunks (Lic needed in NS)	2	No		
6.14	KX-NSM104X-E License Panasonic E- License Activate 4ch H.323 IP-GW or 4ch SIP-Trunk	2			
6.15	KX-NSF201W-E. License Panasonic E- License ACD reports License & QUEUE announcement	2			
6.16	Any other item to complete installation covering all accessories/consumable to complete the above works.(list on a separate sheet & insert in here)	1	Lot		
	Total For ICT: Bill No. 6 C/F to ICT: Bills Summary page ICT:H-35				

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
	ICT: BILL No.7 : Intruder Alarm System & Access Control **Supply, install, test and commission the following: -** **(PRICE TO BE EXCLUSIVE OF V.A.T)**				
	INTRUDER ALARM SYSTEM				
7.1	GSM Microprocessor Based 140 Zone Control Panel as Risco	2	No		
7.2	16 Zone Expander as Risco	8	No		
7.3	LCD keypad as Risco	8	No		
7.4	Magnetic Contact Switches	200	No		
7.5	a) Medium Range Pet Immune Motion sensor 360 degrees as Risco	150	No		
7.5	b) Medium Range Pet Immune Motion sensor 90 degrees as Risco	50	No		
7.6	Break Glass	20	No		
7.7	Siren/ Flasher Boxed Unit	3	No		
7.8	Power Suppy Unit	3	No		
7.9	Alarm Panic Buttons	400	No		
7.10	12Ahr Batteries	2	No		
7.11	Remote Kit	6	No		
7.12	Vibration Sensors as Risco	20	No		
7.12	Cabling works & Accessories	1	Lot		
7.13	Allow for User Training, Test & Comissioning	1	Lot		
7.14	1 years waranty of Equipments	1	lot		
	Total For ICT: Bill No. 7 C/F to Collection page				

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
	Access Control System				
7.1	IP based fingerprint terminal Access Control SF420 ZK-Teco (For Door Entry)	70	No		
7.2	RFID Multi-Door Controller C5 Series C5S140	19	No		
7.3	350KG Heavy Duty ElectroMagnetic Contact (Mag LOCK) Complete with Mounting Bracket	70	No		
7.4	ZKBioSecurity Software	1	Lot		
7.4	ZK-Teco TF1600 IP Based Finger Print Access Control Terminal (For door Exit)	70			
7.5	ZKTeco 125kHz Read only Proximity Smart Door Exit/Entry Access Control Plastic Card	150	No		
7.5	Power Suppy Unit Complete with 2No 12Ah	10			
7.7	Cabling works & Accessories	1	Lot		
7.8	Allow for Unser Training, Test & Comissioning	1	lot		
7.9	1 years waranty of Equipments	1	Lot		
7.10	Cisco Catalyst 9200 Series 48 port Full 30W PoE+ C9200L-48P-4G Layer 3 Switch - 48 X Gigabit Ethernet Network, 4 X Gigabit Ethernet Uplink - Manageable - Twisted Pair, Optical Fiber - Modular - 3 Layer Supported	2	No		
Total For ICT: Bill No. 7 C/F to Collection page					

Item	Description	Amount in KES
	ICT: BILL No 7 COLLECTION PAGE	
1	TOTAL AMOUNT B/F PAGE ICT:H-21 ……	
2	TOTAL AMOUNT B/F PAGE ICT:H-22……	
	Total For ICT: Bill No. 7 C/F to ICT: Bills Summary page ICT:H-35	

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
	ICT: BILL No-8 **MAIN OSPITAL: Closed Circuit Television System** **Supply, install, test and commission the following: -** **(PRICE TO BE EXCLUSIVE OF V.A.T)**				
8.1	Wiring of CCTV camera from server room to IP camera location with CAT 6 4 pair 24 AWG Siemon UTP cable or Approved Equivalent. Cable to follow Conduits & Cable tray/Trunking	35	Rolls		
8.2	Termination of the Cat 6 UTP cables at both ends with RJ 45	192	No		
8.3 (a)	Hikvision 4MP Darkfighter PoE IP DOME Camera, DS-2CD2145FWD-I 2.8mm Fixed Lens, Outdoor WDR IR Video Surveillance Security Camera with SD Card Slot, IP67 IK10 H.265	90	No		
b)	4MP Darkfighter POE IP Bullet Camera AcuSense,OEM Hikvision DS-2CD2T46G1-4I/SL 2.8mm, Strobe Light & Audio Alarm,262ft IR Range, MicroSD, IP66 Outdoor Network Surveillance Security Camera Bullet,H.265+,ONVIF	6	No		
8.4	Hikvision 8mp NVR DS-96064NI-E 64 Channel, 400Mbps Embedded 64 Ports POE Embedded Plug Play Network Video Recorder 2 SATA Interface H.265 complete with 10TB Storage Hard Disk.	2	No		
8.5	42" Samsung LED screen	2	No		
8.6	Category 6 4 pair UTP 1m patch cord as Siemon	13	No		
8.7	Category 6 24port patch panel	2	No		
Total C/F to ICT: BILL No. 8 Collection page					

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
8.8	Cisco Catalyst 9200 Series **48 port Full 30W PoE+ C9200L-48P-4G Layer 3 Switch - 48 X Gigabit Ethernet Network,** 4 X Gigabit Ethernet Uplink - Manageable - Twisted Pair, Optical Fiber - Modular - 3 Layer Supported	2	No.		
8.9	Network Documentation	1	Lot		
8.11	LENOVO A740 utra slim 68.58cm touchscreen ALL-IN-ONE computer with Intel Core i7,(Processor:2.7GHz Intel Core i7 Quad-Core, Memory: 8GB DDR3 RAM, H81 chipset, OS-windows 8.1, HDD- 1T+8GB SSHD, Graphics-N-vidia GT840A 2GB,) complete with wireles Kevboard & Mouse.	1	No		
8.12	Allow for training of the personnel on the Item usage and operation of CCTV system	1	Lot		
8.13	Allow System programming	1	Lot		
Total C/F to ICT: BILL No. 8 Collection page					

Item	Description	Amount in KES
	ICT: BILL No 8 COLLECTION PAGE	
1	TOTAL AMOUNT B/F PAGE ICT:H-24……	
2	TOTAL AMOUNT B/F PAGE ICT:H-25 ……	
	Total For ICT: Bill No. 8 C/F to ICT: Bills Summary page ICT:H-35	

THE MORGUE BLOCK

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
	ICT: BILL No. 8 **MORGUE: STRUCTURED CABLING INSTALLATIONS** **Supply, install, test and commission the following: -** **(PRICE TO BE EXCLUSIVE OF V.A.T)**				
8.1	**HORIZONTAL CABLING**				
8.8.1	CAT 6 4 pair 24 AWG Siemon UTP cable or Approved Equivalent	12	Rolls		
8.8.2	Siemon, CAT 6 face plate complete with Single CAT 6 Angled module RJ 45 key stones 45^0 exit MX6-(02) or Approved Equivalent	31	No.		
8.8.3	Siemon UTP CAT 6 24 port patch panels (HD6 – 24) or Approved Equivalent	3	No.		
8.8.4	CAT 6 UTP Cable pulling , per 305 meters.	1	Lot		
8.8.5	Siemon UTP CAT 6 RJ 45 – RJ 45 patch cord, 1m or Approved Equivalent	62	No.		
8.8.6	Siemon UTP CAT 6 RJ45 – RJ 45 patch cord, 3M or Approved Equivalent	31	No.		
8.8.7	Printed self laminated wrap cable markers, to be installed at both cable ends.	1	Lot		
8.8.8	Termination of CAT 6 UTP horizontal cables on both Ends	10	Points		
8.2	**CABINETS**				
8.2.1	27U metal powder coated high gauge cabinet, glass door, 4 twins, 800mm deep, 5 shelves, 4 funs, lockable (two spare keys) vertical cable management complete with **Vertical 100mm wide Trunking**, **5No Twin 13A Socket outlets** wired as 1 spur circuit to a **32A 3 Pin Isolator** mounted on the trunking	2	No.		
8.3	**ACTIVE EQUIPMENT**				
8.3.1	Cisco Catalyst 9200 Series **48 port Full 30W PoE+ C9200L-48P-4G Layer 3 Switch - 48 X Gigabit Ethernet Network,** 4 X Gigabit Ethernet Uplink - Manageable - Twisted Pair, Optical Fiber - Modular - 3 Layer Supported	1	No.		
8.3.2	Indoor 802.11ax Wi-Fi Access Point as **RUCKUS R750** INDOOR ACCESS POINT with One 2.5Gbps Ethernet port and one 1Gbps Ethernet port P.O.E	1	No		
	Total C/F to ICT: BILL No. 8 Collection page				

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
8.3.3	Cisco SFP Interconnector for Router configaration to be connected on the back of the 2 SFP ports behind the C9200L switch with P.O.E	1	No		
8.3.6	Cable organizer-2U with cover for data patched panels.	3	No.		
8.4	**BACKBONE CABLING**				
8.4.1	24 way fibre optic patch panel complete with connectors Siemon or Approved Equivalent	2	No		
8.4.2	1M Factory Terminated Fibre optic patch cords complete with connectors to be used inside cabinet Siemon or Approved Equivalent	8	No.		
8.4.4	4 pair single-mode fibre optic cable linking edge switches in cabinet in server room	300	LM		
Total C/F to ICT: BILL No. 8 Collection page					

Item	Description	Amount in KES
	ICT: BILL No 8 COLLECTION PAGE	
1	TOTAL AMOUNT B/F PAGE ICT:H-27 ……	
2	TOTAL AMOUNT B/F PAGE ICT:H-28……	
	Total For ICT: Bill No. 8 C/F to ICT: Bills Summary page ICT:H-35	

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
	ICT:BILL No-10 **MORGUE: Closed Circuit Television System Supply, install, test and commission the following: -** **(PRICE TO BE EXCLUSIVE OF V.A.T)**				
10.1	Wiring of CCTV camera from server room to IP camera location with CAT 6 4 pair 24 AWG Siemon UTP cable or Approved Equivalent. Cable to follow Conduits & Cable tray/Trunking	12	Rolls		
10.2	Termination of the Cat 6 UTP cables at both ends with RJ 45	48	No		
10.3 (a)	Hikvision 4MP Darkfighter PoE IP DOME Camera, DS-2CD2145FWD-I 2.8mm Fixed Lens, Outdoor WDR IR Video Surveillance Security Camera with SD Card Slot, IP67 IK10 H.265	19	No		
b)	4MP Darkfighter POE IP Bullet Camera AcuSense,OEM Hikvision DS-2CD2T46G1-4I/SL 2.8mm, Strobe Light & Audio Alarm,262ft IR Range, MicroSD, IP66 Outdoor Network Surveillance Security Camera Bullet,H.265+,ONVIF	5	No		
10.4	Hikvision 8mp NVR DS-7616NI-K2/32P 16 Ports POE Embedded Plug Play Network Video Recorder 2 SATA Interface H.265 complete with 10TB Storage Hard Disk.	1	No		
10.5	42" Samsung LED screen	1	No		
10.6	Category 6 4 pair UTP 1m patch cord as Siemon	24	No		
10.7	Category 6 24port patch panel	2	No		
	Total C/F to ICT:BILL No. 10 Collection page				

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
10.8	Cisco Catalyst 9200 Series **48 port Full 30W PoE+ C9200L-48P-4G Layer 3 Switch - 48 X Gigabit Ethernet Network,** 4 X Gigabit Ethernet Uplink - Manageable - Twisted Pair, Optical Fiber - Modular - 3 Layer Supported	1	No.		
10.9	Network Documentation	1	Lot		
10.11	LENOVO A740 utra slim 68.58cm touchscreen ALL-IN-ONE computer with Intel Core i7,(Processor:2.7GHz Intel Core i7 Quad-Core, Memory: 8GB DDR3 RAM, H81 chipset, OS-windows 8.1, HDD- 1T+8GB SSHD, Graphics-N-vidia GT840A 2GB,) complete with wireles Kevboard & Mouse.	1	No		
10.12	Allow for training of the personnel on the Item usage and operation of CCTV system	1	Lot		
10.13	Allow System programming	1	Lot		
Total C/F to ICT:BILL No. 10 Collection page					

Item	Description	Amount in KES
	ICT:BILL No 10 COLLECTION PAGE	
1	TOTAL AMOUNT B/F PAGE ICT:H-30 ……	
2	TOTAL AMOUNT B/F PAGE ICT:H-31……	
	Total For ICT: Bill No. 10 C/F to ICT: Bills Summary page ICT:H-35	

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
	ICT: BILL No. 11 **MORGUE- IP PABX INSTALLATION & TELEPHONY** **Supply, install, test and commission the following: -** **(PRICE TO BE EXCLUSIVE OF V.A.T)**				
11.1	KX-NS1000UK Panasonic **IP PBX-640 IP phones/960 Analog Extns,600 lines**	1	No		
11.2	KX-NS0111X M-DSP Unit for VOIP GW, Conference and Voice Mail	1	Lot		
11.3	KX-NSM010X-E. LicensePanasonic E- License Capacity Expansion from 31 to 600 IP extension	1	Lot		
11.4	KX-NSM520X-E. License Panasonic E- License Activate 20 IP-PT or SIP-MLT	4	No		
11.5	KX-NSM116X-E. LicensePanasonic E- License Activate 16ch H.323 IP-GW or 16ch SIP-Trunk	1	No		
11.6	KX-NT553X-BPanasonic Proprietary IP Phone Line LCD,24 Self Labelling, POE, Gigabit	1	No		
11.7	KX-NT505XB Panasonic IP DSS console with 48BLF keys	1	No		
11.8	KX-NSA301WJ-E. License Panasonic E- License Supervisor License for call Centre 1 user	1	Lot		
11.9	KX-NT551X-B Panasonic Proprietary IP phone, 1LCD,8PF- Key, POE, Gigabit, Black (call center users)	1	No		
11.10	RP-TCA430E- Panasonic Headset Headset for ITS/dect (Reception users)	2	No		
11.11 a)	KX-HDV130XB Panasonic Sip Phone 2× 16 LCD, POE,2 Ethernet ports,2 SIP ACCTS	13	No		
11.12	KX-NT630XB 3.6 Inches Monochrome LCD,24 key Labelling, SRTP - Executive users	1	No		
11.13	NEO GATE TG400 4ch GSM gateway for SIP trunks (Lic needed in NS)	1	No		
11.14	KX-NSM104X-E License Panasonic E- License Activate 4ch H.323 IP-GW or 4ch SIP-Trunk	1			
11.15	KX-NSF201W-E. License Panasonic E- License ACD reports License & QUEUE announcement	1			
11.16	Any other item to complete installation covering all accessories/consumable to complete the above works.(list on a separate sheet & insert in here)	1	Lot		
	Total For ICT:Bill No. 11 C/F to ICT: Bills Summary page ICT:H-35				

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
	ICT:BILL No.12 **GENERAL ITEMS** **(PRICE TO BE EXCLUSIVE OF V.A.T)**				
12.1.1	Any other item to complete installation covering all accessories/consumable to complete the above works.(list on a separate sheet & insert in here)	1	Lot		
12.1.2	Allow sum for attendance to other specialists including furniture sub-contractor, electrical sub-contractor and main contractor	1	Lot		
12.1.4	Working drawings for the data network to be used during the installation	1	Lot		
12.1.5	As installed drawings for the Data network, 3 sets of original hard copies and soft copy on CD-R & on **2GB hp** flash disk in **AUTOCAD 2000** format & on **P.D.F**	1	Lot		
12.1.6	Testing and commissioning the whole network to CAT 6 standards & Documentation to cover certified CAT6 test results and report.	1	Lot		
12.1.8	Allow attendance liaison and statutory compliance as per CAK requirements.	1	Lot		
12.1.9	Allow For user Training and Basic Maintainance	1	Lot		
Total For ICT: Bill No. 12 C/F to Bills Summary page ICT:H-35					

Item	ICT: Bills Summary Page	Amount KES
1	BILL No. 1: Total Amount B/F Page ICT:H-7…….	
2	BILL No. 2: Total Amount B/F Page ICT:H-10…….	
3	BILL No. 3: Total Amount B/F Page ICT:H-13…….	
	BILL No. 4: Total Amount B/F Page ICT:H-16…….	
	BILL No. 5: Total Amount B/F Page ICT:H-19…….	
	BILL No. 6: Total Amount B/F Page ICT:H-20…….	
	BILL No. 7: Total Amount B/F Page ICT:H-23…….	
	BILL No. 8: Total Amount B/F Page ICT:H-26…….	
	BILL No. 9: Total Amount B/F Page ICT:H-29…….	
	BILL No. 10: Total Amount B/F Page ICT:H-32…….	
	BILL No. 11: Total Amount B/F Page ICT:H-33…….	
	BILL No. 12: Total Amount B/F Page ICT:H-34…….	
Total for ICT: Works C/F to ICT: Price summary Page ICT:H-36		

ITEM No.	ICT: PRICE SUMMARY PAGE	AMOUNT KES
1	Sub-Contract Preliminaries and General Conditions Brought Forward From page H-4……	
2	Total Amount for Stucured Cabling, PABX Access Control, Intruder Alarm & IP-CCTV Brought Forward Fron page H-35	
	SUB-TOTAL (Without V.A.T)	
3	Add 16% V.A.T	
4	**ADD CONTIGENCY**	**1,500,000.00**
TOTAL AMOUNT (***VAT INCLUSIVE***)FOR STRUCTURED CABLING & IP TELEPHONY SYSTEM WORKS CARRIED FORWARD TO ELECTRICAL PRICE SUMMARY SUMMARY PAGE EPS*P01*		

3. NURSE CALL SYSTEM

SECTION F: NURSE CALL SYSTEMPARTICULAR SPECIFICATIONS

Part 1. Nurse Call System

1.1 Overview

The Nurse Call System (NCS) is an efficient and flexible hub for patient information and staff activity, from the moment of admission to discharge. The system's features provide the functionality to reduce staff response time to patient calls by effectively managing staff, call types, and communications between both patient and staff utilizing either VoIP or analog audio. All system data is captured and stored in real-time in a robust database and is accessed by user interface software programs.

1.2 General

The system must:

A. Be an IP-based system that is field programmable and configurable.

B. Have the ability to interface with a computer display terminal.

C. Have user-configurable software for nurse console system computers.

D. Provide noninterrupted high quality, full duplex audio communication between patient/staff stations and nurse console station handset.

E. Have hot-swappable field devices.

F. Follow UL guidelines for network connectivity.

G. Conform to UL 1069 standards and equipment and be UL listed under NBRZ Hospital Signaling and Nurse Call Equipment. Submitting the UL listing cards describing the equipment by model number shall be proof of such listing.

H. Be manufactured and assembled in the United States and designed by the manufacturer to operate as a complete system. Items of equipment include wire and cable. All systems should state "Made in America".

These requirements must be met:

I. Provide a catalog of designs and materials with the system. The supplier is required to submit the manufacturer's complete service notes and drawings detailing all interconnections.

J. Consider alternate equipment only when submitted for approval by the hospital 10 days prior to opening of the bid.

K. Include a five-year warranty for all manufactured components and a one-year warranty for labor. A maintenance contract is not required from a factory-authorized distributor after the warranty is expired. Factory technical training shall be available on an on-going basis for facility employees at every facility in which the equipment is installed.

L. Factory technical training is available for the life of the system at no cost. Travel and per diem is the responsibility of the facility.

M. Written confirmation on the type of speech offered includes full duplex, high quality speech (uninterrupted two-way speech).
N. Systems using VOX circuitry (Voice Operated Switching) or push-to-talk audio are not acceptable. VOX systems that incorporate microphones in

pillow speakers to simulate true duplex audio shall not be allowed.

1.3 Functionality

The system must have:

A. Capability to utilize either SIP or analog audio.
B. The ability to interface to VoIP.
C. System must not require or rely on an owner furnished PBX for functionality to comply with UL 1069.
D. Unlimited field expandability.
E. Programmable priority levels for patient calls such as Routine, Priority, and Emergency.
F. Programmable priority levels for staff calls such as staff emergency and code blue.
G. Devices that are supervised and provide system failure alarms.
H. Capability to immediately report the failure of any field device's microprocessor to a computer display.
I. Capability to program the system to remotely cancel calls. See local code.
J. Capability to configure all call types with assignable priorities, lights, and flash rates.
K. The means to escalate a call to proper staff levels with specific request, with single touch at console system.
L. Functionality to answer a call and send specific request to appropriate level of staff from console system.
M. Capability to swing (move) patient calls between console systems.
N. Password protection for critical and noncritical levels of system setup, allowing access to authorized personnel only.
O. Call tone volume control (password protected) with automatic volume decrease at designated time of day (Quiet Mode). Quiet Mode can also affect radio pager beeping sequence.
P. Capability to connect to a VPN connection for shop/factory troubleshooting, maintenance, reprogramming, and downloading future software upgrades.
Q. Capability for patient calls to report to any master configured on the nurse call system.
R. Allow all masters configured on the same network to operate independently of each other.

S. Field programmable station functions that can be modified by factory certified technician. System must have the ability to:

T. Interface with a wireless communication system, such as (Vocera, Voalté, Polycom, etc. and pagers.)

U. Support patient stations for controlling the patient room TV and lights.

V. Interface with computerized system(s) to receive external equipment alarms and optionally report such alarms to the facility EMR/EHR.

W. Create productivity reports.

X. Support two-way signaling and text messaging between console systems.

Y. Support two-way signaling and audio communication between console systems and audio-enabled devices.

Z. Create unlimited audio paging zones.

AA. Program any call type to transmit an automatic text message to any wireless pager, phone, or other wireless device.

BB. Activate unlimited number of auxiliary signaling devices (ASD), connected to the system (i.e., zone dome lights or duty stations).

CC. Interface with hospital ADT system via HL7 to automatically populate patient information.

DD. Interface with infant security systems, IV pumps/medical devices, telemetry systems, etc., to receive calls and send emergency pages to appropriate levels of staff.

1.4 Nurse Console Station

The computer interface must:

A. Include an on-screen keyboard in the software platform for sites with limited space requirements and/or when a desktop keyboard is absent.

B. Provide map mode customization to allow an entire unit to be graphically viewed by staff. Calls to be displayed in each room with no limit on the number of simultaneously displayed calls. Patient requests, staff presence, and admitted patients may be visually displayed on the map.

C. Display simultaneous and constant patient requests and staff location in either a list or graphical (map) format. Multiple staff level location displays should be separate and designated by unique colors.

D. Display incoming calls by room number, bed number and call type. Call type to be differentiated by audible tone and screen color. Patient name may be configured to display on screen with each call. Hospital should designate

field programmable tones, colors, and flash rates. Settings can be changed at any time by factory-certified technician.

E. Display recalled patient calls and service request not answered within an allotted amount of time. An elapse timer should indicate the length of time the call is in the system. The hospital should have the ability to set recall time limits for all individual call types and tasks for all levels of staff.

F. Display original request upon recall with the ability to use the same or add additional requests as required.

G. Display at all times the hospital name, floor/unit name, time of day, and system status indicators.

H. Differentiate between male and female patients using color for the patient information screen and bed icons on the map.

I. Allow on-site configuration of room numbers, zone paging, patient priority, zone lights, and duty station assignments. Any combination of alphanumeric room configurations are allowable to a maximum of nine characters.

J. Provide auto-page feature (where applicable) to allow assigned staff to be paged automatically when any patient call is placed. The message on the wireless device must indicate location (room and bed) and the call type (Routine, Bath, etc.).

The computer interface must have the ability to:

A. Place a call on hold while answering a higher priority call. Any number of calls can be placed on hold with an on-screen indicator of ON HOLD status while the elapsed timer continues to run.

B. Support location mapping on all master models.

C. Register and locate staff by constant display in either a list or graphical (map) format.

D. View active staff requests on a monitor in either a list or graphical (map) format.

E. Set patient status at the console system to be Routine, Priority, or Emergency. Call should display on-screen based on status and have unique tones and colors for each call type.

F. Mute calls for a predetermined amount of time to allow staff to assist patients without annunciating the call at the console system.

Part 2. General Overview

A. All nurse call system wiring must be in accordance with NEC and local codes. All components must be provided with plug-in connections to system wiring.
B. NEC or local codes must apply to all cables for support or installation in plenum spaces.
C. All cables must be labeled at termination or splice points.
D. Alternate equipment shall be considered only when submitted for approval by the hospital 10 days prior to opening of the bid.
E. Items of equipment supplied by a U.S. manufacturer must be acceptable for use in this nurse call system.
F. Part numbers designated may change according to the manufacturer's new product releases. The equipment specified must meet or exceed the specifications as outlined.
G. No deviation from the equipment specified in this document is acceptable.
H. The manufacturer has at least six installations of comparable systems and must supply a complete list of references with the bid.
I. All system service must be performed by an authorized factory servicing company. Emergency service installer to be on-site within four hours. General service to occur within a 24-hour window.
J. Where union rules or local ordinances prohibit the selling company to install the defined system, the selling company must have at least one factory-certified technician assigned to supervise the project.
K. Selling company must have at least one factory-certified installer for the installation.

2.2 Proposal Standards

Alternate proposals shall not be acceptable. All proposals must include the following:

A. Manufacturer’s name, model numbers, and factory specification sheets for each equipment item supplied by the factory authorized distributor.
B. All function variations of equipment clearly indicated in written form and preapproved by the architect/owner 10 days prior to bid date.

Part 3. Head End Equipment

3.1 Voice over Internet Protocol (VoIP)

A. General Description

The nurse call system must offer operation as either VoIP-based or traditional analog audio system. For a VoIP-based installation, the following specifications must apply:

1. Full duplex audio.
2. No external PBX required for operation.

Note: Systems that rely on a connection to an external, owner provided PBX is not acceptable. They are in direct violation of the system's UL 1069 listing.

3. PoE or external DC power source.
4. Downstream Ethernet port for additional devices (non-PoE).
5. DTMF generation, TIA 464B
6. Programmable call progress tones
7. SIPP: RFC 3261, 3262, 3263, 3264, 2327
8. Voice codecs: G.711, G.723, G.726, G.729A/B, iLBC
9. Wideband codecs: G.722.2, G.711.1
10. Echo canceller: G.167 (128ms tail length)
11. VAD, CNG, packet loss concealment (PLC)
12. Adaptive jitter buffer
13. Noise reduction
14. Equalizer
15. RTP/RTCP packetization: RFC 3550, 3551, 2198
16. DTMF relay: RFC 2833, RFC 4733
17. SRTP (Secured RTP) per RFC 3711, 128 bit AES
18. SIP TLS
19. STUN
20. Embedded Web
21. TFTP
22. Domes and nurse stations are VoIP devices
23. SIP proxy and call controller, typically one per floor
24. Ability to integrate with third-party VoIP PBX for call capability with wireless phone systems

3.2 Distribution Panel Networking

A. General Description

The distribution panel is used with the nurse call system and consists of up to eight controller boards, audio controller, and network switch. All nurse call distribution panels must:

1. Have the ability to be networked.
2. Use standard network cabling.
3. Communicate over IP-based network.
4. Be able to run networked or independently from the network.
5. Support unlimited number of distribution panels to be networked together.
6. Support remote or local network-based configuration.

B. Functionality

The distribution panel must have the ability to support:

1. Up to 128 dome lights.
2. Up to eight nurse console stations.
3. Notification of system failures.
4. Reporting for up to eight nurse console stations.
5. Eight external audio connections.
6. Full duplex audio.
7. Expansion by networking additional distribution panels.
8. Either surface or flush mount.
9. Notification of system failures.

3.3 Power Supply Module

A. General Description

Power supply modules provide low voltage power to the nurse call system distribution panel.

Power supply modules must:

1. Provide low voltage power to all signaling field units for the nurse call system.
2. Provide independent replaceable power supplies and a 120VAC power outlet for plug-in type power connections.
3. Include high frequency switching, solid-state circuitry, electronic circuit breaker overload protection and a power LED.

B. Functionality

A power supply module must have the ability to support:

1. Up to five individual power supplies.
2. An Uninterruptible Power Supply (UPS) to protect against power fluctuations and power outages.
3. Connectivity to the facility's critical branch of emergency power.
4. Maximum load of 80 dome lights.
5. Either surface or flush mount.

3.4 Home Run Module

A. General Description

The remote Home Run Module (HRM) is responsible for the communication between the dome light network and the nurse console stations. The HRM must have:

1. Voltage test points.
2. Minimal mounting area.
3. 12″x12″ wall mount electrical enclosure.
4. LED status indicators.
5. Integrated power supply.

B. Functionality

A Home Run Module must have the ability to support:

1. Up to 16 dome lights or 63 devices per HRM.
2. Unlimited networking capability.
3. Up to eight nurse console stations.
4. Notification of system failures.
5. Reporting for up to eight nurse console stations.
6. Eight external audio connections.
7. Full duplex audio.
8. Expansion by networking additional distribution panels.
9. Connection to an Uninterruptible Power Supply (UPS) to protect against power fluctuation and power outages.

Part 4. Nurse Console Station Equipment

4.1 Nurse Console Stations

A. General Description

Nurse console stations are available in multiple configurations, ranging from 10″ to 21″ display size. Each nurse console station is capable of displaying active calls, service requests, and staff locations in either graphical area map or list format. Nurse console stations must have:

1. Touch screen with integrated handset.
2. Graphical user interface.
3. Full duplex, high quality, two-way voice communication with adjustable volume.
4. Staff assignment and patient information.
5. Call list and active call list display, service request, and staff location capability via software.
6. Highly customizable features to meet nursing unit's needs.
7. Routine, priority, and emergency call annunciation throughout the NCS.
8. Unlimited call tones with adjustable volume level and repeat interval for each call type.
9. Capability for facility to control time and volume levels for Quiet Mode feature.
10. All functions and features listed in in Part 7 of this specification.

Nurse console stations must have the ability to support:

11. Information exchange of patient, staff, and other data between nurse consoles.
12. Cancellation of emergency and code calls only at the originating calling device.
13. Cancellation of routine calls from the device where the call originated, from any nurse console system assigned to receive call, or at a designated remote locator station.

14. Full messaging capability for pagers, text paging, and wireless devices with messaging interface software.
15. Ability to interface with the facility ADT information system with optional interface software.
16. Keyboard and mouse.
17. Active call LED to match dome light colors.
18. One-button switching between a call list mode and a graphical floor map mode.
19. Staff location mapping in either graphical floor map or list format.

4.2 Computer Display Terminal

A. General Description

The display terminal is used as a supplemental display with a 15" touch screen monitor and is typically placed in a PBX room or other location where audio is not required from the patient room. The display terminal provides visual call display and sound only. The computer display terminal must have the ability to:

1. Configure call annunciation.
2. Configure call priority to determine call order.
3. Mute active calls so that new incoming calls produce sound.
4. Interface with paging system(s) to send alert pages to staff.
5. Use same .wav files as the nurse call system softwares applications for call tones and priorities.
6. Send staff information from another master or be manually entered.
7. Receive patient information from the database management application via ADT or be manually entered.
8. Support a mouse and keyboard.

4.3 Visual Indicator Panel

A. General Description

Used as an optional audible and visual annunciator for a facility or unit where audio communication to patient rooms is not required. The Visual Indicator Panel must have:

1. Ability to be an auxiliary/remote signaling device in areas that are not near the nurse's station or in another area where only the highest priority calls must annunciate.
2. Thirty-two segment, 4-gang annunciation panel.
3. IP-addressable on-board processor.
4. Front panel indicator windows with LEDs for 32 rooms.
5. Power/Status indicator LED.
6. Configurable LED flash rates, dome color, call priority, sound, and illumination patterns.
7. Ability to emulate nurse console station tones.
8. Ability to process up to 100 simultaneous calls.
9. Ability to annunciate up to 16 different alert types, from up to 64 unique addresses and 32 individual controllers.
10. Unlimited number of visual indicator devices on one nurse call network.
11. Ability to annunciate broad-area alerts similar to a duty station.
12. Capability of accepting calls from assigned controllers or centrals on the nurse call network.
13. Ability to adapt to one 1-, 2-, or 3-gang back-box using adapter ring.

4.4 Sequencer Device

A. General Description

The sequencer device is used to provide flow solution in coordination with i-Dome devices. The sequencer must support:

1. Up to 64 i-Dome devices.
2. Visual notification for workflow sequence.
3. IP-addressable, on-board processor.
4. Priority override feature for *next to be seen* mode.

Part 5. Patient Room Equipment

5.1 Dome Light

A. General Description

The dome light provides clear visual notification to staff members of a room's status. The dome light must have:

1. Long-life RGB LED lamps displaying up to 15 colors selections from a palette of approximately one million colors.
2. Ability to customize LED colors and flash rates on a per call type basis.
3. Solid, slow and fast flashing, and scrolling indications.
4. Built-in buzzer configurable for any call type.
5. Normal and emergency calls distinguished by different visual signals for positive identification of call priority.
6. Multisegmented luminary that allows multiple colors to be displayed simultaneously.
7. Adjustable LEDs through white balance control.
8. Power-up test sequence to verify proper LED illumination.
9. Wall or ceiling mounts for increased visibility from most angles.
10. Translucent lens sections, which allow maximum visibility in all directions under high ambient lighting conditions.
11. Optical contact closure input, configurable to any type of alarm.
12. Programmable contact closure output relay.
13. Ability to be used as zone light.
14. Automatic detection of attached devices during initial configuration.
15. Ability to report multiple connected devices as unique locations.
16. Network supervision.

5.2 Patient Stations

A. General Description

Patient stations are available in both a single or dual patient configuration. Patient stations must have:

1. Routine and Cancel buttons, with optional ¼″ auxiliary input(s), Code Blue and Staff Emergency button(s) (4-gang single and dual patient stations).
2. An internal Mylar cone speaker (4-gang single and dual patient stations).
3. An internal two-way audio system to ensure communication if a pillow speaker or bed disconnects (4-gang single and dual patient stations).
4. Ability to adapt to one 1-, 2-, or 3-gang back-box using adapter ring.
5. Ability to be flush mounted directly to the back-box.
6. Ability to incorporate an easy-to-mount solid faceplate with station circuit boards attached.
7. Sub plates that can be removed or unsnapped only with the use of a tool.
8. Ability for full duplex audio when a pillow or external speaker is attached

(1-gang single patient station).

9. Standard configuration of Routine, Cancel and Staff Emergency buttons. Code Blue option replaces Staff Emergency button (1-gang single patient station).
10. Compatibility with both VoIP and analog systems.
11. Cleaning mode to prevent accidental call placement.
12. Call assurance LED.
13. Unique call assurance tone based on button pressed.
14. Connectivity to the dome light.
15. Cord-out override without requiring dummy plugs.
16. External speaker connection.
17. Compatibility with patient bed interfaces.
18. Remote jack capabilities (except 1-gang single patient station).
19. Privacy LED that illuminates whenever microphone is active.
20. Support for television and room light controls.
21. Network supervision.
22. Configurable alert types.
23. Ability to accept requests from nurse console station.
24. Compatibility with side rail bed communications and bed exit emergency alarms.

5.3 Staff Station

A. General Description

Used for voice communication between the nurse station and other nonpatient occupied areas such as nurses' lounge, waiting rooms, locker rooms, and break rooms. The Staff Station must have:

1. Standard configuration of Routine and Cancel buttons, with additional ¼″ auxiliary input, Code Blue and Staff Emergency button options.
2. An internal Mylar cone speaker.
3. Buzzer to annunciate assigned duties.
4. An internal two-way audio system to ensure communication if a pillow speaker or bed disconnects.
5. Ability to adapt to one 1-, 2-, or 3-gang back-box using adapter ring.
6. Ability to be flush mounted directly to the back-box.
7. Ability to incorporate an easy-to-mount solid faceplate with station circuit boards attached.
8. Sub plates that can be removed or unsnapped only with the use of a tool.
9. Compatibility with both VoIP and analog systems.
10. Cleaning mode to prevent accidental call placement.
11. Call assurance LED.
12. Unique call assurance tone based on button pressed.
13. Connectivity to the dome light.
14. Cord-out override without requiring dummy plugs.
15. External speaker connection.
16. Compatibility with patient bed interfaces.
17. Remote jack capabilities.
18. Privacy LED that illuminates whenever microphone is active.
19. Support for television and room light controls.
20. Network supervision.
21. Configurable alert types.

22. Ability to accept requests from nurse console station.
23. Compatibility with side rail bed communications and bed exit emergency alarms.

5.4 Visual Patient Station

A. General Description

The 1-gang Visual Patient Station is a standalone, nonaudio patient station. The Visual Patient Station must have:

1. Standard 1/4" phono receptacle for call cord.
2. Standard configuration to include Routine, Cancel, and Staff Emergency buttons. Code Blue option replaces Staff Emergency Button.
3. Call assurance LED when call is placed.
4. Flexibility to connect to other devices, dome lights, or controller.
5. Unique call assurance tone based on button pressed.
6. Ability for patient use of the call cord to signal for assistance.
7. Automatically placed cord-out call when the cord set is unplugged from a receptacle.
8. Fault call displayed if malfunction or disconnect occurs.
9. Network supervision.
10. Support for a cord-out call override feature to eliminate the need for dummy plugs.
11. Field configurable contact closure output relay.

5.5 i-Dome Touch

A. General Description

This is a touch-screen device used outside of patient rooms. The i-Dome Touch interfaces with nurse call systems, patient beds, and wireless devices. The i-Dome Touch must have:

1. A mini-dome LED configurable for 15 dome colors and 7 flash assignments with ability to connect an additional remote lamp.
2. Flexibility to connect to other devices, dome lights or controller.
3. Ability to display patient and room status while maintaining privacy.
4. Unique call assurance tone based on button pressed.
5. Capability to be used as a standalone or integrated into a nurse call system
6. 4.5″ color touch screen displaying patient and staff information.
7. Built-in speaker for call annunciation and feedback.
8. Three-gang mounting style with ability to mount to a 1-, 2-, or 3-gang box with optional adaptor plate.
9. Up to six rounding timers with visual status to remind staff to check on a patient or room state.
10. Up to six status timers with visual status for staff reminders.
11. Ability to show status from other devices, such as beds.
12. Environmental Services control of room state.
13. Ability to cycle between colors to show multiple status issues.
14. Capability to set patient attributes (NPO, fall risk, etc.) from device.
15. Optional Code Blue stat timer triggered by external event.
16. Network supervision.
17. Transport request paging function.
18. Lockout screen to prevent unauthorized access.
19. Field or remote configurable contact closure output relay.

20. Two configurable optically isolated inputs.

5.6 i-Dome, NV i-Dome2

A. General Description

One-gang device used to alert staff to a variety of urgent conditions by displaying patient and room status via the mini-dome. The i-Dome must have:

1. A mini-dome LED configurable for 15 dome colors and 7 flash assignments with ability to connect an additional remote lamp.
2. Easy-to-operate, color-coded push buttons.
3. Three configurable switches for dome light color assignments.
4. Easy to clean, sealed, switches for infection control.
5. Flexibility to connect to other devices, dome lights or controller.
6. Ability to display patient and room status while maintaining privacy.
7. Unique call assurance tone based on button pressed.
8. Capability to be used as a standalone or integrated into a nurse call system.
9. Timer activation to remind staff to check on a patient or room status.
10. Ability to show status from other devices, such as beds.
11. Support for multiple states for each button.
12. Ability to cycle between colors to show multiple conditions.
13. Ability to display either patient or room status.
14. Network supervision.
15. Field or remote configurable contact closure output relay.
16. Two configurable optically isolated inputs.
17. Ability to duplicate all buttons and LED functions on a secondary device.

5.7 i-Status

A. General Description

Used when the functionality of an i-Dome is desired without the mini-dome on the front. The i-Status must have:

1. Ability to activate a remote LED configurable for 15 dome colors and 7 flash assignments with ability to connect an additional remote lamp.
2. Easy-to-operate, color-coded push buttons.
3. Three configurable switches for dome light color assignments.
4. Easy to clean, sealed, switches for infection control.
5. Flexibility to connect to other devices, dome lights or controller.
6. Ability to display patient and room status with remote LED.
7. Ability to show status from other devices with remote LED.
8. Ability to cycle between colors to show multiple conditions with remote LED.
9. Unique call assurance tone based on button pressed.
10. Capability to be used as a standalone or integrated into a nurse call system.
11. Timer activation to remind staff to check on a patient or room status.
12. Support for multiple states for each button.
13. Network supervision.
14. Field or remote configurable contact closure output relay.
15. Two configurable optically isolated inputs.
16. Ability to duplicate all buttons and LED functions on a secondary device.

5.8 Locator Station

A. General Description

Used in-room to illuminate the dome light to indicate that staff is present in the room. The Locator Station must have:

1. Easy-to-operate, color-coded push buttons.
2. Flexibility to connect to other devices, dome lights, or controller.
3. Flexibility to provide two to three levels of staff location (buttons).
4. Capability to remotely cancel associated patient station calls.
5. Unique call assurance tone based on button pressed.
6. Network supervision.
7. Field or remote configurable contact closure output relay.
8. Two configurable optically isolated inputs.
9. Ability to duplicate all buttons and LED functions on a secondary device.
10. Ability to activate a remote LED configurable for 15 dome colors and 7 flash assignments with ability to connect an additional remote lamp.

5.9 Push/Pull Station

A. General Description

Used in patient rooms and other areas where priority calls require immediate and emergency attention. The Push/Pull stations must have:

1. Visible call assurance LEDs indicating a call is placed.
2. Large CANCEL button for cancellation of calls.
3. Yellow push-for-assistance button and pull cord allow for two call types from the same device.
4. Adjustable length pull cord for emergency calls.
5. Water-resistant gasket for shower stations.
6. Ability to connect to a remote water-resistant pull cord.
7. Ability to utilize multiple pull cord options, such as antimicrobial, glow in the dark.
8. Flexibility to connect to other devices, dome lights, or controller.
9. Unique call assurance tone based on button pressed.
10. Network supervision.
11. Field or remote configurable contact closure output relay.
12. Two configurable optically isolated inputs.
13. Ability to duplicate all buttons and LED functions on a secondary device.
14. Ability to activate a remote LED configurable for 15 dome colors and 7 flash assignments with ability to connect an additional remote lamp.

5.10 Emergency Pull Cords

A. General Description

Used to alert staff members of the location where prompt emergency help is required. These devices must have:

1. Large color-coded labels for placement of calls.
2. Ability to display a visible call assurance LED when call is placed.
3. Large color-coded CANCEL or CANCEL AT TOILET label for cancellation of calls.
4. Flexibility to connect to other devices, dome lights, or controller.
5. Adjustable length pull cord that extends to the floor.

6. Ability to connect to a remote water-resistant pull cord.
7. Water-resistant gasket for shower stations.
8. Ability to utilize multiple pull cord options, such as antimicrobial, glow in the dark,
9. Unique call assurance tone based on button pressed.
10. Network supervision.
11. Field or remote configurable contact closure output relay.
12. Two configurable optically isolated inputs.
13. Ability to duplicate all buttons and LED functions on a secondary device.
14. Ability to activate a remote LED configurable for 15 dome colors and 7 flash assignments with ability to connect an additional remote lamp.

5.11 Remote Pull Cords

A. General Description

This is a remote pull cord and LED used to alert staff members of the location where prompt emergency help is required. These devices must have:

1. Call activation location without requiring an additional address.
2. Large color-coded labels for placement of calls.
3. Ability to display a visible call assurance LED when call is placed.
4. Large color-coded CANCEL or CANCEL AT TOILET label for cancellation of calls.
5. Flexibility to connect to other devices, dome lights, or controller.
6. Adjustable length pull cord that extends to the floor.
7. Ability to connect to a remote water-resistant pull cord.
8. Ability to utilize multiple pull cord options, such as antimicrobial, glow in the dark.
9. Water-resistant gasket for shower stations.
10. Unique call assurance tone based on button pressed.
11. Network supervision.
12. Field or remote configurable contact closure output relay.
13. Two configurable optically isolated inputs.
14. Ability to duplicate all buttons and LED functions on a secondary device.
15. Ability to activate a remote LED configurable for 15 dome colors and 7 flash assignments with ability to connect an additional remote lamp.

5.12 Push Button Stations

A. General Description

The push button stations are designed for placing specific staff initiated alarms. These devices must have:

1. Large color-coded descriptive buttons for placement and cancellation of calls.
2. Large CANCEL label for cancellation of calls, with exception of the emergency/code blue station.
3. Standard color coded buttons to include but not limited to: Help, Staff Emergency, Emergency, Code Apgar, Code Baby, Code ALS, Code Blue, Code Pink, Code White, Staff Call, Assist, combined Staff Emergency and Code Blue.
4. Capability for custom button verbiage and language.
5. Visible call assurance LED(s).
6. Flexibility to connect to other devices, dome lights, or controller.
7. Dry contact closure activated when button is pressed. Deactivated when

the Cancel button is pressed.

8. Capability for all calls to annunciate locally at assigned nurses stations.
9. Defined call types that report to pagers and at PBX with programming.
10. Unique call assurance tone based on button pressed.
11. Network supervision.
12. Field or remote configurable contact closure output relay.
13. Two configurable optically isolated inputs.
14. Ability to duplicate all buttons and LED functions on a secondary device.
15. Ability to activate a remote LED configurable for 15 dome colors and 7 flash assignments with ability to connect an additional remote lamp.

5.13 Enhanced Duty Station

A. General Description

For remote call annunciation in areas such as nurse lounges, locker rooms, break rooms, soiled utility, clean utility, and med rooms. The duty station must have:

1. Multicolor LED.
2. Support for 16 different tone patterns.
3. Same call tones as nurse console configuration. Excludes custom tones.
4. Capability to temporarily silence using mute button. (Available with no mute button.)
5. Flexibility to connect to other devices, dome lights, or controller.
6. Network supervision.
7. Availability for value engineered option without same call tones as nurse console configuration.
8. Adjustable volume level for each call tone.
9. A mini-dome LED configurable for 15 dome colors and 7 flash assignments with ability to connect an additional remote lamp.

5.14 Bed Connectors

A. General Description

Bed connector devices are 1-gang stainless steel faceplates, each featuring a 37-pin receptacle. Each bed connector must have:

1. Dual color LED indicator display for current device status: standby mode, bed connected, bed disconnected.
2. Stainless steel faceplate.
3. Modular disconnect capabilities.
4. Ability to replace in field without termination changes.
5. Ability to connect with patient stations via 12-pin Panduit connectors.
6. Network supervision (excludes WC-BED2).
7. Ability to support for Stryker® iBED™ awareness features and interface license to Stryker iBED (NV-iBED2 only).
8. Support for standard 37-pin operation. Support cord-out override feature with no dummy plugs needed.
9. Support an optically isolated connection for the low voltage light controller.
10. Call assurance tone via connected patient station.

5.15 Optical Isolated Jack

A. General Description

The optical isolated jack connects auxiliary hospital equipment such as IV pumps, exit pads, and ventilator alarms to the nurse call system. The device protects the nurse call system from high or rapidly changing voltage. The Optical Isolated Jack must have:

1. Cord-out override without requiring dummy plugs.
2. Three standard ¼″ phono jacks.
3. Multicolored port status LEDs for each jack.
4. Unique identifier for each jack.
5. Independently configurable jacks.
6. Supervised jacks for cord-out alarm.
7. Network supervision.

5.16 Speaker

A. General Description

The speaker is a 1-gang device to provide enhanced audio away from a patient station or as an additional speaker.

5.17 Audio Extension Ring

A. General Description

The audio extension ring is installed in conjunction with an in-room, 1-gang device for remote audio from patient station. The audio extension ring must have:

1. Microphone for two-way communication (NV-AER only).
2. One-gang remote audio device.
3. Ability to install in-line a 1-gang device.

5.18 Pillow Speakers

A. General Description

Used for conveniently contacting hospital personnel and managing patient room entertainment features. The pillow speaker is not required for two-way audio. The pillow speaker must have:

1. Nurse call button.
2. Three buttons, for use by patient, for special needs such as pain, water, and toilet.
3. Ability to assign the appropriate care level to each pillow speaker button.
4. Provision for enhanced model pillow speakers for digital television control.
5. Television buttons for up/down channel, must, close caption, and on/off.
6. Keypad for manually entering television channel numbers.
7. Mylar coned speaker.
8. 10-pin modular plug.
9. Ability to easily clean and sterilize.
10. UL-1069 listing with nurse call system.

B. Optional Functions

1. Room light controls.
2. Numerical keypad for television control.
3. Twelve-pin breakaway connector available.
4. Headset feature for private listening of entertainment.
5. TV (on/off/channel change) buttons.
6. Volume control for incoming television audio.
7. Pain Med and Bed Pan call buttons with universal symbols.

8. Variety of controls governing patient entertainment systems (radio and television).

5.19 Strain Relief

A. General Description

The strain relief extends the connection point from the patient station for the pillow speaker and provides a quick disconnect. The strain relief must have:

1. 10-pin male RJ-45 connector to patient station.
2. 10-pin female RJ-45 socket to pillow speaker.
3. P-clip to attach cable portion of strain relief to patient.

5.20 Break-Away Cord

A. General Description

The break-away cord extends the connection point from the patient station for the pillow speaker. Rated at seven pounds of pull. The break-away cord must have:

1. RJ-45 style 10-pin connector to patient station.
2. Medical style 12-pin connector to pillow speaker.
3. Ability to not affect cord-out function when disconnected.
4. P-clip to attach cable portion of strain relief to patient station.

Part 6. System Interfaces

6.1 Wireless Messaging Interface

The nurse call system can interface with wireless messaging systems that include, but are not limited to, pagers and wireless phones.

A. The Wireless Messaging Interface must have the ability to:

1. Simultaneously interface with multiple wireless device types.
2. Accept alerts and text messages from nurse console stations.
3. Accept alerts and text messages from external systems through web or custom interfaces.
4. Interface to to the nurse call system software.
5. Interface with standard paging systems using standard TAP (v1.8), ESPA 4.4.4.
6. Interface with third-party wireless communication systems, such as Vocera, Voalté, Spectralink, and Ascom.
7. Interface with third-party middleware, such as Emergin, Extension, and Amcomm.
8. Support additional output protocols, such as SMTP and SNPP. For example, automatically generates email to management for code blue alert.
9. Support either IP or RS-232 protocols.
10. Accept and route incoming voice communications from external systems.
11. Support passing priority and distinct tone to connected interfaces.

6.2 Local Positioning System Interface

The Local Positioning System interfaces with multiple Real Time Locating System (RTLS) vendors. The Local Positioning System software must have the ability to:

1. Light a patient room dome light to indicate staff presence by illuminating the assigned color lamp (up to four) when a staff member wearing a badge enters a patient room.
2. Allow Routine, Bed Pan, or Pain Med patient calls to be automatically canceled when staff of assigned level enters a patient room.
3. Support the nurse call system to have automatic location features such staff location display on the onscreen map, as low battery indication and badge log file.
4. Store staff location information in the reporting database for generating productivity reports on all patient calls.
5. Automatically escalate a routine call placed while staff present in room.
6. Interface with multiple RTLS vendors, such as AeroScout, Centrak, Sonitor, Versus, Visonic.

6.3 ADT Gateway Interface

The ADTGateway server software provides an interface between a hospital's admission/discharge/transfer system and the nurse call system. ADTGateway must have the ability to:

1. Receive information from the hospital's Admit-Discharge-Transfer system in real-time.
2. Receive information using HL7, Version 2.x.
3. Receive information through a TCP/IP connection.
4. Support filtering.
5. Automatically populate predefined information in the appropriate patient information profile in the nurse call system.

Part 7. Nurse Call System Software

Nurse call system software is a combination of server programs and user interface software that together deliver a complete nurse call management system.

7.1 User Interface Software

The user interface software that runs on the nurse console station must have:

1. Ability to display all calls and staff locations via interactive map mode.
2. Ability to import and display custom floor plan.
3. Configurable menu task bar.
4. Ability to set user-defined call tones, colors, and verbiage.
5. Ability to set user-defined quiet mode parameters.
6. Ability to accept ADT HL7 input.
7. Ability to show, at all times, detailed patient attributes such as gender, fall risk, isolation requirements, etc., via icon or text.
8. Method to manually input detailed patient attributes into the nurse console station. (Not dependent on additional workstation.)
9. Ability to input staff and set assignments directly into the nurse console station. (Not dependent on additional workstation.)
10. Ability to accept staff information, scheduling, and assignments from an external system.
11. Call answer screen for all incoming alerts and requests which includes multiple one-touch task selection, patient information, acuity level, alert type, and other user-defined parameters.
12. Store unlimited preset alphanumeric messages sent to any combination of specific staff member(s), team(s) or individual pager numbers.
13. Use an auto-page mode to direct all call levels to the pager assigned to the bed placing the call. Hospital must have the ability to determine which level(s) of calls go to any or all of the pagers assigned to the bed.
14. Enable assigned staff member(s) to be paged automatically, using an auto-page feature, when any patient call is placed. Page message shows source of call (room, bed) and call type placed (Routine, Bath, Staff Emergency, etc.).
15. Automatic escalation allowing a support staff member to be paged if a primary staff member does not respond to call/request in a specified time period.
16. Supervisor Page feature allowing supervisory staff members to be automatically paged when a patient request is not completed the primary staff or support staff in a specified time period.
17. Ability to manually message desired staff member by team, room assignment, name, or wireless device ID.
18. Store the last eight manually input transmitted messages and recipients for easy repaging.

19. Assign any staff member to any wireless device or team.
20. Assign an unlimited number of staff to any patient bed.
21. Send an unlimited number of stored messages to any wireless device from any nurse console system in the system.
22. Ability to schedule user-defined messages.
23. Have patient alert routed directly to the staff member(s) or team(s) assigned to the patient. The nurse call system must continue to indicate the alert until the assigned staff member cancels the alert in the room or the patient alert is answered at the nurse console system. The wireless device must display: alert type, room and bed number of the alert, and patient need in plain English format.
24. Capability to swing (move) patient calls between console systems.
25. Password protection for critical and noncritical levels of system setup, allowing access to authorized personnel only.
26. Call tone volume control (password protected) with automatic volume decrease at designated time of day (Quiet Mode). Quiet Mode can also affect radio pager beeping sequence.
27. Automatic notification to Environmental Services on patient discharge.
28. Display at all times the room state on graphical floor map (clean, dirty, out-of-service).
29. Audio capabilities to provide simultaneous communication to configurable groups of rooms.
30. View and the ability to print real-time reports, such as staff assignment and patient information.

B. Nurse Call System Web Interface

The nurse call system Web interface is a Web-based server software that provides access to many functions of the nurse console systems. This interface has the ability to:

1. Send text-based messages to wireless devices.
2. View and edit the patient room housekeeping status.
3. View staff members and edit profiles and room assignments.
4. View and edit patient profiles.
5. View the location of medical equipment (if used with a Real Time Locating System).
6. Apply security features to manage roles and accessibility.

C. Data Management Application

D. Data Management server software provides common functionality and data sharing across the facility network and nurse call network. This software has an automatic backup feature for disaster recovery and stores data and configurations for quick and easy updating or replacement of masters or other system server applications.

E. FocusCare Manager

FocusCare Manager Server software controls scheduled events, such as clearing assignments for staff, pagers, badges, and support staff at a predetermined time after a shift ends. Manager also is used for setting i-Dome and i-Status attributes which include bed status, fall risk, isolation and NPO settings.

F. Wireless Integration System

Wireless Integration system server software provides a general purpose, flexible

interface between external products, services, data, and nurse call system software. It has the ability to interface to a paging system and/or a two-way wireless device system such as Spectralink, Ascom, or Vocera and accepts inputs from third-party systems to distribute to wireless devices.
See *Section 6.1* for software capabilities.

G. Local Positioning System

The LPS is an automatic locating system server software that uses ultrasonic signals to provide extraordinarily accurate, real-time location of staff members and hospital equipment.
See *Wireless Messaging Interface* for software capabilities.

H. ADTGateway

The ADTGateway server software provides an interface between a hospital's admission/discharge/transfer system and the nurse call system.
See *ADT Gateway* for software capabilities.

I. Reporting and SQL Logging Application

TQI Logger is a server database tool that interfaces with an MS-SQL database and the report management application. The data is accessed by reporting software to generate management, patient, area, and call distribution reports.
TQI Logger has the ability to:

1. Receive data from all connected nurse console station on the nurse call system.
2. Process the data into individual files and store them on the MS-SQL database.
3. Provide a direct data link from a local positioning system, which feeds all locating data directly to the database.

J. Report Management Application

Report Management software is a server application and Web-based reporting system featuring data gathering and reporting tools for users of the nurse call system. This application interfaces with an MS-SQL database and must have:

1. Ability to define, schedule, and run management, staff, patient, area, and call distribution reports based on nurse call events.
2. Ability to define reports based on call distribution by alert types, number of calls by alert type, and call response times.
3. Security features to manage roles and accessibility.
4. Ability to define reports based on time or date ranges.
5. Support for email notification, chart format, and printing.

K. CareBoard Software

A Web-based software program that provides access to an online form for entering and updating patient-related information that displays on a monitor in each patient room.
FC CareBoard must have the ability to:

1. Automatically populates configurable patient and staff information from the nurse call system software.
2. Display active alerts from patient room.
3. Display the schedule for therapy, diagnostics, etc.
4. Display the patient's pain level.
5. Add important notes regarding patient care.
6. Display the status of personal items such as hearing aids and dentures.

7. Adjust the monitor brightness for day or night mode.

L. FocusCare WhiteBoard Software

Used to display current status information for a set of beds and patients via a large-format display, typically in hallways or nursing areas.
FC WhiteBoard must have the ability to:

1. Fully integrates to the nurse call system software suite and optional Web interfaces.
2. Display changes made from the system software in real-time.
3. Support Stryker® iBed™ status directly from each bed.
4. Customize the color, font, number of rows, empty beds, and refresh delays.
5. Define the desired fields or headings to show on the monitor display.

M. FocusCare PatientFlow Software

A Web-based software that provides access to functions for managing the intake process, patient flow, appointments, patient location, and staff assignments within a clinic facility.
FC PatientFlow must have the ability to:

1. View daily appointments.
2. View a care provider's patients.
3. View providers and edit their profiles.
4. Change a patient exam room.
5. Sort the day's appointments by patient, provider, time, or by room/lab.
6. See the location of a provider (an automatic locating system is required).
7. Apply security features to manage roles and accessibility.

Part 8. Training

8.1 In-Service Training

A. All in-service training must include necessary handouts or user manuals.

B. Nurse call system installing vendor must supply one in-service per year, minimum, at no additional charge to the hospital. Facility is responsible for scheduling one month in advance (minimum).

C. The in-service must be coordinated with the nursing education department of the hospital and signed off by the nursing administration.

D. Nursing staff of the facility must be thoroughly instructed in the use of the system by factory authorized distributor personnel. Such in-service must be provided in conjunction with the installation of the system equipment.

E. Maintenance staff of the facility must have an introductory review of the system and installed components by factory authorized distributor personnel.

F. Factory certified technician shall provide on-site training.

8.2 Factory Training

A. A factory technical training seminar is provided at no additional cost to the facility. Travel and per diem is the responsibility of the facility.

B. Training seminars are held at the nurse call system's manufacturing facility. Seminars are scheduled as needed and offer a minimum of two days of hands-on training to all hospital engineering and/or biomedical staff.

C. Hospital personnel have access to this school for the life of the system.

D. Factory provided on-site training must be available for an additional fee.

8.3 Warranty

A. Full five (5) year warranty on all manufactured field equipment, and one (1) year on labor.

B. Non-WestCall manufactured equipment warranty is based on equipment manufacturer's warranty.

Part 9. Contractor Requirements

9.1 The contractor must:

A. Be an authorized distributor for product supplied.
B. Produce an authorized distributor letter from manufacturer upon request of specifying authority.
C. Furnish all equipment, accessories, and material in strict accordance with specifications and applicable drawings as required for a nurse call system.
D. Ensure that the system meets or exceeds all requirements for states' health planning and development regulations, and state fire marshal building codes.
E. Ensure that the local system is installed per plans and specifications.
F. Have at least one factory certified installer responsible for the installation.
G. Hold all applicable state and local licenses. Copies must be available upon request.
H. Hold current manufacturers certification for system being installed.
I. Provide copy of technician certification upon request.
J. Have a four-hour response time for catastrophic system failures. Service must be offered 24 hours a day, 7 days a week, and 365 days a year.

Glossary

The terms and acronyms in this table are used in this specification.

Term	Definition
ADT	Admit-Discharge-Transfer
ASD	Auxiliary Signaling Device
Call assurance	A light or a beep tone indicating that the system recognizes that a call has been placed.
CNG	Comfort Noise Generation
DTMF	Dual Tone Multi-Frequency
ESPA 4.4.4	Serial data interface for paging equipment
HL7	Health Level Seven International
IDC	Insulation Displacement Connection
Jitter Buffer	Hardware device or software process that eliminates jitter caused by transmission delays in a VoIP network
NCS	Nurse Call System
OAI	Open Applications Interface
PBX	Private Branch Exchange
PoE	Power over Ethernet
RTCP	Real-Time Control Protocol
RTP	Real-Time Transport Protocol
SIP	Session Initiation Protocol
SOAP	Simple Object Access Protocol
SPDT	Single pull, double throw
SQL	Structured Query Language
STUN	Session Traversal Utilities for NAT
TAP	Telelocator Alphanumeric Protocol
TCP/IP	Transmission Control Protocol over Internet Protocol
TFT	Thin Film Transistor
TFTP	Trivial File Transfer Protocol
TLS	Transport Layer Security
VAD	Voice Activity Detection
Value engineered	The ability to provide the necessary functions in a product at the lowest cost, without sacrificing functionality.
VDC	Voltage Direct Current
VESA	Video Electronics Standards Association
VLN	Vocational Licensed Nurse
VOIP	Voice Over Internet Protocol
VOX	Voice Operated Switching
VPN	Virtual Private Network

Keywords

This addendum describes the keywords to indicated requirement levels in this specification. Interpret these keywords appearing in this specification document as described in the following table.

Term	Description
Ability	Able to perform this function. May require additional equipment and/or software.
Must **Shall**	These are absolute requirements.
Must Not **Shall Not**	These are absolute prohibitions.
Should **Recommended**	There may exist valid reasons in particular circumstances to ignore a particular item. However, the full implications must be understood and carefully weighed before choosing a different course.
Should Not **Not Recommended**	There may exist valid reasons in particular circumstances when the particular behavior is acceptable or even useful. However, the full implications must be understood and the case carefully weighed before choosing implementing any behavior described with these terms.
May **Optional**	An item is truly optional. Example: A vendor could choose to include an item because a certain marketplace requires it, or because a vendor feels it enhances a product, while another vendor may omit the same item.
Required	Capable of being expanded to include a feature, but not part of the standard product. May require additional equipment or software.
Unlimited	In all practical use, such as a typical installation, there is no limitation on quantity that can be used.

SECTION G: NURSE CALL SYSTEM EVALUATION CRITERIA

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

1. Determination of Responsiveness
2. Detailed Technical Examination
3. Combination of Technical and Tender Sums Comparison

STAGE 1- DETERMINATION OF RESPONSIVENESS

A) PRELIMINARY EXAMINATION

This stage of evaluation shall involve examination of the pre-qualification conditions 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 may include the following:

i) Category of Registration with N.C.A 3 and above in the relevant trade;
ii) Class of Licenses with the relevant statutory bodies e.g. CAK, Energy Regulatory Commission, County Government, and Water Management Boards etc;
iii) Proof of payment for tender document;
iv) Provision of Bid Security;
v) Dully filled Form of Tender;
vi) Any other conditions included in the advertisement notice/Invitation letter.

Note:

The bid security shall be in accordance with Instruction to Tenderers which states as follows:

- **Clause 19.1** of Instruction to Tenderers,"the tenderers shall furnish as part of his tenders a tender surety in the amount stated in the tender document in the Appendix to Instructions to Tenderers".

- **Clause 19.2** of Instruction to Tenderers, "the unconditional Tender surety shall be in Kenya shillings and be in form of a certified cheque, bank draft, an irrevocable letter of credit or a guarantee from a reputable Bank/ Insurance approved by PPOA located in the Republic of Kenya. The format of the surety shall be in accordance with the sample form included in the tender documents and the tender surety shall be valid for **150 days** from the date of tender opening".

- **Clause 23.2** of Instruction to Tenderers: "For the purposes of this clause, a substantially responsive tender is one which conforms to all terms and condition and specifications of the tender document without material deviation or reservation and has a valid Bank/Insurance guarantee".

The employer may seek further clarification/confirmation if necessary to confirm authenticity/compliance of any condition of the tender.

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

NOTE: ALL COPIES OF DOCUMENTS PROVIDED MUST BE CERTIFIED BY COMMISSIONER OF OTHS and ALL PAGES OF THE COMPLETE TENDER DOCUMENT SUBMITTED MUST BE PAGENATED/SERIALISED

B) COMPLETENESS OF TENDER DOCUMENT

The tender document shall be examined based on clause 2.2 of the Instruction to Tenderers which states as follows:

In accordance with clause 2.2 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 sub clause 2.1 of Instruction to Tenderers and adequacy of resources to effectively carry out the subject contract. The tenderers shall be required to fill the Standards Forms provided for the purposes of providing the required information. The tenderers may also attach the required information if they so desire.

The award of points for the **STANDARD FORMS** considered in this section shall be as shown below

	PARAMETER	**MAXIMUM POINTS**
(i)	Statement of compliance	3
(ii)	Tender Questionnaire	5
(iii)	Confidential Business Questionnaire	5
(iv)	Key personnel	15
(v)	Contract Completed in the last Five (5) years	15
(vi)	Schedules of on-going projects	10
(vii)	Schedules of contractors equipment	10
(viii)	Audited Financial Report for the last 3 years	10
(ix)	Evidence of Financial Resources	10
(x)	Name, Address and Telephone of Banks (Contractor to provide)	5
(xi)	Litigation History	2
(xii)	Sanctity of the tender document as in accordance with clause 5 of instruction to tenderer	10
	TOTAL	**100**

The detailed scoring plan shall be as shown in table 1 below: -

TABLE 1

Item	Description	Point Scored	Max. Point	
i.	**Statement of Compliance** • Signed and stamped ---------- 3 • Signed but not stamped or vice versa ---------- 2 • Not Signed nor stamped ---------- 0		**3**	
ii.	**Tender Questionnaire Form** • Completely filled ---------- 5 • Partially filled ---------- 3 • Not filled ---------- 0		**5**	
iii.	**Confidential Business Questionnaire Form** • Completely filled ---------- 5 • Partially filled ---------- 3 • Not filled ---------- 0		**5**	
iv	**Key Personnel (Attach evidence)**			**15**
	Director of the firm • Holder of degree Information Technology field ---------- 4 • Holder of certificate in Information Technology field ---------- 3 • Holder of trade test certificate in I.T field---------- 2 • No relevant certificate ---------- 0		**4**	
	At least 1No. degree/diploma of key personnel in relevant Engineering field • With over 10 years relevant experience ---------- 4 • With over 5 years relevant experience---------- 2 • With under 5 years relevant experience ---------- 1		**4**	
	At least 1No certificate holder of key personnel in relevant Engineering field • With over 10 years relevant experience---------- 3 • With over 5 years relevant experience ---------- 2 • With under 5 years relevant experience ----------1		**3**	
	At least 2No artisan (trade test certificate in relevant Engineering field) • Artisan with over 10 years relevant experience ---------- 2 • Artisan with under 10 years relevant experience ---------- 1 • Non skilled worker with over 10 years relevant experience ----- 1		**4**	
v	**Contract completed in the last five (5) years (Max of 5 No. Projects**) • Project of similar nature, complexity and magnitude ---------- 3 • Project of similar nature but of lower value than the one in consideration ---------- 2 • No completed project of similar nature ---------- 0		**15**	

vi	**On-going projects (Max of 5 No. Projects)** • Project of similar nature, complexity and magnitude -------- 2 • Project of similar nature but of lower value than the one in consideration ---------- 1 • No ongoing project of similar nature - ---------- 0		**10**	
vii	**Schedule of contractors equipment and transport (proof or evidence of ownership)** • Means of transport (Vehicle) ---------- 4 • No means of transport ---------- 0		4	**10**
	For each specific equipment required in the installation of the Work being tendered for. (Maximum No. of equipment to be considered – 3 No.---------- 2		6	
viii	**Financial report** **Audited financial report (last three (3) years)** • Turn over greater or equal to 5 times the cost of the project ---10 • Turn over greater or equal to 3 times the cost of the project --- 6 • Turn over greater or equal to the cost of the project ---------- 4 • Turn over below the cost of the project ---------- 2		**10**	
ix	**Evidence of Financial Resources (cash in hand, lines of credit, over draft facility etc)** • Has financial resources equal or above the cost of the project ----10 • Has financial resources below the cost of the project ----------5 • Has not indicated sources of financial resources ---------- 0		**10**	
x	**Name, Address and Telephone of Banks (Contractor to provide)** • Provided ---------- 5 • Not provided ---------- 0		**5**	
xi	**Litigation History** • Filled ---------- 2 • Not filled ---------- 0		**2**	
xii	**Sanctity of the tender document** • Having the document intact (not tempered with in any way) ---10 • Having mutilated or modified the tender document ---------- 0		**10**	
	TOTAL		**100**	

Any bidder who scores 60 points and above shall be considered for further evaluation

STAGE 2 - TECHNICAL EVALUATION

A) COMPLIANCE WITH TECHNICAL SPECIFICATIONS

In this section, the bid will be analyzed to determine compliance with General and Particular technical specifications for the works as indicated in the tender document.

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

Where the Equipment proposed by the tenderer differs with the models specified in the tender document, it is mandatory that the brochures/catalogues of the same be submitted with the tender document highlighting the catalogues Numbers of the proposed items. Such brochures/catalogues should indicate comprehensive relevant data of the proposed equipment/items which should include but not limited to the following:

a) Standards of manufacture

b) Performance ratings/characteristics

c) Material of manufacture

d) Electrical power ratings and

e) Any other necessary requirements (Specify)

Following the above analyses, where the proposed equipment are found not to satisfy the specifications, the tender will be deemed Non – Responsive and will not be evaluated further.

B) <u>TECHNICAL EXAMINATION</u>

In this section, the information provided in the Technical Schedule or Brochures attached will be analyzed for bidders who have qualified from **STAGE 2A** above and points awarded as shown below to a maximum of 100 points

TABLE 2

Item	Description	Score	Max. Score
	Technical schedule/Brochures • Relevant Manufacturer Brochures for items in the technical schedule with equipments to be supplied highlighted and meets specification (Where alternative are to supplied ---------- 100 or • Completely filled Technical Schedule indicating Brand, Model/ Country of origin as per specification in the tender ---------- 100 • Relevant Manufacturer Brochures for items in the technical schedule with equipments to be supplied not highlighted but within range of those specified and meets specifications ---------- 75 or • Completely filled Technical Schedule indicating items as specified in the tender but with less than 100% and above 75% of items in the technical schedule provided ---------- 75 • Relevant Manufacturer Brochures for items in the technical schedule with equipments to be supplied but between 50% and less than 75% of items highlighted and within range of those specified and meets specifications---------- 60 or • Completely filled Technical Schedule indicating items as specified in the tender but between 50% and 75% of items in the technical schedule provided ---------- 60 • Relevant Manufacturer Brochures for between 25% and less than 50% of items in the technical schedule with equipment to be supplied highlighted and meets specifications---------- 50 or • For between 25% and 50% of technical schedule filled indicating Brand/Model/Country of origin for the items considered as specified in the tender ---------- 50 • Less than 25% provided or no technical data provided, either in form of brochures or filling of Technical Schedule. ---------- 0		**100**
	TOTAL		**100**

Any bidder who scores 50 points and above shall be considered for further evaluation

STAGE 3 - FINANCIAL EVALUATION

The evaluation shall be in two sections
1. Preliminary examinations and
2. Tender sum Comparisons

A) PRELIMINARY EXAMINATIONS

The preliminary examination in the Financial Evaluation shall be in accordance with clause 26 of Instruction to Tenderers.

The parameter to be considered under this section includes the following:

a) Arithmetic errors and comparison of rates

(1) Arithmetic Errors

The bid shall be checked for arithmetic errors based on the rates and the total sums indicated in the bills of quantities.

a) Confirmation shall be sought in writing from the tenderers whose tender sums will be determined to have a significant arithmetic error to their disadvantage, to confirm whether they stand by their tender sums. The error shall be treated as per **clause 24 of Instructions to Tenderers**.

Non compliance with the above shall lead to **automatic disqualification from further evaluation.**

Discount if any shall be treated as an error in pursuant to **clause 26.3** of Instructions to Tenderers

(2) Comparison of rates

The evaluation committee will compare rates from different bidders and note consistency of rates and front loading. The evaluation committee will judge and make an appropriate decision giving evidence.

SECTION H – NURSE CALL SYSTEM (NCS) BILLS OF QUANTITIES

A. Notes and Sample Items for Preparing a Bill of Quantities

1. These Notes for Preparing a Bill of Quantities are intended only as information for the Procuring Entity or the person drafting the Tender Documents. Priced Bills of Quantities shall be part and parcel of the Contract Documents.

2. The objectives and purpose of the Bills of Quantities are to provide sufficient information on the specifications, descriptions and quantities of Works to be performed to enable tenders to be prepared efficiently and accurately and when a contract has been entered into, to provide a priced Bill of Quantities for use in the periodic valuation of Works executed. Inorder to attain these objectives, Works should be itemized in the Bill of Quantities insufficient detail to distinguish between the different classes of Works, or between Works of the same nature carried outin different locations or in other circumstances which may give rise to different considerations of cost. Consistent with these requirements, the layout and content of the Bill of Quantities should be as simple and clear as possible.

3. The Bills of Quantities should be divided generally into thef ollowing sections:

a) Preambles
b) Preliminary items
c) Work Items
c) Daywork Schedule; and
d) Provisionalitems
e) Summary.

4. NOTES TO PREPARING PREAMBLES

4.1 The Preambles should include only those items that constitute the cost of the works but would not be priced separately as they are expected to be included in the unit prices. Care should be taken to ensure that these items are not are petition of the conditions of contract. The Preambles should indicate the inclusiveness of the unit prices and should state the methods of measurement that have been adopted in the preparation of the Bill of Quantities, that are to be used for the measurement of any part of the Works. The units of measurement and abbreviations should be defined and any mandatory national units defined and described. The methods of and procedure for re- measurement should be described in the Preambles.

4.2 Units of Measurement - The following units of measurement and abbreviations shall be used, unless other national units are mandatory in Kenya.

nit	Abbreviation	Unit	Abbreviation
cubic meter	m^3 or cu m	millimetre	mm

4.3 The Bills of Quantities shall be read in conjunction with the Instructions to Tenders, General and Special Conditions of Contract, Technical Specifications, and Drawings.

4.4. The quantities given in the Bills of Quantities are estimated and partly provisional and are given to provide a common basis for tendering. The basis of payment will be the actual quantities of work ordered and carried out, as measured by the Contractor and verified by the Architect and valued at the rates and prices tender in the priced.

Bills of Quantities, where applicable, and otherwise at such rates and prices as the Architect may fix within the terms of the Contract.

4.5. The rates and prices tender in the priced Bills of Quantities shall, except in so far as it is otherwise provided under the Contract, include all Constructional Plant, labour, supervision, materials, erection, maintenance, insurance, profit, taxes, and duties, together with all general risks, liabilities, and obligations set out or implied in the Contract.

4.6. Arateorprice shall be entered against each item in the priced Bill of Quantities, whether quantities are stated or not. The cost of Items against which the Contractor has failed to enter a rate or price shall be deemed to be covered by other rates and prices entered in the Bill of Quantities.

4.7. The whole cost of complying with the provisions of the Contract shall be included in the Items provided in the priced Bills of Quantities, and where no Items are provided, the cost shall be deemed to be distributed among the ratesand prices entered for the related Items of Work.

4.8. General directions and descriptions of work and materials are not necessarily repeated nor summarized in the Bills of Quantities. References to the relevant sections of the Contract documents shall be made before entering prices agains teach item in the priced Bills of Quantities.

4.9 Provisional Sums and contingency sums included and so designated in the Bills of Quantities shall be expended in whole or in part at the direction and discretion of the Architect in accordance with Sub-Clause13.5 and Clause 13.6 of the General Conditions of contract.

4.10 In preparing the Bills of Quantities, notes should be removed as they are intended to guide the person preparing the Tender Documents. The Contractor must allow in his rates for any costs associated with and complying with the requirements in the Preambles.

4.11 Should a tenderer/contractor not price any item in any section of the Bills of Quantities including Preliminary items, it will be assumed that he/she has spread its cost in other areas that he/she will have priced. Therefore, the itemor items will be executed without any additional costs or without being treated like variations.

NOTES ON PREPARING BILLS OF QUANTITIES

5.1 The Preliminary Items should be limited to tangible items that should be priced by the tenderer, are identifiable and can be priced separately and included in the interim valuations precisely. Such items may include such items as site office, notice boards, and other temporary works, otherwise items such as security for the Works which are primarily part of the Contractor's obligations should be included in the Contractor's rates.

5.2 The work items in the Bills of Quantities should be grouped into sections to distinguish between those parts of the Works which by nature, location, access, timing, or any other special characteristics may give rise to different methods of construction, or phasing of the Works, or considerations of cost. Such groups could be ground excavations, structures, external works, services, etc. General items common to all parts of the Works may be grouped as a separate section in the Bill of Quantities.

5.3 Quantities should be computed net from the Drawings, unless directed otherwise in the Contract, and no allowance should be made for bulking, shrinkage or waste. Quantitiesshouldberoundedupwhereappropriate.

5.4 Where the measured items a redeemed not to be exact because of the likelihood that the scope can change during the execution of the works, such items could be subject to re-measurement, the word **"provisional"** should be used to identify such cases. Where whole sections of the work items fall in this class, for example foundations, they should be labelled "Provisional Quantities" or "Provisional Items" so that the Tenderer/Contractor is advised up front that such items are subject to re-measurement to done before such work is cover-up.

5.5 All items that have not been measured and therefore not subject tot enders pricing should be listed in the Bills of Quantities as **Provisional Sums** for particular item or class of Work, which may be subject to a nominated subcontract or separate measurements at a later date during the execution of the works. For example, if it is deemed not possible to measure electrical works before going to tender because detail designs are not ready, a provisional sum can be allowed in the Bills of Quantities for "Installation of Electrical Works" to be executed later when actual design details are completed. To the extent not covered above, there should be in the Bills of Quantities a general provision for physical and financial contingencies made as a "Provisional Sum for Contingencies" and "Provisional Sum for Fluctuations". The inclusion of such provisional sums often facilitates budgetary approval by avoiding the need to request periodic supplementary approvals as the future need arises.

5.6 Provisional sums to cover specialized works normally carried out by Nominated Sub Contractors should be avoided and instead Bills of Quantities of the specialized Works should be included as a section of the main Bills of Quantities to be priced by the Main Contractor. The Main Contractor should be required to indicate the name(s) of the specialized firms he proposes to engage to carry out the specialized Works as his approved domestic sub-contractors. Only provisional sums to cover specialized Works by statutory authorities should be included in the Bills of Quantities.

5.7 A Daywork Schedule should be included if the probability of unforeseen work, outside the items included in the Bill of Quantities, is relatively high. To facilitate checking by the Procuring Entity of the realism of rates quoted by the tenderers,

the Daywork Schedule should normally comprise:

i) A list of the various classes of labor, and materials for which basic.

ii) Daywork rates and prices for various categories of labor are to be inserted by the tenderer, together with a statement of the conditions under which the Contractor will be paid for Work executed on a Daywork basis.

iii) A percent a get o be entered by the tenderer agains teach basic Day work item.

iv) Subtotal amount for labor, materials and plant representing the Contractor's profit, overheads, supervision and other charges.

5.8 The Summary should contain a tabulation of the separate parts of the Bills of Quantities carried forward, with provisional sums for Daywork, Provisional sums and Contingencies, and provision for Total Costing. The last line should allow for tenderer to indicate any discounts before arriving at a total cost carried forward to the Form of Tender.

BILLS OF QUANTITIES

(a) Preambles

1. The method of measurement of completed work for payment shall be in accordance with *[insert the name of a standard reference guide, or full details of the methods to be used]*.

2. The Site is situated in NAROK COUNTY It is approximately150Kilometers from Nairobi.

3. The Contractor shall obtain the Architect's approval on the siting of all temporary buildings, spoil heaps, temporary access path, and storage of materials. The Contractor shall also obtain the Architect approval and direction regarding the use of any materials found on the Site.

4. The drawings used in the preparation of these Bills of Quantities can be inspected at the offices of the Procuring Entityor Procuring Entity's Representative during normal working hours. Two sets of the Working Drawings shall be provided to the contractor, but additional copies shall be provided at a cost to be determined by the Engineer.

5. The Contractor shall allow for the payment of all bank charges in connection with the procurement of Bank Guarantees and stamp charges in connection with this contract Agreement.

6. The Contractor shall carry out the various sections of the Works in such an order as the Architect May direct. The Procuring Entity reserves the right to occupy the Works by sections on completion provided that such occupation is considered to be both practical and reasonable and will not interfere with the Works. The Contractor shall allow any costs associated with such occupation.
7. The main Contractor will be fully responsible for paying his Sub-Contractor but the Procuring Entity reserves the right in very exceptional circumstances to make such payments direct in the interests of the project where the completion thereof might be jeopardized by any dispute or vicariousness between the Contractor and the Sub-Contractor involve.

8. The Contractor shall complete and deliver the Works in the period inserted in the Form of Tender as his time for completion of the Works from the date for Possession, to be agreed with the Engineer. The Contract Period is presumed to have been calculated making due allowance for seasonal inclement weather conditions. Noclaimfor extension of time due to the normal in clement weather for this area shall be entertained.

9. The Contractor shall, upon receiving instructions to proceed with the Works, draw up a Programme and Progress Chart setting out the order in which the Works are to be carried out, with the appropriate dates there of. This Chart shall be agreed with the Architect and no deviation from the order set out in it will be permitted without the written consent of the Engineer. The Contractor will be responsible for arranging the above programme with all his sub-Contractors and Specialties. The Contractor shall allow in his rates for carrying out this exercise, and for updating it as required.

10. The Contractor shall submit to the Architect on the first day of each week or such longer period as the Architect from time to time direct, a Progress Report and any information for the proceeding period, showing the progress during the period and the up-to-date cumulative progresson all important items of each section or portion of the Works.

11. The Contractor shall arrange for photographs of the Site to be taken by a professional photographer approved by the Engineer.The Photographs shall provide a record of the Site and adjacent are as prior to the commencement of the Works and shall cover such portion of the works in progress and completion as the Architect shall direct. All prints shall be full plate size, unmounted, and marked on the reverse side with the date of exposure, identification reference and brief description. The copyright of all photographs shall be vested in the Procuring Entity. The negatives and four prints from each negative shall be delivered to the Architect within two weeks of exposure.

12. Figured dimensions are to be followed in preference to dimensions scaled from the Drawings, but whenever possible dimensions are to be taken on the Site or from the buildings. Before any work is commenced by Sub- Contractors or Specialist Firms, dimensions must be checked on the site comparable dimensions shown on the drawings. The Contractor shall be responsible for the accuracy of such dimensions.

13. Prior to commencement of any work the Contractor is to ascertain from the relevant Authorities the exact position, depth and level of all existing electric cables, waterpipes or other services in the are aand he shall make whatever provisions may be required by the Authorities concerned for the support and protection of such services. Any damage or disturbance caused to any services shall be reported immediately to the Architect and the relevant Authority and shall be made good to their satisfaction at the Contractor's expense. Where appropriate the Contractor shall open up the ground in advance of the main work by hand digging if necessary, to locate precisely the position and details of the services which are likely to affect his operations.

14. The Contractor shall include in his prices for the transport of materials, workmen, etc./, to and from the site of the proposed works, at such hours and by such route as are permitted by the Authorities.

15. The Contractor will be required to make good, at his own expense and damage he may cause to the present road surface and pavements within or beyond the boundary of the Site, during the period of the works. All existing paths, storm water channels, etc., that may be destroyed or damaged during the progress of the Works shall be reinstated by the Contractor to the satisfaction of the Engineer.

16. The Contractor is to allow for complying with all instructions and regulations of the Police Authorities.

17. All water shall be fresh, clean and pure, free from earthly, vegetable or organic matter, acid or alkaline substance in solution. The Contractor shall provide at his own risk and cost all water for use in connection with the Works, (including works of sub–contractors). If need be, he shall make arrangements with the Local Water Authority for the installation of a separate meter for all water used by him throughout the Contract and pay all cost and fees in connection therewith. He shall also provide temporary storage tanks and tubing, etc., as may be necessary, and clear away at completion.

18. The Contractor shall provide all artificial lighting and power for his own use on the Works, (including Sub – Contractor's) including all temporary connections, wiring, fittings, etc., and clearing away on completion. The Contractor shall pay all fees and obtain all permits in connection there with.

19. The Contractor shall constantly keep on the Works a Literate English-speaking Agent or Representative, competent and experienced in the kind of work involved, who shall giveh is whole time to the superintendence of the works. (Including works of sub – contractors). Such Agent or Representative shall receive on behalf of the Contractordirections and instruction from the Engineer, and such directions and instructions shall be deemed to be given to the contractor in accordance with the Conditions of Contract. The Agent shall not be replaced without the specific approval of the Engineer.

20. The Contractor shall ensure that the safety of his work people and all authorized visitors to the site are protected at all times. In particular, there shall be the proper provision of guard–rails to scaffolding, protection against falling materials, tools on site, dust, nail and other sharp objects. The site shall be kept tidy and clear of dangerous rubbish. The Architect shall be empowered to suspend work on site should it be considered this condition is not being observed and no claim arising from such suspension will be allowed.

21. The are as available to the Contractor for workyards, offices and other facilities shall be directed by the Architect and any existing features to remain shall be protected from damage throughout the Contract Period and handed back in good condition when they are vacated at the end of the Contract. If additional areas are required, the contractorshallsourcethenatowncost.

22. The Contractor shall give the Architect reasonable notice of the intention to set out or take levels for any part of the Works so that arrangements may be made for checking the work. The accuracy of setting out and leveling shall be within the tolerances specified in the Specifications or on the Drawings. The checking of setting out or leveling by the Architect shall not relieve the Contractor of his duties or responsibilities under the Contract.

23. The Contractor must take steps necessary to safe guard and shall beheld fully responsible for any damage caused to existingand adjacent property, including buildings that are not a subject of demolition. He shall make good at his own cost damage to persons and property caused there on, and he shall indemnify the Procuring Entity against any loss or claim that may arise.

24. The Contractor shall take such steps and exercise such care and diligence as to minimize nuisance arising from dust, noise or any other cause to the occupiers of the existing and adjacent property. He must provide such temporary and special screens and tarpaulins or gummy bags, hoarding, barriers, warning signs etc. as he considers necessary and sufficient for the protection of the existing and adjacent property and or prevention of nuisance etc. as directed by Engineer.

25. The Contractors attention is drawn to the standards levy order which was amended on 15thOctober 1998.Legal notice No.154 of 1998. The Contractor is required to pay a monthly level of 0.2% of his factory price of construction works with effect from January 1999. Tenderer shall allow for this in the build-upo f his rates.

26. The Contractor shall provide temporary sheds, offices meshrooms, sanitary, accommodation and other temporary buildings for the use of the contractor and sub-contractors, including lighting furniture equipment and attendance.

27. Contractor shall provide/build labor camp sat areas to be agreed with the Engineer. Labor camps shall be complete with sanitary accommodation and fencing gates.

28. The Contractor must provide the necessary toilet facilities to the requirement and satisfaction of the Health Authorities and maintain the same in a thoroughly clean and sanitary condition and pay all conservancy fees during the period of the Works and remove when no longer required.

29. The Contractor shall provide at his own risk and cost all watching and lighting as necessary to safeguard the Works, Plant and materials against damage and theft.

30. The Contractor shall provide all necessary hoists, tackle, plant, equipment, vehicles, tools and appliances of every description for the due and satisfactory completion of the Works and shall remove the same on completion. All such plant, tools and equipment shall comply with all regulations in force throughout the period of the Contract and shall be altered or adopted during the Contract period as may be necessary to comply with any amendments in or additions to such regulations.

31. Provide, erect and maintain all necessary scaffolding, sufficiently strong and efficient for the due performance of the works, including Sub-Contract Works, provide special scaffolding as required by Sub-Contractors, alter and adopt all scaffolding as and when required during the Works, and remove on completion. No scaffolding is measured here in after and the Contractor must allow in his rates for this.

32. The Contractor shall take all necessary precautions such as temporaryf encing, hoarding fans, planked footways, guard–rails gantries screen, etc., for the safe custody of the Works, materials and public protection and adjacent properties.

33. Cover up all and protect from damage, including damage from in clement weather, all finished work and unfixed materials, including that of Sub-Contractors, etc., to the satisfaction of the Architect until the completion ofthe Contract.

34. The Contractor shall, after completion of the works, at his own expense, remove and clear away all surplus excavated demolition materials, plant, rubbish and unused materials and shall leave the whole of the Site and Works in a clean and tidy state to the satisfaction of the Engineer, sheds, camps, etc. Particular care shall be taken toleavecleanallfloors and windows and tore move all paint and cement all rubbis hand dirt as it accumulates. The Contractor is to find his own dump and shall pay all charges in connection there with.

35. Concrete test cubes shall be prepared in a set of three, as described including testing fees, labor and materials, making molds, transport, handling, etc. Allow in your rates for making at least four cubes on each occasion, from different batches; the concrete being taken from the point of deposit.

36. The Contractors hall furnish at the earliest possible opportunity before work commences, and at his own cost, any samples of materials and workmanship that may be called for by the Architect for the approval or rejection, and any further samples in the case of rejection, until such samples are approved by the Engineer.

Such samples, when approved, shall be the minimum standard for the work to which they apply. The proceduref or submitting samples of materials for testing or approval and the method of marking for identification shall be as laid down by the Engineer.The Contractor shall allow in his Tender for such samples and tests, including those in connection with his Sub-Contractors work.

37. The Contractors attention is drawn to the Finance Bill of the year 2000/2001 on withholding tax on contractual payment section 35(7)(i)(ii) which became effective on 1st July 2000. A 3% withholding tax will be applicable to all in terim payments exceeding Kshs…….....……. for work done in respect of building or civil works. The contractor shall allow for any costs arising resulting there from in the build-up of rates.

38. Blasting will only be allowed with the express permission of the Architect in writing. All blasting operations shall be carried out at the Contractor's sole risk and cost, in accordance with any Government regulations in force for the time being, and any special regulations laid down by the Architect governing the use and storage of explosives.

39. The National Construction Authority is a state corporation established under the national construction authority Act No.14 of 2011. The broad Mandate of the Authority is to over see the construction industry and coordinate its development. The National Construction Authority Regulations 2014 with an effective date of 6thJune 2014, regulation 25, - Allow 0.5% of the tender sum/contract sum for construction levy.

40. The Contractor attention is drawn to Finance Bill of 1993 where VATwas introduced in all contracts for construction services. The tenderer is also drawn to VATAct Cap 476 clause 19(9). The tenderer must allow for VAT1.19 as instructed else where.

41. The contractor shall allow and pay for all insurance to cover risks and indemnities required Items 17 and 18 of the Conditions of contract and also specified in the Special Conditions of Contract.

NCS: BILL NO. 1 - PRELIMINARY ITEMS

ITEM	DESCRIPTION	QTY	UNIT	UNIT RATE KES	AMOUNT KES
1	Discrepancies clause				
2	Conditions of sub-contract Agreement clause				
3	Payment's clause				
4	Site location clause				
5	Scope of Contract Works clause				
6	Extent of the Contractor's Duties clause				
7	Firm price contract clause				
8	Variation clause				
9	Prime cost and provisional sum clause (insert profit and attendance which is a percentage of expended PC or provisional sum.)				
10	Bond clause				
11	Government Legislation and Regulations clause				
12	Import Duty and Value Added Tax clause (Note this clause applies for materials supplied only. VAT will also be paid by the sub-contractor as allowed in the summary page)				
13	Insurance company Fees clause				
14	Provision of services by the Main contractor clause				
15	Samples and Materials Generally clause				
	SUB-TOTAL CARRIED TO PAGE NCS: **H-4**				

ITEM	DESCRIPTION	QTY	UNIT	UNIT RATE KES	AMOUNT KES
16	Supplies clause				
17	Bills of Quantities clause				
18	Contractor's Office in Kenya clause				
19	Builder's Work clause				
20	Setting to work and Regulating system clause				
21	Identification of plant components clause				
22	Working Drawings clause				
23	Record Drawings (As Installed) and Instructions clause				
24	Maintenance Manual clause				
25	Hand over clause				
26	Painting clause				
27	Testing and Inspection – manufactured plant clause				
28	Testing and Inspection – Installation clause				
29	Storage of Materials clause				
30	Initial Maintenance clause				
	SUB-TOTAL CARRIED TO PAGE NCS: **H-4**				

ITEM	DESCRIPTION	QTY	UNIT	UNIT RATE KES	AMOUNT KES
31	Attendance Upon Tradesmen, etc. (Insert percentage only) clause				
32	Local and other Authorities notices and fees clause Temporary Works clause				
33	Patent Rights clause				
34	Mobilization and Demobilization Clause				
35	Extended Preliminaries Clause				
36	Allow for profit and Attendance for the above				
37	Amendment to Scope of Sub-contract Works Clause				
38	Contractor Obligation and Employers Obligation clause				
39	**Other preliminaries.** To ensure that equipments are provided to specifications allow for factory visit of Gensets and Voltage Stabilizers for 3 No. persons (1 Electrical Engineers Architect, and 1 Client representative) to visit the manufacturing factory to verify the specifications and witness all the relevant factory tests before approval of shipping. The cost of the visit to includes but not limited to: - a) Visa processing fees b) Return air-tickets to and from the factory. c) Any transfer fees d) Local transport both in Nairobi and the city of destination. e) Accommodation at a hotel/resort not less than 4 stars in rating. Any other incidental costs for smooth facilitation of the trip				
40		1	sum	**2,000,000.00**	**2,000,000.00**
	SUB-TOTAL CARRIED TO PAGE NCS: **H-4**				

ITEM	DESCRIPTION	QTY	UNIT	UNIT RATE KES	AMOUNT KES
a)	ubtotal brought forward from page NCS: H-1				
b)	ubtotal brought forward from page NCS: H-2				
c)	ubtotal brought forward from page NCS: H-3				
	TOTAL FOR PRELIMINARIES CARRIED FORWARD TO NURSE CALL SYSTEM PRICE MAIN SUMMARY Page				

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
	NCS: BILL No.1 **FIRST FLOOR NURSE CALL SYSTEM** **Supply, install, test and commission the following: -**				
1.1	Nurse call points comprising wiring in 3-core 2.5mm^2 PVC-CU cables in 20mm Φ concealed HG PVC	90	No.		
1.2	Over-door lights for the awrd doors and entrances	21	No.		
1.3	Nurse call patients BedHead Panel comprising 2 No. (Uplight & Downlight) single 600mm, LED fluorescent fitting with acrylic diffuser as Philips, patient's nurse call pull/push cord and 1 No. 13A mains voltage socket outlet, Data/Telephone outlet, 2No Provision for Medical/Oxygen gases outlet.	90	No.		
1.4	6 feet cord call button with right angle plug	90	No.		
1.5	Call reset facility for the ward doors	14	No.		
1.6	30 Bed master indicator nurse call station panel to Engineers approval.	1	No.		
1.7	20 Bed master indicator nurse call station panel to Engineers approval.	2	No.		
1.8	12 Bed master indicator nurse call station panel to Engineers approval.	3	No.		
1.9	Nurse call panel power point comprising wiring in 3 x 2.5mm^2 PVC/SC CU cables drawn in 25mm Φ concealed HG PVC conduits	6	No.		
1.10	Cloak Room help Push Button	20	No		
					-
					-
					-
Total For NCS: Bill No. 1 C/F to NCS: Bills Summary page					-

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
	NCS: BILL No.2 **SECOND FLOOR NURSE CALL SYSTEM** **Supply, install, test and commission the following: -**				
2.1	Nurse call points comprising wiring in 3 -core 2.5mm^2 PVC - CU cables in 20mmØ concealed HG PVC conduits	135	No.		
2.1	Over door lights for the wards	27	No.		
2.2	Nurse call patients BedHead Panel comprising 2 No. (Uplight & Downlight) single 600mm, LED fluorescent fitting with acrylic diffuser as Philips, patient's nurse call pull/push cord and 1 No. 13A mains voltage socket outlet, Data/Telephone outlet, 2No Provision for Medical/Oxygen gases outlet.	135	No.		
2.3	6 feet cord call button with right angle plug	135	No.		
2.4	Call reset facility for the ward door.	20	No.		
2.5	12 Bed master indicator Nurse Call Station panel as legrand or approved equivalent.	3	No.		
2.6	20 Bed master indicator Nurse Call Station panel as legrand or approved equivalent.	2	No.		
2.7	30 Bed master indicator Nurse Call Station panel as legrand or approved equivalent.	2	No.		
2.8	Nurse call panel power point comprising wiring in 3 x 2.5mm^2 PVC/SC CU cables drawn in 25mmØ concealed HG PVC conduits	7	No.		
2.9	Cloak Room help Push Button	31	No		
	Total For NCS: Bill No. 2 C/F to NCS: Bills Summary page				-

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
	NCS: BILL No.3 **THIRD FLOOR- NURSE CALL SYSTEM** **Supply, install, test and commission the following: -**				
3.1	Nurse call points comprising wiring in 3 - core 2.5mm^2 PVC - CU cables in 20mm Φ concealed HG PVC conduits.	170	No.		
3.2	Over - door lights for the wards	37	No.		
3.3	Nurse call patients BedHead Panel comprising 2 No. (Uplight & Downlight) single 600mm, LED fluorescent fitting with acrylic diffuser as Philips, patient's nurse call pull/push cord and 1 No. 13A mains voltage socket outlet, Data/Telephone outlet, 2No Provision for Medical/Oxygen gases outlet.	170	No.		
3.4	6 feet cord call button with right angle plug.	170	No.		
3.5	Call reset facility for the ward doors	30	No.		
3.6	40 bed master indicator Nurse call station panel as Legrand or approved equivalent.	2	No.		
3.7	20 bed master indicator Nurse call station panel as Legrand or approved equivalent.	2	No.		
3.8	30 bed master indicator Nurse call station panel as Legrand or approved equivalent.	2	No.		
3.9	Nurse call panel power point comprising wiring in 3 x 2.5mm^2 PVC/SC CU cables drawn in 25mm Φ concealed HG PVC conduits complete with draw wire.	6	No.		
3.10	Cloak Room help Push Button	42	No		
	Total For NCS: Bill No. 3 C/F to NCS: Bills Summary page				-

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
	NCS: BILL No.4 **FOURTH FLOOR- NURSE CALL SYSTEM** **Supply, install, test and commission the following: -**				
4.1	Nurse call points comprising wiring in 3 - core 2.5mm^2 PVC - CU cables in 20mm Φ concealed HG PVC conduits.	50	No.		
4.2	Over - door lights for the wards	11	No.		
4.3	Nurse call patients BedHead Panel comprising 2 No. (Uplight & Downlight) single 600mm, LED fluorescent fitting with acrylic diffuser as Philips, patient's nurse call pull/push cord and 1 No. 13A mains voltage socket outlet, Data/Telephone outlet, 2No Provision for Medical/Oxygen gases outlet.	50	No.		
4.4	6 feet cord call button with right angle plug.	50	No.		
4.5	Call reset facility for the ward doors	15	No.		
4.6	30 bed master indicator Nurse call station panel as Legrand or approved equivalent.	2	No.		
4.7	Nurse call panel power point comprising wiring in 3 x 2.5mm^2 PVC/SC CU cables drawn in 25mm Φ concealed HG PVC conduits complete with draw wire.	2	No.		
4.8	Cloak Room help Push Button	15	No		
4.9	Any other Item(s) to complete the installation. a) b) c) d) E) f) g) h)				
	Total For NCS: Bill No. 4 C/F to NCS: Bills Summary page				-

Item	NCS: Bills Summary Page	Amount KES
1	BILL No. 1: Total Amount B/F Page NCS: H-5…….	
2	BILL No. 2: Total Amount B/F Page NCS: H-6 …….	
3	BILL No. 3: Total Amount B/F Page NCS: H-7…….	
4	BILL No. 4: Total Amount B/F Page NCS: H-8…….	
Total for Nurse Call System Works C/F to NCS: Price summary Page NCS: H-10		

ITEM No.	NCS: PRICE SUMMARY PAGE	AMOUNT KES
1	Sub-Contract Preliminaries and General Conditions Brought Forward From page NCS: H-4……	
2	Total Amount for NURSE CALL SYSTEM Brought Forward From page NCS: H-9	
	SUB-TOTAL (*Without V.A.T***)**	
3	*Add 16% V.A.T*	
4	**ADD CONTIGENCY**	**1,000,000.00**
TOTAL AMOUNT (***VAT INCLUSIVE***)FOR NURSE CALL SYSTEM WORKS CARRIED FORWARD TO ELECTRICAL SUMMARY PAGE EPSP**01**		

4. UNINTERRUPTIBLE POWER SUPPLY (UPS)

SECTION F: UPS PARTICULAR SPECIFICATIONS

1. Scope

1.1 This General Technical Specification lays down the functional requirements, performance characteristics, quality of installation and materials used, and standard of workmanship required for Uninterruptible Power Supply (UPS) system to be provided under contracts and orders administrated by the Electrical and Mechanical Services Department.

1.2 This General Technical Specification should be read in conjunction with the "General Requirements for Electronic Contracts, ESG01" and Particular Specification of the Contract or Order.

1.3 In the event of a conflict between this General Technical Specification with the Particular Specification of the Contract or Order, the Particular Specification of the Contract or Order shall prevail.

1.4 Notwithstanding the precedence specified, the Contractor shall always immediately seek advice from the Engineer in the event of conflicts between specifications.

1.5 This Specification should only be applied for the UPS system, for which the inverter is designed to operate continuously.

2. Description of System

The UPS system shall consist of rectifier/charger, batteries, inverter, static bypass, manual bypass, protective devices and accessories that automatically provide continuous supply of electric power to its load within tolerances as set out in this General Technical Specification and/or the Particular Specification of the Contract or Order and without interruption upon the failure or deterioration of the normal a.c. supply.

3. Related Documents and Specifications

3.1 The following documents, references and standards shall be observed and complied with where appropriate and applicable.

(i) BS 5099: "Electric cables. Voltage levels for spark testing"

(ii) BS 6724: "Electric cables. Thermosetting insulated, armoured cables for voltages of 600/1000V and 1900/3300V, having low emission of smoke and corrosive gases when affected by fire"

(iii) BS 7430: "Code of practice for protective earthing of electrical installations"

(iv) IEC 60228: "Conductors of insulated cable"

(v) IEC 60287-1: "Electric cables - Calculation of the current rating - Part 1: Current rating equations (100 % load factor) and calculation of losses"

(vi) IEC 60332-1: "Tests on electric and optical fibre cables under fire conditions - Part 1: Test for vertical flame propagation for a single insulated wire or cable"

(vii) IEC 60332-3: "Tests on electric cables under fire conditions – Part 3: Test for vertical frame spread of vertically-mounted bunched wires and cables"

(viii) IEC 60754-1: "Test on gases evolved during combustion of materials from cables – Part 1: Determination of the amount of halogen acid gas"

(ix) IEC 60896-22: "Stationary lead-acid batteries – Part 22: Valve regulated types - Requirement"

(x) IEC 60950-1: "Information technology equipment – Safety – Part 1: General requirements"

(xi) IEC 61034: "Measurement of smoke density of cables burning under defined conditions"

(xii) IEC 62040: "Uninterruptible power systems"

(xiii) IEEE 485: "Recommended practice for sizing lead-acid batteries for stationary applications"

(xiv) Code of Practice for the Electricity (Wiring) Regulations issued by Electrical & Mechanical Services Department

(xv) General Requirements for Electronic Contracts ESG01 - EMSD

(xvi) Supply Rules published by local power supply companies.

3.2 The year of issue of above specifications should be the latest issue as appropriate at the time of contract placement. However, other equivalent international or national standards would be considered. Any deviation should be stated clearly in the tender submission.

4. Abbreviations

(a) 'BS' means British Standards published by the British Standards Institution, U.K.

(b) 'IEC' means International Electrotechnical Commission

(c) 'IEEE' means The Institute of Electrical and Electronics Engineers, Incorporated

(d) 'RMS' means Root Mean Square Value

(e) 'UPS' means Uninterruptible Power Supply

5 Functional and Performance Requirements

5.1 General

5.1.1 The UPS system shall be of double-conversion type conforming to IEC 62040-3.

5.1.2 The general and safety requirements of UPS system shall be complied with IEC 62040-1.

5.1.3 If the mains supply is supported by the power generator sets, the UPS system shall be designed to interface and operate with the power generators to maintain an uninterrupted electricity supply in case of city mains failure.

5.1.4 The UPS system shall be of modular design and made up of one or more physically detachable equipment modules or cabinets, preferably of the draw-out type and removable from the front of the UPS system.

5.1.5 The UPS system shall be designed to permit ready access to modules and assemblies. The placement of parts, test points and terminals shall be such that they are accessible for circuit checking, adjustment and maintenance without the removal of any adjacent module or assembly.

5.1.6 The UPS system shall be constructed in heavy duty metal enclosures and designed for floor mounting.

5.1.7 All materials and parts comprising the UPS system shall be new, of current manufacture, of a high grade and free from all defects and imperfections and shall not have been in prior service, except as required during factory testing.

5.1.8 All active electronic devices shall be solid state. All semiconductor devices shall be hermetically sealed. All relays shall be dust tight.

5.1.9 All power semiconductors in the module shall be protected by fast acting fuses so that the failure of any one power semiconductor will not cause cascading failures. Each fuse shall preferably be provided with a blown fuse indicator on the control panel.

5.1.10 The UPS module shall not incur permanent damage to itself and the connected load under all predictable types of failure conditions within itself and the connected load.

5.1.11 Fast acting current limiting devices shall be used to protect against failures of solid state devices.

5.1.12 The total harmonic current distortion that generated by the UPS system shall conform to the Supply Rules published by local power supply companies.

5.1.13 The Static Transfer Switch (STS) shall be provided for UPS system to supply power to the load. In the event of a UPS system fault, the STS shall automatically transfer the load from UPS output to the other source without causing any interruption.

5.1.14 (Optional) For fully modular design, the UPS system shall consist of, but not limited to, plug-in power module, battery module, bypass module, output distribution module and hot-swap module with N+1 redundancy level.

5.1.15 (Optional) For fully modular design, the UPS system shall comply with the following requirements:-

(a) All of the power module shall support hot-swap without transferring to bypass.

(b) The UPS system shall have a central bypass unit and visual display for easy maintenance.

(c) The system efficiency of UPS system should be at least 92% at 50% rated load.

5.2 Operation Modes

5.2.1 The UPS system shall operate in three different operating modes:

(i) Normal mode;
(ii) Discharging mode; and
(iii) Bypass mode.

5.2.2 Normal Mode

(a) Under normal operation, the rectifier/charger unit shall convert the incoming a.c. mains power supply to d.c. power.
(b) The rectifier/charger unit output shall feed the inverter and charge up the batteries simultaneously. The inverter shall convert the d.c. power into a.c. mains power which feeds the load.

5.2.3 Discharging Mode

(a) Upon failure of the incoming a.c. mains supply or the incoming a.c. mains supply voltage goes outside the tolerances as set out in the Particular Specification, the

inverter and the batteries shall continue to supply power to the load without interruption or disturbance.

(b) Alarm indications shall be provided to indicate the failure of a.c. mains supply and the operation in the Discharging Mode.

(c) The UPS system shall continuously run in this Discharging Mode:

(i) for a duration as set out in the Particular Specification; or

(ii) until the incoming a.c. mains supply to return to normal at which the UPS system returns to Normal Mode. Alarm indications shall be automatically reset.

(d) "Battery low" alarm indication shall be given if the batteries reaching the cut-off voltage and the batteries are nearly drained to depletion. The UPS system shall automatically transfer to By-pass Mode.

5.2.4 Bypass Mode

The UPS system shall transfer the load to the incoming a.c. mains supply by-passing the rectifier/charger unit, batteries and inverter without any interruption under the following conditions:

(i) malfunction or failure of any modules of the UPS system

(ii) the batteries are drained to near depletion

(iii) over-temperature

(iv) overloads

(v) load current transients (inrush or fault clearing)

5.3 Operating Functions

5.3.1 The UPS system shall have regulating and self-protection functions against the following conditions:

(i) overvoltage

(ii) power line surges

(iii) undervoltage and overcurrent introduced by the incoming a.c. mains supply

(iv) overvoltage and voltage surges introduced at the output terminals by paralleled sources, load switching and circuit breaker operation in the distribution system

(v) sudden changes in the output load and short circuits at the

output terminals

5.3.2 Ringing transients, voltage spikes and surges shall be suppressed and shall be removed from the output of the UPS system.

5.3.3 The overall efficiency of the UPS system, output to input, shall not be less than 92% for UPS at 50% rated load.

5.3.4 The efficiency shall be measured under the following conditions:

i) The module is operating at the full rated load.
ii) The batteries are fully charged and floating on the system.
iii) The input voltage is within the Specification.
iv) The load power factor is between unity and 0.8 lagging.

5.3.5 The UPS system shall comply with IEC 62040-2 for electromagnetic compatibility requirements.

5.3.6 Temperature sensors shall be provided to monitor the temperature of UPS system and the batteries. The UPS system shall automatically transfer the load to the bypass source via the static bypass switch without power interruption in case over-temperature alarm is detected. The threshold of the over-temperature alarm shall be configurable and the alarm shall be disabled and enabled.

5.3.7 The UPS system shall be equipped with facilities to prevent backfeed to the input terminals causing hazards to the operating or maintenance personnel.

5.3.8 A maintenance bypass shall be provided to allow maintenance personnel to manually isolate the UPS system from the load for maintenance purpose and connect the load directly to the incoming a.c. mains supply.

5.3.9 A battery circuit breaker shall be provided to allow maintenance personnel to isolate the batteries from the UPS system for maintenance purpose without affecting the normal power supply to the load.

5.3.10 The UPS system shall be equipped an emergency shutdown switch. When the emergency switch is activated, the UPS system input, output and battery circuit breakers shall be open and the UPS system shall be completely isolated from all sources of power. The emergency shutdown switch shall be protected with cover to prevent accidental shutdown.

5.4 Status and Alarm Indications

5.4.1 The UPS system shall be equipped with, either digital displays or analogue meters to display the following operation information:

i) Input voltage and current meters (with phase selection switch for 3-phase equipment)
ii) D.C. battery charge / discharge current meter
iii) D.C. battery voltage meter
iv) A.C. voltmeter with selection switch to monitor either the UPS output or the bypass supply
v) Output and bypass a.c. ammeter (load current)
vi) Frequency meter (45 - 55 Hz) with selection switch to monitor the UPS output or bypass supply

5.4.2 The UPS system shall provide at least visual indication for the following alarms:

i) Overload
ii) Overload shutdown
iii) Equipment over-temperature
iv) Battery circuit breaker open
v) Battery discharging
vi) Low battery voltage
vii) Input power failure
viii) Inverter output over-voltage / under-voltage
ix) Static bypass inhibited
x) Load on bypass

5.4.3 An audible alarm shall be triggered whenever any alarms is detected. The audible alarm shall be mutable with an acknowledgement button.

5.4.4 The UPS system shall be provided with sufficient built-in diagnostic aids to facilitate trouble-shooting, maintenance and circuit calibration.

5.4.5 Each module of the UPS system shall be accompanied by suitable indicators and test points allowing the current status of each module to be monitored.

5.4.6 (Optional) The UPS system shall provide local mimic panel on the equipment cabinet. The mimic shall depict a complete single line diagram of the UPS system. The status of the following circuit breakers and modules shall be indicated:

a) UPS module a.c. input circuit breaker;
b) Battery circuit breaker;
c) System output circuit breaker; and

d) System bypass circuit breaker.

5.4.7 (Optional) The mimic shall display the operation mode of the UPS system and the source of power where the load is drawn.

5.5 Remote Monitoring

5.5.1 The UPS system shall provide voltage-free dry contacts for the summary alarm status.

5.5.2 The UPS system shall provide an output interface port for connection of workstation to allow remote monitoring the operating status of the UPS system.

5.5.3 (Optional) The workstation shall be provided for graphical display of the operating the status of the UPS system, including the alarms and status as set out in Clause 5.4.1 and 5.4.2 of this General Technical Specification.

5.5.4 (Optional) The workstation depicted in Clause 5.5.3 shall be equipped with high capacity storage device to store the event logs and alarm records for retrieval and further processing with commercially available PC applications.

5.5.5 (Optional) Remote alarm function shall be provided in the UPS system for notifying a list of pre-defined users via means, such as e-mail and SMS upon UPS system failure or change of operation mode to alert users for proper shutdown. The list of users shall be programmable.

5.6 Ventilation

5.6.1 Adequate force air cooling by sufficient rated ventilation fans shall be installed to ensure that all components operate within their environmental ratings.

5.6.2 The power input to the ventilation fans shall be connected to the output of the UPS system, as one of the load such that continuous power supply to the ventilation fans shall be maintained all the time under different operation modes of the UPS system.

5.6.3 All ventilation fans/blowers shall be equipped with facilities for alarm status indication and remote monitoring.

5.6.4 Temperature sensors shall be provided to monitor the temperature of critical components including batteries. Upon the detection of temperatures in excess of the component manufacturers'

recommended ambient working temperature, the sensors shall trigger audible and visual alarms on the control and monitoring panel.

5.7 Earthing Arrangement

All cabinet(s) must be solidly bonded to a good earth in accordance with BS 7430 using an adequate section of cable or busbar. The earth connection at the cabinet(s) shall be made to the frame earth terminal provided or alternatively to a substantial part of the basic frame rather than to a bolted-on panel.

6 Equipment and Accessories Specifications

6.1 General

6.1.1 The maximum working voltage, current and rate of change of current (di/dt) of all solid state power components and electronic devices shall not exceed 50% of the absolute maximum ratings established by their manufacturers. The heat dissipation capability of the solid state component cases at a certain ambient temperature shall be such that the temperature of the cases shall not be greater than 75% of their ratings.

6.2 Rectifier / Charger Unit

6.2.1 The rectifier/charger unit shall be equipped with adjustable current limiting facility to limit the charging current for the batteries.

6.2.2 The output circuit of the rectifier / charger charging current shall also be voltage regulated.

6.2.3 The rectifier / charger shall be discharged such that 95% of the energy shall be replaced in ten times (10x) the discharge time.

6.2.4 The rectifier/charger unit shall have sufficient output capacity for simultaneous operation of both the rated load and charging the batteries where they have been discharged to a state of system shutdown.

6.2.5 The rectifier/charger unit shall maintain the batteries at full charge until the next discharge operation.

6.2.6 The rectifier/charger unit shall provide features whereby when the a.c. power is returned to the a.c. input bus after the UPS system has been operating on battery power or has been de-energised, the total

initial current requirement at the input terminals will not exceed 20% of the rated output current, and the current will gradually increase to 100% of full rating over a 15-second time interval.

6.3 Inverter Unit

6.3.1 The output voltage shall be adjustable to +3% of the nominal voltage as stipulated in the Particular Specification.

6.3.2 The inverter shall be able to sustain an overload across its output terminals without shut off. It shall continue to operate at 125% of its rated power for 10 minutes, and shall maintain full output voltage for at least 10 second, when supplying up to 150% of its rated current.

6.3.3 The inverter shall be capable of providing at least 300% over-current under short circuit conditions. The tenderer shall state the period that the UPS system will continue to operate under the 300% overload condition before the inverter is shut down and disconnected automatically from the load bus.

6.3.4 The output frequency of the inverter shall be maintained in a phase-locked condition with the frequency of the bypass source for as long as it is within +2% of the nominal value.

6.3.5 In the event of the bypass line frequency being out of the tolerance, the inverter shall phase lock to a built-in temperature compensated oscillator. In such case, the total frequency deviation, including short term fluctuations and long terms drifts, shall not exceed ±0.25% from the nominal frequency.

6.3.6 The inverter shall have fault sensing facilities, a static interrupter and output circuit breaker for the removal of the inverter output from the load, without exceeding the limits stated in this Specification.

6.3.7 When feeding a linear load, the total harmonic distortion generated by the inverter shall be less than 5% RMS and any single harmonic shall be less than 3% RMS over the entire load range.

6.3.8 The steady-state (static) output voltage regulation of the inverter shall not deviate by more than ±3% under the following conditions:

i) 0 to 100% load application;
ii) ambient temperature variations;
iii) minimum to maximum DC bus voltage.

6.3.9 The dynamic (transient) output voltage regulation of the inverter shall be better than ±10% under the following conditions:

i) 50% step load application and rejection with zero initial load and 50% initial loads;
ii) transfer of the rated load from the inverter to the bypass source or vice versa;
iii) loss or return of the a.c. input. The output voltage shall return to 95% of the steady-state value within 50 milliseconds.

6.4 Static Bypass Switch

6.4.1 A static bypass switch shall be equipped to provide uninterrupted transfer of the load to the bypass source automatically when a malfunction or overload occurs in the UPS system.

6.4.2 The transfer shall be performed on a "make-before-break" basis such that the static bypass switch is closed before the static interrupter and/or the output circuit breaker is tripped open.

6.4.3 The static bypass switch shall preferably be connected in parallel with a circuit breaker which is activated together with the static switch and subsequently replaces the static switch.

6.4.4 If the transfer of load to the bypass source is the result of an overload, then when the overload is removed, the load shall be transferred back to the inverter either automatically or manually depending on the setting of a selection switch.

6.5 Batteries

6.5.1 The batteries shall be of maintenance-free and sealed type conforming to IEC 60896-22.

6.5.2 The batteries shall be of heavy-duty industrial type design. The housing of the battery shall be corrosive resistant.

6.5.3 The batteries shall be equipped with safety vent caps to prevent internal cell explosions caused by internal pressure developed during battery discharge or recharge.

6.5.4 The batteries shall have sufficient voltage and ampere-hour rating to maintain the UPS output at the rated output capacity for the duration as set out in the Particular Specification.

6.5.5 The discharge ratings of the batteries shall be determined at 25°C conforming to IEEE 485.

6.5.6 The batteries shall be housed in either racks or cubicles, as set out in

Particular Specification. The rack or cubicle shall be protected with electrolyte resistant paint.

6.5.7 Inter-cell connectors shall be protected with anti-corrosion plastic or non-metallic covers.

6.5.8 Circuit breakers shall be provided to isolate the batteries from the rectifier/charger unit and the inverter unit of the UPS system. The circuit breakers shall be automatically opened to disconnect the batteries when the discharge limit of volts per cell of the batteries is reached.

6.5.9 The circuit breakers shall also be manually operated and shall be able to be remotely controlled.

6.5.10 (Optional) The Battery Management System (BMS) shall be provided to monitor the real time status and performance of each battery cell and provide alert on any identified abnormality of individual battery cell.

6.5.11 (Optional) The BMS shall continuously capture and securely transmit battery performance data to the workstation. Monitored battery parameters shall include, but not limited to, individual battery terminal voltage, battery internal impedance, ambient temperature, internal battery temperature, status of charge and float current.

6.6 <u>Power Cable & Earthing Cable</u>

6.6.1 The conductors shall be of high conductivity annealed copper wire complying with IEC 60228.

6.6.2 The maximum continuous current carrying capacity and the factors for determining such ratings for the cable shall be based on IEC 60287 and on the conditions obtained on Site.

6.6.3 The nominal thickness of the insulation shall be as specified in BS 6724.

6.6.4 The insulation shall not break down when spark tested in accordance with BS 5099.

6.6.5 The cables shall be flame retardant and shall comply with the requirements of IEC 60332-1 & 60332-3.

6.6.6 The emission level of hydrochloric acid of the insulation and sheath of the cables under combustion shall not be greater than 0.5% when tested in accordance with IEC 60754-1.

6.6.7 The level of smoke density of all cables under burning shall comply with the requirement of IEC 61034.

6.6.8 Appropriated grommets or insulated bushes should be used to protect the non-armoured cables passing through metal box or any other metal work.

7 Reliability and Availability

7.1 The UPS system shall be designed for continuous reliable operation. All the system components including the rectifier/charger unit, inverter unit, bypass switch, batteries and cables shall have a proven serviceable life of at least 10 years.

7.2 The inability to perform a required function, the occurrence of unexpected action by the equipment, or the degradation of performance to below the required specifications shall be considered as a failure.

7.3 Mean-Time-Between-Failure (MTBF) shall be the average operating time accumulated by the total population of identical items in the UPS system between failures.

7.4 The MTBF for the following equipment shall not be less than 50,000 hours or as set out in the Particular Specification:

a) rectifier/charger unit;
b) inverter unit;
c) bypass static switch; and
d) batteries.

7.5 The availability of the UPS system shall be defined as the probability the UPS system is providing the normal operation and functions with the required performance.

7.6 The availability of the UPS system shall be better than 99.99% or as set out in the Particular Specification.

7.7 The tenderer shall submit calculations with reliability block diagrams for the UPS system to demonstrate compliance with the required availability and predicted MTBF figure for the whole UPS system.

7.8 The MTTR of the UPS system shall not exceed 1 hour. The MTTR shall be the time, excluding travelling time, required to diagnose the fault and restore the UPS system to normal working condition by means of module replacement on site. The Tenderer shall provide a statement on the MTTR of the supplied UPS system.

SECTION G: UPS EVALUATION CRITERIA

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

1. Determination of Responsiveness
2. Detailed Technical Examination
3. Combination of Technical and Tender Sums Comparison

STAGE 1- DETERMINATION OF RESPONSIVENESS

A) PRELIMINARY EXAMINATION

This stage of evaluation shall involve examination of the pre-qualification conditions 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 may include the following:

i) Category of Registration with N.C.A 3 and above in the relevant trade;
ii) Class of Licenses with the relevant statutory bodies e.g. Energy Regulatory Commission, County Government, and Water Management Boards etc;
iii) Proof of payment for tender document;
iv) Provision of Bid Security;
v) Dully filled Form of Tender;
vi) Any other conditions included in the advertisement notice/Invitation letter.

Note:

The bid security shall be in accordance with Instruction to Tenderers which states as follows:

- **Clause 19.1** of Instruction to Tenderers,"the tenderers shall furnish as part of his tenders a tender surety in the amount stated in the tender document in the Appendix to Instructions to Tenderers".

- **Clause 19.2** of Instruction to Tenderers, "the unconditional Tender surety shall be in Kenya shillings and be in form of a certified cheque, bank draft, an irrevocable letter of credit or a guarantee from a reputable Bank/ Insurance approved by PPOA located in the Republic of Kenya. The format of the surety shall be in accordance with the sample form included in the tender documents and the tender surety shall be valid for **150 days** from the date of tender opening".

- **Clause 23.2** of Instruction to Tenderers: "For the purposes of this clause, a substantially responsive tender is one which conforms to all terms and condition and specifications of the tender document without material deviation or reservation and has a valid Bank/Insurance guarantee".

The employer may seek further clarification/confirmation if necessary to confirm authenticity/compliance of any condition of the tender.

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

NOTE: ALL COPIES OF DOCUMENTS PROVIDED MUST BE CERTIFIED BY COMMISSIONER OF OTHS and ALL PAGES OF THE COMPLETE TENDER DOCUMENT SUBMITTED MUST BE PAGENATED/SERIALISED

B) COMPLETENESS OF TENDER DOCUMENT

The tender document shall be examined based on clause 2.2 of the Instruction to Tenderers which states as follows:

In accordance with clause 2.2 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 sub clause 2.1 of Instruction to Tenderers and adequacy of resources to effectively carry out the subject contract. The tenderers shall be required to fill the Standards Forms provided for the purposes of providing the required information. The tenderers may also attach the required information if they so desire.

The award of points for the **STANDARD FORMS** considered in this section shall be as shown below

	PARAMETER	**MAXIMUM POINTS**
(i)	Statement of compliance	3
(ii)	Tender Questionnaire	5
(iii)	Confidential Business Questionnaire	5
(iv)	Key personnel	15
(v)	Contract Completed in the last Five (5) years	15
(vi)	Schedules of on-going projects	10
(vii)	Schedules of contractors equipment	10
(viii)	Audited Financial Report for the last 3 years	10
(ix)	Evidence of Financial Resources	10
(x)	Name, Address and Telephone of Banks **(**Contractor to provide**)**	5
(xi)	Litigation History	2
(xii)	Sanctity of the tender document as in accordance with clause 5 of instruction to tenderer	10
	TOTAL	**100**

The detailed scoring plan shall be as shown in table 1 below: -

TABLE 1

Item	Description	Point Scored	Max. Point	
i.	**Statement of Compliance** • Signed and stamped ---------- 3 • Signed but not stamped or vice versa ---------- 2 • Not Signed nor stamped ---------- 0		**3**	
ii.	**Tender Questionnaire Form** • Completely filled ---------- 5 • Partially filled ---------- 3 • Not filled ---------- 0		**5**	
iii.	**Confidential Business Questionnaire Form** • Completely filled ---------- 5 • Partially filled ---------- 3 • Not filled ---------- 0		**5**	
iv	**Key Personnel (Attach evidence)**			**15**
	Director of the firm • Holder of degree in Electrical & Information Engineering & Information Technology ---------- 4 • Holder of certificate in Elec Engineering & Cert in I.T ---------- 3 • Holder of trade test certificate in relevant Engineering field------- 2 • No relevant certificate ---------- 0		**4**	
	At least 1No. degree/diploma of key personnel in relevant Engineering field • With over 10 years relevant experience ---------- 4 • With over 5 years relevant experience---------- 2 • With under 5 years relevant experience ---------- 1		**4**	
	At least 1No certificate holder of key personnel in relevant Engineering field • With over 10 years relevant experience---------- 3 • With over 5 years relevant experience ---------- 2 • With under 5 years relevant experience ----------1		**3**	
	At least 2No artisan (trade test certificate in relevant Engineering field) • Artisan with over 10 years relevant experience ---------- 2 • Artisan with under 10 years relevant experience ---------- 1 • Non skilled worker with over 10 years relevant experience ----- 1		**4**	
v	**Contract completed in the last five (5) years (Max of 5 No. Projects**) • Project of similar nature, complexity and magnitude ---------- 3 • Project of similar nature but of lower value than the one in consideration ---------- 2 • No completed project of similar nature ---------- 0		**15**	

vi	**On-going projects (Max of 5 No. Projects)** • Project of similar nature, complexity and magnitude -------- 2 • Project of similar nature but of lower value than the one in consideration ---------- 1 • No ongoing project of similar nature - ---------- 0		**10**	
vii	**Schedule of contractors equipment and transport (proof or evidence of ownership)** • Means of transport (Vehicle) ---------- 4 • No means of transport ---------- 0		4	**10**
	For each specific equipment required in the installation of the Work being tendered for. (Maximum No. of equipment to be considered – 3 No.---------- 2		6	
viii	**Financial report** **Audited financial report (last three (3) years)** • Turn over greater or equal to 5 times the cost of the project ---10 • Turn over greater or equal to 3 times the cost of the project --- 6 • Turn over greater or equal to the cost of the project ---------- 4 • Turn over below the cost of the project ---------- 2		**10**	
ix	**Evidence of Financial Resources (cash in hand, lines of credit, over draft facility etc)** • Has financial resources equal or above the cost of the project ----10 • Has financial resources below the cost of the project ----------5 • Has not indicated sources of financial resources ---------- 0		**10**	
x	**Name, Address and Telephone of Banks (Contractor to provide)** • Provided ---------- 5 • Not provided ---------- 0		**5**	
xi	**Litigation History** • Filled ---------- 2 • Not filled ---------- 0		**2**	
xii	**Sanctity of the tender document** • Having the document intact (not tempered with in any way) ---10 • Having mutilated or modified the tender document ---------- 0		**10**	
	TOTAL		**100**	

Any bidder who scores 80 points and above shall be considered for further evaluation

STAGE 2 - TECHNICAL EVALUATION

A) COMPLIANCE WITH TECHNICAL SPECIFICATIONS

In this section, the bid will be analyzed to determine compliance with General and Particular technical specifications for the works as indicated in the tender document.

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

Where the Equipment proposed by the tenderer differs with the models specified in the tender document, it is mandatory that the brochures/catalogues of the same be submitted with the tender document highlighting the catalogues Numbers of the proposed items. Such brochures/catalogues should indicate comprehensive relevant data of the proposed equipment/items which should include but not limited to the following:

a) Standards of manufacture

b) Performance ratings/characteristics

c) Material of manufacture

d) Electrical power ratings and

e) Any other necessary requirements (Specify)

Following the above analyses, where the proposed equipment are found not to satisfy the specifications, the tender will be deemed Non – Responsive and will not be evaluated further.

B) <u>TECHNICAL EXAMINATION</u>

In this section, the information provided in the Technical Schedule or Brochures attached will be analyzed for bidders who have qualified from **STAGE 2A** above and points awarded as shown below to a maximum of 100 points

TABLE 2

Item	Description	Score	Max. Score
	Technical schedule/Brochures • Relevant Manufacturer Brochures for items in the technical schedule with equipments to be supplied highlighted and meets specification (Where alternative are to supplied ---------- 100 or • Completely filled Technical Schedule indicating Brand, Model/ Country of origin as per specification in the tender ---------- 100 • Relevant Manufacturer Brochures for items in the technical schedule with equipments to be supplied not highlighted but within range of those specified and meets specifications ---------- 75 or • Completely filled Technical Schedule indicating items as specified in the tender but with less than 100% and above 75% of items in the technical schedule provided ---------- 75 • Relevant Manufacturer Brochures for items in the technical schedule with equipments to be supplied but between 50% and less than 75% of items highlighted and within range of those specified and meets specifications---------- 60 or • Completely filled Technical Schedule indicating items as specified in the tender but between 50% and 75% of items in the technical schedule provided ---------- 60 • Relevant Manufacturer Brochures for between 25% and less than 50% of items in the technical schedule with equipment to be supplied highlighted and meets specifications---------- 50 or • For between 25% and 50% of technical schedule filled indicating Brand/Model/Country of origin for the items considered as specified in the tender ---------- 50 • Less than 25% provided or no technical data provided, either in form of brochures or filling of Technical Schedule. ---------- 0		**100**
	TOTAL		**100**

Any bidder who scores 80 points and above shall be considered for further evaluation

STAGE 3 - FINANCIAL EVALUATION

The evaluation shall be in two sections
1. Preliminary examinations and
2. Tender sum Comparisons

A) PRELIMINARY EXAMINATIONS

The preliminary examination in the Financial Evaluation shall be in accordance with clause 26 of Instruction to Tenderers.

The parameter to be considered under this section includes the following:

a) Arithmetic errors and comparison of rates

(1) Arithmetic Errors

The bid shall be checked for arithmetic errors based on the rates and the total sums indicated in the bills of quantities.

a) Confirmation shall be sought in writing from the tenderers whose tender sums will be determined to have a significant arithmetic error to their disadvantage, to confirm whether they stand by their tender sums. The error shall be treated as per **clause 24 of Instructions to Tenderers**.

Non compliance with the above shall lead to **automatic disqualification from further evaluation.**

Discount if any shall be treated as an error in pursuant to **clause 26.3** of Instructions to Tenderers

(2) Comparison of rates

The evaluation committee will compare rates from different bidders and note consistency of rates and front loading. The evaluation committee will judge and make an appropriate decision giving evidence.

SECTION H – UPS BILLS OF QUANTITIES

A. Notes and Sample Items for Preparing a Bill of Quantities

1. These Notes for Preparing a Bill of Quantities are intended only as information for the Procuring Entity or the person drafting the Tender Documents. Priced Bills of Quantities shall be part and parcel of the Contract Documents.

2. The objectives and purpose of the Bills of Quantities are to provide sufficient information on the specifications, descriptions and quantities of Works to be performed to enable tenders to be prepared efficiently and accurately and when a contract has been entered into, to provide a priced Bill of Quantities for use in the periodic valuation of Works executed. Inorder to attain these objectives, Works should be itemized in the Bill of Quantities insufficient detail to distinguish between the different classes of Works, or between Works of the same nature carried outin different locations or in other circumstances which may give rise to different considerations of cost. Consistent with these requirements, the layout and content of the Bill of Quantities should be as simple and clear as possible.

3. The Bills of Quantities should be divided generally into thef ollowing sections:

   a) Preambles
   b) Preliminary items
   c) Work Items
   c) Daywork Schedule; and
   d) Provisionalitems
   e) Summary.

4. NOTES TO PREPARING PREAMBLES

4.1 The Preambles should include only those items that constitute the cost of the works but would not be priced separately as they are expected to be included in the unit prices. Care should be taken to ensure that these items are not are petition of the conditions of contract. The Preambles should indicate the inclusiveness of the unit prices and should state the methods of measurement that have been adopted in the preparation of the Bill of Quantities, that are to be used for the measurement of any part of the Works. The units of measurement and abbreviations should be defined and any mandatory national units defined and described. The methods of and procedure for re- measurement should be described in the Preambles.

4.2 Units of Measurement - The following units of measurement and abbreviations shall be used, unless other national units are mandatory in Kenya.

nit	Abbreviation	Unit	Abbreviation
cubic meter	m^3 or cu m	millimetre	mm

4.3 The Bills of Quantities shall be read in conjunction with the Instructions to Tenders, General and Special Conditions of Contract, Technical Specifications, and Drawings.

4.4. The quantities given in the Bills of Quantities are estimated and partly provisional and are given to provide a common basis for tendering. The basis of payment will be the actual quantities of work ordered and carried out, as measured by the Contractor and verified by the Architect and valued at the rates and prices tender in the priced.

Bills of Quantities, where applicable, and otherwise at such rates and prices as the Architect may fix within the terms of the Contract.

4.5. The rates and prices tender in the priced Bills of Quantities shall, except in so far as it is otherwise provided under the Contract, include all Constructional Plant, labour, supervision, materials, erection, maintenance, insurance, profit, taxes, and duties, together with all general risks, liabilities, and obligations set out or implied in the Contract.

4.6. Arateorprice shall be entered against each item in the priced Bill of Quantities, whether quantities are stated or not. The cost of Items against which the Contractor has failed to enter a rate or price shall be deemed to be covered by other rates and prices entered in the Bill of Quantities.

4.7. The whole cost of complying with the provisions of the Contract shall be included in the Items provided in the priced Bills of Quantities, and where no Items are provided, the cost shall be deemed to be distributed among the ratesand prices entered for the related Items of Work.

4.8. General directions and descriptions of work and materials are not necessarily repeated nor summarized in the Bills of Quantities. References to the relevant sections of the Contract documents shall be made before entering prices agains teach item in the priced Bills of Quantities.

4.9 Provisional Sums and contingency sums included and so designated in the Bills of Quantities shall be expended in whole or in part at the direction and discretion of the Architect in accordance with Sub-Clause13.5 and Clause 13.6 of the General Conditions of contract.

4.10 In preparing the Bills of Quantities, notes should be removed as they are intended to guide the person preparing the Tender Documents. The Contractor must allow in his rates for any costs associated with and complying with the requirements in the Preambles.

4.11 Should a tenderer/contractor not price any item in any section of the Bills of Quantities including Preliminary items, it will be assumed that he/she has spread its cost in other areas that he/she will have priced. Therefore, the itemor items will be executed without any additional costs or without being treated like variations.

5. NOTES ON PREPARING BILLS OF QUANTITIES

5.1 The Preliminary Items should be limited to tangible items that should be priced by the tenderer, are identifiable and can be priced separately and included in the interim valuations precisely. Such items may include such items as site office, notice boards, and other temporary works, otherwise items such as security for the Works which are primarily part of the Contractor's obligations should be included in the Contractor's rates.

5.2 The work items in the Bills of Quantities should be grouped into sections to distinguish between those parts of the Works which by nature, location, access, timing, or any other special characteristics may give rise to different methods of construction, or phasing of the Works, or considerations of cost. Such groups could be ground excavations, structures, external works, services, etc. General items common to all parts of the Works may be grouped as a separate section in the Bill of Quantities.

5.3 Quantities should be computed net from the Drawings, unless directed otherwise in the Contract, and no allowance should be made for bulking, shrinkage or waste. Quantitiesshouldberoundedupwhereappropriate.

5.4 Where the measured items a redeemed not to be exact because of the likelihood that the scope can change during the execution of the works, such items could be subject to re-measurement, the word **"provisional"** should be used to identify such cases. Where whole sections of the work items fall in this class, for example foundations, they should be labelled "Provisional Quantities" or "Provisional Items" so that the Tenderer/Contractor is advised up front that such items are subject to re-measurement to done before such work is cover-up.

5.5 All items that have not been measured and therefore not subject tot enders pricing should be listed in the Bills of Quantities as **Provisional Sums** for particular item or class of Work, which may be subject to a nominated subcontract or separate measurements at a later date during the execution of the works. For example, if it is deemed not possible to measure electrical works before going to tender because detail designs are not ready, a provisional sum can be allowed in the Bills of Quantities for "Installation of Electrical Works" to be executed later when actual design details are completed. To the extent not covered above, there should be in the Bills of Quantities a general provision for physical and financial contingencies made as a "Provisional Sum for Contingencies" and "Provisional Sum for Fluctuations". The inclusion of such provisional sums often facilitates budgetary approval by avoiding the need to request periodic supplementary approvals as the future need arises.

5.6 Provisional sums to cover specialized works normally carried out by Nominated Sub Contractors should be avoided and instead Bills of Quantities of the specialized Works should be included as a section of the main Bills of Quantities to be priced by the Main Contractor. The Main Contractor should be required to indicate the name(s) of the specialized firms he proposes to engage to carry out the specialized Works as his approved domestic sub-contractors. Only provisional sums to cover specialized Works by statutory authorities should be included in the Bills of Quantities.

5.7 A Daywork Schedule should be included if the probability of unforeseen work,

outside the items included in the Bill of Quantities, is relatively high. To facilitate checking by the Procuring Entity of the realism of rates quoted by the tenderers, the Daywork Schedule should normally comprise:

i) A list of the various classes of labor, and materials for which basic.

ii) Daywork rates and prices for various categories of labor are to be inserted by the tenderer, together with a statement of the conditions under which the Contractor will be paid for Work executed on a Daywork basis.

iii) A percent a get o be entered by the tenderer agains teach basic Day work item.

iv) Subtotal amount for labor, materials and plant representing the Contractor's profit, overheads, supervision and other charges.

5.8 The Summary should contain a tabulation of the separate parts of the Bills of Quantities carried forward, with provisional sums for Daywork, Provisional sums and Contingencies, and provision for Total Costing. The last line should allow for tenderer to indicate any discounts before arriving at a total cost carried forward to the Form of Tender.

BILLS OF QUANTITIES

(a) Preambles

1. The method of measurement of completed work for payment shall be in accordance with *[insert the name of a standard reference guide, or full details of the methods to be used]*.

2. The Site is situated in NAROK COUNTY It is approximately150Kilometers from Nairobi.

3. The Contractor shall obtain the Architect's approval on the siting of all temporary buildings, spoil heaps, temporary access path, and storage of materials. The Contractor shall also obtain the Architect approval and direction regarding the use of any materials found on the Site.

4. The drawings used in the preparation of these Bills of Quantities can be inspected at the offices of the Procuring Entityor Procuring Entity's Representative during normal working hours. Two sets of the Working Drawings shall be provided to the contractor, but additional copies shall be provided at a cost to be determined by the Engineer.

5. The Contractor shall allow for the payment of all bank charges in connection with the procurement of Bank Guarantees and stamp charges in connection with this contract Agreement.

6. The Contractor shall carry out the various sections of the Works in such an order as the Architect May direct. The Procuring Entity reserves the right to occupy the Works by sections on completion provided that such occupation is considered to be both practical and reasonable and will not interfere with the Works. The Contractor shall allow any costs associated with such occupation.
7. The main Contractor will be fully responsible for paying his Sub-Contractor but the Procuring Entity reserves the right in very exceptional circumstances to make such payments direct in the interests of the project where the completion thereof might be jeopardized by any dispute or vicariousness between the Contractor and the Sub-Contractor involve.

8. The Contractor shall complete and deliver the Works in the period inserted in the Form of Tender as his time for completion of the Works from the date for Possession, to be agreed with the Engineer. The Contract Period is presumed to have been calculated making due allowance for seasonal inclement weather conditions. Noclaimfor extension of time due to the normal in clement weather for this area shall be entertained.

9. The Contractor shall, upon receiving instructions to proceed with the Works, draw up a Programme and Progress Chart setting out the order in which the Works are to be carried out, with the appropriate dates there of. This Chart shall be agreed with the Architect and no deviation from the order set out in it will be permitted without the written consent of the Engineer. The Contractor will be responsible for arranging the above programme with all his sub-Contractors and Specialties. The Contractor shall allow in his rates for carrying out this exercise, and for updating it as required.

10. The Contractor shall submit to the Architect on the first day of each week or such longer period as the Architect from time to time direct, a Progress Report and any information for the proceeding period, showing the progress during the period and the up-to-date cumulative progresson all important items of each section or portion of the Works.

11. The Contractor shall arrange for photographs of the Site to be taken by a professional photographer approved by the Engineer.The Photographs shall provide a record of the Site and adjacent are as prior to the commencement of the Works and shall cover such portion of the works in progress and completion as the Architect shall direct. All prints shall be full plate size, unmounted, and marked on the reverse side with the date of exposure, identification reference and brief description. The copyright of all photographs shall be vested in the Procuring Entity. The negatives and four prints from each negative shall be delivered to the Architect within two weeks of exposure.

12. Figured dimensions are to be followed in preference to dimensions scaled from the Drawings, but whenever possible dimensions are to be taken on the Site or from the buildings. Before any work is commenced by Sub- Contractors or Specialist Firms, dimensions must be checked on the site comparable dimensions shown on the drawings. The Contractor shall be responsible for the accuracy of such dimensions.

13. Prior to commencement of any work the Contractor is to ascertain from the relevant Authorities the exact position, depth and level of all existing electric cables, waterpipes or other services in the are aand he shall make whatever provisions may be required by the Authorities concerned for the support and protection of such services. Any damage or disturbance caused to any services shall be reported immediately to the Architect and the relevant Authority and shall be made good to their satisfaction at the Contractor's expense. Where appropriate the Contractor shall open up the ground in advance of the main work by hand digging if necessary, to locate precisely the position and details of the services which are likely to affect his operations.

14. The Contractor shall include in his prices for the transport of materials, workmen, etc./, to and from the site of the proposed works, at such hours and by such route as are permitted by the Authorities.

15. The Contractor will be required to make good, at his own expense and damage he may cause to the present road surface and pavements within or beyond the boundary of the Site, during the period of the works. All existing paths, storm water channels, etc., that may be destroyed or damaged during the progress of the Works shall be reinstated by the Contractor to the satisfaction of the Engineer.

16. The Contractor is to allow for complying with all instructions and regulations of the Police Authorities.

17. All water shall be fresh, clean and pure, free from earthly, vegetable or organic matter, acid or alkaline substance in solution. The Contractor shall provide at his own risk and cost all water for use in connection with the Works, (including works of sub–contractors). If need be, he shall make arrangements with the Local Water Authority for the installation of a separate meter for all water used by him throughout the Contract and pay all cost and fees in connection therewith. He shall also provide temporary storage tanks and tubing, etc., as may be necessary, and clear away at completion.

18. The Contractor shall provide all artificial lighting and power for his own use on the Works, (including Sub – Contractor's) including all temporary connections, wiring, fittings, etc., and clearing away on completion. The Contractor shall pay all fees and obtain all permits in connection there with.

19. The Contractor shall constantly keep on the Works a Literate English-speaking Agent or Representative, competent and experienced in the kind of work involved, who shall giveh is whole time to the superintendence of the works. (Including works of sub – contractors). Such Agent or Representative shall receive on behalf of the Contractordirections and instruction from the Engineer, and such directions and instructions shall be deemed to be given to the contractor in accordance with the Conditions of Contract. The Agent shall not be replaced without the specific approval of the Engineer.

20. The Contractor shall ensure that the safety of his work people and all authorized visitors to the site are protected at all times. In particular, there shall be the proper provision of guard–rails to scaffolding, protection against falling materials, tools on site, dust, nail and other sharp objects. The site shall be kept tidy and clear of dangerous rubbish. The Architect shall be empowered to suspend work on site should it be considered this condition is not being observed and no claim arising from such suspension will be allowed.

21. The are as available to the Contractor for workyards, offices and other facilities shall be directed by the Architect and any existing features to remain shall be protected from damage throughout the Contract Period and handed back in good condition when they are vacated at the end of the Contract. If additional areas are required, the contractorshallsourcethenatowncost.

22. The Contractor shall give the Architect reasonable notice of the intention to set out or take levels for any part of the Works so that arrangements may be made for checking the work. The accuracy of setting out and leveling shall be within the tolerances specified in the Specifications or on the Drawings. The checking of setting out or leveling by the Architect shall not relieve the Contractor of his duties or responsibilities under the Contract.

23. The Contractor must take steps necessary to safe guard and shall beheld fully responsible for any damage caused to existingand adjacent property, including buildings that are not a subject of demolition. He shall make good at his own cost damage to persons and property caused there on, and he shall indemnify the Procuring Entity against any loss or claim that may arise.

24. The Contractor shall take such steps and exercise such care and diligence as to minimize nuisance arising from dust, noise or any other cause to the occupiers of the existing and adjacent property. He must provide such temporary and special screens and tarpaulins or gummy bags, hoarding, barriers, warning signs etc. as he considers necessary and sufficient for the protection of the existing and adjacent property and or prevention of nuisance etc. as directed by Engineer.

25. The Contractors attention is drawn to the standards levy order which was amended on 15thOctober 1998.Legal notice No.154 of 1998. The Contractor is required to pay a monthly level of 0.2% of his factory price of construction works with effect from January 1999. Tenderer shall allow for this in the build-upo f his rates.

26. The Contractor shall provide temporary sheds, offices meshrooms, sanitary, accommodation and other temporary buildings for the use of the contractor and sub-contractors, including lighting furniture equipment and attendance.

27. Contractor shall provide/build labor camp sat areas to be agreed with the Engineer. Labor camps shall be complete with sanitary accommodation and fencing gates.

28. The Contractor must provide the necessary toilet facilities to the requirement and satisfaction of the Health Authorities and maintain the same in a thoroughly clean and sanitary condition and pay all conservancy fees during the period of the Works and remove when no longer required.

29. The Contractor shall provide at his own risk and cost all watching and lighting as necessary to safeguard the Works, Plant and materials against damage and theft.

30. The Contractor shall provide all necessary hoists, tackle, plant, equipment, vehicles, tools and appliances of every description for the due and satisfactory completion of the Works and shall remove the same on completion. All such plant, tools and equipment shall comply with all regulations in force throughout the period of the Contract and shall be altered or adopted during the Contract period as may be necessary to comply with any amendments in or additions to such regulations.

31. Provide, erect and maintain all necessary scaffolding, sufficiently strong and efficient for the due performance of the works, including Sub-Contract Works, provide special scaffolding as required by Sub-Contractors, alter and adopt all scaffolding as and when required during the Works, and remove on completion. No scaffolding is measured here in after and the Contractor must allow in his rates for this.

32. The Contractor shall take all necessary precautions such as temporaryf encing, hoarding fans, planked footways, guard–rails gantries screen, etc., for the safe custody of the Works, materials and public protection and adjacent properties.

33. Cover up all and protect from damage, including damage from in clement weather, all finished work and unfixed materials, including that of Sub-Contractors, etc., to the satisfaction of the Architect until the completion ofthe Contract.

34. The Contractor shall, after completion of the works, at his own expense, remove and clear away all surplus excavated demolition materials, plant, rubbish and unused materials and shall leave the whole of the Site and Works in a clean and tidy state to the satisfaction of the Engineer, sheds, camps, etc. Particular care shall be taken toleavecleanallfloors and windows and tore move all paint and cement all rubbis hand dirt as it accumulates. The Contractor is to find his own dump and shall pay all charges in connection there with.

35. Concrete test cubes shall be prepared in a set of three, as described including testing fees, labor and materials, making molds, transport, handling, etc. Allow in your rates for making at least four cubes on each occasion, from different batches; the concrete being taken from the point of deposit.

36. The Contractors hall furnish at the earliest possible opportunity before work commences, and at his own cost, any samples of materials and workmanship that may be called for by the Architect for the approval or rejection, and any further samples in the case of rejection, until such samples are approved by the Engineer.

Such samples, when approved, shall be the minimum standard for the work to which they apply. The proceduref or submitting samples of materials for testing or approval and the method of marking for identification shall be as laid down by the Engineer.The Contractor shall allow in his Tender for such samples and tests, including those in connection with his Sub-Contractors work.

37. The Contractors attention is drawn to the Finance Bill of the year 2000/2001 on withholding tax on contractual payment section 35(7)(i)(ii) which became effective on 1st July 2000. A 3% withholding tax will be applicable to all in terim payments exceeding Kshs…….....……. for work done in respect of building or civil works. The contractor shall allow for any costs arising resulting there from in the build-up of rates.

38. Blasting will only be allowed with the express permission of the Architect in writing. All blasting operations shall be carried out at the Contractor's sole risk and cost, in accordance with any Government regulations in force for the time being, and any special regulations laid down by the Architect governing the use and storage of explosives.

39. The National Construction Authority is a state corporation established under the national construction authority Act No.14 of 2011. The broad Mandate of the Authority is to over see the construction industry and coordinate its development. The National Construction Authority Regulations 2014 with an effective date of 6thJune 2014, regulation 25, - Allow 0.5% of the tender sum/contract sum for construction levy.

40. The Contractor attention is drawn to Finance Bill of 1993 where VATwas introduced in all contracts for construction services. The tenderer is also drawn to VATAct Cap 476 clause 19(9). The tenderer must allow for VAT1.19 as instructed else where.

41. The contractor shall allow and pay for all insurance to cover risks and indemnities required Items 17 and 18 of the Conditions of contract and also specified in the Special Conditions of Contract.

UPS: BILL NO. 1 - PRELIMINARY ITEMS

ITEM	DESCRIPTION	QTY	UNIT	UNIT RATE KES	AMOUNT KES
1	Discrepancies clause				
2	Conditions of sub-contract Agreement clause				
3	Payment's clause				
4	Site location clause				
5	Scope of Contract Works clause				
6	Extent of the Contractor's Duties clause				
7	Firm price contract clause				
8	Variation clause				
9	Prime cost and provisional sum clause (insert profit and attendance which is a percentage of expended PC or provisional sum.)				
10	Bond clause				
11	Government Legislation and Regulations clause				
12	Import Duty and Value Added Tax clause (Note this clause applies for materials supplied only. VAT will also be paid by the sub-contractor as allowed in the summary page)				
13	Insurance company Fees clause				
14	Provision of services by the Main contractor clause				
15	Samples and Materials Generally clause				
	SUB-TOTAL CARRIED TO PAGE UPS: **H-4**				

ITEM	DESCRIPTION	QTY	UNIT	UNIT RATE KES	AMOUNT KES
16	Supplies clause				
17	Bills of Quantities clause				
18	Contractor's Office in Kenya clause				
19	Builder's Work clause				
20	Setting to work and Regulating system clause				
21	Identification of plant components clause				
22	Working Drawings clause				
23	Record Drawings (As Installed) and Instructions clause				
24	Maintenance Manual clause				
25	Hand over clause				
26	Painting clause				
27	Testing and Inspection – manufactured plant clause				
28	Testing and Inspection – Installation clause				
29	Storage of Materials clause				
30	Initial Maintenance clause				
	SUB-TOTAL CARRIED TO PAGE UPS: **H-4**				

ITEM	DESCRIPTION	QTY	UNIT	UNIT RATE KES	AMOUNT KES
31	Attendance Upon Tradesmen, etc. (Insert percentage only) clause				
32	Local and other Authorities notices and fees clause				
33	Temporary Works clause				
34	Patent Rights clause				
35	Mobilization and Demobilization Clause				
36	Extended Preliminaries Clause				
37	Allow for profit and Attendance for the above				
38	Amendment to Scope of Sub-contract Works Clause				
39	Contractor Obligation and Employers Obligation clause				
40	**Other preliminaries.** To ensure that equipments are provided to specifications allow for factory visit of Gensets and Voltage Stabilizers for 5 No. persons (2 Electrical Engineers Architect, and 2 Client representative) to visit the manufacturing factory to verify the specifications and witness all the relevant factory tests before approval of shipping. The cost of the visit to includes but not limited to: - a) Visa processing fees b) Return air-tickets to and from the factory. c) Any transfer fees d) Local transport both in Nairobi and the city of destination. e) Accommodation at a hotel/resort not less than 4 stars in rating. Any other incidental costs for smooth facilitation of the trip	1	sum	**3,000,000.00**	**3,000,000.00**
	SUB-TOTAL CARRIED TO PAGE UPS: **H-4**				

ITEM	DESCRIPTION	QTY	UNIT	UNIT RATE KES	AMOUNT KES
a)	Subtotal brought forward from page UPS: H-1				
b)	Subtotal brought forward from page UPS: H-2				
c)	Subtotal brought forward from page UPS: H-3				
	TOTAL FOR PRELIMINARIES CARRIED FORWARD TO UPS: **PRICE MAIN SUMMARY Page** UPS: **H-8**				

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
	UPS: BILL No.1 **3-PHASE 400KVA & 10KVA Single Phase U.P.S INSTALLATIONS** **Supply, install, test and commission the following: -**				
1.1	**400KVA,** TRUE ON-LINE **DOUBLE CONVERSION** THREE PHASE IN - THREE PHASE OUT HOSPITAL UPS AS **APC, BORI** or **SOCOMEC** able to sustain power for atleast 20 minutes operating on full load as per the technical specifications, Complete with Automatic change over switch, Rectifier, boosts connector, battery charger, static inverter, maintenance. By pass switch (manual) No break static transfer switch, surge arrestor, battery Bank, main control panel with LCD display and all other accessories to make the equipment functional.	1	Lot		
1.2	**10KVA,** TRUE ON-LINE **DOUBLE CONVERSION** SINGLE PHASE IN - SINGLE PHASE OUT UPS AS **APC, BORI** or **SOCOMEC** able to sustain power for atleast 20 minutes operating on full load as per the technical specifications, Complete with Automatic change over switch, Rectifier, boosts connector, battery charger, static inverter, maintenance. By pass switch (manual) No break static transfer switch, surge arrestor, battery Bank, main control panel with LCD display and all other accessories to make the equipment functional.	1	Lot		
1.3	Earthing of the equipment and bonding of all metal parts.	1	Lot		
1.5	500A SPN By-pass switch complete with 2No. 500A change over switches, wired internally in an 16 gauge steel galvanized sheet & powder coated off –white.	1	Lot		
1.6	1 year warranty for the equipment.	1	Lot		
1.7	4 core 240mm^2 XLPE/SWA/PVC Cu cable running from the Main LV Board to the U.P.S above via the BY-Pass unit.	150	LM		
1.8	4 core 240mm^2 XLPE/SWA/PVC Cu cable running from the U.P.S BY-Pass unit to Clean Power SUB-BOARD	40	LM		
	Total For UPS: Bill No. 1 C/F to UPS: Bills Summary page				

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
	UPS: BILL No.2				
	GENERAL ITEMS				
2.1.1	Any other item to complete installation covering all accessories/consumable to complete the above works.(list on a separate sheet & insert in here)	1	Lot		
2.1.2	Allow sum for attendance to other specialists including furniture sub-contractor, electrical sub-contractor and main contractor	1	Lot		
2.1.4	Working drawings for the data network to be used during the installation	1	Lot		
2.1.5	As installed drawings for the Data network, 3 sets of original hard copies and soft copy on CD-R & on **2GB hp** flash disk in **AUTOCAD** format & on **P.D.F**	1	Lot		
2.1.6	Testing and commissioning the whole network to CAT 6 standards & Documentation to cover certified CAT6 test results and report.	1	Lot		
	Total For UPS: Bill No. 2 C/F to UPS: Bills Summary page				

Item	UPS: Bills Summary Page	Amount KES
1	BILL No. 1: Total Amount B/F Page UPS: H-5 …….	
2	BILL No. 2: Total Amount B/F Page UPS: H-6…….	
Total for U.P.S Works C/F to UPS: Price summary Page		

ITEM No.	UPS: PRICE SUMMARY PAGE	AMOUNT KES
1	Sub-Contract Preliminaries and General Conditions Brought Forward From page UPS: H-4……	
2	Total Amount for U.P.S Brought Forward Fron page UPS: H-7	
	SUB-TOTAL (Without V.A.T)	
3	Add 16% V.A.T	
4	**ADD CONTIGENCY**	**600,000.00**
TOTAL AMOUNT (*VAT INCLUSIVE*) FOR U.P.S WORKS CARRIED FORWARD TO ELECTRICAL PRICE SUMMARY PAGE EPSP *01*		

5. 2No. 500KVA SYNCHRONISED GENERATORS, 1No. 150KVA STANDBY GENERATOR & VOLTAGE STABILZERS

SECTION F: GENSETS PARTICULAR SPECIFICATIONS

1 Location of site

The site for the proposed Contract Works is at NAROK COUNTY

Scope of works

Supply, Installation, Testing and commissioning of:

i) 2No. **500** KVA Prime rated Generator sets

ii) 1No 1,000KVA Automatic Voltage Regulator

iii)1No. **150** KVA Standby rated Generator set.

iv)1No 150KVA Automatic Voltage Regulator

2 Climatic Conditions

The following climatic conditions apply at the site of the Contract Works and the equipment, materials and installations shall be suitable for these conditions:

Mean Maximum Temperatures 25°c

Mean Minimum Temperature 12°c

Range of Relative humidity 39% - 97%

Salt in the atmosphere 0.02%

Altitude 1600mm above sea level

Latitude /Longitude 10° 20'S/360° 05'E

Solar Radiation, February Mean Max 630 Langleys

Extremely heavy rains fall at certain periods of the year and the contractor shall be deemed to have taken account of this factor both in his prices and his planning of the execution of the contract works.

Equipment de-rating factors for the temperature and altitude shall be stated.

3 Operating Conditions

The equipment and all components shall be suitable for the operation in ambient conditions of 5^0 C to 40^0C and up to 100% relative humidity

i) In an unheated ventilated building
ii) In the open air as specified

Unless otherwise stated all ratings of equipment and components shall be

interpreted as site rating and NOT sea level or other ratings.

4. Functional Objectives

The set shall be capable of operating continuously and satisfactorily in a medium dust laden atmosphere as defined in BS 1701 and in accordance with BS 649.

The generating set is required for standby duty and will be connected to the switchboard through a circuit. It shall have an automatic mains failure control, appropriately interlocked with the other incoming supply. Provisions shall be made in the control circuit of the generator for automatic and remote push button control, including the terminals and cable glands for all external cables, which will be supplied by others, where specified. It shall also be possible to start, operate and stop the set manually, independent of any automatic features.

Within the operating conditions specified in part 3 above the set shall be capable of starting and accepting full load within the shortest possible time, and in any case, in not more than 10 seconds. Any special features included to achieve this shall be stated in Section F.

5. Scope of the Contract Works

The work covered by this Specification includes the design, manufacture, supply, delivery, installation, commissioning and testing to the satisfaction of the Engineer and maintenance for a period of twelve months of a new generating set complete with all necessary ancillary equipment.

The equipment is to comprise 2No. **500** KVA, 415 volts/3 phase /50Hz continuously rated diesel generator set with all integral accessories, and all necessary equipment for the safe and efficient working of the set. The diesel generator set will be site rated at level of 1660 metres, Kenya Datum.

Diesel generator set to include:

a) Push button starting, starting battery and mains power supply trickle charger to be included.
b) 72 hour operational running capacity auxiliary fuel oil storage tank, loose transfer pump and duplex oil strainer.
c) An integral belly/ base fuel tank for daily service with an operational running capacity of 8 hours
d) All interconnecting pipe work, valves and fittings between the storage tank, base tank and the diesel engine.
e) An automatic generator control unit
f) A diesel generator control cubicle
g) Acoustic enclosure/ sound attenuated canopy
h) All local wiring
i) Maintenance tools and spare parts as specified.

6 Performance Objective

The output rating of the set in KVA, the voltage, the number of phases and the frequency shall be as specified in the Bills of Quantities.

Within the operating conditions specified the set, equipped with its standard air intake filters, shall be capable of delivering its rated output continuously at rated voltage and 0.8 lagging power factor and of delivering 10% in excess of the continuous maximum rating for a period of one hour in any 12 hour period.
The steady state voltage shall be maintained within 2 ½ % of the rated voltage under control of the voltage regulator between the cold start ambient conditions and the maximum working temperature, from no load to 10% overload and from unity to 0.8 lagging power factor. After any change of load the voltage shall not vary by more than + 15% of the rated voltage and shall return to within +/- 3% within 3 seconds and to within 2 ½ % of rated voltage within 1 seconds. On starting the voltage overshoot shall not exceed 15% and shall return to within 3% in not more than 3 seconds.
The governing of the set shall be such that the steady load speed band shall not exceed 1% of rated speed. Sudden removal of the full load at rated frequency shall not cause the frequency to rise above 110% of the rated frequency and it shall return to within 105% of the rated frequency within 3 seconds. The resultant steady state frequency shall return to 104% within 15 seconds. If full load is then reimposed the frequency shall not fall below 94% of rated frequency and shall return to 99% within 3 seconds and to the rated frequency within 15 seconds. The cyclic irregularity of the set at full load shall not be worse than 1/150.
The deviated interference shall be suppressed to the limit specified in BS 800 and BS 833.

7. Generating Set Arrangement

Unless otherwise indicated the set and its auxiliaries shall be mounted on sufficiently substantial underbase. All items which must be held in correct relative alignment shall be located by means of dowels.
The set shall be designed and supplied for operation bolted to the floor on robust anti-vibration and shock absorbing devices. They shall have adjusting screws for optimum setting and levelling and be so designed and installed that no appreciable engine vibration shall be transmitted to the floor or to any surrounding.
Bearings shall be suitable for operation over long periods without the need for replacement of the lubricant. Oil lubricated bearings shall be fitted with a visible oil level gauge.

8. Diesel Engine

8.1 General

The engine shall comply in design and performance with BS.649 "Diesel Engines for General purposes" or its approved equivalent. The engine shall be designed for satisfactory operation on fuel oil and lubricating oil complying with BS. 2869. The engine shall be totally enclosed, with forced lubrication from an integral pump having on the suction side a course strainer and on the delivery side a dual' full flow' fine filter with a changeover cock incorporating pressure by-pass, so that the oil flow to the engine is maintained if the filter should choke. Alternatively a single filter of the self-cleaning type fitted with a by-pass relief valve and having the same filtration performance may be provided. Manual lubrication of any part of the engine will not be accepted. The capacity of the lubricating oil system shall be sufficient to enable the engine to run continuously for 12 hours at any load without replacement.

A filter with a by-pass relief valve shall be inserted in the fuel line immediately before the pump(s). The fuel filter element shall be incapable of passing particles larger than micrometers. The fuel system shall be so arranged that fuel resulting from filter, pump or pipe spillage shall be incapable of entering the engine sump.

Air filters complying with KS 06-294: 1986, Grade 'A' and Grade 'B' suitable for use in a dusty atmosphere shall be fitted on the engine air intake(s)

No significant critical speed of the complete shaft system, including the generator, shall be within 15% of the rated speed.
A manually reset overspeed trip shall be fitted to stop the engine if its speed exceeds the rated speed by 15%. A mechanical trip is preferred but an electrical overspeed trip may be offered. Both types shall be equipped with a pair of contacts which close on operation of the trip. If the device is belt driven, at least two belts shall be provided and the drive shall be capable of carrying full load with one belt removed.

The set shall be arranged such that on shut-down the cooling water temperature shall not rise with residual heat so that the high water temperature lock-out operates. The engine may be naturally aspirated as pressure charged, or as indicated.

The starting shall be by means of electricity supplied from a starter battery. The starter motor shall be of axial type, de-energizing by a device operated from the engine. A means of manual starting shall also be provided.
Suitable means shall be provided for running by hand the engine main shaft and the associated generator to facilitate inspection and overhaul.

If weekly test runs are insufficient to prevent the drying out of the bearings, means shall be provided to ensure that the bearing surfaces are adequately and automatically wetted with lubricating oil either periodically or immediately prior to every start.

The engine shall be capable of being started from any crank position.
A thermostatically controlled 240-volt immersion heater may be fitted in the engine lubricating oil sump to facilitate starting. The heating surface loading of any lubricating oil heater(s) shall not exceed 0.015 watt per square millimeter to avoid carbonization of oil.

An efficient exhaust silencer with adequate draining facilities shall be supplied, and shall either be mounted on the set or installed in a generator room constructed as shown on the drawing indicated. The exhaust silencer system shall be so arranged that it may be readily relocated if required. Where any additional piping bends and fittings are specified, the manufacturer shall advise on any problems involved.

8.2 <u>Fuel Oil System</u>

An auxiliary fuel storage tank whose minimum capacity shall be sufficient to run the engine continuously on full load for 72 hours shall be installed in the position indicated in the contract drawing. It shall be supplied complete with supports.
The tank shall be fitted with a hand operated fuel with a flexible suction hose to permit filling from a drum on the floor.
A three way cock shall be fitted in the line from tank to the engine to enable the fuel to be supplied from a source other than the storage tank.

The position of the cock shall be clearly marked 'MANUAL, AUTOMATIC, OFF' as applicable.
A duplex oil filter shall be supplied between the storage tank and the diesel engine. The duplex filter shall be capable of being cleaned without dismantling, or in interruption of the fuel flow, and shall be easily maintainable. The tank shall be equipped with a graduated dipstick, a clearly visible contents' gauge (not of the site glass type) and with drain, vent,

overflow and inlet and outlet connection.
The set shall also have an integral belly/base fuel tank for daily services with an operational running capacity of 8 hours.

8.3 Lubricating Oil System

An engine driven integral gear type lubricating oil pump shall be provided. The lubricating oil system shall include an oil cooler and fine mesh filters, together with devices to indicate lubricating oil pressure and to initiate a 240 volt A.C. Lubricating oil Low pressure Alarm, Lubricating Oil High Temperature Alarm and Cooling Water High Temperature Alarm.
As separate 240 volt A.C. Motor driven automatic lubricating oil priming pump shall be provided for intermittent operation when the diesel is lying idle.

8.4 Starting of Engine

The diesel generator set shall have facilities for local and remote push button starting, with a Local/ Remote/ Automatic selector switch at the local panel.
On mains failure the engine shall be capable of being automatically started from battery located near the generator set.
The battery shall be complete with drip tray and trickle charger.
All necessary relays, contacts, switches and miscellaneous items for the starting sequence shall be supplied and installed in the local control panel.
The system shall be designed to give maximum reliability in starting.
The Contractor shall state in detail his proposals to ensure reliable starting and prevention of deterioration of the diesel engine, generator and exciter during idle periods.
All manually operated valves and controls on whose setting the correct operation of the automatic starting equipment depends shall be provided with locking devices.

8.5 Cooling System

The engine may be air or water cooled unless a preference is indicated.

8.5.1 Air Cooling of Engine

Cooling air for the engine and lubricating oil shall be provided by fan(s) mechanically driven from the engine. The cooling system shall be adequate for the total requirements of the engine when running on continuous full load and on 10% overload for one hour in accordance with BS 649 and under the conditions of Section 3.

The engine shall be so designed that the cooling air discharges into or is drawn through a reasonably airtight ducted assembly enclosing the lubricating oil cooler, the cylinder barrels and the cylinder heads of the engine.
This assembly shall terminate in a flanged outlet to which trunking may be readily attached when necessary, to enable hot air from the cooling system to be discharged outside the building.
Belt driven fans shall have at least two belts and the drive shall be capable of transmitting the full load with one belt removed. The cooling air temperature shall be controlled so as to maintain a safe working temperature of the cylinder hand(s) and the engine shall shut down if the maximum is exceeded.

8.5.2 Water Cooling of Engine

A radiator of the air blast type shall be provided. It shall either have separate sections for water and for lubricating oil or be arranged for jacket water cooling only.
The radiator shall be mounted on the set and the fan(s) shall be mechanically driven from the engine. Where indicated the radiators shall be suitable for remote wall or floor mounting, in which case the fan shall be electric motor driven from a supply similar in voltage, phase and frequency to the alternator output and shall be started on line.
Where remotely mounted, the fan shall only operate when generating set is running and shall

be controlled by a thermostat mounted in the radiator such that the fan motor will start on rising temperature 50^0C and stop on falling temperature.
Belt driven fans shall be provided with at least two belts and the drive shall be capable of transmitting the full load with one belt removed. Circulation of the jacket water and lubricating oil through the respective radiator sections and /or heat exchanger shall be by means of pumps mechanically driven by the engine. Belt driven pumps shall be provided with at least two belts and drive shall be capable of transmitting the full load with one belt removed.
Circulation by thermo-syphon will be accepted provided the engine will operate under the conditions of section 6 and in accordance with BS 649.
An easily visible flow indicator provided with contacts shall be fitted in the water outlet from the engine; the contacts shall close in the 'no flow' condition and shut down the set.
Alternatively in thermosyphon systems and sealed or pressurized radiator systems the flow indicator may be dispensed with providing the engine shuts down by the operation of the high temperature or low oil pressure safety devices in accordance with section 8.3.
A thermostatically controlled diverter valve shall be inserted in the engine water discharge pipe with a return to the circulating pipe section, to maintain the circulating water at the optimum temperature irrespective of the load. Alternatively a thermostatic bypass will be accepted.
A radiator make-up/expansion tank, fitted with float control inlet, shall be provided. If a sealed or pressurized unit is offered the tank may be dispensed with.
Where indicated provision shall be made on the radiator framework to permit the attachment of ducting for the discharge air.
A thermometer shall be mounted near the cylinder head(s) to indicate water temperature. Where a lubricating oil cooler is fitted, thermometers shall be mounted at the oil inlet too and outlet from the engine. Alternatively, thermocouple may be provided at all thermometer positions and taken to an instrument panel.
Adequate drains shall be provided at low points in the water and lubricating oil systems of the radiator and, where applicable, of the heat exchanger.

8.6 <u>Governing System</u>

Governing shall conform to B.S. 640 Class A. The governor shall control the frequency within the limits stated in Section 6 Part. Manual speed adjustment shall be provided over a range of +/-15% of the rated speed at any load. The governor system shall be of the mechanical or hydraulic type. In addition the engine shall be fitted with an approved overspeed trip device which shall operate independently of the normal speed governor and shall act directly upon the fuel supply to the engine.
The overspeed shall act at a speed of 12% to 15% in excess of normal operating speed.

8.7 <u>Exhaust System</u>

The diesel engine shall be provided with a suitable exhaust system for horizontal discharge outside the diesel generator room.
The silencer shall be of spark arresting type and shall be equipped with cleaning and draining arrangements.
If an exhaust driven turbo-charger is supplied it shall include air intake filters, mani-folds and outlet manifolds.
All necessary ducting, piping, supports and lagging required for the system shall be included. Weatherproof wall boxes permitting expansion shall be fitted where the exhaust piping passes through the building wall or roof. Pipe work shall be connected at site by butt weld connections or use of flanged joints. The use of screwed connectors shall be avoided.

Flanges shall conform to the appropriate Table of B.S.10: 1962. Welding of flanges at site shall be carried out in accordance with B.S.806. The faces of flanges shall be machined and the backs shall be machined or spot faced to receive the bolt heads.
Valves and fittings shall be of approved design and manufacture and shall be subject to the same tests as the highest pressure piping or vessel to which they are connected.

8.8 Engine Instruments

Unless otherwise indicated the following instruments shall be provided:

(a) a lubricating oil pressure gauge
(b) a running hours meter
(c) a tachometer
(d) a water thermometer
(e) an exhaust gas pyrometer or thermometer mounted near the mani-fold
(f) lubricating oil thermometers on the inlet to and outlet from the engine, when a lubricating oil cooler if fitted
(g) Exhaust turbo-blower pressure gauge(s) as applicable

8.9 Pipe work, Valves and Fittings

All piping shall comply with requirements of KS-259:11989 for mild steel pipes.
Provision shall be made for ready handing of all parts of the plant during assembly or disassembly of the unit.
Adequate provision shall be made for attaching lifting devices, slings and eyebolts.

9. The Generator (Alternator and Exciter)

9.1 General

The generator shall comply with B.S.2613:197, for service in tropical conditions, and shall withstand being idle for considerable periods without any harmful drop in the insulation resistance
The generator shall have a prime rated net output of **500** KVA as specified in the schedules of the Bills of Quantities, at 0.8 lagging power factor, 415 volts, 3 phase, 4 wire, 50 Hertz with brushless rotating rectifier excitation system and voltage regulator. It shall be directly coupled to the engine and be sized such that it will accept the maximum output of the engine including overload. The output voltage shall be maintained within plus or minus 2 ½ % from no load to full load conditions. The alternator shall be capable of operating within the range of plus or minus 15% of the nominal voltage according to the automatic voltage regulator.
Three phase machines shall be star connected, and a diagram showing the terminal marking and phase rotation shall be provided in the terminal box. Cables connecting the machine winding and machine terminals shall not have a higher de-rating factor for temperature than the windings.
The insulation shall comply with BS 2757 excluding Classes Y and A. The insulation shall have an oil, moisture and fungus proof finish, with a surface which will not retain dust or condensation. It shall be possible to put the set in service after long periods in unheated storage without necessarily drying out the insulation.
The alternator shall be capable of withstanding a short circuit for three seconds when under the control of the automatic voltage regulator.

9.2 Excitation

Excitation shall be by means of brushless direct coupled exciter armature.
The alternators shall be designed for an excitation voltage at full load of not less than 50 Volts unless prior approval is given.

9.3 Electrical control panel

The Automatic Mains Failure control panel shall be provided and fitted with the following:-

a) Two four pole contactors and two TP & N incoming MCCB's each of suitable rating for controlling the supply from the mains transformer and standby generator.
b) An automatic voltage regulator for the set.
c) Control equipments as necessary including phase failure protection relay for both the mains supply and the generator supply (with both under and over voltage protection) and phase sequence protection relay for the mains supply all to fulfill the functional requirements and automatic changeover as detailed in Part 9.3.2
d) One ammeter and a selector switch to measure each phase current and neutral current
e) One voltmeter and a selector switch to read line to line and line to neutral voltage
f) A frequency meter
The meters shall comply with BS 89, table 7.

9.3.1 General

The set is to be used for mains failure duty and an automatic starting panel shall be provided which shall contain all necessary equipment for controlling the automatic starting and stopping of the set, lubricating oil priming (if necessary), all auxiliaries, fault warnings and shut downs. All faults, warning and shut-downs shall be separately indicated. There shall be test facilities for indication lamps, etc, preferably by means of a single test button.

Means shall be provided for isolating all supplies to the starting panel either by an isolating switch or by withdrawable fuses.

When the set is stopped other than under lock-out conditions, it shall be self-resetting ready for the next start.

The set shall be suitable for starting by manual means. e.g. by cranking or direct operation of the starter solenoid.

All switches and push buttons shall be clearly marked to indicate their function.

It shall be possible to operate the 'Start' and 'Stop' buttons and to see the 'Set Failure' indications without opening the panel doors.

9.3.2 Automatic Changeover Controls

The controls shall be installed and wired in the machine control panel.

The control shall be provided such that on failure of the normal electricity supply, it will automatically initiate the starting of and effect the transfer of load to the standby generator. The schematic for the controls shall be approved by the Electrical Engineer before manufacture commences.

Where failure of the normal supply is referred to, it shall be defined as follows:

a) Complete loss of voltage in one line or in all the three lines
b) Falling of voltage below 85% of the normal voltage between two lines or line and neutral
c) Voltage overshoot to 110% of the normal voltage between two lines or line and neutral
d) Incorrect phase sequence

On failure of the normal supply, the unit shall operate in the following manner:

(a) After a delay, adjustable from 0 to 15 seconds (to avoid operation by a transient dip in

voltage) a signal shall be given to start the standby generating set.

(b) On receipt of a signal from the standby generating set that it is ready to take load, and providing that the failure of the normal supply still persists, the normal supply contactor in the control panel shall open and the standby contactor shall close. If the normal supply has been restored before the changeover has taken place, the contactor shall not operate and the starting relay contacts shall open to initiate the shutting down of the standby generating set.

When the standby supply is in operation and the normal supply is restored and remains within 10% of rated voltage on all phases for a pre-set time (adjustable up to 120 second) the standby contactor shall open and the normal supply contactor shall close; the starting relay contacts shall then open to shut down the generating set.
Provision shall be made so that automatic return to normal supply can be prevented if required.
Once a start signal has been sent to standby generating set, the engine starting sequence shall be allowed to continue until the set is ready to take the load before a stopping signal is sent.

A push button labelled 'Test' shall be provided to enable a failure of normal supply to be simulated. If the button is pressed and released the equipment shall complete the starting sequence, and when the set is ready to take load it shall be shut down. If the button is held depressed the equipment shall change over to the standby supply when the set is ready to take load.

Indicating lamps or illuminated panels shall be provided on the front of the panel. They shall be appropriately labelled, easily visible and shall give the following information:

'Main Supply Available'
'Generator Supply Available'
'Mains Supply on load'
'Generator Supply on load'

9.4 <u>Lock out</u>

9.4.1 <u>General</u>

The set shall stop and lock out to prevent further starting when:

a) It fails to start when the electric starter motor has been in operation for 20 seconds under automatic start condition.

b) The lubricating oil pressure falls to a value at which it would be unsafe to continue running the engine.

c) The cooling water does not flow, when the engine is fitted with a visible flow indicator on the cooling water system.

d) (i) In water cooled engines the cooling water temperature exceeds a predetermined limit.

(ii) In air cooled engines the cylinder head temperature exceeds a safe maximum.

e) The overspeed trip has operated.

9.4.2 Failure of the circuits concerned in sub-section 9.4.1 (b) to 9.4.1(e) shall cause a set to shut down. Reset of lock out shall be by hand.

9.5 Fault indication

Each lock-out detailed in section 9.4.1 shall be indicated by a lamp on the panel together with an indication of the fault causing the shut-down. The fault warning lights shall be set to operate before the lock-out.

9.6 Starting Battery and Charger

The battery shall be 12 volts and capable of with-standing the loads imposed upon it by its specified duties. It may be of lead-acid or alkaline type and shall be of sufficient capacity for four starts in succession once in an eight-hour period. Auxiliary circuits connected to the battery shall be protected by fuses.

The battery shall be used to supply an automatic starting and control equipment, and relay operation shall not be impaired when the battery is supplying current to the starter motor.

A single phase supply for battery charging shall be available from the main M.V SWITCHBOARD.

A charger shall be provided which will recharge the battery after engine starting and maintain it in a charged condition when the set is standing or is in service. It may also supply the load of any automatic starting and control equipments, and an additional load up to 24 watts when the set is running and in service.

An alternative quick charge rate shall be provided. The charger shall be fitted with an ammeter to measure the charger and discharge current excluding the starter motor current.

9.7.1 Wiring and Earthing

Power cables and small wiring cables interconnecting major components shall be of the heat and oil resistant type and shall be metal sheathed or run in metal ducts or metal conduit, which shall be coded and terminated with lugs or eyes or to be soldered, the terminations shall be clearly marked with the numbers and letters of the terminals to which they are connected. Terminals shall be numbered or lettered, easily accessible and fitted with individual insulating barriers or adequately spaced. Barriers shall be fitted to separate control terminals from power wiring terminals.

All metal work housing electrical equipment shall be bonded to a brass earthing terminal and connected to station Earth and as detailed in the schedule.

9.8 Contactors

Contactors shall have magnetic circuits designed for a.c or d.c operation and shall be rated in accordance with ks 04-182:1982.Four pole- contactors shall be fitted for three phase-equipment and two-pole contactors for single phase equipments. Main and auxiliary contacts shall be silver faced or better.

9.9 Relays

Relays shall preferably be of sealed type mounted in approved plug-in bias with spring loaded retainers but if this is not practicable they shall be mounted on individual sub-bases and wired so that easy access is obtained to soldered connections. Unsealed relays shall be enclosed in individual or common dust protecting cases.

Time delays, if of the pneumatic type, shall operate on filtered air. The thermal type of time delay relay will not be accepted.

9.10 Fuses

Fuses shall comply with KS-183:1978. A spare fuse cartridge for each pole shall be mounted inside each equipment.

9.11 Rectifiers, Capacitors and solid State components

Rectifiers, capacitors and solid state components shall be suitable for any transient voltage and high currents likely to be uncounted during the operation of the equipment and for the internal operating temperature of the enclosures at the specified maximum external ambient temperature.

9.12 Enclosures for Equipment

Enclosures for electrical and control equipment shall be drip proof and dust protecting, with adequate front and rear access as necessary for maintenance and repair. Special attention shall be given to the method of construction and to the mounting of the components to minimize the effect of vibration. Diagrams of connections in durable form shall be mounted inside the enclosures.

10 Lifting Gear and Handling.

Provision shall be made for ready handling of all parts of the plant during assembly or disassembly of the unit. Adequate provision shall be made for attaching lifting devices, slings and eyebolts.

11 Commissioning

The Contractor shall include for fully commissioning the set and its control equipment and for the purpose of the required tests, shall provide all necessary instrument s, tools, fuel and lubricating oil.

The following tests and checks as applicable shall be carried out by the contractor in the presence of the electrical engineer or his representative.

a) Check that the main frame is level in all directions, engine and generator shafts are in proper alignment and the vibration absorbing devices are properly installed and located.

b) Check water and sump oil levels and that the water jacket and radiation heaters (if fitted) are in working order.

Check the battery electrolyte levels and the specific gravity.

d) Examine the containers in which the fuel and lubricating oils were delivered and check that the type and grade of oils are as recommended for the unit.

e) Ensure that sufficient fuel oil is in the fuel tank for a two hours test run.

f) Check that all radiator and engine block water drain points are free from sludge and

other blockages.

g) Check engine bolts, main drive coupling, valve clearance, fuel pumps settings, governor settings, pipeline connections, water hose, exhaust couplings, flexible pipe work etc, and where a separate cooling water tank is fitted, that the water levels is satisfactory and the ball valve and overflow work.

h) Checkall outgoing connections on the generator and the control panel. All lugs for principal connections shall have clean and bright contact surfaces. A suitable abrasive shall be used where necessary.

i) Check access panels and doors for proper opening and closing and for functioning of any interlocks fitted.

j) With the set isolated from the main supply and the selector switch in the 'manual' position, start the engine by means of the 'start' push button and allow it to run up to normal speed. Check that the main battery charger is automatically switched off to avoid its being overloaded by the reduction in voltage across the battery. Where a battery charging dynamo is fitted, check that the main battery charger is disconnected by the operation of the auxiliary contact during the time the engine is running.

k) Check instruments and gauges for normal operation and response and that the generator voltage is being maintained within the prescribed limits, making due allowance for no-load conditions. Compare the reading of the frequency meter with that of engine tachometer, where both are fitted

i) Stop engine by turning selector switch to off position and verify that the generator contactor opens at between 95% and 85% of normal voltage. Re-check water and oil levels.

m) Turn selector switch to 'Auto' position. Disconnect the sensing circuit supply and check that the set starts, the mains contactor opens, and the generator contactor closes in correct order. Reconnect the sensing circuit to verify that the engine stops on restoration of the mains supply and the contactors operate correctly. Check voltage sensing and time delays on each phase in turn and also the push buttons for mains failure simulation and engine stopping operate correctly.

NOTE: Running of the engine for any length of time under no load condition is undesirable and tests calling for such operation should be carried out in as short time as possible consistent with thoroughness.

n) Operate the necessary isolators and switches to put the set on standby for essential services network with the mains failure simulation push, verify that the set operates correctly with the appropriate time delay for taking up load and that the carrying of the load and its distribution over three phases are satisfactory.

o) Run the set at various loads for periods totaling at least 30 minutes. Check that the voltage and frequency are being maintained within the required limits with large alterations of load. Note the rate of charge on the dynamo ammeter with the engine running (if a dynamo is fitted), and the rate of charge on the battery charging ammeter with the engine stopped. Check against manufacturers recommendations and adjust charging rates if necessary.

p) Check that the various engine safeguards operate satisfactorily.

q) Check the vibration absorbing devices for proper operation and that performance of all flexible connections, both mechanical and electrical, is satisfactory.

r) When all tests are satisfactory and agreed with the Engineer or his representative, the lubricating oil and water levels shall be finally checked, the fuel oil tank replenished and set left in normal operating order.

s) An initial supply of all lubricating oils and greases shall be provided by the Contractor.

t) Additional lubricating oil shall be provided for recharging the engine sump once together with a supply of lubricating oils and greases to cover the normal use and serving of the set during the 12 months maintenance period referred to in Part 14 of Section D.

SECTION G: GENERATOR & VOLTAGE STABILIZER EVALUATION CRITERIA

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

1. Determination of Responsiveness
2. Detailed Technical Examination
3. Combination of Technical and Tender Sums Comparison

STAGE 1- DETERMINATION OF RESPONSIVENESS

A) PRELIMINARY EXAMINATION

This stage of evaluation shall involve examination of the pre-qualification conditions 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 may include the following:

i) Category of Registration with N.C.A 3 and above in the relevant trade;
ii) Class of Licenses with the relevant statutory bodies e.g. Energy Regulatory Commission, County Government, and Water Management Boards etc;
iii) Proof of payment for tender document;
iv) Provision of Bid Security;
v) Dully filled Form of Tender;
vi) Any other conditions included in the advertisement notice/Invitation letter.

Note:

The bid security shall be in accordance with Instruction to Tenderers which states as follows:

- **Clause 19.1** of Instruction to Tenderers,"the tenderers shall furnish as part of his tenders a tender surety in the amount stated in the tender document in the Appendix to Instructions to Tenderers".

- **Clause 19.2** of Instruction to Tenderers, "the unconditional Tender surety shall be in Kenya shillings and be in form of a certified cheque, bank draft, an irrevocable letter of credit or a guarantee from a reputable Bank/ Insurance approved by PPOA located in the Republic of Kenya. The format of the surety shall be in accordance with the sample form included in the tender documents and the tender surety shall be valid for **150 days** from the date of tender opening".

- **Clause 23.2** of Instruction to Tenderers: "For the purposes of this clause, a substantially responsive tender is one which conforms to all terms and condition and specifications of the tender document without material deviation or reservation and has a valid Bank/Insurance guarantee".

The employer may seek further clarification/confirmation if necessary to confirm authenticity/compliance of any condition of the tender.

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

NOTE: ALL COPIES OF DOCUMENTS PROVIDED MUST BE CERTIFIED BY COMMISSIONER OF OTHS and ALL PAGES OF THE COMPLETE TENDER DOCUMENT SUBMITTED MUST BE PAGENATED/SERIALISED

B) COMPLETENESS OF TENDER DOCUMENT

The tender document shall be examined based on clause 2.2 of the Instruction to Tenderers which states as follows:

In accordance with clause 2.2 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 sub clause 2.1 of Instruction to Tenderers and adequacy of resources to effectively carry out the subject contract. The tenderers shall be required to fill the Standards Forms provided for the purposes of providing the required information. The tenderers may also attach the required information if they so desire.

The award of points for the **STANDARD FORMS** considered in this section shall be as shown below

	PARAMETER	**MAXIMUM POINTS**
(i)	Statement of compliance	3
(ii)	Tender Questionnaire	5
(iii)	Confidential Business Questionnaire	5
(iv)	Key personnel	15
(v)	Contract Completed in the last Five (5) years	15
(vi)	Schedules of on-going projects	10
(vii)	Schedules of contractors equipment	10
(viii)	Audited Financial Report for the last 3 years	10
(ix)	Evidence of Financial Resources	10
(x)	Name, Address and Telephone of Banks (Contractor to provide)	5
(xi)	Litigation History	2
(xii)	Sanctity of the tender document as in accordance with clause 5 of instruction to tenderer	10
	TOTAL	**100**

The detailed scoring plan shall be as shown in table 1 below: -

TABLE 1

Item	Description	Point Scored	Max. Point	
i.	**Statement of Compliance** • Signed and stamped ---------- 3 • Signed but not stamped or vice versa ---------- 2 • Not Signed nor stamped ---------- 0		**3**	
ii.	**Tender Questionnaire Form** • Completely filled ---------- 5 • Partially filled ---------- 3 • Not filled ---------- 0		**5**	
iii.	**Confidential Business Questionnaire Form** • Completely filled ---------- 5 • Partially filled ---------- 3 • Not filled ---------- 0		**5**	
iv	**Key Personnel (Attach evidence)**			**15**
	Director of the firm • Holder of degree in Mechanical Engineering field ------- 4 • Holder of Diploma or certificate mechanical Engineering field - 2 • Holder of trade test certificate in relevant Engineering field------- 1 • No relevant certificate ---------- 0		**4**	
	At least 1No. degree/diploma of key personnel in relevant Engineering field • With over 10 years relevant experience ---------- 4 • With over 5 years relevant experience---------- 2 • With under 5 years relevant experience ---------- 1		**4**	
	At least 1No certificate holder of key personnel in relevant Engineering field • With over 10 years relevant experience---------- 3 • With over 5 years relevant experience ---------- 2 • With under 5 years relevant experience ----------1		**3**	
	At least 2No artisan (trade test certificate in relevant Engineering field) • Artisan with over 10 years relevant experience ---------- 2 • Artisan with under 10 years relevant experience ---------- 1 • Non skilled worker with over 10 years relevant experience ----- 1		**4**	
v	**Contract completed in the last five (5) years (Max of 5 No. Projects**) • Project of similar nature, complexity and magnitude ---------- 3 • Project of similar nature but of lower value than the one in consideration ---------- 2 • No completed project of similar nature ---------- 0		**15**	

vi	**On-going projects (Max of 5 No. Projects)** • Project of similar nature, complexity and magnitude -------- 2 • Project of similar nature but of lower value than the one in consideration ---------- 1 • No ongoing project of similar nature - ---------- 0		**10**	
vii	**Schedule of contractors equipment and transport (proof or evidence of ownership)** • Means of transport (Vehicle) ---------- 4 • No means of transport ---------- 0		4	**10**
	For each specific equipment required in the installation of the Work being tendered for. (Maximum No. of equipment to be considered – 3 No.---------- 2		6	
viii	**Financial report** **Audited financial report (last three (3) years)** • Turn over greater or equal to 5 times the cost of the project ---10 • Turn over greater or equal to 3 times the cost of the project --- 6 • Turn over greater or equal to the cost of the project ---------- 4 • Turn over below the cost of the project ---------- 2		**10**	
ix	**Evidence of Financial Resources (cash in hand, lines of credit, over draft facility etc)** • Has financial resources equal or above the cost of the project ----10 • Has financial resources below the cost of the project ----------5 • Has not indicated sources of financial resources ---------- 0		**10**	
x	**Name, Address and Telephone of Banks (Contractor to provide)** • Provided ---------- 5 • Not provided ---------- 0		**5**	
xi	**Litigation History** • Filled ---------- 2 • Not filled ---------- 0		**2**	
xii	**Sanctity of the tender document** • Having the document intact (not tempered with in any way) ---10 • Having mutilated or modified the tender document ---------- 0		**10**	
	TOTAL		**100**	

Any bidder who scores 80 points and above shall be considered for further evaluation

STAGE 2 - TECHNICAL EVALUATION

A) COMPLIANCE WITH TECHNICAL SPECIFICATIONS

In this section, the bid will be analyzed to determine compliance with General and Particular technical specifications for the works as indicated in the tender document.

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

Where the Equipment proposed by the tenderer differs with the models specified in the tender document, it is mandatory that the brochures/catalogues of the same be submitted with the tender document highlighting the catalogues Numbers of the proposed items. Such brochures/catalogues should indicate comprehensive relevant data of the proposed equipment/items which should include but not limited to the following:

a) Standards of manufacture

b) Performance ratings/characteristics

c) Material of manufacture

d) Electrical power ratings and

e) Any other necessary requirements (Specify)

Following the above analyses, where the proposed equipment are found not to satisfy the specifications, the tender will be deemed Non – Responsive and will not be evaluated further.

B) TECHNICAL EXAMINATION

In this section, the information provided in the Technical Schedule or Brochures attached will be analyzed for bidders who have qualified from **STAGE 2A** above and points awarded as shown below to a maximum of 100 points

TABLE 2

Item	Description	Score	Max. Score
	Technical schedule/Brochures • Relevant Manufacturer Brochures for items in the technical schedule with equipments to be supplied highlighted and meets specification (Where alternative are to supplied ---------- 100 or • Completely filled Technical Schedule indicating Brand, Model/ Country of origin as per specification in the tender ---------- 100 • Relevant Manufacturer Brochures for items in the technical schedule with equipments to be supplied not highlighted but within range of those specified and meets specifications ---------- 75 or • Completely filled Technical Schedule indicating items as specified in the tender but with less than 100% and above 75% of items in the technical schedule provided ---------- 75 • Relevant Manufacturer Brochures for items in the technical schedule with equipments to be supplied but between 50% and less than 75% of items highlighted and within range of those specified and meets specifications---------- 60 or • Completely filled Technical Schedule indicating items as specified in the tender but between 50% and 75% of items in the technical schedule provided ---------- 60 • Relevant Manufacturer Brochures for between 25% and less than 50% of items in the technical schedule with equipment to be supplied highlighted and meets specifications---------- 50 or • For between 25% and 50% of technical schedule filled indicating Brand/Model/Country of origin for the items considered as specified in the tender ---------- 50 • Less than 25% provided or no technical data provided, either in form of brochures or filling of Technical Schedule. ---------- 0		**100**
	TOTAL		**100**

Any bidder who scores 80 points and above shall be considered for further evaluation

STAGE 3 - FINANCIAL EVALUATION

The evaluation shall be in two sections
1. Preliminary examinations and
2. Tender sum Comparisons

A) PRELIMINARY EXAMINATIONS

The preliminary examination in the Financial Evaluation shall be in accordance with clause 26 of Instruction to Tenderers.

The parameter to be considered under this section includes the following:

a) Arithmetic errors and comparison of rates

(1) Arithmetic Errors

The bid shall be checked for arithmetic errors based on the rates and the total sums indicated in the bills of quantities.

a) Confirmation shall be sought in writing from the tenderers whose tender sums will be determined to have a significant arithmetic error to their disadvantage, to confirm whether they stand by their tender sums. The error shall be treated as per **clause 24 of Instructions to Tenderers**.

Non compliance with the above shall lead to **automatic disqualification from further evaluation.**

Discount if any shall be treated as an error in pursuant to **clause 26.3** of Instructions to Tenderers

(2) Comparison of rates

The evaluation committee will compare rates from different bidders and note consistency of rates and front loading. The evaluation committee will judge and make an appropriate decision giving evidence.

SECTION H – GENERATOR & AVR BILLS OF QUANTITIES

A. Notes and Sample Items for Preparing a Bill of Quantities

1. These Notes for Preparing a Bill of Quantities are intended only as information for the Procuring Entity or the person drafting the Tender Documents. Priced Bills of Quantities shall be part and parcel of the Contract Documents.

2. The objectives and purpose of the Bills of Quantities are to provide sufficient information on the specifications, descriptions and quantities of Works to be performed to enable tenders to be prepared efficiently and accurately and when a contract has been entered into, to provide a priced Bill of Quantities for use in the periodic valuation of Works executed. Inorder to attain these objectives, Works should be itemized in the Bill of Quantities insufficient detail to distinguish between the different classes of Works, or between Works of the same nature carried outin different locations or in other circumstances which may give rise to different considerations of cost. Consistent with these requirements, the layout and content of the Bill of Quantities should be as simple and clear as possible.

3. The Bills of Quantities should be divided generally into thef ollowing sections:

a) Preambles
b) Preliminary items
c) Work Items
c) Daywork Schedule; and
d) Provisionalitems
e) Summary.

4. NOTES TO PREPARING PREAMBLES

4.1 The Preambles should include only those items that constitute the cost of the works but would not be priced separately as they are expected to be included in the unit prices. Care should be taken to ensure that these items are not are petition of the conditions of contract. The Preambles should indicate the inclusiveness of the unit prices and should state the methods of measurement that have been adopted in the preparation of the Bill of Quantities, that are to be used for the measurement of any part of the Works. The units of measurement and abbreviations should be defined and any mandatory national units defined and described. The methods of and procedure for re- measurement should be described in the Preambles.

4.2 Units of Measurement - The following units of measurement and abbreviations shall be used, unless other national units are mandatory in Kenya.

nit	Abbreviation	Unit	Abbreviation
cubic meter	m^3 or cu m	millimetre	mm

4.3 The Bills of Quantities shall be read in conjunction with the Instructions to Tenders, General and Special Conditions of Contract, Technical Specifications, and Drawings.

4.4. The quantities given in the Bills of Quantities are estimated and partly provisional and are given to provide a common basis for tendering. The basis of payment will be the actual quantities of work ordered and carried out, as measured by the Contractor and verified by the Architect and valued at the rates and prices tender in the priced.

Bills of Quantities, where applicable, and otherwise at such rates and prices as the Architect may fix within the terms of the Contract.

4.5. The rates and prices tender in the priced Bills of Quantities shall, except in so far as it is otherwise provided under the Contract, include all Constructional Plant, labour, supervision, materials, erection, maintenance, insurance, profit, taxes, and duties, together with all general risks, liabilities, and obligations set out or implied in the Contract.

4.6. Arateorprice shall be entered against each item in the priced Bill of Quantities, whether quantities are stated or not. The cost of Items against which the Contractor has failed to enter a rate or price shall be deemed to be covered by other rates and prices entered in the Bill of Quantities.

4.7. The whole cost of complying with the provisions of the Contract shall be included in the Items provided in the priced Bills of Quantities, and where no Items are provided, the cost shall be deemed to be distributed among the ratesand prices entered for the related Items of Work.

4.8. General directions and descriptions of work and materials are not necessarily repeated nor summarized in the Bills of Quantities. References to the relevant sections of the Contract documents shall be made before entering prices agains teach item in the priced Bills of Quantities.

4.9 Provisional Sums and contingency sums included and so designated in the Bills of Quantities shall be expended in whole or in part at the direction and discretion of the Architect in accordance with Sub-Clause13.5 and Clause 13.6 of the General Conditions of contract.

4.10 In preparing the Bills of Quantities, notes should be removed as they are intended to guide the person preparing the Tender Documents. The Contractor must allow in his rates for any costs associated with and complying with the requirements in the Preambles.

4.11 Should a tenderer/contractor not price any item in any section of the Bills of Quantities including Preliminary items, it will be assumed that he/she has spread its cost in other areas that he/she will have priced. Therefore, the itemor items will be executed without any additional costs or without being treated like variations.

5. NOTES ON PREPARING BILLS OF QUANTITIES

5.1 The Preliminary Items should be limited to tangible items that should be priced by the tenderer, are identifiable and can be priced separately and included in the interim valuations precisely. Such items may include such items as site office, notice boards, and other temporary works, otherwise items such as security for the Works which are primarily part of the Contractor's obligations should be included in the Contractor's rates.

5.2 The work items in the Bills of Quantities should be grouped into sections to distinguish between those parts of the Works which by nature, location, access, timing, or any other special characteristics may give rise to different methods of construction, or phasing of the Works, or considerations of cost. Such groups could be ground excavations, structures, external works, services, etc. General items common to all parts of the Works may be grouped as a separate section in the Bill of Quantities.

5.3 Quantities should be computed net from the Drawings, unless directed otherwise in the Contract, and no allowance should be made for bulking, shrinkage or waste. Quantitiesshouldberoundedupwhereappropriate.

5.4 Where the measured items a redeemed not to be exact because of the likelihood that the scope can change during the execution of the works, such items could be subject to re-measurement, the word **"provisional"** should be used to identify such cases. Where whole sections of the work items fall in this class, for example foundations, they should be labelled "Provisional Quantities" or "Provisional Items" so that the Tenderer/Contractor is advised up front that such items are subject to re-measurement to done before such work is cover-up.

5.5 All items that have not been measured and therefore not subject tot enders pricing should be listed in the Bills of Quantities as **Provisional Sums** for particular item or class of Work, which may be subject to a nominated subcontract or separate measurements at a later date during the execution of the works. For example, if it is deemed not possible to measure electrical works before going to tender because detail designs are not ready, a provisional sum can be allowed in the Bills of Quantities for "Installation of Electrical Works" to be executed later when actual design details are completed. To the extent not covered above, there should be in the Bills of Quantities a general provision for physical and financial contingencies made as a "Provisional Sum for Contingencies" and "Provisional Sum for Fluctuations". The inclusion of such provisional sums often facilitates budgetary approval by avoiding the need to request periodic supplementary approvals as the future need arises.

5.6 Provisional sums to cover specialized works normally carried out by Nominated Sub Contractors should be avoided and instead Bills of Quantities of the specialized Works should be included as a section of the main Bills of Quantities to be priced by the Main Contractor. The Main Contractor should be required to indicate the name(s) of the specialized firms he proposes to engage to carry out the specialized Works as his approved domestic sub-contractors. Only provisional sums to cover

specialized Works by statutory authorities should be included in the Bills of Quantities.

5.7 A Daywork Schedule should be included if the probability of unforeseen work, outside the items included in the Bill of Quantities, is relatively high. To facilitate checking by the Procuring Entity of the realism of rates quoted by the tenderers, the Daywork Schedule should normally comprise:

i) A list of the various classes of labor, and materials for which basic.

ii) Daywork rates and prices for various categories of labor are to be inserted by the tenderer, together with a statement of the conditions under which the Contractor will be paid for Work executed on a Daywork basis.

iii) A percent a get o be entered by the tenderer agains teach basic Day work item.

iv) Subtotal amount for labor, materials and plant representing the Contractor's profit, overheads, supervision and other charges.

5.8 The Summary should contain a tabulation of the separate parts of the Bills of Quantities carried forward, with provisional sums for Daywork, Provisional sums and Contingencies, and provision for Total Costing. The last line should allow for tenderer to indicate any discounts before arriving at a total cost carried forward to the Form of Tender.

BILLS OF QUANTITIES

(a) Preambles

1. The method of measurement of completed work for payment shall be in accordance with *[insert the name of a standard reference guide, or full details of the methods to be used]*.

2. The Site is situated in NAROK COUNTY It is approximately150Kilometers from Nairobi.

3. The Contractor shall obtain the Architect's approval on the siting of all temporary buildings, spoil heaps, temporary access path, and storage of materials. The Contractor shall also obtain the Architect approval and direction regarding the use of any materials found on the Site.

4. The drawings used in the preparation of these Bills of Quantities can be inspected at the offices of the Procuring Entityor Procuring Entity's Representative during normal working hours. Two sets of the Working Drawings shall be provided to the contractor, but additional copies shall be provided at a cost to be determined by the Engineer.

5. The Contractor shall allow for the payment of all bank charges in connection with the procurement of Bank Guarantees and stamp charges in connection with this contract Agreement.

6. The Contractor shall carry out the various sections of the Works in such an order as the Architect May direct. The Procuring Entity reserves the right to occupy the Works by sections on completion provided that such occupation is considered to be both practical and reasonable and will not interfere with the Works. The Contractor shall allow any costs associated with such occupation.
7. The main Contractor will be fully responsible for paying his Sub-Contractor but the Procuring Entity reserves the right in very exceptional circumstances to make such payments direct in the interests of the project where the completion thereof might be jeopardized by any dispute or vicariousness between the Contractor and the Sub-Contractor involve.

8. The Contractor shall complete and deliver the Works in the period inserted in the Form of Tender as his time for completion of the Works from the date for Possession, to be agreed with the Engineer. The Contract Period is presumed to have been calculated making due allowance for seasonal inclement weather conditions. Noclaimfor extension of time due to the normal in clement weather for this area shall be entertained.

9. The Contractor shall, upon receiving instructions to proceed with the Works, draw up a Programme and Progress Chart setting out the order in which the Works are to be carried out, with the appropriate dates there of. This Chart shall be agreed with the Architect and no deviation from the order set out in it will be permitted without the written consent of the Engineer. The Contractor will be responsible for arranging the above programme with all his sub-Contractors and Specialties. The Contractor shall allow in his rates for carrying out this exercise, and for updating it as required.

10. The Contractor shall submit to the Architect on the first day of each week or such longer period as the Architect from time to time direct, a Progress Report and any information for the proceeding period, showing the progress during the period and the up-to-date cumulative progresson all important items of each section or portion of the Works.

11. The Contractor shall arrange for photographs of the Site to be taken by a professional photographer approved by the Engineer.The Photographs shall provide a record of the Site and adjacent are as prior to the commencement of the Works and shall cover such portion of the works in progress and completion as the Architect shall direct. All prints shall be full plate size, unmounted, and marked on the reverse side with the date of exposure, identification reference and brief description. The copyright of all photographs shall be vested in the Procuring Entity. The negatives and four prints from each negative shall be delivered to the Architect within two weeks of exposure.

12. Figured dimensions are to be followed in preference to dimensions scaled from the Drawings, but whenever possible dimensions are to be taken on the Site or from the buildings. Before any work is commenced by Sub- Contractors or Specialist Firms, dimensions must be checked on the site comparable dimensions shown on the drawings. The Contractor shall be responsible for the accuracy of such dimensions.

13. Prior to commencement of any work the Contractor is to ascertain from the relevant Authorities the exact position, depth and level of all existing electric cables, waterpipes or other services in the are aand he shall make whatever provisions may be required by the Authorities concerned for the support and protection of such services. Any damage or disturbance caused to any services shall be reported immediately to the Architect and the relevant Authority and shall be made good to their satisfaction at the Contractor's expense. Where appropriate the Contractor shall open up the ground in advance of the main work by hand digging if necessary, to locate precisely the position and details of the services which are likely to affect his operations.

14. The Contractor shall include in his prices for the transport of materials, workmen, etc./, to and from the site of the proposed works, at such hours and by such route as are permitted by the Authorities.

15. The Contractor will be required to make good, at his own expense and damage he may cause to the present road surface and pavements within or beyond the boundary of the Site, during the period of the works. All existing paths, storm water channels, etc., that may be destroyed or damaged during the progress of the Works shall be reinstated by the Contractor to the satisfaction of the Engineer.

16. The Contractor is to allow for complying with all instructions and regulations of the Police Authorities.

17. All water shall be fresh, clean and pure, free from earthly, vegetable or organic matter, acid or alkaline substance in solution. The Contractor shall provide at his own risk and cost all water for use in connection with the Works, (including works of sub–contractors). If need be, he shall make arrangements with the Local Water Authority for the installation of a separate meter for all water used by him throughout the Contract and pay all cost and fees in connection therewith. He shall also provide temporary storage tanks and tubing, etc., as may be necessary, and clear away at completion.

18. The Contractor shall provide all artificial lighting and power for his own use on the Works, (including Sub – Contractor's) including all temporary connections, wiring, fittings, etc., and clearing away on completion. The Contractor shall pay all fees and obtain all permits in connection there with.

19. The Contractor shall constantly keep on the Works a Literate English-speaking Agent or Representative, competent and experienced in the kind of work involved, who shall giveh is whole time to the superintendence of the works. (Including works of sub – contractors). Such Agent or Representative shall receive on behalf of the Contractordirections and instruction from the Engineer, and such directions and instructions shall be deemed to be given to the contractor in accordance with the Conditions of Contract. The Agent shall not be replaced without the specific approval of the Engineer.

20. The Contractor shall ensure that the safety of his work people and all authorized visitors to the site are protected at all times. In particular, there shall be the proper provision of guard–rails to scaffolding, protection against falling materials, tools on site, dust, nail and other sharp objects. The site shall be kept tidy and clear of dangerous rubbish. The Architect shall be empowered to suspend work on site should it be considered this condition is not being observed and no claim arising from such suspension will be allowed.

21. The are as available to the Contractor for workyards, offices and other facilities shall be directed by the Architect and any existing features to remain shall be protected from damage throughout the Contract Period and handed back in good condition when they are vacated at the end of the Contract. If additional areas are required, the contractorshallsourcethenatowncost.

22. The Contractor shall give the Architect reasonable notice of the intention to set out or take levels for any part of the Works so that arrangements may be made for checking the work. The accuracy of setting out and leveling shall be within the tolerances specified in the Specifications or on the Drawings. The checking of setting out or leveling by the Architect shall not relieve the Contractor of his duties or responsibilities under the Contract.

23. The Contractor must take steps necessary to safe guard and shall beheld fully responsible for any damage caused to existingand adjacent property, including buildings that are not a subject of demolition. He shall make good at his own cost damage to persons and property caused there on, and he shall indemnify the Procuring Entity against any loss or claim that may arise.

24. The Contractor shall take such steps and exercise such care and diligence as to minimize nuisance arising from dust, noise or any other cause to the occupiers of the existing and adjacent property. He must provide such temporary and special screens and tarpaulins or gummy bags, hoarding, barriers, warning signs etc. as he considers necessary and sufficient for the protection of the existing and adjacent property and or prevention of nuisance etc. as directed by Engineer.

25. The Contractors attention is drawn to the standards levy order which was amended on 15thOctober 1998.Legal notice No.154 of 1998. The Contractor is required to pay a monthly level of 0.2% of his factory price of construction works with effect from January 1999. Tenderer shall allow for this in the build-upo f his rates.

26. The Contractor shall provide temporary sheds, offices meshrooms, sanitary, accommodation and other temporary buildings for the use of the contractor and sub-contractors, including lighting furniture equipment and attendance.

27. Contractor shall provide/build labor camp sat areas to be agreed with the Engineer. Labor camps shall be complete with sanitary accommodation and fencing gates.

28. The Contractor must provide the necessary toilet facilities to the requirement and satisfaction of the Health Authorities and maintain the same in a thoroughly clean and sanitary condition and pay all conservancy fees during the period of the Works and remove when no longer required.

29. The Contractor shall provide at his own risk and cost all watching and lighting as necessary to safeguard the Works, Plant and materials against damage and theft.

30. The Contractor shall provide all necessary hoists, tackle, plant, equipment, vehicles, tools and appliances of every description for the due and satisfactory completion of the Works and shall remove the same on completion. All such plant, tools and equipment shall comply with all regulations in force throughout the period of the Contract and shall be altered or adopted during the Contract period as may be necessary to comply with any amendments in or additions to such regulations.

31. Provide, erect and maintain all necessary scaffolding, sufficiently strong and efficient for the due performance of the works, including Sub-Contract Works, provide special scaffolding as required by Sub-Contractors, alter and adopt all scaffolding as and when required during the Works, and remove on completion. No scaffolding is measured here in after and the Contractor must allow in his rates for this.

32. The Contractor shall take all necessary precautions such as temporaryf encing, hoarding fans, planked footways, guard–rails gantries screen, etc., for the safe custody of the Works, materials and public protection and adjacent properties.

33. Cover up all and protect from damage, including damage from in clement weather, all finished work and unfixed materials, including that of Sub-Contractors, etc., to the satisfaction of the Architect until the completion ofthe Contract.

34. The Contractor shall, after completion of the works, at his own expense, remove and clear away all surplus excavated demolition materials, plant, rubbish and unused materials and shall leave the whole of the Site and Works in a clean and tidy state to the satisfaction of the Engineer, sheds, camps, etc. Particular care shall be taken toleavecleanallfloors and windows and tore move all paint and cement all rubbis hand dirt as it accumulates. The Contractor is to find his own dump and shall pay all charges in connection there with.

35. Concrete test cubes shall be prepared in a set of three, as described including testing fees, labor and materials, making molds, transport, handling, etc. Allow in your rates for making at least four cubes on each occasion, from different batches; the concrete being taken from the point of deposit.

36. The Contractors hall furnish at the earliest possible opportunity before work commences, and at his own cost, any samples of materials and workmanship that may be called for by the Architect for the approval or rejection, and any further samples in the case of rejection, until such samples are approved by the Engineer.

Such samples, when approved, shall be the minimum standard for the work to which they apply. The proceduref or submitting samples of materials for testing or approval and the method of marking for identification shall be as laid down by the Engineer.The Contractor shall allow in his Tender for such samples and tests, including those in connection with his Sub-Contractors work.

37. The Contractors attention is drawn to the Finance Bill of the year 2000/2001 on withholding tax on contractual payment section 35(7)(i)(ii) which became effective on 1st July 2000. A 3% withholding tax will be applicable to all in terim payments exceeding Kshs…….....……. for work done in respect of building or civil works. The contractor shall allow for any costs arising resulting there from in the build-up of rates.

38. Blasting will only be allowed with the express permission of the Architect in writing. All blasting operations shall be carried out at the Contractor's sole risk and cost, in accordance with any Government regulations in force for the time being, and any special regulations laid down by the Architect governing the use and storage of explosives.

39. The National Construction Authority is a state corporation established under the national construction authority Act No.14 of 2011. The broad Mandate of the Authority is to over see the construction industry and coordinate its development. The National Construction Authority Regulations 2014 with an effective date of 6thJune 2014, regulation 25, - Allow 0.5% of the tender sum/contract sum for construction levy.

40. The Contractor attention is drawn to Finance Bill of 1993 where VATwas introduced in all contracts for construction services. The tenderer is also drawn to VATAct Cap 476 clause 19(9). The tenderer must allow for VAT1.19 as instructed else where.

41. The contractor shall allow and pay for all insurance to cover risks and indemnities required Items 17 and 18 of the Conditions of contract and also specified in the Special Conditions of Contract.

GEN BILL NO. 1 - PRELIMINARY ITEMS

ITEM	DESCRIPTION	QTY	UNIT	UNIT RATE KES	AMOUNT KES
1	Discrepancies clause				
2	Conditions of sub-contract Agreement clause				
3	Payment's clause				
4	Site location clause				
5	Scope of Contract Works clause				
6	Extent of the Contractor's Duties clause				
7	Firm price contract clause				
8	Variation clause				
9	Prime cost and provisional sum clause (insert profit and attendance which is a percentage of expended PC or provisional sum.)				
10	Bond clause				
11	Government Legislation and Regulations clause				
12	Import Duty and Value Added Tax clause (Note this clause applies for materials supplied only. VAT will also be paid by the sub-contractor as allowed in the summary page)				
13	Insurance company Fees clause				
14	Provision of services by the Main contractor clause				
15	Samples and Materials Generally clause				
	SUB-TOTAL CARRIED TO PAGE GEN **:H-4**				

ITEM	DESCRIPTION	QTY	UNIT	UNIT RATE KES	AMOUNT KES
16	Supplies clause				
17	Bills of Quantities clause				
18	Contractor's Office in Kenya clause				
19	Builder's Work clause				
20	Setting to work and Regulating system clause				
21	Identification of plant components clause				
22	Working Drawings clause				
23	Record Drawings (As Installed) and Instructions clause				
24	Maintenance Manual clause				
25	Hand over clause				
26	Painting clause				
27	Testing and Inspection – manufactured plant clause				
28	Testing and Inspection – Installation clause				
29	Storage of Materials clause				
30	Initial Maintenance clause				
	SUB-TOTAL CARRIED TO PAGE GEN **:H-4**				

ITEM	DESCRIPTION	QTY	UNIT	UNIT RATE KES	AMOUNT KES
31	Attendance Upon Tradesmen, etc. (Insert percentage only) clause				
32	Local and other Authorities notices and fees clause				
	Temporary Works clause				
33	Patent Rights clause				
34	Mobilization and Demobilization Clause				
35	Extended Preliminaries Clause				
36	Allow for profit and Attendance for the above				
37	Amendment to Scope of Sub-contract Works Clause				
38	Contractor Obligation and Employers Obligation clause				
39	**Other preliminaries.**				
40	To ensure that equipments are provided to specifications allow for factory visit of Gensets and Voltage Stabilizers for 5 No. persons (2 Electrical Engineers Architect, and 2 Client representative) to visit the manufacturing factory to verify the specifications and witness all the relevant factory tests before approval of shipping. The cost of the visit to includes but not limited to: - a) Visa processing fees b) Return air-tickets to and from the factory. c) Any transfer fees d) Local transport both in Nairobi and the city of destination. e) Accommodation at a hotel/resort not less than 4 stars in rating. Any other incidental costs for smooth facilitation of the trip	1	sum	**3,500,000.00**	**3,500,000.00**
	SUB-TOTAL CARRIED TO PAGE GEN :H-4				

ITEM	DESCRIPTION	QTY	UNIT	UNIT RATE KES	AMOUNT KES
a)	Subtotal brought forward from page **GEN :** H-1				
b)	Subtotal brought forward from page **GEN :**H-2				
c)	Subtotal brought forward from page **GEN :**H-3				
	TOTAL FOR PRELIMINARIES **CARRIED FORWARD TO GEN PRICE MAIN SUMMARY Page GEN :H-12**				

Item	Description	Qty	Unit	Rate KES	Amount in KES
	GEN : Bill No 2- AMF CONTROL PANEL and CABLING				
	Supply, Install, Test & Commision the following				
2.1	240V AC/12V DC mains power supply trickle battery charger as specified in clause 9.6 of specifications. The trickle charger shall charge the battery when the set is on IDLE mode, otherwise when the set is RUNNING, the battery shall be charged by the generator charger. Wiring shall be done such that the two chargers shall not operate at the same time.	1	No		
2.2	12 volts battery as per the Genset specifications & Rating	2	No		
2.3	2.5mm^2, 2 corePVC/SWA/PVC copper cable cables complete with glands and pvc sleeves: For Trickle Charger Unit (for all three Gensets)	100	LM		
2.4	1.5mm^2, 2 corePVC/SWA/PVC copper cable cables complete with glands and pvc sleeves: For Genset Start-Stop Signal (for all three Gensets)	100	LM		
2.5	Interwire the control panel with the Mains L.V board	1	Lot		
2.6	2 Runs on each Phase of Single Core XLPE/SWA/PVC 300mm^2 copper cable running from each Generator set to the main switch board via change – over & by pass unit. Complete with associated cable glands and lugs. *(consider 2 runs as 1 linear Metre)*	70	LM		
2.7	4 core XLPE/SWA/PVC 120mm^2 copper cable running from 150 KVA Generator set to the main switch board via change – over & by pass unit. Complete with associated cable glands and	65	LM		
2.8	**1600A Motorized Automatic change over unit** as A.B.B for 500kva Generators complete with control panel and associated accessories.	1	Item		
2.9	**250A Motorised Automatic change-Over Unit** for 150KVA Genset Unit Compelete with Manual By-Pass Unit and all associated accessories	1	No		
	SUB-TOTAL C/F TO GEN : PRICE SUMMARY PAGE GEN :H-12				

Item	Description	Qty	Unit	Rate KES	Amount in KES
	GEN : Bill No 3- RECOMMENDED SPARE PARTS AND LUBRICATORS-Price to be Inclusive of VAT				
3.1	Oil Filters (2 No for 150 KVA unit & 4 No for 500KVA unit)	1	Lot		
3.2	Air Filters (2 No for 150 KVA unit & 4 No for 500KVA unit)	1	Lot		
3.3	Fuel injector nozzle to suit the set (2 No for 150 KVA unit & 4 No for 500KVA unit)	1	Lot		
3.4	Set of Fan belts to suit the set (1 No for 150 KVA unit & 1 No for 500KVA unit)	1	Lot		
3.5	100 litres container of sump oil of grade.....*	3	No		
3.6	2 kilogram grease in a tin of grade .....*	3	No		
3.7	2 kilogram grease in a tin of grade…….....*	3	No		
3.8	20 litre of engine oil in a tin of grad….....*	3	No		
3.9	Any other spare parts recommended by Tenderer **	1	Lot		
	SUB-TOTAL C/F TO GEN : PRICE SUMMARY PAGE GEN : H-12				

Item	Description	Qty	Unit	Rate KES	Amount in KES
	GEN : Bill No 4 - TOOLS TO BE SUPPLIED				
	Supply, Install, Test & Commision the following				
4.1	Metal tool box with lock and two keys	1	Lot		
4.2	Set of 8 No. Chrome vanadium ring spanners in sizes to suit the set	1	Lot		
4.3	Set of 3 screwdrivers, 75mm, 200mm and 300mm plus one 200mm Philips type	1	lot		
4.4	Ditto -but open ended spanners	1	Lot		
4.5	Set of feeler gauges	1	Lot		
4.6	Grease gun to suit greasing points	1	No		
4.7	Oil can, trigger type	1	No		
4.8	Any other special tools which the tenderer recommends should be purchased as an optional:*(Tenderer should give details and price but the price not to be included in the total carried	1	Lot		
	SUB-TOTAL C/F TO GEN : PRICE SUMMARY PAGE GEN :H-12				

Item	Description	Qty	Unit	Rate KES	Amount in KES
	GEN : Bill No 5 – AUXILIARY FUEL TANK **Supply, Install, Test & Commision the following**				
5.1	Supply, deliver to site and install, to the approval of the Engineer, and connect to the daily service base/belly fuel tank, an **auxiliary Cylindrical fuel tank of 5,000 Litre Capacity** with level indicator and associated Asccesories . The tank is to be complete with plinth & stand and all interconnecting G.I pipe work.	1	Item		
5.2	Supply, install, test and commission a manually operated fuel pump complete with all interconnecting accessories and G. I piping	1	No		
5.3	Automatic Fuel Outo-Fill System complete with Electric Pump and Manual Operated Hand Pump, Complete with Control Panel, Necessary Gate Valves for Outo & Bypass Mode all interconnected with the Auxiliary Tank	2	No		
	SUB-TOTAL C/F TO GEN : PRICE SUMMARY PAGE GEN : H-12				

Item	Description	Qty	Unit	Rate KES	Amount in KES
	GEN : Bill No 6 – 2 No 500-KVA GENERATING SET **Supply, Install, Test & Commision the following**				
6.1 (i)	Main Hospital Gensets - **500KVA, 415V 3-phase** , 50Hz, 0.8 Cos Ø, 1500rpm **Prime Rate Fully** weather proof with super sound attenuated enclosures AS CATERPILLAR or Equivalent Manufactured from Europe . (To Engineers approval) Each Genset to have an Intelligent PLC controller capable of Synchronizing both Gensets. Gensets to have extended Exhaust pipe (50M)	2	No		
ii)	Morgue Genset **- 150KVA, 415V 3-phase** , 50Hz, 0.8 Cos Ø, 1500rpm **StandBy Fully** weather proof with super sound attenuated enclosures AS CATERPILLAR or Equivalent Manufactured from Europe . (To Engineers approval) Genset to have extended Exhaust pipe (20M)	1	No		
6.2	1600A Manual by-pass unit as A.B.B for the generators above item 6.1 (i) complete with all accessories.	1	Item		
6.4	Floor mounting IP65 manufactured in 16 SWG galvanised mild steel sheet and finished in cream (or appropriate colour) powder coating 1200A rated Synchronising panel with 1200A, 4 Pole ACB EDO Type for the above 500KVA Generators capable of Synchronising both Genset with LOAD Sharing, Engine START / STOP, Generator Breaker CLOSE / TRIP, Fault ACCEPT / RESET, U/V, O/V, U/F, O/F, RPR, RKVR, O/C, loss of Excitation, External protection – Discrete input Should be capable to operate Both Genset on Cyclic operation, and Both when load Demands. The Synchronising panel should be capable of synchronizing 3No. Gen sets of the same capacity	1	Item		
6.4	Allow for 3 sets of "Working drawings" on A2 Printing paper, soft copy on 700MB CD-R and on 4GB Hp Flash Disk- saved on Auto-Cad 2000 format and on PDF format	1	Lot		
6.5	Allow for 3 sets of "AS BULID drawings, Catalouges, Manuals, Test Results etc" on A2 Printing paper, soft copy on 700MB CD-R and on 4GB Hp Flash Disk- saved on Auto-Cad 2000 format and on PDF format	1	Lot		
6.6	Provisional sum for fluctuation of currency .	1	Sum		
6.7	Construction of Hot-Air discharge duct for the specified Genset, Of length 15M for Each Generator	1	Item		
6.8	Testing and Commissioning. Provide test certificates and commencement and completion certificate.	1	Lot		
6.9	Fuel (Diesel)-Full Tank on Each Genset & 5,000 Litres Full Tank on the Auxiliary Tank	1	Lot		
6.10	1600A MCCBs as A.B.B complete with enclosure & associated accessories	2	No		
	SUB-TOTAL C/F TO GEN : PRICE SUMMARY PAGE GEN : H-12				

Item	Description	Qty	Unit	Rate KES	Amount in KES
	GEN : Bill No 7 – EARTHING.				
	Supply, Install, Test & Commision the following				
7.1	Supply and install 4No. Steel cored copper earth rods, 1200mmx12mm threaded for extension, connected by brass clamps to 10metre of 25mmx3m copper earth tape laid in trenches of generator room with brass spacer bar saddles at 1metre intervals, connected to the station earth bar via a brass test clamp.	3	Lot		
	NB. All Earthing equipment and accessories shall be as FURSE				
	Price each per additional earth rod……KES.				
	Price per additional meter of earth tape……KES.				
	SUB-TOTAL C/F TO GEN : PRICE SUMMARY PAGE GEN : H-12				

Item	Description	Qty	Unit	Rate KES	Amount in KES
	GEN : Bill No 8 – VOLTAGE STABILIZERS **Supply, Install, Test & Commision the following**				
8.1	Main Hospital: 3-Phase 415V 1,000KVA (1 MVA) Automatic Servo Voltage Stabilizer with +/- 30% tolerance as SIEMENS or Approved Equivalent	1	No		
8.2	1600A Manual Bypass unit for above AVRs comprising 2No. 1600A Change over switches, busbars, internal wiring, Power coated enclosure manufactured in 16SWG galvanised steel sheet, including all necessary accessories	1	No		
8.3	Morgue: 3-Phase 415V 150KVA (1 MVA) Automatic Servo Voltage Stabilizer with +/- 30% tolerance as SIEMENS or Approved Equivalent	1	No		
8.4	250A Manual Bypass unit for above AVRs comprising 2No. 250A Change over switches, busbars, internal wiring, Power coated enclosure manufactured in 16SWG galvanised steel sheet, including all necessary accessories	1	No		
8.5	2 Runs on each Phase of Single Core XLPE/SWA/PVC 300mm^2 copper cable running from above A.V.R to the main switch board via change – Over & Bypass unit. Complete with associated cable glands and lugs. *(consider 2 runs as 1 linear*	50	LM		
8.6	4 core XLPE/SWA/PVC 120mm^2 copper cable running from 150 KVA Generator set to the main switch board via change – Over & By pass unit. Complete with associated cable glands	30	LM		
	SUB-TOTAL C/F TO GEN : PRICE SUMMARY PAGE GEN : H-12				

Item	Description	Amount in KES
	GENERATOR PRICE SUMMARY PAGE	
1	GEN : Preliminaries & General Conditions H-4	
2	Sub-Total for GEN : Bill No 2 - AMF Panel BF Page GEN :H-5	
3	Sub-Total for GEN : Bill No 3 - Recommended Spare Parts and Lubricators BF Page GEN :H-6	
4	Sub-Total for GEN : Bill No 4 - Tools to be Supplied with the Set BF Page GEN :H-7	
5	Sub-Total for GEN : Bill No 5 - Auxiliary Fuel Tank BF Page GEN : H-8	
6	Sub-Total for GEN :Bill No 6 - Generating Set BF Page GEN :H-9	
7	Sub-Total for GEN : Bill No 7 - Earthing BF Page GEN : H-10	
8	Sub-Total for GEN : Bill No 8 - Voltage Stabilizers BF Page GEN : H-11	
	SUB-TOTAL (Without VAT)	
	Add 16 % V.A.T	
	Add CONTIGENCY SUM	2,000,000.00
	TOTAL AMOUNT FOR GENERATOR INSTALLATIONS CARRIED TO ELECTRICAL PRICE SUMMARY PAGE EP*S01*	

6. 3No. HOSPITAL PASSANGER LIFTS

SECTION F: PARTICULAR SPECIFICATIONS OF LIFTS

1. REGULATIONS

All Apparatus and materials supplied and work carried out shall comply with the provisions of the following documents:-

(a) The latest Edition of I.E.E Regulations

(b) The Kenya Power and Lighting Co. LTD By-laws

(c) The Electric Power Act and the Rules made there under.

(d) EN81 and C.P 407 (1972)

(e) The requirements of the Chief Inspector of Factories for the Kenya Government, Factories Act Chapter 514 SECTION 30.
THE CONTRACTOR SHALL AVAIL ALL THE CERTIFICATES.

(f) Any other regulations governing lift installations in Kenya

2. BUILDER'S WORK BY LIFT CONTRACTOR

A. Lifts Shafts

(i) It shall be the responsibility of the lifts Contractor to verify the Dimensions of the lifts shafts before placing any orders for importation. The Employer/employer's representative will bear neither responsibility nor liability for any approximate dimensions issued – as a guide to the Contractor.

(ii) The lifts Contractor shall provide cut-outs for hall buttons, hall position indicators, hall lanterns and fire man's switch.

It shall be the responsibility of the lifts Contractor to provide, properly position and fix the hall buttons, hall indicators, hall lanterns, fire man's switches, door frames, sills and architraves.

(iii) The lifts Contractor shall provide the necessary scaffolding for erection of equipment and hoarding to secure the work area from general public and maintain safety of the people and other installations in the building.

(iv) The lifts Contractor shall provide temporary electricity supply for

erection and shaft lighting and a permanent supply from an appropriate isolator.

B **Lifts Pit**

The lifts contractor shall provide and fix ladders where such facility may be required as stipulated in BS 2655, and terminal and over travel limit switches.

C. **Lifts Motor Room**

The lifts Contractor shall provide the following in the lifts motor room: -

(i) Cut-outs for roping, safety gear ropes, selector tapes (where provided) cabling etc. in the lifts motor room floor.

(ii) Lifting beam in the form of a rolled steel joist if required.

(iii) General lighting cable ducts and conduits and power and ventilation equipment.

D **Access**

The lifts Contractor shall provide stairway access with lockable doors to the lifts motor room. On the outer side of the door shall be written in red letters:-

"DANGERS 415 VOLTS – LIFT MOTOR ROOM – NO UNAUTHORISED PERSON ALLOWED INSIDE"

E. **Builder's Work**

The lifts Contractor shall provide for

(i) All chasing, and making good

(ii) All drilling and plugging of holes in floors, walls, ceiling and roofs for security services, and equipment requiring screw or bolt fixing.

(iii) Any purpose made fixing brackets

3. **FIREMAN'S SWITCH FOR THE LIFTS**

A fireman's control switch shall be provided in the Ground floor, main entrance lobby. The Fireman's switch shall be of the type approved by the Engineer. Operation of the Fireman's switch shall stop the lift car on the next landing but without opening the car and landing doors and immediately return them to the Ground floor irrespective of any other calls and park lift with doors open. The car will then become inoperative only until the fireman s switch is reset.

4. EMERGENCY ALARM SYSTEM

An emergency alarm system in the form of an intercom shall be installed between the car, the motor room, and the reception desk on the ground floor.

The alarm system shall be clearly labeled "Emergency Alarm". On pushing an alarm button, the system should ring simultaneously in the car, motor room and the security office.

The lifts Contractor shall carry out the wiring in the lift car and between machine and the security office. The power supply for the alarm system shall be derived from a self-recharging unit.

5. EMERGENCY DOOR KEYS

It shall be possible to open every lift-landing door by the use of a release key whether or not the lift car is in the landing zone. The key hole shall be unobstructive and located at high level.

6. CALL STATION AND OPERATING PANEL BUTTONS

The call station, distributed between the lifts on each landing, and operating panel buttons shall be micro-motion push button.

7. INTERFERENCE SUPPRESSION

The lift motor and ancillary controls shall be suppressed so as not to interfere with local radio and television reception and closed circuit television or Electro mechanical equipment within the building. The suppression shall be carried out in accordance with B.S. 800 and all suppression devices incorporated shall comply with B.S. 2655

f) CAR EMERGENCY LIGHTING

The lift cars shall be provided with an emergency light fitting operating from a self-recharging battery unit. The emergency light will be built in the car-operating panel.

g) TEST

Both on completion of his work on the lifts and at the end of the guarantee period, the lifts Contractor shall carry out all the tests as required and in accordance with B.S 2655 part 7 in the presence of the Engineer and shall provide all the necessary instruments, labour and materials to do so at his cost.

Damage occurring, as a result of these tests will be made good by the Lifts Contractor to the Engineer's satisfaction at his expense.

4No. (Four) copies of the test certificates for each lift should be forwarded to the Engineer within 4 days of completion of the last test.

h) TRAINING

The tenderer shall provide for in his tender the training of 4No. Technicians on site, in the maintenance of the lifts during the installation, testing and commissioning period.

11 FACTORY INSPECTION

11.1 The employer shall be entitled to have the quantity and quality of the imported lifts materials inspected by four (4No.) engineers appointed by the Project Manager, and one (1No.) employer's representative.

11.2The said inspection shall be carried out at the factory of manufacture of the lifts materials during normal working hours and the successful tenderer shall give written notice to the Project Manager at the latest thirty (30) calendar days in advance of the date that the lifts materials are ready for inspection.

11.3Travel (including ground, air travel and airport passage taxes) and full board accommodation expenses in at least a Four star hotel incurred by the engineers appointed by the Project Manager, and the employer's representative shall (see clause 12.1) be borne by the successful tenderer and hence the tenderer shall include for these items in the rates.

11.4The contractor shall also provide the Engineers and Employers representative with out Of pocket allowance according to government guidelines, and thus the contractor shall include this in his rates

11.5The inspection shall be completed within six (6) calendar days excluding the period of travel by the inspection team.

11.6If as a result of the inspection any of the lift materials are found to be defective, the successful tenderer shall replace the defective materials and determine a new date as when a new inspection shall be performed at the expense of the contractor.

11.7The successful tenderer shall only ship the lift materials after the said factory inspection.

i) PROTECTION AGAINST POWER/VOLTAGE FLUCTUATIONS, SURGES AND TRANSIENT CURRENTS

12.1 The lift equipment and all its controls shall be protected against voltage/power fluctuation, surges and transient currents. The contractor shall provide for and install all the necessary equipment for this protection.

PARTICULAR SPECIFICATIONS FOR THE LIFTS.

1.00 LOCATION OF SITE

The site of the proposed works is at NAROK TOWN, NAROK COUNTY.

2.0 DESCRIPTION OF THE WORKS

The project comprises the **Supply, installation, testing and commissioning of 3No. Modern Micro-Processor Controlled Hospital bed passenger Lifts to the specifications supplied herein.**

3.00 CLIMATE CONDITIONS

The following climatic conditions apply at the site of the contract work and the equipment, materials and the installations shall be suitable for these conditions.

Altitude	**1600m**
Mean Maximum Temperature	25°C
Mean Minimum Temperature	12°C
Range of Relative Humidity	39%-97%
Longitude (approximately)	36° 05'E
Latitude (approximately)	10°20'S
Salt in the atmosphere	0.02%
Solar radiation, February Mean Max	630 Langleys

Extremely heavy rainfall at certain periods of the year and the contractor shall be deemed to have taken account of this factor both in his prices and his planning of the execution of the contract works.

4.00 GENERAL REQUIREMENTS

The lifts Contractor shall supply, deliver unload, hoist, fix and erect, test and commission all the equipment, plant and materials in accordance with all specifications contained in this document including the Building plans to provide a complete and operable installation. The lifts Contractor shall become liable for defects and be responsible for the initial maintenance of the lifts installed all as specified here in.

5.0. TECHNICAL SPECIFICATION FOR THE LIFTS

HOSPITAL BED PASSENGER LIFTS

No. of Units	:	**Three** (3No.)
Load	:	**1200Kg (15 persons)**
Speed	:	1.5 m/s
Drive:		AC gearless closed loop digital VVVF (microprocessor controlled – bottom drive)
Control system	:	Fully software based microprocessor controlled system
No.of stops	:	Lift 1 -(G, 1, 2, 3, 4) Lift 2 -(G, 1, 2, 3, 4) Lift 3 -(G, 1, 2, 3, 4)
Lift Pit	:	To be determined on site by lift Contractor
Head room	:	To be determined on site
Normal Operation	:	Simplex
V.I.P. Operation:		Should be programmed to operate for V.I.P. service by key switches located on all the floors. The car should however clear all the car calls in the direction of travel of the lift made prior to the VIP call.
Power requirements	:	415V ac, 3 phase, at 50Hz
Machinery	:	To be located above shaft.

Other main facilities and functions to be included:

- Car door operation shall be fully automatic with (Infra-red) electronic door sensors
- Car position indicator
- Door button – re-open
- Extended door-open button
- Voice guidance system (voice synthesizer)
- Emergency power operation and system backing intercom facility – 3 way.
- Alarm power unit and bell
- safe landing with deviation of not more than 3mm floor position indicator on every floor
- independent service key operation
- signal floor lantern with sounders or car arrival chimes on all floors
- remote control car stop (emergency)
- cabin ventilation shall be tropicalised high capacity cylinder type operation. extract fan should be powerful, quiet drought free and multi-directional
- shall incorporate an Audio Visual car overload device.shall have forced ventilation key switch.

Code Compliance The lifts shall comply with BS 5655 or European Specifications equivalent code EN 81

Structural Openings: The lift Contractor shall set the landing doors at 10mm from the finished floor levels so as to get a fall away from the landing to prevent water from **flowing down the lift shafts when washing up.**

Entrances:	The lifts car shall have automatic high speed power operated 2 panel centre openings of 2000mm wide by 2100mm high **(contractor to physically confirm measurement on site)**
Landing door:-	Lifts landings shall have stainless, steel architraves to the Engineer's approval.
Wall switches:-	All operating switches in the lifts shaft shall be of the totally enclosed drip proof type.
Lighting:-	Indirect Lighting shall be fitted in the car to a level of 150 lux. Emergency car lighting to be incorporated
Cabin walls:-	High quality synthetic laminate panels
Mirror:-	Full height and width of the car rear panel
Door Operation:-	Heavy duty variable frequency driven door operators on a frame above the lift car. Fully adjustable door open and close speeds- Micro-processor controlled. o Intelligent speed adjustments to cope with traffic requirements o Full curtain electronic infrared 3 dimensional detectors. o An electro mechanical type tested interlock shall be provided, fitted on the landing door and operated by the door lock cam on the lift car to prevent movement of the lift car until the landing door is both mechanically and electronically locked.
Hand rails:-	Round sectioned with bright brass plating
Emergency light:-	Emergency light in the lift cars shall be 6 watts
Signal Hall Lanterns:-	LCD displays and different tones for up and down motions.
Signal fixtures:-	Wide angle view car position indicator unit with high relieable LED technology.
Floor buttons:-	Micromotion with ring illumination Brushed stainless steel plate with Braille indication.
Floor:-	Rubber knobbed tiles, not less than 6mm thick.
Car position indicators:-	Car position indicators shall be digital LCD type.
Car direction indicators:-	Car direction indicators shall have polycarbonate Covers and 160° angle view.
Manual operation:-	Provision shall be made for manual raising and Lowering by

means of spokeless Wheel. This wheel shall be mounted on the drive motor.

Painting: All parts of the control equipment, switchgear trunking bed plates and closed sections of metal parts which will not be accessible for painting after erection shall be given three coats of paint at the manufacture's works. All bright surfaces shall be coated with lacquer or other protective coating before leaving the manufacturer's works. Metal works in the lift shaft shall be painted on site with three coats of best quality oil paint. The lifts machine and other machinery located in the lifts motor room shall be painted with three coats of best quality oil paint one coat being applied after erection.

Guarantee of Spare parts:- The tenderer must confrim in writing and provide Written commitment from manufacturer, the availability of parts for the make of lift proposed for installation, for a continous period of at least 10 (Ten) years.

Construction:- In general, the lift car shall be constructed from pressed steel. The method of construction and strenth of lift cars, doors and panels shall comply with B.S. 2655. Part 1 1970 and the amendments and in accordance with European code EN 81.

Base frame:- The complete hoisting equipment shall be mounted on a base frame of fabricated steel which when installed shall be insulataed from the building structure by means of rubber or other approved sound and vibration isolated material provided and fixed in an approved manner between frame and the supporting beams.

6.01 INFROMATION TO BE SUPPLIED BY THE TENDERER

The tenderer shall fill in the following information pertaining to the lifts offered at the time of tendering:-

(i) Type of Drive Motor and Size (KW) …….

(ii) Country of Manufacture …….

(iii) Power Factor …….

(iv) Starting Current A ……

(v) Running Current B. ……..

(vi) Duration of Starting Current …….

(vii) Lift Capacity ……

(viii) Lift Speed ……

(ix) Landing Doors Type ……..

(x) Landing Doors Safety Features …….

(xi) Dimensions of Lift Car …….

SECTION G: LIFT EVALUATION CRITERIA

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

1. Determination of Responsiveness
2. Detailed Technical Examination
3. Combination of Technical and Tender Sums Comparison

STAGE 1- DETERMINATION OF RESPONSIVENESS

A) PRELIMINARY EXAMINATION

This stage of evaluation shall involve examination of the pre-qualification conditions 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 may include the following:

i) Category of Registration with N.C.A 3 and above in the relevant trade;
ii) Class of Licenses with the relevant statutory bodies e.g. Energy Regulatory Commission, County Government, and Water Management Boards etc;
iii) Proof of payment for tender document;
iv) Provision of Bid Security;
v) Dully filled Form of Tender;
vi) Any other conditions included in the advertisement notice/Invitation letter.

Note:

The bid security shall be in accordance with Instruction to Tenderers which states as follows:

- **Clause 19.1** of Instruction to Tenderers,"the tenderers shall furnish as part of his tenders a tender surety in the amount stated in the tender document in the Appendix to Instructions to Tenderers".

- **Clause 19.2** of Instruction to Tenderers, "the unconditional Tender surety shall be in Kenya shillings and be in form of a certified cheque, bank draft, an irrevocable letter of credit or a guarantee from a reputable Bank/ Insurance approved by PPOA located in the Republic of Kenya. The format of the surety shall be in accordance with the sample form included in the tender documents and the tender surety shall be valid for **150 days** from the date of tender opening".

- **Clause 23.2** of Instruction to Tenderers: "For the purposes of this clause, a substantially responsive tender is one which conforms to all terms and condition and specifications of the tender document without material deviation or reservation and has a valid Bank/Insurance guarantee".

The employer may seek further clarification/confirmation if necessary to confirm authenticity/compliance of any condition of the tender.

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

NOTE: ALL COPIES OF DOCUMENTS PROVIDED MUST BE CERTIFIED BY COMMISSIONER OF OTHS and ALL PAGES OF THE COMPLETE TENDER DOCUMENT SUBMITTED MUST BE PAGENATED/SERIALISED

B) COMPLETENESS OF TENDER DOCUMENT

The tender document shall be examined based on clause 2.2 of the Instruction to Tenderers which states as follows:

In accordance with clause 2.2 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 sub clause 2.1 of Instruction to Tenderers and adequacy of resources to effectively carry out the subject contract. The tenderers shall be required to fill the Standards Forms provided for the purposes of providing the required information. The tenderers may also attach the required information if they so desire.

The award of points for the **STANDARD FORMS** considered in this section shall be as shown below

	PARAMETER	**MAXIMUM POINTS**
(i)	Statement of compliance	3
(ii)	Tender Questionnaire	5
(iii)	Confidential Business Questionnaire	5
(iv)	Key personnel	15
(v)	Contract Completed in the last Five (5) years	15
(vi)	Schedules of on-going projects	10
(vii)	Schedules of contractors equipment	10
(viii)	Audited Financial Report for the last 3 years	10
(ix)	Evidence of Financial Resources	10
(x)	Name, Address and Telephone of Banks **(**Contractor to provide**)**	5
(xi)	Litigation History	2
(xii)	Sanctity of the tender document as in accordance with clause 5 of instruction to tenderer	10
	TOTAL	**100**

The detailed scoring plan shall be as shown in table 1 below: -

TABLE 1

Item	Description	Point Scored	Max. Point	
i.	**Statement of Compliance** • Signed and stamped ---------- 3 • Signed but not stamped or vice versa ---------- 2 • Not Signed nor stamped ---------- 0		**3**	
ii.	**Tender Questionnaire Form** • Completely filled ---------- 5 • Partially filled ---------- 3 • Not filled ---------- 0		**5**	
iii.	**Confidential Business Questionnaire Form** • Completely filled ---------- 5 • Partially filled ---------- 3 • Not filled ---------- 0		**5**	
iv	**Key Personnel (Attach evidence)**			**15**
	Director of the firm • Holder of degree Mechanical Engineering field ------- 4 • Holder of Diploma in Mechanical Engineering field ---------- 2 • Holder of trade test certificate in Mechanical Engineering field------- 1 • No relevant certificate ---------- 0		**4**	
	At least 1No. degree/diploma of key personnel in relevant Engineering field • With over 10 years relevant experience ---------- 4 • With over 5 years relevant experience---------- 2 • With under 5 years relevant experience ---------- 1		**4**	
	At least 1No certificate holder of key personnel in relevant Engineering field • With over 10 years relevant experience---------- 3 • With over 5 years relevant experience ---------- 2 • With under 5 years relevant experience ----------1		**3**	
	At least 2No artisan (trade test certificate in relevant Engineering field) • Artisan with over 10 years relevant experience ---------- 2 • Artisan with under 10 years relevant experience ---------- 1 • Non skilled worker with over 10 years relevant experience ----- 1		**4**	
v	**Contract completed in the last five (5) years (Max of 5 No. Projects**) • Project of similar nature, complexity and magnitude ---------- 3 • Project of similar nature but of lower value than the one in consideration ---- ---------- 2 • No completed project of similar nature ---------- 0		**15**	

vi	**On-going projects (Max of 5 No. Projects)** • Project of similar nature, complexity and magnitude -------- 2 • Project of similar nature but of lower value than the one in consideration ---------- 1 • No ongoing project of similar nature - ---------- 0		**10**	
vii	**Schedule of contractors equipment and transport (proof or evidence of ownership)** • Means of transport (Vehicle) ---------- 4 • No means of transport ---------- 0		4	**10**
	For each specific equipment required in the installation of the Work being tendered for. (Maximum No. of equipment to be considered – 3 No.---------- 2		6	
viii	**Financial report** **Audited financial report (last three (3) years)** • Turn over greater or equal to 5 times the cost of the project ---10 • Turn over greater or equal to 3 times the cost of the project --- 6 • Turn over greater or equal to the cost of the project ---------- 4 • Turn over below the cost of the project ---------- 2		**10**	
ix	**Evidence of Financial Resources (cash in hand, lines of credit, over draft facility etc)** • Has financial resources equal or above the cost of the project ----10 • Has financial resources below the cost of the project ----------5 • Has not indicated sources of financial resources ---------- 0		**10**	
x	**Name, Address and Telephone of Banks (Contractor to provide)** • Provided ---------- 5 • Not provided ---------- 0		**5**	
xi	**Litigation History** • Filled ---------- 2 • Not filled ---------- 0		**2**	
xii	**Sanctity of the tender document** • Having the document intact (not tempered with in any way) ---10 • Having mutilated or modified the tender document ---------- 0		**10**	
	TOTAL		**100**	

Any bidder who scores 80 points and above shall be considered for further evaluation

STAGE 2 - TECHNICAL EVALUATION

A) COMPLIANCE WITH TECHNICAL SPECIFICATIONS

In this section, the bid will be analyzed to determine compliance with General and Particular technical specifications for the works as indicated in the tender document.

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

Where the Equipment proposed by the tenderer differs with the models specified in the tender document, it is mandatory that the brochures/catalogues of the same be submitted with the tender document highlighting the catalogues Numbers of the proposed items. Such brochures/catalogues should indicate comprehensive relevant data of the proposed equipment/items which should include but not limited to the following:

a) Standards of manufacture

b) Performance ratings/characteristics

c) Material of manufacture

d) Electrical power ratings and

e) Any other necessary requirements (Specify)

Following the above analyses, where the proposed equipment are found not to satisfy the specifications, the tender will be deemed Non – Responsive and will not be evaluated further.

B) <u>TECHNICAL EXAMINATION</u>

In this section, the information provided in the Technical Schedule or Brochures attached will be analyzed for bidders who have qualified from **STAGE 2A** above and points awarded as shown below to a maximum of 100 points

TABLE 2

Item	Description	Score	Max. Score
	Technical schedule/Brochures • Relevant Manufacturer Brochures for items in the technical schedule with equipments to be supplied highlighted and meets specification (Where alternative are to supplied ---------- 100 or • Completely filled Technical Schedule indicating Brand, Model/ Country of origin as per specification in the tender ---------- 100 • Relevant Manufacturer Brochures for items in the technical schedule with equipments to be supplied not highlighted but within range of those specified and meets specifications ---------- 75 or • Completely filled Technical Schedule indicating items as specified in the tender but with less than 100% and above 75% of items in the technical schedule provided ---------- 75 • Relevant Manufacturer Brochures for items in the technical schedule with equipments to be supplied but between 50% and less than 75% of items highlighted and within range of those specified and meets specifications---------- 60 or • Completely filled Technical Schedule indicating items as specified in the tender but between 50% and 75% of items in the technical schedule provided ---------- 60 • Relevant Manufacturer Brochures for between 25% and less than 50% of items in the technical schedule with equipment to be supplied highlighted and meets specifications---------- 50 or • For between 25% and 50% of technical schedule filled indicating Brand/Model/Country of origin for the items considered as specified in the tender ---------- 50 • Less than 25% provided or no technical data provided, either in form of brochures or filling of Technical Schedule. ---------- 0		**100**
	TOTAL		**100**

Any bidder who scores 80 points and above shall be considered for further evaluation

STAGE 3 - FINANCIAL EVALUATION

The evaluation shall be in two sections
1. Preliminary examinations and
2. Tender sum Comparisons

A) PRELIMINARY EXAMINATIONS

The preliminary examination in the Financial Evaluation shall be in accordance with clause 26 of Instruction to Tenderers.

The parameter to be considered under this section includes the following:

a) Arithmetic errors and comparison of rates

(1) Arithmetic Errors

The bid shall be checked for arithmetic errors based on the rates and the total sums indicated in the bills of quantities.

a) Confirmation shall be sought in writing from the tenderers whose tender sums will be determined to have a significant arithmetic error to their disadvantage, to confirm whether they stand by their tender sums. The error shall be treated as per **clause 24 of Instructions to Tenderers**.

Non compliance with the above shall lead to **automatic disqualification from further evaluation.**

Discount if any shall be treated as an error in pursuant to **clause 26.3** of Instructions to Tenderers

(2) Comparison of rates

The evaluation committee will compare rates from different bidders and note consistency of rates and front loading. The evaluation committee will judge and make an appropriate decision giving evidence.

SECTION H – LIFTS BILLS OF QUANTITIES

A. Notes and Sample Items for Preparing a Bill of Quantities

1. These Notes for Preparing a Bill of Quantities are intended only as information for the Procuring Entity or the person drafting the Tender Documents. Priced Bills of Quantities shall be part and parcel of the Contract Documents.

2. The objectives and purpose of the Bills of Quantities are to provide sufficient information on the specifications, descriptions and quantities of Works to be performed to enable tenders to be prepared efficiently and accurately and when a contract has been entered into, to provide a priced Bill of Quantities for use in the periodic valuation of Works executed. Inorder to attain these objectives, Works should be itemized in the Bill of Quantities insufficient detail to distinguish between the different classes of Works, or between Works of the same nature carried outin different locations or in other circumstances which may give rise to different considerations of cost. Consistent with these requirements, the layout and content of the Bill of Quantities should be as simple and clear as possible.

3. The Bills of Quantities should be divided generally into thef ollowing sections:

   a) Preambles
   b) Preliminary items
   c) Work Items
   c) Daywork Schedule; and
   d) Provisionalitems
   e) Summary.

4. NOTES TO PREPARING PREAMBLES

4.1 The Preambles should include only those items that constitute the cost of the works but would not be priced separately as they are expected to be included in the unit prices. Care should be taken to ensure that these items are not are petition of the conditions of contract. The Preambles should indicate the inclusiveness of the unit prices and should state the methods of measurement that have been adopted in the preparation of the Bill of Quantities, that are to be used for the measurement of any part of the Works. The units of measurement and abbreviations should be defined and any mandatory national units defined and described. The methods of and procedure for re- measurement should be described in the Preambles.

4.2 Units of Measurement - The following units of measurement and abbreviations shall be used, unless other national units are mandatory in Kenya.

nit	Abbreviation	Unit	Abbreviation
cubic meter	m^3 or cu m	millimetre	mm

4.3 The Bills of Quantities shall be read in conjunction with the Instructions to Tenders, General and Special Conditions of Contract, Technical Specifications, and Drawings.

4.4. The quantities given in the Bills of Quantities are estimated and partly provisional and are given to provide a common basis for tendering. The basis of payment will be the actual quantities of work ordered and carried out, as measured by the Contractor and verified by the Architect and valued at the rates and prices tender in the priced.

Bills of Quantities, where applicable, and otherwise at such rates and prices as the Architect may fix within the terms of the Contract.

4.5. The rates and prices tender in the priced Bills of Quantities shall, except in so far as it is otherwise provided under the Contract, include all Constructional Plant, labour, supervision, materials, erection, maintenance, insurance, profit, taxes, and duties, together with all general risks, liabilities, and obligations set out or implied in the Contract.

4.6. Arateorprice shall be entered against each item in the priced Bill of Quantities, whether quantities are stated or not. The cost of Items against which the Contractor has failed to enter a rate or price shall be deemed to be covered by other rates and prices entered in the Bill of Quantities.

4.7. The whole cost of complying with the provisions of the Contract shall be included in the Items provided in the priced Bills of Quantities, and where no Items are provided, the cost shall be deemed to be distributed among the ratesand prices entered for the related Items of Work.

4.8. General directions and descriptions of work and materials are not necessarily repeated nor summarized in the Bills of Quantities. References to the relevant sections of the Contract documents shall be made before entering prices agains teach item in the priced Bills of Quantities.

4.9 Provisional Sums and contingency sums included and so designated in the Bills of Quantities shall be expended in whole or in part at the direction and discretion of the Architect in accordance with Sub-Clause13.5 and Clause 13.6 of the General Conditions of contract.

4.10 In preparing the Bills of Quantities, notes should be removed as they are intended to guide the person preparing the Tender Documents. The Contractor must allow in his rates for any costs associated with and complying with the requirements in the Preambles.

4.11 Should a tenderer/contractor not price any item in any section of the Bills of Quantities including Preliminary items, it will be assumed that he/she has spread its cost in other areas that he/she will have priced. Therefore, the itemor items will be executed without any additional costs or without being treated like variations.

5. NOTES ON PREPARING BILLS OF QUANTITIES

5.1 The Preliminary Items should be limited to tangible items that should be priced by the tenderer, are identifiable and can be priced separately and included in the interim valuations precisely. Such items may include such items as site office, notice boards, and other temporary works, otherwise items such as security for the Works which are primarily part of the Contractor's obligations should be included in the

Contractor's rates.

5.2 The work items in the Bills of Quantities should be grouped into sections to distinguish between those parts of the Works which by nature, location, access, timing, or any other special characteristics may give rise to different methods of construction, or phasing of the Works, or considerations of cost. Such groups could be ground excavations, structures, external works, services, etc. General items common to all parts of the Works may be grouped as a separate section in the Bill of Quantities.

5.3 Quantities should be computed net from the Drawings, unless directed otherwise in the Contract, and no allowance should be made for bulking, shrinkage or waste. Quantitiesshouldberoundedupwhereappropriate.

5.4 Where the measured items a redeemed not to be exact because of the likelihood that the scope can change during the execution of the works, such items could be subject to re-measurement, the word **"provisional"** should be used to identify such cases. Where whole sections of the work items fall in this class, for example foundations, they should be labelled "Provisional Quantities" or "Provisional Items" so that the Tenderer/Contractor is advised up front that such items are subject to re-measurement to done before such work is cover-up.

5.5 All items that have not been measured and therefore not subject tot enders pricing should be listed in the Bills of Quantities as **Provisional Sums** for particular item or class of Work, which may be subject to a nominated subcontract or separate measurements at a later date during the execution of the works. For example, if it is deemed not possible to measure electrical works before going to tender because detail designs are not ready, a provisional sum can be allowed in the Bills of Quantities for "Installation of Electrical Works" to be executed later when actual design details are completed. To the extent not covered above, there should be in the Bills of Quantities a general provision for physical and financial contingencies made as a "Provisional Sum for Contingencies" and "Provisional Sum for Fluctuations". The inclusion of such provisional sums often facilitates budgetary approval by avoiding the need to request periodic supplementary approvals as the future need arises.

5.6 Provisional sums to cover specialized works normally carried out by Nominated Sub Contractors should be avoided and instead Bills of Quantities of the specialized Works should be included as a section of the main Bills of Quantities to be priced by the Main Contractor. The Main Contractor should be required to indicate the name(s) of the specialized firms he proposes to engage to carry out the specialized Works as his approved domestic sub-contractors. Only provisional sums to cover specialized Works by statutory authorities should be included in the Bills of Quantities.

5.7 A Daywork Schedule should be included if the probability of unforeseen work, outside the items included in the Bill of Quantities, is relatively high. To facilitate checking by the Procuring Entity of the realism of rates quoted by the tenderers, the Daywork Schedule should normally comprise:

i) A list of the various classes of labor, and materials for which basic.

ii) Daywork rates and prices for various categories of labor are to be inserted by the tenderer, together with a statement of the conditions under which the Contractor will be paid for Work executed on a Daywork basis.

iii) A percent a get o be entered by the tenderer agains teach basic Day work item.

iv) Subtotal amount for labor, materials and plant representing the Contractor's profit, overheads, supervision and other charges.

5.8 The Summary should contain a tabulation of the separate parts of the Bills of Quantities carried forward, with provisional sums for Daywork, Provisional sums and Contingencies, and provision for Total Costing. The last line should allow for tenderer to indicate any discounts before arriving at a total cost carried forward to the Form of Tender.

BILLS OF QUANTITIES

(a) Preambles

1. The method of measurement of completed work for payment shall be in accordance with *[insert the name of a standard reference guide, or full details of the methods to be used]*.

2. The Site is situated in NAROK COUNTY It is approximately150 Kilometers from Nairobi.

3. The Contractor shall obtain the Architect's approval on the siting of all temporary buildings, spoil heaps, temporary access path, and storage of materials. The Contractor shall also obtain the Architect approval and direction regarding the use of any materials found on the Site.

4. The Contractor shall allow for the payment of all bank charges in connection with the procurement of Bank Guarantees and stamp charges in connection with this contract Agreement.

5. The Contractor shall carry out the various sections of the Works in such an order as the Architect May direct. The Procuring Entity reserves the right to occupy the Works by sections on completion provided that such occupation is considered to be both practical and reasonable and will not interfere with the Works. The Contractor shall allow any costs associated with such occupation.

6. The main Contractor will be fully responsible for paying his Sub-Contractor but the Procuring Entity reserves the right in very exceptional circumstances to make such payments direct in the interests of the project where the completion thereof might be jeopardized by any dispute or vicariousness between the Contractor and the Sub-Contractor involve.

7. The Contractor shall complete and deliver the Works in the period inserted in the Form of Tender as his time for completion of the Works from the date for Possession, to be agreed with the Engineer. The Contract Period is presumed to have been calculated making do allowance for seasonal inclement weather conditions. Noclaimfor extension of time due to the normal in clement weather for this area shall be entertained.

8. The Contractor shall, upon receiving instructions to proceed with the Works, draw up a Programme and Progress Chart setting out the order in which the Works are to be carried out, with the appropriate dates there of. This Chart shall be agreed with the Architect and no deviation from the order set out in it will be permitted without the written consent of the Engineer. The Contractor will be responsible for arranging the above programme with all his sub-Contractors and Specialties. The Contractor shall allow in his rates for carrying out this exercise, and for updating it as required.

9. The Contractor shall submit to the Architect on the first day of each week or such longer period as the Architect from time to time direct, a Progress Report and any information for the proceeding period, showing the progress during the period and

the up-to-date cumulative progresson all important items of each section or portion of the Works.

10. The Contractor shall arrange for photographs of the Site to be taken by a professional photographer approved by the Engineer.The Photographs shall provide a record of the Site and adjacent are as prior to the commencement of the Works and shall cover such portion of the works in progress and completion as the Architect shall direct. All prints shall be full plate size, unmounted, and marked on the reverse side with the date of exposure, identification reference and brief description. The copyright of all photographs shall be vested in the Procuring Entity. The negatives and four prints from each negative shall be delivered to the Architect within two weeks of exposure.

11. Figured dimensions are to be followed in preference to dimensions scaled from the Drawings, but whenever possible dimensions are to be taken on the Site or from the buildings. Before any work is commenced by Sub- Contractors or Specialist Firms, dimensions must be checked on the site comparable dimensions shown on the drawings. The Contractor shall be responsible for the accuracy of such dimensions.

12. Prior to commencement of any work the Contractor is to ascertain from the relevant Authorities the exact position, depth and level of all existing electric cables, waterpipes or other services in the are aand he shall make whatever provisions may be required by the Authorities concerned for the support and protection of such services. Any damage or disturbance caused to any services shall be reported immediately to the Architect and the relevant Authority and shall be made good to their satisfaction at the Contractor's expense. Where appropriate the Contractor shall open up the ground in advance of the main work by hand digging if necessary, to locate precisely the position and details of the services which are likely to affect his operations.

13. The Contractor shall include in his prices for the transport of materials, workmen, etc./, to and from the site of the proposed works, at such hours and by such route as are permitted by the Authorities.

14. The Contractor will be required to make good, at his own expense and damage he may cause to the present road surface and pavements within or beyond the boundary of the Site, during the period of the works. All existing paths, storm water channels, etc., that may be destroyed or damaged during the progress of the Works shall be reinstated by the Contractor to the satisfaction of the Engineer.

15. The Contractor is to allow for complying with all instructions and regulations of the Police Authorities.

16. All water shall be fresh, clean and pure, free from earthly, vegetable or organic matter, acid or alkaline substance in solution. The Contractor shall provide at his own risk and cost all water for use in connection with the Works, (including works of sub–contractors). If need be, he shall make arrangements with the Local Water Authority for the installation of a separate meter for all water used by him throughout the Contract and pay all cost and fees in connection therewith. He shall also provide temporary storage tanks and tubing, etc., as may be necessary, and clear away at completion.

17. The Contractor shall provide all artificial lighting and power for his own use on the Works, (including Sub – Contractor's) including all temporary connections, wiring,

fittings, etc., and clearing away on completion. The Contractor shall pay all fees and obtain all permits in connection there with.

18. The Contractor shall constantly keep on the Works a Literate English-speaking Agent or Representative, competent and experienced in the kind of work involved, who shall giveh is whole time to the superintendence of the works. (Including works of sub – contractors). Such Agent or Representative shall receive on behalf of the Contractordirections and instruction from the Engineer, and such directions and instructions shall be deemed to be given to the contractor in accordance with the Conditions of Contract. The Agent shall not be replaced without the specific approval of the Engineer.

19. The Contractor shall ensure that the safety of his work people and all authorized visitors to the site are protected at all times. In particular, there shall be the proper provision of guard–rails to scaffolding, protection against falling materials, tools on site, dust, nail and other sharp objects. The site shall be kept tidy and clear of dangerous rubbish. The Architect shall be empowered to suspend work on site should it be considered this condition is not being observed and no claim arising from such suspension will be allowed.

20. The are as available to the Contractor for workyards, offices and other facilities shall be directed by the Architect and any existing features to remain shall be protected from damage throughout the Contract Period and handed back in good condition when they are vacated at the end of the Contract. If additional areas are required, the contractorshallsourcethenatowncost.

21. The Contractor shall give the Architect reasonable notice of the intention to set out or take levels for any part of the Works so that arrangements may be made for checking the work. The accuracy of setting out and leveling shall be within the tolerances specified in the Specifications or on the Drawings. The checking of setting out or leveling by the Architect shall not relieve the Contractor of his duties or responsibilities under the Contract.

22. The Contractor must take steps necessary to safe guard and shall beheld fully responsible for any damage caused to existingand adjacent property, including buildings that are not a subject of demolition. He shall make good at his own cost damage to persons and property caused there on, and he shall indemnify the Procuring Entity against any loss or claim that may arise.

23. The Contractor shall take such steps and exercise such care and diligence as to minimize nuisance arising from dust, noise or any other cause to the occupiers of the existing and adjacent property. He must provide such temporary and special screens and tarpaulins or gummy bags, hoarding, barriers, warning signs etc. as he considers necessary and sufficient for the protection of the existing and adjacent property and or prevention of nuisance etc. as directed by Engineer.

24. The Contractors attention is drawn to the standards levy order which was amended on 15thOctober 1998.Legal notice No.154 of 1998. The Contractor is required to pay a monthly level of 0.2% of his factory price of construction works with effect from January 1999. Tenderer shall allow for this in the build-upo f his rates.

25. The Contractor shall provide temporary sheds, offices meshrooms, sanitary, accommodation and other temporary buildings for the use of the contractor and sub-

contractors, including lighting furniture equipment and attendance.

26. Contractor shall provide/build labor camp sat areas to be agreed with the Engineer. Labor camps shall be complete with sanitary accommodation and fencing gates.

27. The Contractor must provide the necessary toilet facilities to the requirement and satisfaction of the Health Authorities and maintain the same in a thoroughly clean and sanitary condition and pay all conservancy fees during the period of the Works and remove when no longer required.

28. The Contractor shall provide at his own risk and cost all watching and lighting as necessary to safeguard the Works, Plant and materials against damage and theft.

29. The Contractor shall provide all necessary hoists, tackle, plant, equipment, vehicles, tools and appliances of every description for the due and satisfactory completion of the Works and shall remove the same on completion. All such plant, tools and equipment shall comply with all regulations in force throughout the period of the Contract and shall be altered or adopted during the Contract period as may be necessary to comply with any amendments in or additions to such regulations.

30. Provide, erect and maintain all necessary scaffolding, sufficiently strong and efficient for the due performance of the works, including Sub-Contract Works, provide special scaffolding as required by Sub-Contractors, alter and adopt all scaffolding as and when required during the Works, and remove on completion. No scaffolding is measured here in after and the Contractor must allow in his rates for this.

31. The Contractor shall take all necessary precautions such as temporaryf encing, hoarding fans, planked footways, guard–rails gantries screen, etc., for the safe custody of the Works, materials and public protection and adjacent properties.

32. Cover up all and protect from damage, including damage from in clement weather, all finished work and unfixed materials, including that of Sub-Contractors, etc., to the satisfaction of the Architect until the completion ofthe Contract.

33. The Contractor shall, after completion of the works, at his own expense, remove and clear away all surplus excavated demolition materials, plant, rubbish and unused materials and shall leave the whole of the Site and Works in a clean and tidy state to the satisfaction of the Engineer, sheds, camps, etc. Particular care shall be taken toleavecleanallfloors and windows and tore move all paint and cement all rubbis hand dirt as it accumulates. The Contractor is to find his own dump and shall pay all charges in connection there with.

34. Concrete test cubes shall be prepared in a set of three, as described including testing fees, labor and materials, making molds, transport, handling, etc. Allow in your rates for making at least four cubes on each occasion, from different batches; the concrete being taken from the point of deposit.

35. The Contractors hall furnish at the earliest possible opportunity before work commences, and at his own cost, any samples of materials and workmanship that may be called for by the Architect for the approval or rejection, and any further samples in the case of rejection, until such samples are approved by the Engineer. Such samples, when approved, shall be the minimum standard for the work to which they apply. The proceduref or submitting samples of materials for testing or

approval and the method of marking for identification shall be as laid down by the Engineer.The Contractor shall allow in his Tender for such samples and tests, including those in connection with his Sub-Contractors work.

36. The Contractors attention is drawn to the Finance Bill of the year 2000/2001 on withholding tax on contractual payment section 35(7)(i)(ii) which became effective on 1st July 2000. A 3% withholding tax will be applicable to all in terim payments exceeding Kshs…….....……. for work done in respect of building or civil works. The contractor shall allow for any costs arising resulting there from in the build-up of rates.

37. Blasting will only be allowed with the express permission of the Architect in writing. All blasting operations shall be carried out at the Contractor's sole risk and cost, in accordance with any Government regulations in force for the time being, and any special regulations laid down by the Architect governing the use and storage of explosives.

38. The National Construction Authority is a state corporation established under the national construction authority Act No.14 of 2011. The broad Mandate of the Authority is to over see the construction industry and coordinate its development. The National Construction Authority Regulations 2014 with an effective date of 6thJune 2014, regulation 25, - Allow 0.5% of the tender sum/contract sum for construction levy.

39. The Contractor attention is drawn to Finance Bill of 1993 where VATwas introduced in all contracts for construction services. The tenderer is also drawn to VATAct Cap 476 clause 19(9). The tenderer must allow for VAT1.19 as instructed else where.

40. The contractor shall allow and pay for all insurance to cover risks and indemnities required Items 17 and 18 of the Conditions of contract and also specified in the Special Conditions of Contract.

LIFT: BILL NO. 1 - PRELIMINARY ITEMS

ITEM	DESCRIPTION	QTY	UNIT	UNIT RATE KES	AMOUNT KES
1	Discrepancies clause				
2	Conditions of sub-contract Agreement clause				
3	Payment's clause				
4	Site location clause				
5	Scope of Contract Works clause				
6	Extent of the Contractor's Duties clause				
7	Firm price contract clause				
8	Variation clause				
9	Prime cost and provisional sum clause (insert profit and attendance which is a percentage of expended PC or provisional sum.)				
10	Bond clause				
11	Government Legislation and Regulations clause				
12	Import Duty and Value Added Tax clause (Note this clause applies for materials supplied only. VAT will also be paid by the sub-contractor as allowed in the summary page)				
13	Insurance company Fees clause				
14	Provision of services by the Main contractor clause				
15	Samples and Materials Generally clause				
	SUB-TOTAL CARRIED TO PAGE LIFT: H-4				

ITEM	DESCRIPTION	QTY	UNIT	UNIT RATE KES	AMOUNT KES
16	Supplies clause				
17	Bills of Quantities clause				
18	Contractor's Office in Kenya clause				
19	Builder's Work clause				
20	Setting to work and Regulating system clause				
21	Identification of plant components clause				
22	Working Drawings clause				
23	Record Drawings (As Installed) and Instructions clause				
24	Maintenance Manual clause				
25	Hand over clause				
26	Painting clause				
27	Testing and Inspection – manufactured plant clause				
28	Testing and Inspection – Installation clause				
29	Storage of Materials clause				
30	Initial Maintenance clause				
	SUB-TOTAL CARRIED TO PAGE LIFT: H-4				

ITEM	DESCRIPTION	QTY	UNIT	UNIT RATE KES	AMOUNT KES
31	Attendance Upon Tradesmen, etc. (Insert percentage only) clause				
32	Local and other Authorities notices and fees clause				
33	Temporary Works clause				
34	Patent Rights clause				
35	Mobilization and Demobilization Clause				
36	Extended Preliminaries Clause				
37	Allow for profit and Attendance for the above				
38	Amendment to Scope of Sub-contract Works Clause				
39	Contractor Obligation and Employers Obligation clause				
40					
41	**Allow for Five Million Shillings (KES:5,000,000.00) for Five (5) Project to Oversees Factory Inspection of the Lifts as per Clause 11**	1	Sum	**5,000,000.00**	**5,000,000.00**
	SUB-TOTAL CARRIED TO PAGE LIFT: H-4				

ITEM	DESCRIPTION	QTY	UNIT	UNIT RATE KES	AMOUNT KES
a)	Subtotal brought forward from page **LIFT:**H-1				
b)	Subtotal brought forward from page **LIFT:** H-2				
c)	Subtotal brought forward from page **LIFT:** H-3				
	TOTAL FOR PRELIMINARIES CARRIED FORWARD TO PRICE MAIN SUMMARY Page LIFT:H-9				

Item	DESCRIPTION	Qty	Unit	Unit Rate KES	Amount KES
	LIFT: BILL NO. 2 - HOSPITAL BED PASSANGER LIFT				
1.01	(a)Price for all imported materials (give break-down on a separate sheet) (b)State the Foreign currency, if any, on which the tender is based…..... (c)State the exchange rate applied …….……	1	Lot		
1.02	Price for locally purchased Materials, Installation and commissioning costs including factories inspection fees (give breakdown on separate sheet).	1	Lot		
1.03	Price for full service maintenance of the lifts during 12 months defects liability period for whole period @ KES. ……per month	1	Sum		
1.03	Price for 2 No. Keys for the V.I.Ps	1	Lot		
1.04	Price for 2 sets of operation and maintenance manuals as described in the specifications.	1	Lot		
1.05	Price for 2 sets of record drawing as described in the specifications.	1	Lot		
1.06	1200 kgs (15 Persons) Speed of 1.5m/s, 6 No. stops Duplex, (machine Room Less) HOSPITAL BED PASSANGER LIFT, complete with voltage stabilizer.	3	No.		
1.07	Installation and commissioning of the 3 No. Passenger Lifts. The testing and commissioning will be done as detailed below: i) Prior to commencement of the commissioning work, the contractor shall submit a procedure for the inspection, testing and commissioning of the lifts. ii) Commissioning will be undertaken by a qualified person using the approved inspection, testing and commissioning procedure. iii) On successful commissioning of the system, in terms of the specified requirements, a Taking Over Certificate shall be completed. iv) The Final Completion date for the lift system installation is determined from the Hand over Certificate. The taking over date is also that date on which the warranty period is deemed to have commenced.	1	Item		
1.08	Maintenance for 12 months of 3 No. Passenger Lift as described in the Technical Specifications.	1	Item		
1.09	Allow for design and coordination, shop and working drawings, as installed and record drawings, demonstrations and instructions, equipment performance and adjustment settings, maintenance manual, service and warranty, tags, charts and instructions.	1	Item		
1.10	415V Surge diverter as Furze ESP 415, or approved equivalent, complete with purpose-made enclosure with viewing window.	1	No.		
	Total LIFT: Bill No. 1 C/F to Bill Collection Page LIFT:H-7				

Item	Description	Qty	Unit	Unit Rate KES	Amount KES
1.11	Allow for overseas factory inspection by 4No. Engineers Appointed by the Project Manager and 1No. Employer's representative as described in clause 11.0 page D_24 of the specifications.	1	Lot		
1.12	Allow for associated Electrical works on the Four (4 No.) floors installing appropriate fittings, lighting the lift shaft and switchgear in the machine room to the Engineers satsifaction.	1	Lot		
1.13	Allow for testing, inspection and certification of installed lifts by Government approved inspector	1	Lot		
1.14	Allow for training of 4No. Technicians Appointed by the Project Manager as described in clause 10 of the specifications	1	Lot		
1.15	FLUCTUATIONS Allow provisional sum of Kenya Shillings Six Hundred Thousands (KES. 600,000.00) for fluctuations	1	Sum	600,000.00	600,000.00
	Total C/F to LIFT: Bill Collection Page LIFT:H-7				

Item	Description	Amount in KES
	LIFT:BILL COLLECTION PAGE	
1	TOTAL AMOUNT B/F PAGE LIFT:H-5 ……	
2	TOTAL AMOUNT B/F PAGE LIFT:H-6……	
	Total For Bill C/F to LIFT: Price Summary page LIFT: H-8	

ITEM No.	LIFT PRICE SUMMARY PAGE	AMOUNT KES
1	Total Amount for LIFT: BILL No 1 Sub-Contract Preliminaries and General Conditions Brought Forward From page LIFT:H-4…	
2	Total Amount for LIFT: BILL No 2- 3No. HOSPITAL BED PASSANGER LIFT Brought Forward Fron page LIFT: H-8	
	SUB-TOTAL (Without V.A.T	
3	Add 16% V.A.T	
4	**ADD CONTIGENCY**	**1,000,000.00**
TOTAL AMOUNT FOR LIFT INSTALLATION (*VAT INCLUSIVE)* CARRIED FORWARD TO ELECTRICAL PRICE SUMMARY PAGE EPSP *01*		

ELECTRICAL PRICE SUMMARY PAGE

Item	Description	Amount KES
	ELECTRICAL PRICE SUMMARY PAGE	
1	TOTAL FOR ELECTRICAL WORKS B/F FROM ELECTRICAL PRICE SUMMARY PAGE Elec: H-51	
2	TOTAL FOR I.C.T WORKS B/F FROM ICT PRICE SUMMARY PAGE ICT: H-36	
3	TOTAL FOR NURSE CALL SYSTEM WORKS B/F FROM NURSE CALL PRICE SUMMARY PAGE NCS: H-10	
4	TOTAL FOR NU.P.S WORKS B/F FROM BILLS SUMMARY PAGE UPS: H-8	
5	TOTAL FOR GENERATORS & VOLTAGE STABILIZERS WORKS B/F FROM GENERATOR PRICE SUMMARY PAGE GEN: H-12	
6	TOTAL FOR LIFTS WORKS B/F FROM LIFTS PRICE SUMMARY PAGE LIFT: H-9	
TOTAL COST FOR ELECTRICAL ENGINEERING SERVICES WORKS CARRIED TO ELECTRICAL & MECHANICAL GRAND SUMMARY PAGE M&E GSP 01		

VOLUME II

MECHANICAL INSTALLATION WORK

FOR

INTERNAL PLUMBING, DRAINAGE AND FIRE FIGHTING,SOLAR HOT WATER HEATING, BOREHOLE DRILLING AND EQUIPPING,WATER TANKS MEDICAL GASES & OXYGEN PLANT,MORGUE COLD ROOM AND INCINERATOR INSTALATION WORKS

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Cold room and Incinerator……..D1-D103

SECTION A - EVALUATION AND QUALIFICATION CRITERIA

1.1 GENERAL PROVISIONS

1.2 This section contains the criteria that the Employer shall use to evaluate tender and qualify tenderers. No other factors, methods or criteria shall be used other than specified in this tender document. The Tenderer shall provide all the information requested in the forms included in Section IV, Tendering Forms. The Procuring Entity shall use **the Standard Tender Evaluation Document for Goods and Works** for evaluatingTenders.

1.3 Wherever a Tenderer is required to state a monetary amount, Tenderers should indicate the Kenya Shilling equivalent using the rate of exchange determined as follows:

a) For construction turnover or financial data required for each year - Exchange rate prevailing on the last day of the respective calendar year (in which the amounts for that year is to be converted) was originally established.

b) Value of single contract - Exchange rate prevailing on the date of the contract signature.

(a) Exchange rates shall be taken from the publicly available source identified in the ITT 14.3. Any error in determining the exchange rates in the Tender may be corrected by the Procuring Entity.

1.4 EVALUATION AND CONTRACT AWARD CRITERIA

TheProcuring Entity shall use the criteria and methodologies listed in this Section to evaluate tenders and arrive at the Lowest Evaluated Tender. The tender that(i) meets the qualification criteria, (ii) has been determined to be substantially responsive to the Tender Documents, and (iii) is determined to have the Lowest Evaluated Tender price shall be selected for award of contract.

2.0 PRELIMINARY EXAMINATION FOR DETERMINATION OF

The Procuring Entity will start by examining all tenders to ensure they meet in all respects the eligibility criteria and other mandatory requirements in the ITT, and that the tender is complete in all aspects in meeting the requirements provided for in the preliminary evaluation criteria outlined below. The Standard Tender Evaluation Report Document for Goods and Works for evaluating Tenders provides very clear guide on how to deal with review of these requirements. Tenders that do not pass the Preliminary Examination will be considered non-responsive and will not be considered further.

Tenderers are required to submit copies of the following MANDATORY DOCUMENTS which will be used during Preliminary Examination to determine responsiveness:

a) Copy of Certificate of Registration/Incorporation
b) Copy of Valid Tax Compliance Certificate
c)
d) Category of Registration with N.C.A 3 and above in the relevant trade
e) Must Submit NCA current annual licence Certificate.
f) Fill and submit the Form of Tender in the format provided

NOTE: ALL COPIES OF DOCUMENTS PROVIDED MUST BE CERTIFIED BY COMMISSIONER OF OTHS and ALL PAGES OF THE COMPLETE TENDER DOCUMENT SUBMITTED MUST BE PAGENATED/SERIALISED

g) Fill and submit the Self-declaration form that the person/tenderer is not debarred in the matter of the public procurement and asset disposal act 2015
h) Must fill and submit the Self-declaration form that the person/tenderer will not engage in any corrupt or fraudulent practice in the format provided
i) Must fill and submit the declaration and commitment to the code of ethics in the format provided
j) Must fill and submit Tenderer Information Form in the format provided
k) Must and submit a duly filled up Confidential Business Questionnaire in format provided
l) Fill and submit the Form of Tender Security in the format provided
m) Must submit manufacturer authorization where applicable

At this stage, the tenderer's submission will either be responsive or non- responsive. The non-responsive submissions will be eliminated from the entire evaluation process and will not be considered further.

PRICE EVALUATION

Consistent with and in addition to the criteria listed in ITT 33.3 and ITT 29.3; and ITT 34 and its subparagraphs the following criteria shall apply:

The tenderer who passes the required Technical score and provides the lowest evaluated price will be considered for award

2.2.1 Evaluation of Technical aspects of the Tender

The Procuring Entity shall evaluate the Technical aspects of the Tender to determine compliance with the Procuring Entity's requirements under Section V 'Schedule of Requirement' and whether the Tenders are substantially responsive to the Technical Specifications and other Requirements.

[The Procuring Entity will highlight herein any particular details, characteristics, functional guarantees or other requirements under the specifications, which the Tenderer is required to specifically confirm or provide details as per Section V, Supply Requirements or other parts of the Tender Document. To facilitate, a template may be attached or clearly described all information and list of documentation to be submitted by Tenderers to enable evaluation of Technical parts of the Tender]

Evaluation and comparison of Tenders: The following evaluation criteria shall be applied not withstanding any other requirement in the tender documents.

Selection Process

Below is a description of the evaluation steps that will be adopted.

STEP 1: Preliminary evaluation

This will be an elimination stage which will be done as per paragraph 2.0 above.

STEP 2: Technical evaluation

Bidders will be subjected to a technical evaluation as per the Evaluation Criteria.

The proposed solution should include items in the technical specification.

*Only bidders who **score 70% and above** of the proposed technical evaluation will be subjected to financial evaluation. Bidders who score less than 70% will be treated as non-compliant submissions and will be eliminated at this stage.*

STEP 2-TECHNICAL EVALUATION

Bidders shall be required to submit relevant technical brochures/catalogues with the tender document,highlighting the Catalogue Numbers of the proposed items. Such brochures/catalogues should indicate comprehensive relevant data of the proposed equipment/items which should include but not limited to the following:

(i) Standards of manufacture;
(ii) Performance ratings/characteristics;
(iii)Material of manufacture; (iv)Electrical power ratings; and
(v) Any other necessary requirements (Specify).

The bid will then be analyzed, using the information in the technical brochures, to determine compliance with General and Particular technical specifications for the works as indicated in the tender document. The tenderer shall also fill in the Technical Schedule as specified in the tender document for Equipment and Items indicating the Country of Origin, Model/Make/Manufacturer and catalogue numbers of the Items/Equipment they propose to supply.

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

PARAMETER		*MAXIMUM POINTS*
(i)	Compliance with Technical Specifications	40
(ii)	Tender Questionnaire	3
(iii)	Key personnel	12
(iv)	Contract Completed in the last Five (5) years	9
(v)	Schedules of on-going projects	4
(vi)	Schedules of contractors equipment	12
(vii)	Audited Financial Report for the last 3 years	6
(viii)	Evidence of Financial Resources	9
(ix)	Name, Address and Telephone of Banks (Contractor to provide)	3
(x)	Litigation History	2
	TOTAL	*100*

The pass-mark under the Technical Evaluation is 80 percent.

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

TABLE 1: Technical Evaluation

Item	Description	Points Scored	Max. Point	
1	**Compliance with Technical Specifications** • Compliant ----------40 • Non-compliant---------- 0 ***(Note: Tender Evaluation Committee to carryout analysis showing how decision on this requirement has been arrived at. Attach analysis on this as an Appendix)***		**40**	
2	**Tender Questionnaire Form** • Completely filled----------3 • Not filled---------- 0		**3**	
3	**Key Personnel (Attach evidence)**			**12**
	Director of the firm • Holder of degree in relevant Engineering field---------- 4 • Holder of diploma in relevant Engineering field---------- 3 • Holder of certificate in relevant Engineering field---------- 2 • Holder of trade test certificate in relevant Engineering field---------- 1 • No relevant certificate---------- 0		**4**	
	At least 1No. degree/diploma holder of key personnel in relevant field • With over 10 years relevant experience----------4 • With over 5 years relevant experience---------- 2 • With under 5 years relevant experience---------- 1		**4**	
	At least 1 No certificate holder of key personnel in relevant field • With over 10 years relevant experience---------- 2 • With over 5 years relevant experience---------- 1 • With under 5 years relevant experience----------0.5		**2**	
	At least 2No artisan (trade test certificate in relevant field) • Artisan with over 10 years relevant experience---------- 2 • Artisan with under 10 years relevant experience---------- 1 • Non skilled worker with over 10 years relevant experience---------- 0		**2**	
4	**Contracts completed in the last five (5) years (Max of 3No. Projects)- <u>Provide Evidence</u>** • Project of similar nature, complexity or magnitude---------- 3 • Project of similar nature but of lower value than the one in consideration ----------2 • No completed project of similar nature----------0		**9**	

Item	Description	Points Scored	Max. Point
5	**On-going projects – <u>Provide Evidence</u>** • No Project of similar nature, complexity and magnitude---------- 0 • Three and below Projects of similar, nature complexity and magnitude ---------- 3 • Four and above Projects of similar nature, complexity and magnitude ---------- 4		**4**
6	**Schedule of contractors equipment and transport (proof or evidence of ownership/Lease)**		**12**
	a) Relevant Transport • Means of transport (Vehicle)---------- 6 • No means of transport---------- 0		6
	b) Relevant Equipment • Has relevant equipment for work being tendered----------6 • No relevant equipment for work being tendered----------0		6
7	**Financial report**		**6**
	a) Audited financial report (last three (3) years) • Average Annual Turn-over equal to or greater than the cost of the project ----------6 • Average Annual Turn-over above 50% but below 100% of the cost of the project ---------- 3 • Average Annual Turn-over below 50% of the cost of the project - 1		
	b) Evidence of Financial Resources (cash in hand, lines of credit, over draft facility etc.) • Has financial resources to finance the projected **monthly cash flow*** for three months---------- 9 • Has financial resources equal to the projected **monthly cash flow***----------6 • Has financial resources less the projected **monthly cash flow***----------3 • Has not indicated sources of financial resources----------0		**9**
8	**Name, Address and Telephone of Banks (Contractor to provide)** • Information Provided----------3 • No Information Provided----------0		**3**
9	**Litigation History** • Duly Filled----------2 • Not filled----------0		**2**
	TOTAL		**100**

Any bidder who scores 80 points and above shall be considered for further evaluation.
**Monthly Cash Flow =Tender Sum/Contract Period*

STEP 3 - FINANCIAL EVALUATION

Upon completion of the technical evaluation a detailed financial evaluation shall follow.

The evaluation shall be in **three stages**

a) Determination of Arithmetic errors
b) Comparison of Rates; and
c) Consistency of the Rates.

A) *Determination of Arithmetic Errors*

Arithmetic Errors will be corrected by the Procuring Entity as follows:

i) 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 Bills of Quantities, the amount as stated in the Form of Tender shall prevail. Pursuant to Section 82 of the Public Procurement and Asset Disposal Act 2015, 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 by any person or entity;

ii) Error correction factor shall be computed by expressing the difference between the amount and the corrected tender sum as a percentage of the corrected contract works (i.e. corrected tender sum less P.C; and Provisional Sums);

B) *Comparison of rates*

Items that are under priced or overpriced may indicate potential for non-delivery and front loading respectively. The committee shall promptly write to the tenderer asking for detailed breakdown of costs for any of the quoted items, relationship between those prices, proposed construction/installation methods and schedules.

The evaluation committee shall evaluate the responses and make an appropriate recommendation to the procuring entity giving necessary evidence. Such recommendations may include but not limited to:

a) Recommend no adverse action to the tenderer after a convincing response;
b) Employer requiring that the amount of the performance bond be raised at the expense of the successful tenderer to a level sufficient to protect the employer against potential financial losses;
c) Recommend non-award based on the response provided and the available demonstratable evidence that the scope, quality, completion timing, administration of works to be undertaken by the tenderer, would adversely be affected or the rights of the employer or the tenderers obligations would be limited in a substantial way.

C) *Consistency of the Rates*

The evaluation committee will compare the consistency of rates for similar items and note all inconsistencies of the rates for similar items.

STAGE 4 - RECOMMENDATION FOR AWARD

The successful bidder shall be the tenderer with the lowest evaluated tender price.

SECTION B-BILLS OF QUANTITIES

(a) Preambles

1. The method of measurement of completed work for payment shall be in accordance with *[insert the name of a standard reference guide, or full details of the methods to be used]*.

2. The Contractor shall obtain the Architect's approval on the siting of all temporary buildings, spoil heaps, temporary access path, and storage of materials. The Contractor shall also obtain the Architect approval and direction regarding the use of any materials found on the Site.

3. The drawings used in the preparation of these Bills of Quantities can be inspected at the offices of the Procuring Entity or Procuring Entity's Representative during normal working hours. Two sets of the Working Drawings shall be provided to the contractor but additional copies shall be provided at a cost to be determined by the Engineer.

4. The Contractor shall allow for the payment of all bank charges in connection with the procurement of Bank Guarantees and stamp charges in connection with this contract Agreement.

5. The Contractor shall carry out the various sections of the Works in such an order as the Architect/Engineer May direct. The Procuring Entity reserves the right to occupy the Works by sections on completion provided that such occupation is considered to be both practical and reasonable and will not interfere with the Works. The Contractor shall allow any costs associated with such occupation.
6. The main Contractor will be fully responsible for paying his Sub-Contractor but the Procuring Entity reserves the right in very exceptional circumstances to make such payments direct in the interests of the project where the completion thereof might be jeopardized by any dispute or vicariousness between the Contractor and the Sub- Contractor involve.

7. The Contractor shall complete and deliver the Works in the period inserted in the Form of Tender as his time for completion of the Works from the date for Possession, to be agreed with the Engineer. The Contract Period is presumed to have been calculated making due allowance for seasonal inclement weather conditions. Noclaimfor extension of time due to the normal in clement weather for this area shall be entertained.

8. The Contractor shall, upon receiving instructions to proceed with the Works, draw up a Programme and Progress Chart setting out the order in which the Works are to be carried out, with the appropriate dates there of. This Chart shall be agreed with the Architect and no deviation from the order set out in it will be permitted without the written consent of the Engineer. The Contractor will be responsible for arranging the above programme with all his sub-Contractors and Specialties. The Contractor shall allow in his rates for carrying out this exercise, and for updating it as required.

9. The Contractor shall submit to the Architect on the first day of each week or such longer period as the Architect from time to time direct, a Progress Report and any information for the proceeding period, showing the progress during the period and the up-to-date cumulative progresson all important items of each section or portion of the Works.

10. The Contractor shall arrange for photographs of the Site to be taken by a professional photographer approved by the Engineer.The Photographs shall provide a record of the Site and adjacent are as prior to the commencement of the Works and shall cover such portion of the works in progress and completion as the Architect shall direct. All prints shall be full plate size, unmounted, and marked on the reverse side with the date of exposure, identification reference and brief description. The copyright of all photographs shall be vested in the Procuring Entity. The negatives and four prints from each negative shall be delivered to the Architect within two weeks of exposure.

11. Figured dimensions are to be followed in preference to dimensions scaled from the Drawings, but whenever possible dimensions are to be taken on the Site or from the buildings. Before any work is commenced by Sub-Contractors or Specialist Firms, dimensions must be checked on the site comparable dimensions shown on the drawings. The Contractor shall be responsible for the accuracy of such dimensions.

12. Prior to commencement of any work the Contractor is to ascertain from the relevant Authorities the exact position, depth and level of all existing electric cables, waterpipes or other services in the are aand he shall make whatever provisions may be required by the Authorities concerned for the support and protection of such services. Any damage or disturbance caused to any services shall be reported immediately to the Architect and the relevant Authority and shall be made good to their satisfaction at the Contractor's expense. Where appropriate the Contractor shall open up the ground in advance of the main work by hand digging if necessary, to locate precisely the position and details of the services which are likely to affect his operations.

13. The Contractor shall include in his prices for the transport of materials, workmen, etc./, to and from the site of the proposed works, at such hours and by such route as are permitted by the Authorities.

14. The Contractor will be required to make good, at his own expense and damage he may cause to the present road surface and pavements within or beyond the boundary of the Site, during the period of the works. All existing paths, storm water channels, etc., that may be destroyed or damaged during the progress of the Works shall be reinstated by the Contractor to the satisfaction of the Engineer.

15. The Contractor is to allow for complying with all instructions and regulations of the Police Authorities.

16. All water shall be fresh, clean and pure, free from earthly, vegetable or organic matter, acid or alkaline substance in solution. The Contractor shall provide at his own risk and cost all water for use in connection with the Works, (including works of sub–contractors). If need be, he shall make arrangements with the Local Water Authority for the installation of a separate meter for all water used by him throughout the Contract and pay all cost and fees in connection therewith. He shall also provide temporary storage tanks and tubing, etc., as may be necessary, and clear away at completion.

17. The Contractor shall provide all artificial lighting and power for his own use on the Works, (including Sub – Contractor's) including all temporary connections, wiring, fittings, etc., and clearing away on completion. The Contractor shall pay all fees and obtain all permits in connection there with.

18. The Contractor shall constantly keep on the Works a Literate English-speaking Agent or Representative, competent and experienced in the kind of work involved, who shall giveh is whole time to the superintendence of the works. (Including works of sub – contractors). Such Agent or Representative shall receive on behalf of the Contractordirections and instruction from the Engineer, and such directions and instructions shall be deemed to be given to the contractor in accordance with the Conditions of Contract. The Agent shall not be replaced without the specific approval of the Engineer.

19. The Contractor shall ensure that the safety of his work people and all authorized visitors to the site are protected at all times. In particular, there shall be the proper provision of guard–rails to scaffolding, protection against falling materials, tools on site, dust, nail and other sharp objects. The site shall be kept tidy and clear of dangerous rubbish. The Architect shall be empowered to suspend work on site should it be considered this condition is not being observed and no claim arising from such suspension will be allowed.

20. The are as available to the Contractor for workyards, offices and other facilities shall be directed by the Architect and any existing features to remain shall be protected from damage throughout the Contract Period and handed back in good condition when they are vacated at the end of the Contract. If additional areas are required, the contractorshallsourcethenatowncost.

21. The Contractor shall give the Architect reasonable notice of the intention to set out or take levels for any part of the Works so that arrangements may be made for checking the work. The accuracy of setting out and leveling shall be within the tolerances specified in the Specifications or on the Drawings. The checking of setting out or leveling by the Architect shall not relieve the Contractor of his duties or responsibilities under the Contract.

22. The Contractor must take steps necessary to safe guard and shall beheld fully responsible for any damage caused to existingand adjacent property, including buildings that are not a subject of demolition. He shall make good at his own cost damage to persons and property caused there on, and he shall indemnify the Procuring Entity against any loss or claim that may arise.

23. The Contractor shall take such steps and exercise such care and diligence as to minimize nuisance arising from dust, noise or any other cause to the occupiers of the existing and adjacent property. He must provide such temporary and special screens and tarpaulins or gummy bags, hoarding, barriers, warning signs etc. as he considers necessary and sufficient for the protection of the existing and adjacent property and or prevention of nuisance etc. as directed by Engineer.

24. The Contractors attention is drawn to the standards levy order which was amended on 15thOctober 1998.Legal notice No.154 of 1998. The Contractor is required to pay a monthly level of 0.2% of his factory price of construction works with effect from January 1999. Tenderer shall allow for this in the build-upo f his rates.

25. The Contractor shall provide temporary sheds, offices meshrooms, sanitary, accommodation and other temporary buildings for the use of the contractor and sub-contractors, including lighting furniture equipment and attendance.

26. Contractor shall provide/build labor camp sat areas to be agreed with the Engineer. Labor camps shall be complete with sanitary accommodation and fencing gates.

27. The Contractor must provide the necessary toilet facilities to the requirement and satisfaction of the Health Authorities and maintain the same in a thoroughly clean and sanitary condition and pay all conservancy fees during the period of the Works and remove when no longer required.

28. The Contractor shall provide at his own risk and cost all watching and lighting as necessary to safeguard the Works, Plant and materials against damage and theft.

29. The Contractor shall provide all necessary hoists, tackle, plant, equipment, vehicles, tools and appliances of every description for the due and satisfactory completion of the Works and shall remove the same on completion. All such plant, tools and equipment shall comply with all regulations in force throughout the period of the Contract and shall be altered or adopted during the Contract period as may be necessary to comply with any amendments in or additions to such regulations.

30. Provide, erect and maintain all necessary scaffolding, sufficiently strong and efficient for the due performance of the works, including Sub-Contract Works, provide special scaffolding as required by Sub-Contractors, alter and adopt all scaffolding as and when required during the Works, and remove on completion. No scaffolding is measured here in after and the Contractor must allow in his rates for this.

31. The Contractor shall take all necessary precautions such as temporaryf encing, hoarding fans, planked footways, guard–rails gantries screen, etc., for the safe custody of the Works, materials and public protection and adjacent properties.

32. Cover up all and protect from damage, including damage from in clement weather, all finished work and unfixed materials, including that of Sub-Contractors, etc., to the satisfaction of the Architect until the completion ofthe Contract.

33. The Contractor shall, after completion of the works, at his own expense, remove and clear away all surplus excavated demolition materials, plant, rubbish and unused materials and shall leave the whole of the Site and Works in a clean and tidy state to the satisfaction of the Engineer, sheds, camps, etc. Particular care shall be taken toleavecleanallfloors and windows and tore move all paint and cement all rubbis hand dirt as it accumulates. The Contractor is to find his own dump and shall pay all charges in connection there with.

34. Concrete test cubes shall be prepared in a set of three, as described including testing fees, labor and materials, making molds, transport, handling, etc. Allow in your rates for making at least four cubes on each occasion, from different batches; the concrete being taken from the point of deposit.

35. The Contractors hall furnish at the earliest possible opportunity before work commences, and at his own cost, any samples of materials and workmanship that may be called for by the Architect for the approval or rejection, and any further samples in the case of rejection, until such samples are approved by the Engineer. Such samples, when approved, shall be the minimum standard for the work to which they apply. The procedure f or submitting samples of materials for testing or approval and the method of marking for identification shall be as laid down by the Engineer.The Contractor shall allow in his Tender for such samples and tests, including those in connection with his Sub-Contractors work.

36. The Contractors attention is drawn to the Finance Bill of the year 2000/2001 on withholding tax on contractual payment section 35(7)(i)(ii) which became effective on 1st July 2000. A 3% withholding tax will be applicable to all interim payments exceeding Kshs…….....……. for work done in respect of building or civil works. The contractor shall allow for any costs arising resulting there from in the build-up of rates.

37. Blasting will only be allowed with the express permission of the Architect in writing. All blasting operations shall be carried out at the Contractor's sole risk and cost, in accordance with any Government regulations in force for the time being, and any special regulations laid down by the Architect governing the use and storage of explosives.

38. The National Construction Authority is a state corporation established under the national construction authority Act No.14 of 2011. The broad Mandate of the Authority is to over see the construction industry and coordinate its development. The National Construction Authority Regulations 2014 with an effective date of 6thJune 2014, regulation 25, - Allow 0.5% of the tender sum/contract sum for construction levy.

39. The Contractor attention is drawn to Finance Bill of 1993 where VAT was introduced in all contracts for construction services. The tenderer is also drawn to VAT Act Cap 476 clause 19(9). The tenderer must allow for VAT 1.19 as instructed else where.

40. The contractor shall allow and pay for all insurance to cover risks and indemnities required Items 17 and 18 of the Conditions of contract and also specified in the Special Conditions of Contract.

SPECIAL NOTES

i. The Bills of Quantities form part of the contract documents and are to be read in conjunction with the contract drawings and general specifications of materials and works.

ii. The prices quoted shall be deemed to include for all obligations under the sub-contract including but not limited to supply of materials, labour, delivery to site, storage on site, installation, testing, commissioning and all taxes (**including 16% VAT**).

iii. In accordance with Government policy, the 16% VAT and 3% Withholding Tax **shall be deducted** from all payments made to the Tenderer, and the same shall be forwarded to the **Kenya Revenue Authority (KRA).**

iv. All prices omitted from any item, section or part of the Bills of Quantities shall be deemed to have been included to another item, section or part there of.

v. The brief description of the items given in the Bills of Quantities are for the purpose of establishing a standard to which the sub-contractor shall adhere. Otherwise alternative brands of **equal** and **approved** quality will be accepted.

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

vi. The grand total of prices in the price summary page must be carried forward to the **Form of Tender for the tender to be deemed valid**.

vii. Tenderers must enclose, together with their submitted tenders, detailed manufacturer's Brochures detailing Technical Literature and specifications on all the equipment they intend to offer.

BILL NO. 1 - PRELIMINARY ITEMS

Prices will be inserted against item of preliminaries in the sub-contractor's Bills of Quantities and specification. These Bills are designated as Bill 1 in this Section. Where the sub-contractor fails to insert his price in any item he shall be deemed to have made adequate provision for this on various items in the Bills of Quantities. The preliminaries form part of this contract and together with other Bills of Quantities covers for the costs involved in complying with all the requirements for the proper execution of the whole of the works in the contract.

BILL No. 1 PRELIMINARIES

ITEM	DESCRIPTION	QTY	UNIT	RATE	KSHS	cts
1	Discrepancies clause					
2	Conditions of sub-contract Agreement clause					
3	Payments clause					
4	Site location clause					
5	Scope of Contract Works clause					
6	Extent of the Contractor's Duties clause					
7	Firm price contract clause					
8	Variation clause					
9	Prime cost and provisional sum clause (insert profit and attendance which is a percentage of expended PC or provisional sum.)					
10	Bond clause					
11	Government Legislation and Regulations clause					
12						
13	Import Duty and Value Added Tax clause (Note this clause applies for materials supplied only. VAT will also be paid by the sub-contractor as allowed in the summary page)					
14	Insurance company Fees clause					
15	Provision of services by the Main contractor clause					
	Samples and Materials Generally clause					
	SUB-TOTAL CARRIED TO PAGE B-8					

ITEM	DESCRIPTION	QTY	UNIT	RATE	KSHS	cts
16	Supplies clause					
17	Bills of Quantities clause					
18	Contractor's Office in Kenya clause					
19	Builder's Work clause					
20	Setting to work and Regulating system clause					
21	Identification of plant components clause					
22	Working Drawings clause					
23	Record Drawings (As Installed) and Instructions clause					
24	Maintenance Manual clause					
25	Hand over clause					
26	Painting clause					
27	Testing and Inspection – manufactured plant clause					
28						
29	Testing and Inspection – Installation clause					
30	Storage of Materials clause 1					
	Initial Maintenance clause					
	SUB-TOTAL CARRIED TO PAGE B-8					

ITEM	DESCRIPTION	QTY	UNIT	RATE	KSHS	cts
31	Attendance Upon Tradesmen, etc. (Insert percentage only) clause					
32	Local and other Authorities notices and fees clause					
33	Temporary Works clause					
34	Patent Rights clause					
35	Mobilization and Demobilization Clause					
36	Extended Preliminaries Clause					
37	Allow for profit and Attendance for the above					
38	Amendment to Scope of Sub-contract Works Clause					
39	Contractor Obligation and Employers Obligation clause					
40	Any other preliminaries;					
41	total above					
	Subtotal brought forward from page B6					
	Subtotal brought forward from page B8					
	TOTAL FOR PRELIMINARIES CARRIED FORWARD TO PRICE SUMMARY					

BILL NO.1- OPD BLOCK

Item	Description	Unit	Qty	Rate	Amount
	SANITARY FITTINGS Supply, deliver, install and fix the following sanitary fittings including all materials and jointing to supply, waste/soil and overflow pipes.Twyfords Ltd products are specified only as an indication of quality. Equal and approved appliances may be supplied. Where trade names are mentioned, the Ref. No. is intended only as a guide to the type and quality of fittings				
	Squatting Water Closet				
A	Squatting water closet suite in white vitreous china comprising of wc bowl with top plate and integral foot threads, complete with horizontal outlet to BS 3402.As Twyford or equal and approval.	No	14		
	WC Flush Valves				
B	50 mm WC flush valve for the above WC pan complete with, back entry with integral vacuum breaker, non-hold-open features and non-return valve, inlet control stop and wall plate comprising flush valve, bent chrome plated flush pipe and rubber pipe connector.As COBRA Flushometer model.	No	14		
C	Close-coupled WC suite ('S' or 'P'-trap) in approved colour complete with horizontal outlet to BS 3402 with 7.5 litre valveless low level ceramic cistern and fittings including siphon, 15mm diameter side inlet ball valve, 20mm diameter side overflow, plastic flush bend, dual flush system, inlet connection, chrome-plated lever and heavy plastic seat and cover with metal top fixed (chrome plated) hinges. All to be as IDEAL STANDARD “PLAN”-wc pan.109.003.34 water closet or equal and approved.	No	6		
	Total carried to Collection Page				

Item	Description	Unit	Qty	Rate (Kshs)	Amount
A	**Disabled Persons Water Closet and Wash Hand Basin Facility** Wheel chair accessible W.C facility Comprising of the following:- **i**)Close coupled W.C with 7.5 litre cistern with bottom inlet and overflow.The bowl shall be of size 375x560x420mm high.The bowl and cistern shall be manufactured from vitreous china complying with B.S 3402 .The unit shall be complete with valveless cistern fittings including syphon, 1 /2" side inlet ballvalve, 3 /4" side overflow, plastics flushbend, inlet connector and reversible metallic chrome plated cistern lever.There shall also be a heavy duty seat(25mmhigh) and cover with chrome plated metal hinges, toilet roll holder, 610 x 610 x 6mm thick mirror and robe hook. ii)Semi pedestal wall mounted W.H.B of size 600x500x545mm high with flexible connectors to waste and taps.The basin shall be manufactured from vitreous china complying with B.S 3402.It shall have one L/H tap hole with 1/2" chrome plated lever action pillar tap, chrome plated waste with height adjustable trap, pedestal and wall fixing bolts. **iii)** Hinged support rail with toilet roll holder 770mm long manufactured in nylon coated aluminium and mounted on a wall fixing plate plate size 230x100 mm, 4No 600mm grab rails with covered wall plates. The set shall be as Twyfords DOC.M wheelchair accessible W.C. facility or approved equivalent.	Set	1		
B	**Emergency Drencher Shower** Emergency Drencher Shower for use where accidental splashing of acid, chemical or radioactive chemial demands instant attention. Automatic in action, the shower sends down torrential cascade of water as soon as the user pulls the chain. 11/4" non-concussive valve with chain and rubber, 305mm diameter shower head with pipe and wall stays. Metal work chrome-plated. As "Armitage Shanks" or equal and approved.	No	2		
C	**Eye Wash Fountain** All chrome-plated metal eye wash fountain which instantly provides a gentle stream of water to wash the eyes in the event of an accident. The unit shall be as " Armitage Shanks" or equal and approved.	No	2		
	Total carried to Collection Page				

Item	Description	Unit	Qty	Rate (Kshs)	Amount
	Wash hand basin				
A	Half pedestal Wash hand basin size 510 x 420mm with one tap holes and chain stay hole, 32mm diameter chrome plated pop up chain waste, concealed wall brackets, chrome plated single tap hole basin mixer as Cobra and chrome plated bottle trap (32mm 'P' trap) with 75mm seal. The wash hand basin to be as Twyfords 'Sola 510' or equal and approved.	No	50		
B	Ditto but corner counter top wash ahd basin	No	18		
C	Hand Driers Automatic Hand Drier in white colour, operating on an infra-red automatic sensing system with safety cut-out complete with plastic rawl plugs and fixing screws. The hand drier to have a heating capacity of 1.8 kw and to be of size 270 x 64 x 143mm deep as HEATRAE SADIA "Handi Dri" or approved equivalent.	No	12		
D	Urinal Three range urinal bowl in white vitreous china comprising 3No. bowls with 2No. division complete with bowl/divisions support complete with 7.5 litres automatic ceramic cistern ref CX 8611 WH, and fittings including siphon ball valve, cistern supports and drip tap in brass, chrome plated bottle trap, chrome plated flushpipe and spreader ref SS 6071SS with all connections, wall hangers/supports. To be as Twyfords 'Camden' or approved equivalent.	No	4		
E	Urinal Two range urinal bowl in white vitreous china comprising 2No. bowls with 1No. division complete with bowl/divisions support complete with 7.5 litres automatic ceramic cistern ref CX 8611 WH, and fittings including siphon ball valve, cistern supports and drip tap in brass, chrome plated bottle trap, chrome plated flushpipe and spreader ref SS 6071SS with all connections, wall hangers/supports. To be as Twyfords 'Camden' or approved equivalent.	No	2		
	Total carried to Collection Page				

Item	Description	Unit	Qty		
A	Urinal flush valve as Cobra No.FJ 6000, 3/4" Flush Master Junior, CP, exposed type with integral ballostop valve and wall plate, complete with C.P. flush pipe and fittings for top inlet spreader.	No	6		
B	**Cleaners Sink** Heavy duty sink size 455 x 380 x 230mm deep in fireclay complete with hardwood pad on the front edge and fitted bucket aluminium alloy grating and 20mm chrome plated wall mounted inclined bricon tap, chrome plate chain and rubber stopper and heavy gauge 11/2" bottle trap and stainless steel legs. All as "Armitage Shanks Birch" or approved equivalent.	No	1		
C	**Medical Wash Hand Basin** Counter top Twyfords "SOLA L.B.G/L" wash hand basin with no tap holes and chain stay hole cat. No. WB 1520WH, wall brackets cat no. SR 1315 xx complete with "lever action mixer fitting, 1/2 with swivel nozzle and divided flow" wall mounted mixer cat. no. SF 1099 CP, chrome grid waste 11/4" cat no. WF 4341 CP and white plastic bottle trap 11/4" P-trap cat. no.WF 8482 xx or approved equivalent.	No	16		
D	**Shower fittings** Chrome plated shower mixer fitting 1/2" with adjustable shower rose at fixed height with concealed pipe work. Complete with hot and cold stop corks and wall fixing brackets.	No	2		
E	**Shower tray** Shower tray shall be constructed from microlite ceramic and of overall dimensions 900 x 900 x 150mm high and shall have a 40mm dia chrome plated waste. The shower shall be as "Twyfords Calypso" or approved equivalent	No	2		
F	**Plaster Sink** Stainless steel gauge 16 plaster sink complete with drain and 1/2" bib tap chrome-plated to be installed in plaster room including 100mm dia drain pipes and gully trap.	No.	2		
G	**Toilet roll holder** Toilet roll holder in vitreous china to BS 3402 in white colour of size 165x165mm and recessed into wall. Toilet roll holder to be as Twyfords “SEMI RECESSED & ORNAMENTAL’ accessories Ref. No. VC 9808 WH	No	16		
Total carried to Collection Page					

Item	Description	Unit	Qty	Rate (Kshs)	Amount
A	**Soap Dispenser** Soap Dispenser, capacity 1.136 litres complete with plastic rawl plugs, fixing screws, lock and key complete with initial fill of soap gel. The soap dispenser to be as ZALPON'S MARK 7 model, size 125 x 100 x 290mm high or approved equivalent	No	8		
B	**Mirrors** 6mm thick polished plate glass, silver backed mirror with beveled edges, size 610x497mm plugged and screwed to wall with 4No. Chrome plated chrome capped screws and 5mm thick foam back nest.	No	21		
C	**Laboratory Sinks** "Vulcathene" black injection moulded polypropylene sink with self-draining base and an outlet to accept the waste described below as Cat No.602 complete with:- - "Vultex Labline" bench mounted 1-way outlet fitting with inlet for supply and side valve having swivel nozzle and spout. - "Vulcathene" 1½" waste, plug, back, nut, butyl rubber gasket, grating and chain as Cat No.504. - "Vulcathene" anti-siphon bottle trap as Cat No. W561.	No	12		
D	**Taps** "Vultex Labline" bench mounted 1-way outlet fitting with inlet for supply and side valve having swivel nozzle and spout.	No.	12		
E	**Sluice Unit** Twyfords "Grafton B.P.S." hopper cat.no. FC4076WH loose-trap FC44612WH complete with Vitreous china high level cistern 7.5 Litre capacity with valveless fittings and reversible chain pull CX7610WH, cistern supporting brackets SR1300XX stainless steel flushpipe with spreader and clips SS6020SS Combine bedpan and urinal bottle jet with 1/2" lever handle taps, SF6504CP legs and bearers for hopper SR3053XX sinks 760mm x 455mm FC1350WH chain and waste 11/2" chrome plated WF4338CP waste pipe for the hopper WF9685WH legs and bearers for sink SR3043XX drain with anti-drip stip FC9684WH legs and bearers for drain SR3052XX chrome plated extended bib tap 1/2" SF5204CP Chrome plated Lever action mixer tap flexible hose and handspray SF7053CP.	No	2		
	Total carried to Collection Page				

Item	Description	Unit	Qty	Rate (Kshs)	Amount
A	**Kitchen Sink** Double bowl, double drainer stainless steel kitchen sink of size 1800 x 600mm as manufactured by ASL. The bowl size to be 430 x 420 x 200mm deep complete with chrome plated 40mm waste fittings, plugs, chain stays, overflow, 1No. 15mm diameter chrome plated sink mixer with over-arm swivel spout as Cobra model 166/04 with carina handles, chrome plated bottle trap with 75mm deep seal and chain waste fitting.	No	2		
B	**Robe hook** Robe hook in vitreous china and in white colour mounted unto a concealed screw to wall wedges, to be as Twyfords OC 6858 1998 or approved equivalent.	No	16		
	<u>Internal Plumbing Works</u> Supply, deliver and install pipes, tubing and fittings as described and shown on the drawings. The pipes shall be PN 25 PPR pipes where exposed to adverse weather condition and all conforming to the current European standards for PPR installations and to the Engineers approval, pipe jointing shall be by polyfusion or use of electric coupling. Rates must allow for all Metal/plastic threaded adaptors where required for the connection of sanitary fixtures, valves, sockets, sliding and fixed joints, support raceways, isolating sheaths, elastic materials, expansion arms and bends, crossovers, couplings, clippings, connectors, joints etc. as required in the running lengths of pipework and also where necessary, for pipe fixing clips, holder bats plugged and screwed for the proper and satisfactory functioning of the system. The pipes will be pressure tested before the plastering of wall commences and as per the manufacturers recommended testing pressures.				
	PPR Pipes				
C	20mm diameter pipework	Lm	160		
D	25mm diameter pipework	Lm	100		
E	32mm diameter pipework	Lm	150		
F	40mm diameter pipework	Lm	56		
G	50mm diameter pipework	Lm	70		
	Bends				
H	20mm diameter bends	No.	100		
I	25mm diameter bends	No.	100		
	Total carried to Collection Page				

Item	Description	Unit	Qty	Rate (Kshs)	Amount
A	32mm diameter bends	No.	45		
B	40mm diameter bends	No.	40		
C	50mm diameter bends	No.	26		
	Tees				
D	25mm equal Tees	No.	70		
E	32mm equal Tees	No.	48		
F	40mm equal Tees	No.	16		
G	50mm equal Tees	No.	8		
	Reducers				
H	25 x 20mm diameter reducer	No.	120		
I	32 x 20mm diameter	No.	100		
J	32 x 25mm diameter	No.	45		
K	40 x 20mm diameter	No.	60		
L	40 x 25mm diameter	No.	45		
M	40 x 32mm diameter	No.	34		
N	50 x 25mm diameter	No.	18		
O	50 x 32mm diameter	No.	22		
P	50 x 40mm diameter	No.	30		
	Unions				
Q	20mm diameter pipe unions	No.	25		
R	25mm diameter pipe unions	No.	18		
S	32mm diameter pipe unions	No.	14		
T	40mm diameter pipe unions	No.	11		
U	50mm diameter pipe unions	No.	9		
	Threaded Fittings				
V	20mm male/female threaded 90° bend/Elbow	No.	44		
	Total carried to collection page				

Item	Description	Unit	Qty	Rate (Kshs)	Amount
A	25mm male/female threaded 90° bend/Elbow	No.	70		
B	32mm male/female threaded 90° bend/Elbow	No.	32		
C	40mm male/female threaded 90° bend/Elbow	No.	28		
	Plugs				
D	40mm diameter pipe threaded plug	No.	5		
E	50mm ditto	No.	4		
	Valves				
F	25mm diameter approved medium pressure screw down full way non-rising stem wedge gate valve to BS 5154 PN 20 for series B rating, with wheel and head joints to steel tubing and complete with round male threaded transition fittings. The gate valve to be as PEGLER or approved equivalent.	No.	25		
G	32mm ditto	No.	14		
H	40mm ditto	No.	11		
I	50mm ditto	No.	9		
J	32mm non-return valve	No.	6		
K	32mm medium pressure ball valve	No.	1		
	Pipe Sleeves				
L	65mm diameter heavy duty PVC pipe sleeves for crossing over columns and beams.	Lm	45		
	Total carried to collection page				

Item	Description	Qty	Unit	Rate (Kshs)	Amount
	INTERNAL FOUL WATER DRAINAGE				
	Supply, deliver and install the following UPVC, MUPVC, soil and waste systems respectively to B.S 5255 with fittings fixed to Manufactures Printed instructions and manufactured by reputable manufacturers. Tenderers must allow in their pipework prices for all the couplings, clippings, connectors, joints etc. as required in the running lengths of pipework and also where necessary, for pipe fixing clips, holder bats plugged and screwed for the proper and satisfactory functioning of the system.				
	MuPVC and uPVC Waste and Soil pipework				
A	100mm diameter heavy gauge golden brown UPVC pipe	225	Lm		
B	100mm diameter heavy gauge grey mUPVC pipe	187	Lm		
C	75mm diameter heavy gauge grey mUPVC pipe	110	Lm		
D	50mm diameter waste pipe	150	Lm		
E	40mm diameter waste pipe	120	Lm		
F	32mm diameter waste pipe	83	Lm		
	Bends				
G	100mm diameter bend with access	34	No.		
H	100mm diameter long radius bend	18	No.		
I	75mm diameter long radius bend	24	No.		
J	100mm diameter sweep bend	20	No.		
K	50mm diameter sweep bend	30	No.		
L	40mm diameter sweep bend	29	No.		
M	32mm diameter sweep bend	32	No.		
	Total carried to collection page				

Item	Description	Qty	Unit	Rate (Kshs)	Amount
	Tees				
A	50mm diameter sweep tee	24	No.		
B	40mm diameter sweep tee	18	No.		
C	32mm diameter sweep tee	22	No.		
	Access Caps				
D	50mm diameter access cap	60	No.		
E	40mm diameter access cap	45	No.		
F	32mm diameter access cap	40	No.		
	Boss Connectors				
G	75 x 40mm diameter boss connector	22	No.		
	Reducing Sockets				
H	100 x 75 reducing socket	2	No.		
I	100 x 50 reducing socket	2	No.		
J	50 x 32 reducing socket	5	No.		
K	40 x 32 reducing socket	6	No.		
	WC Connectors				
L	100mm diameter WC connector	16	No.		
	Traps				
M	100 x 50mm diameter floor trap and grating	20	No.		
N	100 x 100mm diameter floor drain and grating	12	No.		
O	Standard 300 x 300 x 450mm masonry gully trap complete with 125mm thick reinforced concrete cover.	22	No.		
	Weathering Slates and Vent Cowls				
P	100mm diameter weathering slate and apron.	24	No.		
Q	100mm diameter vent cowl	24	No.		
	Total carried to collection page				

COLLECTION PAGE FOR GROUND FLOOR PLUMBING AND DRAINAGE WORKS

Item	Description		Amount (Kshs)
1	Total carried forward from page B8	……	
2	Total carried forward from page B9	……	
3	Total carried forward from page B10	……	
4	Total carried forward from page B11	……	
5	Total carried forward from page B12	……	
6	Total carried forward from page B13	……	
7	Total carried forward from page B14	……	
8	Total carried forward from pageB15	……	
9	Total carried forward from page B16	……	
10	Total carried forward from page B17	……	
Total for Ground Floor Plumbing and Drainage Works Carried to Summary Page			

BILL NO.2- MATERNITY

Item	Description	Unit	Qty	Rate	Amount
	SANITARY FITTINGS Supply, deliver, install and fix the following sanitary fittings including all materials and jointing to supply, waste/soil and overflow pipes.Twyfords Ltd products are specified only as an indication of quality. Equal and approved appliances may be supplied. Where trade names are mentioned, the Ref. No. is intended only as a guide to the type and quality of fittings				
A	Water Closet Close-coupled WC suite ('S' or 'P'-trap) in approved colour complete with horizontal outlet to BS 3402 with 7.5 litre valveless low level ceramic cistern and fittings including siphon, 15mm diameter side inlet ball valve, 20mm diameter side overflow, plastic flush bend, dual flush system, inlet connection, chrome-plated lever and heavy plastic seat and cover with metal top fixed (chrome plated) hinges. All to be as IDEAL STANDARD “PLAN”-wc pan.109.003.34 water closet or equal and approved.	No	18		
B	Wash hand basin Half pedestal Wash hand basin size 510 x 420mm with one tap holes and chain stay hole, 32mm diameter chrome plated pop up chain waste, concealed wall brackets, chrome plated single tap hole basin mixer as Cobra and chrome plated bottle trap (32mm 'P' trap) with 75mm seal. The wash hand basin to be as Twyfords 'Sola 510' or equal and approved.	No	34		
C	Ditto but Counter top Wash hand basin	No	20		
D	Cleaners Sink Heavy duty sink size 455 x 380 x 230mm deep in fireclay complete with hardwood pad on the front edge and fitted bucket aluminium alloy grating and 20mm chrome plated wall mounted inclined bricon tap, chrome plate chain and rubber stopper and heavy gauge 11/2" bottle trap and stainless steel legs. All as "Armitage Shanks Birch" or approved equivalent.	No	1		
E	Baby bath Vitreous china baby bath of size 510 x 650mm with two tap holes complete with supporting front legs and bearers in stainless steel, 32mm diameter waste fitting with removable overflow tube, lever operated mixer tap and chrome plated handles. All as Twyfords baby bath or approved equivalent.	No	6		
	Total carried to Collection Page				

Item	Description	Unit	Qty	Rate (Kshs)	Amount
A	Sluice Unit Twyfords "Grafton B.P.S." hopper cat.no. FC4076WH loose-trap FC44612WH complete with Vitreous china high level cistern 7.5 Litre capacity with valveless fittings and reversible chain pull CX7610WH, cistern supporting brackets SR1300XX stainless steel flushpipe with spreader and clips SS6020SS Combine bedpan and urinal bottle jet with 1/2" lever handle taps, SF6504CP legs and bearers for hopper SR3053XX sinks 760mm x 455mm FC1350WH chain and waste 11/2" chrome plated WF4338CP waste pipe for the hopper WF9685WH legs and bearers for sink SR3043XX drain with anti-drip stip FC9684WH legs and bearers for drain SR3052XX chrome plated extended bib tap 1/2" SF5204CP Chrome plated Lever action mixer tap flexible hose and handspray SF7053CP.	No	3		
A	Toilet roll holder Toilet roll holder in vitreous china to BS 3402 in white colour of size 165x165mm and recessed into wall. Toilet roll holder to be as Twyfords "SEMI RECESSED & ORNAMENTAL' accessories Ref. No. VC 9808 WH	No	24		
B	Soap Dispenser Soap Dispenser, capacity 1.136 litres complete with plastic rawl plugs, fixing screws, lock and key complete with initial fill of soap gel. The soap dispenser to be as ZALPON'S MARK 7 model, size 125 x 100 x 290mm high or approved equivalent	No	12		
C	Mirrors 6mm thick polished plate glass, silver backed mirror with beveled edges, size 610x497mm plugged and screwed to wall with 4No. Chrome plated chrome capped screws and 5mm thick foam back nest.	No	40		
D	Robe hook Robe hook in vitreous china and in white colour mounted unto a concealed screw to wall wedges, to be as Twyfords OC 6858 1998 or approved equivalent.	No	24		
	Total carried to Collection Page				

Item	Description	Unit	Qty	Rate (Kshs)	Amount
A	Shower fittings Concealed shower fitting consisting of 15mm chrome plated riser pipe to connect the concealed single lever shower mixer for hot and cold water to a 100mm diameter swivel/ adjustable shower rose, chrome plated handles and stop corks and other necessary fittings and accessories. All to be as Twyford or equal and approved.	No	8		
B	Shower tray Shower tray shall be constructed from microlite ceramic and of overall dimensions 900 x 900 x 150mm high and shall have a 40mm dia chrome plated waste. The shower shall be as "Twyfords Calypso" or approved equivalent	No	8		
C	Disabled Persons Water Closet and Wash Hand Basin Facility Wheel chair accessible W.C facility Comprising of the following:- i)Close coupled W.C with 7.5 litre cistern with bottom inlet and overflow.The bowl shall be of size 375x560x420mm high.The bowl and cistern shall be manufactured from vitreous china complying with B.S 3402 .The unit shall be complete with valveless cistern fittings including syphon, 1 /2" side inlet ballvalve, 3 /4" side overflow, plastics flushbend, inlet connector and reversible metallic chrome plated cistern lever.There shall also be a heavy duty seat(25mmhigh) and cover with chrome plated metal hinges, toilet roll holder, 610 x 610 x 6mm thick mirror and robe hook. ii)Semi pedestal wall mounted W.H.B of size 600x500x545mm high with flexible connectors to waste and taps.The basin shall be manufactured from vitreous china complying with B.S 3402.It shall have one L/H tap hole with 1/2" chrome plated lever action pillar tap, chrome plated waste with height adjustable trap, pedestal and wall fixing bolts. iii) Hinged support rail with toilet roll holder 770mm long manufactured in nylon coated aluminium and mounted on a wall fixing plate plate size 230x100 mm, 4No 600mm grab rails with covered wall plates. The set shall be as Twyfords DOC.M wheelchair accessible W.C. facility or approved equivalent.	set	1		
	Total carried to Collection Page				

Item	Description	Unit	Qty		
A	Dhobi Sink				
	Heavy duty stainless steel sink of size 600 x 450 x 285mm deep in 16 SWG as manufactured by ASL suitable for mounting on counter, complete with 1 No. 15mm diameter chrome plated back inlet bib tap Cobra ref 107EC CP, 40mm diameter chrome plated bottle trap and chain waste fitting and plug.	No.	1		
B	Urinal bowl				
	Urinal bowl in white vitreous china complete with 7.5 litres automatic ceramic cistern ref CX 8611 WH, and fittings including siphon ball valve, cistern supports and drip tap in brass, chrome plated bottle trap, chrome plated flushpipe and spreader ref SS 6071SS with all connections, wall hangers/supports. To be as Twyfords 'Camden' or approved equivalent.	No	3		
C	SCRUB-UP Twyford Scrub-up Trough 2500mm long with Left hand outlet Cat No. SS9122SS Complete with 3No. wall mounted Lever action mixer taps Cat No. SF1099CP 11/2Chrome plated Waste fitting and a s trap	No	4		
	<u>Internal Plumbing Works</u> Supply, deliver and install pipes, tubing and fittings as described and shown on the drawings. The pipes shall be PN 25 PPR pipes where exposed to adverse weather condition and all conforming to the current European standards for PPR installations and to the Engineers approval, pipe jointing shall be by polyfusion or use of electric coupling. Rates must allow for all Metal/plastic threaded adaptors where required for the connection of sanitary fixtures, valves, sockets, sliding and fixed joints, support raceways, isolating sheaths, elastic materials, expansion arms and bends, crossovers, couplings, clippings, connectors, joints etc. as required in the running lengths of pipework and also where necessary, for pipe fixing clips, holder bats plugged and screwed for the proper and satisfactory functioning of the system.				
	PPR Pipes				
D	20mm diameter pipework	Lm	120		
E	25mm diameter pipework	Lm	180		
F	32mm diameter pipework	Lm	150		
G	40mm diameter pipework	Lm	40		
	Bends				
H	20mm diameter bends	No.	68		
	Total carried to collection page				

Item	Description	Unit	Qty	Rate (Kshs)	Amount
A	25mm diameter bends	No.	55		
B	32mm diameter bends	No.	45		
C	40mm diameter bends	No.	20		
	Tees				
D	20mm equal Tees	No.	60		
E	25mm equal Tees	No.	48		
F	32mm equal Tees	No.	26		
G	40mm equal Tees	No.	20		
	Reducers				
H	25 x 20mm diameter reducer	No.	23		
I	32 x 20mm diameter	No.	14		
J	32 x 25mm diameter	No.	67		
K	40 x 20mm diameter	No.	45		
L	40 x 25mm diameter	No.	24		
M	40 x 32mm diameter	No.	55		
	Unions				
N	20mm diameter pipe unions	No.	34		
O	25mm diameter pipe unions	No.	20		
P	32mm diameter pipe unions	No.	25		
Q	40mm diameter pipe unions	No.	20		
	Threaded Fittings				
R	20mm male/female threaded 90° bend/Elbow	No.	120		
	Total carried to collection page				

Item	Description	Unit	Qty	Rate (Kshs)	Amount
A	25mm male/female threaded 90° bend/Elbow	No.	110		
B	32mm male/female threaded 90° bend/Elbow	No.	65		
C	40mm male/female threaded 90° bend/Elbow	No.	40		
	Valves				
F	25mm diameter approved medium pressure screw down full way non-rising stem wedge gate valve to BS 5154 PN 20 for series B rating, with wheel and head joints to steel tubing and complete with round male threaded transition fittings. The gate valve to be as PEGLER or approved equivalent.	No.	24		
G	32mm ditto	No.	20		
H	40mm ditto	No.	12		
K	32mm medium pressure ball valve	No.	6		
Total carried to collection page					

Item	Description	Qty	Unit	Rate (Kshs)	Amount (Kshs)
	INTERNAL FOUL WATER DRAINAGE Supply, deliver and install the following UPVC, MUPVC, soil and waste systems respectively to B.S 5255 with fittings fixed to Manufactures Printed instructions and manufactured by reputable manufacturers. Tenderers must allow in their pipework prices for all the couplings, clippings, connectors, joints etc. as required in the running lengths of pipework and also where necessary, for pipe fixing clips, holder bats plugged and screwed for the proper and satisfactory functioning of the system.				
	MuPVC and uPVC Waste and Soil pipework				
A	100mm diameter heavy gauge golden brown UPVC pipe	160	Lm		
B	100mm diameter heavy gauge grey mUPVC pipe	100	Lm		
D	50mm diameter waste pipe	110	Lm		
E	40mm diameter waste pipe	56	Lm		
F	32mm diameter waste pipe	44	Lm		
	Bends				
G	100mm diameter bend with access	24	No.		
K	50mm diameter sweep bend	24	No.		
L	40mm diameter sweep bend	40	No.		
M	32mm diameter sweep bend	30	No.		
Total carried to collection page					

Item	Description	Qty	Unit	Rate (Kshs)	Amount (Kshs)
	Tees				
A	50mm diameter sweep tee	35	No.		
B	40mm diameter sweep tee	25	No.		
C	32mm diameter sweep tee	30	No.		
	Access Caps				
D	50mm diameter access cap	5	No.		
E	40mm diameter access cap	8	No.		
F	32mm diameter access cap	6	No.		
	Boss Connectors				
G	75 x 40mm diameter boss connector	4	No.		
	Reducing Sockets				
H	100 x 75 reducing socket	3	No.		
I	100 x 50 reducing socket	2	No.		
J	50 x 32 reducing socket	4	No.		
K	40 x 32 reducing socket	2	No.		
	WC Connectors				
L	100mm diameter WC connector	24	No.		
	Traps				
M	100 x 50mm diameter floor trap and grating	45	No.		
N	100 x 100mm diameter floor drain and grating	20	No.		
Total carried to collection page					

COLLECTION PAGE FOR MATERNITY PLUMBING AND DRAINAGE WORKS

Item	Description		Amount (Kshs)
1	Total carried forward from page B19	……	
2	Total carried forward from page B20	……	
3	Total carried forward from page B21	……	
4	Total carried forward from page B22	……	
5	Total carried forward from page B23	……	
6	Total carried forward from page B24	……	
7	Total carried forward from page B25	……	
7	Total carried forward from page B26	……	
Total for First Floor Plumbing and Drainage Works Carried to Summary Page			

BILL NO.3 -SECOND FLOOR

Item	Description	Unit	Qty	Rate	Amount
	SANITARY FITTINGS Supply, deliver, install and fix the following sanitary fittings including all materials and jointing to supply, waste/soil and overflow pipes.Twyfords Ltd products are specified only as an indication of quality. Equal and approved appliances may be supplied. Where trade names are mentioned, the Ref. No. is intended only as a guide to the type and quality of fittings				
A	Water Closet Close-coupled WC suite ('S' or 'P'-trap) in approved colour complete with horizontal outlet to BS 3402 with 7.5 litre valveless low level ceramic cistern and fittings including siphon, 15mm diameter side inlet ball valve, 20mm diameter side overflow, plastic flush bend, dual flush system, inlet connection, chrome-plated lever and heavy plastic seat and cover with metal top fixed (chrome plated) hinges. All to be as IDEAL STANDARD “PLAN”-wc pan.109.003.34 water closet or equal and approved.	No	23		
D	Urinal Two range urinal bowl in white vitreous china comprising 2No. bowls with 2No. divisions complete with bowl/divisions support complete with 7.5 litres automatic ceramic cistern ref CX 8611 WH, and fittings including siphon ball valve, cistern supports and drip tap in brass, chrome plated bottle trap, chrome plated flushpipe and spreader ref SS 6071SS with all connections, wall hangers/supports. To be as Twyfords 'Camden' or approved equivalent.	No	2		
	Total carried to Collection Page				

Item	Description	Unit	Qty	Rate	Amount
	Wash Hand basin				
A	Counter top Wash hand basin size 510 x 420mm with one tap holes and chain stay hole, 32mm diameter chrome plated pop up chain waste, concealed wall brackets, chrome plated single tap hole basin mixer as Cobra and chrome plated bottle trap (32mm 'P' trap) with 75mm seal. The wash hand basin to be as Twyfords 'Sola 510' or equal and approved.	No	30		
C	Ditto but Half pedestal Wash hand basin	No	10		
B	Assisted Bath Assisted bath for the elderly and disabled with overflow blanking disc and grips 2No. tap holes cat No. BS 1172CP complete with chain waste fitting 11/2" cat No. WF 5344CP, supplementary leg sets for steel bath to BS 1390:1990 cat no. BG 1390xx, chrome plated chain waste 11/2" and overflow cat. no. WF 5650 CP, S-trap bath tub trap and chrome plated bath tub mixer with a telephone shower as "manhattan" 3/4" bath/shower mixer fitting cat. no.MH 5265CP and 3No. 600 x 35mm dia grab rails stainless steel. All as Twyfords Avalon Bath" or approved equivalent.	No	4		
C	Medical Wash Hand Basin Counter top Twyfords "SOLA L.B.G/L" wash hand basin with no tap holes and chain stay hole cat. No. WB 1520WH, wall brackets cat no. SR 1315 xx complete with "lever action mixer fitting, 1/2 with swivel nozzle and divided flow" wall mounted mixer cat. no. SF 1099 CP, chrome grid waste 11/4" cat no. WF 4341 CP and white plastic bottle trap 11/4" P-trap cat. no.WF 8482 xx or approved equivalent.	No	30		
D	Kitchen Sink (SBSD) Stainless steel, single bowl single drainer (SBSD) kitchen sink size 1067 x 573mm complete with 1No. 15mm dia chrome plated mixer tap with indicator for cold water in the headwork, 40mm dia heavy duty sink waste, 86mm dia flange, 93mm long shank slotted with plug and backnut, 40mm dia plastic bottle trap with 75mm deep seal, chain waste and plug..	No	1		
E	Mirrors 6mm thick polished plate glass, silver backed mirror with beveled edges, size 610x457mm plugged and screwed to wall with 4No. Chrome plated chrome capped screws and 5mm thick foam back nest.	No	24		
	Total carried to Collection Page				

Item	Description	Unit	Qty	Rate	Amount
A	Bed Pan Washer Sink Combination combined bed pan washer as and sink assembly with drainer comprising of hopper at right hand side, loose bolted S-trap with sealing gasket, vitreous china high level 9litre cistern, with valveless fittings and reversible chain pull, cistern supporting brackets, stainless steel flushpipe with spreader and clip, combined bedpan and urinal bottle jet with 1/2" lever handle tap and legs and bearers to hopper/sink. The sink to be of size 760 x 455mm and waste pipe to hopper legs and bearers for sink drainer with anti-drip strip and legs and bearers for drainer. The fitting to be chrome plated 1/2" lever action mixer tap, flexible hose and hand spray, wall hook. All as "Twyfords Grafton" or approved equivalent.	No	2		
B	Sterilization Sink Hospital sterilization sink in stainless steel, size 600 x 600mm x 450mm deep with two tap holes, stainless steel cantilever brackets(pair) , front leg supports in stainless steel and unslotted chain waste fitting complete with lever action mixer tap for hot and cold water. All as Twyfords Hospital Sink or approved equivalent.	No	2		
C	Soap Dispenser Soap Dispenser, capacity 1.136 litres complete with plastic rawl plugs, fixing screws, lock and key complete with initial fill of soap gel. The soap dispenser to be as ZALPON'S MARK 7 model, size 125 x 100 x 290mm high or approved equivalent	No	10		
	Total carried to Collection Page				

Item	Description	Unit	Qty	Rate	Amount
A	Toilet roll holder Toilet roll holder in vitreous china to BS 3402 in white colour of size 165x165mm and recessed into wall. Toilet roll holder to be as Twyfords “SEMI RECESSED & ORNAMENTAL’ accessories Ref. No. VC 9808 WH	No	22		
B	Soap Dish Twyfords semi-recessed built in soap tray in vitreous china size: 305 x 150mm	No	20		
C	Shower fittings 15mm diameter concealed shower fitting with fixed 100mm diametershower rose with both cold and hot water stop cork knobs or approved equivalent	No	11		
D	Shower tray Shower tray shall be constructed from microlite ceramic and of overall dimensions 800 x 800 x 150mm high and shall have a 40mm dia chrome plated waste. The shower shall be as "Twyfords Calypso" or approved equivalent	No	11		
E	Towel rail High quality chrome-plated towel rail screwed to wall, and complete with wall plates as "Twyfords PB 0363CP" or approved equivalent	No	11		
F	Copper tubing 12mm diameter copper tubing 300mm long bent as required including union jointing to steel tubing and fittings	No	11		
G	Urinal flush valve as Cobra No.FJ 6000, 3/4" Flush Master Junior, CP, exposed type with integral ballostop valve and wall plate, complete with C.P. flush pipe and fittings for top inlet spreader.	No	5		
	Total carried to Collection Page				

Item	Description	Unit	Qty	Rate (Kshs)	Amount
	Internal Plumbing Works				
	Supply, deliver and install pipes, tubing and fittings as described and shown on the drawings. The pipes shall be PN 25 PPR pipes where exposed to adverse weather condition and all conforming to the current European standards for PPR installations and to the Engineers approval, pipe jointing shall be by polyfusion or use of electric coupling. Rates must allow for all Metal/plastic threaded adaptors where required for the connection of sanitary fixtures, valves, sockets, sliding and fixed joints, support raceways, isolating sheaths, elastic materials, expansion arms and bends, crossovers, couplings, clippings, connectors, joints etc. as required in the running lengths of pipework and also where necessary, for pipe fixing clips, holder bats plugged and screwed for the proper and satisfactory functioning of the system. The pipes will be pressure tested before the plastering of wall commences and as per the manufacturers recommended testing pressures.				
	PPR Pipes				
A	20mm diameter pipework	Lm	100		
B	25mm diameter pipework	Lm	85		
C	32mm diameter pipework	Lm	65		
D	40mm diameter pipework	Lm	64		
E	50mm diameter pipework	Lm	30		
	Bends				
F	20mm diameter bends	No.	50		
G	25mm diameter bends	No.	18		
H	32mm diameter bends	No.	13		
I	40mm diameter bends	No.	7		
J	50mm diameter bends	No.	5		
	Total carried to collection page				

Item	Description	Unit	Qty	Rate (Kshs)	Amount
	Tees				
A	25mm equal Tees	No.	20		
B	32mm equal Tees	No.	25		
C	40mm equal Tees	No.	18		
D	50mm equal Tees	No.	10		
	Reducers				
E	25 x 20mm diameter reducer	No.	15		
F	32 x 20mm diameter	No.	10		
G	32 x 25mm diameter	No.	13		
H	40 x 20mm diameter	No.	7		
I	40 x 25mm diameter	No.	9		
J	40 x 32mm diameter	No.	3		
K	50 x 25mm diameter	No.	5		
L	50 x 32mm diameter	No.	2		
M	50 x 40mm diameter	No.	5		
	Unions				
N	20mm diameter pipe unions	No.	16		
O	25mm diameter pipe unions	No.	13		
P	32mm diameter pipe unions	No.	11		
Q	40mm diameter pipe unions	No.	11		
R	50mm diameter pipe unions	No.	9		
	Threaded Fittings				
S	20mm male/female threaded 90° bend/Elbow	No.	35		
T	25mm male/female threaded 90° bend/Elbow	No.	18		
U	32mm male/female threaded 90° bend/Elbow	No.	20		
V	40mm male/female threaded 90° bend/Elbow	No.	9		
Total carried to collection page					

Item	Description	Unit	Qty	Rate (Kshs)	Amount
	Valves				
A	25mm diameter approved medium pressure screw down full way non-rising stem wedge gate valve to BS 5154 PN 20 for series B rating, with wheel and head joints to steel tubing and complete with round male threaded transition fittings. The gate valve to be as PEGLER or approved equivalent.	No.	10		
B	32mm ditto	No.	8		
C	40mm ditto	No.	5		
D	50mm ditto	No.	2		
E	32mm non-return valve	No.	2		
F	32mm medium pressure ball valve	No.	1		
	Pipe Sleeves				
G	65mm diameter heavy duty PVC pipe sleeves for crossing over columns and beams.	Lm	45		
	Total carried to collection page				

Item	Description	Qty	Unit	Rate (Kshs)	Amount
	INTERNAL FOUL WATER DRAINAGE				
	Supply, deliver and install the following UPVC, MUPVC, soil and waste systems respectively to B.S 5255 with fittings fixed to Manufactures Printed instructions and manufactured by reputable manufacturers. Tenderers must allow in their pipework prices for all the couplings, clippings, connectors, joints etc. as required in the running lengths of pipework and also where necessary, for pipe fixing clips, holder bats plugged and screwed for the proper and satisfactory functioning of the system.				
	MuPVC and uPVC Waste and Soil pipework				
A	100mm diameter heavy gauge grey mUPVC pipe	85	Lm		
B	75mm diameter heavy gauge grey mUPVC pipe	10	Lm		
C	50mm diameter waste pipe	56	Lm		
D	40mm diameter waste pipe	75	Lm		
E	32mm diameter waste pipe	93	Lm		
	Bends				
F	100mm diameter bend with access	5	No.		
G	100mm diameter sweep bend	20	No.		
H	50mm diameter sweep bend	12	No.		
I	40mm diameter sweep bend	16	No.		
J	32mm diameter sweep bend	46	No.		
	Tees				
K	100mm diameter sweep tee	20	No.		
L	50mm diameter sweep tee	10	No.		
M	40mm diameter sweep tee	12	No.		
N	32mm diameter sweep tee	30	No.		
	Total carried to collection page				

Item	Description	Qty	Unit	Rate (Kshs)	Amount
	Access Caps				
A	100mm diameter access cap	10	No.		
B	50mm diameter access cap	6	No.		
C	40mm diameter access cap	14	No.		
D	32mm diameter access cap	24	No.		
	Boss Connectors				
E	100 x 50mm diameter boss connector	12	No.		
F	100 x 40mm diameter boss connector	12	No.		
G	100 x 32mm diameter boss connector	12	No.		
	Reducing Sockets				
H	50 x 40 reducing socket	10	No.		
I	40 x 32 reducing socket	12	No.		
	WC Connectors				
J	100mm diameter WC connector	30	No.		
	Traps				
K	100 x 50mm diameter floor trap and grating	25	No.		
L	100 x 100mm diameter floor drain and grating	4	No.		
M	100mm diameter single branch	8	No.		
N	100mm double branch	6	No.		
Total carried to collection page					

COLLECTION PAGE FOR SECOND FLOOR PLUMBING AND DRAINAGE WORKS

Item	Description		Amount (Kshs)
1	Total carried forward from page B28	……	
2	Total carried forward from page B29	……	
3	Total carried forward from page B30	……	
4	Total carried forward from page B31	……	
5	Total carried forward from page B32	……	
6	Total carried forward from page B33	……	
7	Total carried forward from page B34	……	
8	Total carried forward from page B35	……	
9	Total carried forward from page B36	……	
Total Plumbing and Drainage Works Carried to Summary Page			

BILL NO.4 -THIRD FLOOR

Item	Description	Unit	Qty	Rate	Amount
	SANITARY FITTINGS Supply, deliver, install and fix the following sanitary fittings including all materials and jointing to supply, waste/soil and overflow pipes.Twyfords Ltd products are specified only as an indication of quality. Equal and approved appliances may be supplied. Where trade names are mentioned, the Ref. No. is intended only as a guide to the type and quality of fittings				
A	Close-coupled WC suite ('S' or 'P'-trap) in approved colour complete with horizontal outlet to BS 3402 with 7.5 litre valveless low level ceramic cistern and fittings including siphon, 15mm diameter side inlet ball valve, 20mm diameter side overflow, plastic flush bend, dual flush system, inlet connection, chrome-plated lever and heavy plastic seat and cover with metal top fixed (chrome plated) hinges. All to be as IDEAL STANDARD “PLAN”-wc pan.109.003.34 water closet or equal and approved.	No	27		
B	Ambulant Disabled Water Closet suite Low level wash down water closet suite for the elderly and disabled in white complete with horizontal outlet AND BOTTOM SUPPLY AND OVERFLOW WITH CLOSE COUPLING SIDE LEVER TREATMENT, 7.5 litre cistern, raised heavy duty toilet seat and cover and S-trap outlet and 600 x 35mm stainless steel grab rails (4No.) in stainless steel.The set to be complete with wash hand basin, 6mm thick mirror, toilet roll holder and robe hook. All to be as "Twyfords Avalon BTW" or approved equivalent.	No	2		
	Total carried to Collection Page				

Item	Description	Unit	Qty	Rate	Amount
A	Urinal Three range urinal bowl in white vitreous china comprising 3No. bowls with 3No. divisions complete with bowl/divisions support complete with 7.5 litres automatic ceramic cistern ref CX 8611 WH, and fittings including siphon ball valve, cistern supports and drip tap in brass, chrome plated bottle trap, chrome plated flushpipe and spreader ref SS 6071SS with all connections, wall hangers/supports. To be as Twyfords 'Camden' or approved equivalent.	No	1		
B	Urinal Two range urinal bowl in white vitreous china comprising 2No. bowls with 2No. divisions complete with bowl/divisions support complete with 7.5 litres automatic ceramic cistern ref CX 8611 WH, and fittings including siphon ball valve, cistern supports and drip tap in brass, chrome plated bottle trap, chrome plated flushpipe and spreader ref SS 6071SS with all connections, wall hangers/supports. To be as Twyfords 'Camden' or approved equivalent.	No	3		
C	Wash hand basin Counter top Wash hand basin size 510 x 420mm with one tap holes and chain stay hole, 32mm diameter chrome plated pop up chain waste, concealed wall brackets, chrome plated single tap hole basin mixer as Cobra and chrome plated bottle trap (32mm 'P' trap) with 75mm seal. The wash hand basin to be as Twyfords 'Sola 510' or equal and approved.	No	22		
D	Ditto but Half pedestal Wash hand basin	No	14		
E	Assisted Bath Assisted bath for the elderly and disabled with overflow blanking disc and grips 2No. tap holes cat No. BS 1172CP complete with chain waste fitting 11/2" cat No. WF 5344CP, supplementary leg sets for steel bath to BS 1390:1990 cat no. BG 1390xx, chrome plated chain waste 11/2" and overflow cat. no. WF 5650 CP, S-trap bath tub trap and chrome plated bath tub mixer with a telephone shower as "manhattan" 3/4" bath/shower mixer fitting cat. no.MH 5265CP and 3No. 600 x 35mm dia grab rails stainless steel. All as Twyfords Avalon Bath" or approved equivalent.	No	4		
	Total carried to Collection Page				

Item	Description	Unit	Qty	Rate	Amount
A	Medical Wash Hand Basin Counter top Twyfords "SOLA L.B.G/L" wash hand basin with no tap holes and chain stay hole cat. No. WB 1520WH, wall brackets cat no. SR 1315 xx complete with "lever action mixer fitting, 1/2 with swivel nozzle and divided flow" wall mounted mixer cat. no. SF 1099 CP, chrome grid waste 11/4" cat no. WF 4341 CP and white plastic bottle trap 11/4" P-trap cat. no.WF 8482 xx or approved equivalent.	No	2		
B	Mirrors 6mm thick polished plate glass, silver backed mirror with beveled edges, size 610 x 610mm plugged and screwed to wall with 4No. Chrome plated chrome capped screws and 5mm thick foam back nest.	No	34		
C	Bed Pan Washer Sink Combination combined bed pan washer as and sink assembly with drainer comprising of hopper at right hand side, loose bolted S-trap with sealing gasket, vitreous china high level 9litre cistern, with valveless fittings and reversible chain pull, cistern supporting brackets, stainless steel flushpipe with spreader and clip, combined bedpan and urinal bottle jet with 1/2" lever handle tap and legs and bearers to hopper/sink. The sink to be of size 760 x 455mm and waste pipe to hopper legs and bearers for sink drainer with anti-drip strip and legs and bearers for drainer. The fitting to be chrome plated 1/2" lever action mixer tap, flexible hose and hand spray, wall hook. All as "Twyfords Grafton" or approved equivalent.	No	2		
D	Cleaners Sink Heavy duty sink size 455 x 380 x 230mm deep in fireclay complete with hardwood pad on the front edge and fitted bucket aluminium alloy grating and 20mm chrome plated wall mounted inclined bricon tap, chrome plate chain and rubber stopper and heavy gauge 11/2" bottle trap and stainless steel legs. All as "Armitage Shanks Birch" or approved equivalent.	No	1		
	Total carried to Collection Page				

Item	Description	Unit	Qty	Rate	Amount
A	Robe hook Robe hook in vitreous china and in white colour mounted unto a concealed screw to wall wedges, to be as Twyfords OC 6858 1998 or approved equivalent.	No	27		
B	Soap Dispenser Soap Dispenser, capacity 1.136 litres complete with plastic rawl plugs, fixing screws, lock and key complete with initial fill of soap gel. The soap dispenser to be as ZALPON'S MARK 7 model, size 125 x 100 x 290mm high or approved equivalent	No	16		
C	Toilet roll holder Toilet roll holder in vitreous china to BS 3402 in white colour of size 165x165mm and recessed into wall. Toilet roll holder to be as Twyfords “SEMI RECESSED & ORNAMENTAL’ accessories Ref. No. VC 9808 WH	No	27		
D	Soap Dish Twyfords semi-recessed built in soap tray in vitreous china size: 305 x 150mm	No	21		
E	Shower fittings 15mm diameter concealed shower fitting with fixed 100mm diametershower rose with stop cork for both cold and hot water	No	21		
F	Shower tray Shower tray shall be constructed from microlite ceramic and of overall dimensions 800 x 800 x 150mm high and shall have a 40mm dia chrome plated waste. The shower shall be as "Twyfords Calypso" or approved equivalent	No	21		
G	Towel rail High quality chrome-plated towel rail screwed to wall, and complete with wall plates as "Twyfords PB 0363CP" or approved equivalent	No	21		
H	Copper tubing 12mm diameter copper tubing 300mm long bent as required including union jointing to steel tubing and fittings	No	21		
I	Urinal flush valve as Cobra No.FJ 6000, 3/4" Flush Master Junior, CP, exposed type with integral ballostop valve and wall plate, complete with C.P. flush pipe and fittings for top inlet spreader.	No	9		
	Total carried to Collection Page				

Item	Description	Unit	Qty	Rate (Kshs)	Amount
	Internal Plumbing Works Supply, deliver and install pipes, tubing and fittings as described and shown on the drawings. The pipes shall be PN 25 PPR pipes where exposed to adverse weather condition and all conforming to the current European standards for PPR installations and to the Engineers approval, pipe jointing shall be by polyfusion or use of electric coupling. Rates must allow for all Metal/plastic threaded adaptors where required for the connection of sanitary fixtures, valves, sockets, sliding and fixed joints, support raceways, isolating sheaths, elastic materials, expansion arms and bends, crossovers, couplings, clippings, connectors, joints etc. as required in the running lengths of pipework and also where necessary, for pipe fixing clips, holder bats plugged and screwed for the proper and satisfactory				
	PPR Pipes				
A	20mm diameter pipework	Lm	120		
B	25mm diameter pipework	Lm	100		
C	32mm diameter pipework	Lm	98		
D	40mm diameter pipework	Lm	60		
E	50mm diameter pipework	Lm	28		
	Bends				
F	20mm diameter bends	No.	35		
G	25mm diameter bends	No.	40		
H	32mm diameter bends	No.	20		
I	40mm diameter bends	No.	7		
J	50mm diameter bends	No.	5		
	Tees				
K	25mm equal Tees	No.	72		
L	32mm equal Tees	No.	48		
M	40mm equal Tees	No.	19		
N	50mm equal Tees	No.	12		
Total carried to collection page					

Item	Description	Unit	Qty	Rate (Kshs)	Amount
	Reducers				
A	25 x 20mm diameter reducer	No.	70		
B	32 x 20mm diameter	No.	10		
C	32 x 25mm diameter	No.	22		
D	40 x 20mm diameter	No.	20		
E	40 x 25mm diameter	No.	19		
F	40 x 32mm diameter	No.	22		
G	50 x 25mm diameter	No.	29		
H	50 x 32mm diameter	No.	12		
I	50 x 40mm diameter	No.	6		
	Unions				
J	20mm diameter pipe unions	No.	24		
K	25mm diameter pipe unions	No.	30		
L	32mm diameter pipe unions	No.	34		
M	40mm diameter pipe unions	No.	20		
N	50mm diameter pipe unions	No.	5		
	Threaded Fittings				
O	20mm male/female threaded 90° bend/Elbow	No.	62		
P	25mm male/female threaded 90° bend/Elbow	No.	81		
Q	32mm male/female threaded 90° bend/Elbow	No.	28		
R	40mm male/female threaded 90° bend/Elbow	No.	18		
Total carried to collection page					

Item	Description	Unit	Qty	Rate (Kshs)	Amount
	Valves				
A	25mm diameter approved medium pressure screw down full way non-rising stem wedge gate valve to BS 5154 PN 20 for series B rating, with wheel and head joints to steel tubing and complete with round male threaded transition fittings. The gate valve to be as PEGLER or approved equivalent.	No.	15		
B	32mm ditto	No.	13		
C	40mm ditto	No.	8		
D	50mm ditto	No.	5		
E	32mm non-return valve	No.	2		
F	32mm medium pressure ball valve	No.	1		
	Pipe Sleeves				
G	65mm diameter heavy duty PVC pipe sleeves for crossing over columns and beams.	Lm	60		
	Total carried to collection page				

Item	Description	Qty	Unit	Rate (Kshs)	Amount
	INTERNAL FOUL WATER DRAINAGE				
	Supply, deliver and install the following UPVC, MUPVC, soil and waste systems respectively to B.S 5255 with fittings fixed to Manufactures Printed instructions and manufactured by reputable manufacturers. Tenderers must allow in their pipework prices for all the couplings, clippings, connectors, joints etc. as required in the running lengths of pipework and also where necessary, for pipe fixing clips, holder bats plugged and screwed for the proper and satisfactory functioning of the system.				
	MuPVC and uPVC Waste and Soil pipework				
A	100mm diameter heavy gauge grey mUPVC pipe	185	Lm		
B	50mm diameter waste pipe	78	Lm		
C	40mm diameter waste pipe	72	Lm		
D	32mm diameter waste pipe	111	Lm		
	Bends				
E	100mm diameter bend with access	2	No.		
F	100mm diameter sweep bend	22	No.		
G	50mm diameter sweep bend	16	No.		
H	40mm diameter sweep bend	14	No.		
I	32mm diameter sweep bend	48	No.		
	Tees				
J	100mm diameter sweep tee	24	No.		
K	50mm diameter sweep tee	14	No.		
L	40mm diameter sweep tee	12	No.		
M	32mm diameter sweep tee	28	No.		
	Total carried to collection page				

Item	Description	Qty	Unit	Rate (Kshs)	Amount
	Access Caps				
A	100mm diameter access cap	12	No.		
B	50mm diameter access cap	9	No.		
C	40mm diameter access cap	12	No.		
D	32mm diameter access cap	18	No.		
	Boss Connectors				
E	100x 50mm diameter boss connector	30	No.		
F	100x 40mm diameter boss connector	16	No.		
G	100x 32mm diameter boss connector	15	No.		
	Reducing Sockets				
H	50 x 40 reducing socket	10	No.		
I	40 x 32 reducing socket	12	No.		
	WC Connectors				
J	100mm diameter WC connector	27	No.		
	Traps				
K	100 x 50mm diameter floor trap and grating	35	No.		
L	100 x 100mm diameter floor drain and grating	4	No.		
M	100mm diameter double branch	10	No.		
N	100mm diameter single branch	9	No.		
	Vulcathene pipework				
O	51mm diameter pipework	16	Lm		
P	38mm ditto	18	Lm		
Q	38mm bend	6	No.		
R	38mm diameter access cap	6	No.		
Total carried to collection page					

COLLECTION PAGE FOR THIRD FLOOR PLUMBING AND DRAINAGE WORKS

Item	Description		Amount (Kshs)
1	Total carried forward from page - B38	……	
2	Total carried forward from page - B39	……	
3	Total carried forward from page - B40	……	
4	Total carried forward from page -B41	……	
5	Total carried forward from page - B42	……	
6	Total carried forward from page - B43	……	
7	Total carried forward from page - B44	……	
8	Total carried forward from page - B45	……	
9	Total carried forward from page -B46	……	
Total for Third Floor Plumbing and Drainage Works Carried to Summary Page			

BILL NO.5 -FOURTH FLOOR

Item	Description	Unit	Qty	Rate	Amount
	SANITARY FITTINGS Supply, deliver, install and fix the following sanitary fittings including all materials and jointing to supply, waste/soil and overflow pipes.Twyfords Ltd products are specified only as an indication of quality. Equal and approved appliances may be supplied. Where trade names are mentioned, the Ref. No. is intended only as a guide to the type and quality of fittings				
A	Close-coupled WC suite ('S' or 'P'-trap) in approved colour complete with horizontal outlet to BS 3402 with 7.5 litre valveless low level ceramic cistern and fittings including siphon, 15mm diameter side inlet ball valve, 20mm diameter side overflow, plastic flush bend, dual flush system, inlet connection, chrome-plated lever and heavy plastic seat and cover with metal top fixed (chrome plated) hinges. All to be as IDEAL STANDARD “PLAN”-wc pan.109.003.34 water closet or equal and approved.	No	27		
B	Ambulant Disabled Water Closet suite Low level wash down water closet suite for the elderly and disabled in white complete with horizontal outlet AND BOTTOM SUPPLY AND OVERFLOW WITH CLOSE COUPLING SIDE LEVER TREATMENT, 7.5 litre cistern, raised heavy duty toilet seat and cover and S-trap outlet and 600 x 35mm stainless steel grab rails (4No.) in stainless steel.The set to be complete with wash hand basin, 6mm thick mirror, toilet roll holder and robe hook. All to be as "Twyfords Avalon BTW" or approved equivalent.	No	1		
	Wash Hand Basin				
C	Counter top Wash hand basin size 510 x 420mm with one tap holes and chain stay hole, 32mm diameter chrome plated pop up chain waste, concealed wall brackets, chrome plated single tap hole basin mixer as Cobra and chrome plated bottle trap (32mm 'P' trap) with 75mm seal. The wash hand basin to be as Twyfords 'Sola 510' or equal and approved.	No	16		
	Total carried to Collection Page				

Item	Description	Unit	Qty		
A	Assisted Bath Assisted bath for the elderly and disabled with overflow blanking disc and grips 2No. tap holes cat No. BS 1172CP complete with chain waste fitting 11/2" cat No. WF 5344CP, supplementary leg sets for steel bath to BS 1390:1990 cat no. BG 1390xx, chrome plated chain waste 11/2" and overflow cat. no. WF 5650 CP, S-trap bath tub trap and chrome plated bath tub mixer with a telephone shower as "manhattan" 3/4" bath/shower mixer fitting cat. no.MH 5265CP and 3No. 600 x 35mm dia grab rails stainless steel. All as Twyfords Avalon Bath" or approved equivalent.	No	2		
B	Medical Wash Hand Basin Counter top Twyfords "SOLA L.B.G/L" wash hand basin with no tap holes and chain stay hole cat. No. WB 1520WH, wall brackets cat no. SR 1315 xx complete with "lever action mixer fitting, 1/2 with swivel nozzle and divided flow" wall mounted mixer cat. no. SF 1099 CP, chrome grid waste 11/4" cat no. WF 4341 CP and white plastic bottle trap 11/4" P-trap cat. no.WF 8482 xx or approved equivalent.	No	6		
C	Mirrors 6mm thick polished plate glass, silver backed mirror with beveled edges, size 610x610mm plugged and screwed to wall with 4No. Chrome plated chrome capped screws and 5mm thick foam back nest.	No	22		
D	Bed Pan Washer Sink Combination combined bed pan washer as and sink assembly with drainer comprising of hopper at right hand side, loose bolted S-trap with sealing gasket, vitreous china high level 9litre cistern, with valveless fittings and reversible chain pull, cistern supporting brackets, stainless steel flushpipe with spreader and clip, combined bedpan and urinal bottle jet with 1/2" lever handle tap and legs and bearers to hopper/sink. The sink to be of size 760 x 455mm and waste pipe to hopper legs and bearers for sink drainer with anti-drip strip and legs and bearers for drainer. The fitting to be chrome plated 1/2" lever action mixer tap, flexible hose and hand spray, wall hook. All as "Twyfords Grafton" or approved equivalent.	No	2		
	Total carried to Collection Page				

Item	Description	Unit	Qty	Rate	Amount
A	Cleaners Sink Heavy duty sink size 455 x 380 x 230mm deep in fireclay complete with hardwood pad on the front edge and fitted bucket aluminium alloy grating and 20mm chrome plated wall mounted inclined bricon tap, chrome plate chain and rubber stopper and heavy gauge 11/2" bottle trap and stainless steel legs. All as "Armitage Shanks Birch" or approved equivalent.	No	1		
B	Soap Dispenser Soap Dispenser, capacity 1.136 litres complete with plastic rawl plugs, fixing screws, lock and key complete with initial fill of soap gel. The soap dispenser to be as ZALPON'S MARK 7 model, size 125 x 100 x 290mm high or approved equivalent	No	6		
C	Toilet roll holder Toilet roll holder in vitreous china to BS 3402 in white colour of size 165x165mm and recessed into wall. Toilet roll holder to be as Twyfords “SEMI RECESSED & ORNAMENTAL’ accessories Ref. No. VC 9808 WH	No	11		
D	Soap Dish Twyfords semi-recessed built in soap tray in vitreous china size: 305 x 150mm	No	6		
E	Shower fittings 15mm diameter concealed shower fitting with fixed 100mm diametershower rose with stop cork for both cold and hot water	No	6		
F	Shower tray Shower tray shall be constructed from microlite ceramic and of overall dimensions 800 x 800 x 150mm high and shall have a 40mm dia chrome plated waste. The shower shall be as "Twyfords Calypso" or approved equivalent	No	6		
G	Towel rail High quality chrome-plated towel rail screwed to wall, and complete with wall plates as "Twyfords PB 0363CP" or approved equivalent	No	6		
	Total carried to Collection Page				

Item	Description	Unit	Qty	Rate (Kshs)	Amount
	Internal Plumbing Works Supply, deliver and install pipes, tubing and fittings as described and shown on the drawings. The pipes shall be PN 25 PPR pipes where exposed to adverse weather condition and all conforming to the current European standards for PPR installations and to the Engineers approval, pipe jointing shall be by polyfusion or use of electric coupling. Rates must allow for all Metal/plastic threaded adaptors where required for the connection of sanitary fixtures, valves, sockets, sliding and fixed joints, support raceways, isolating sheaths, elastic materials, expansion arms and bends, crossovers, couplings, clippings, connectors, joints etc. as required in the running lengths of pipework and also where necessary, for pipe fixing clips, holder bats plugged and screwed for the proper and satisfactory functioning of the system. The pipes will be pressure tested before the plastering of wall commences and as per the manufacturers recommended testing pressures				
	PPR Pipes				
A	20mm diameter pipework	Lm	35		
B	25mm diameter pipework	Lm	40		
C	32mm diameter pipework	Lm	15		
D	40mm diameter pipework	Lm	10		
E	50mm diameter pipework	Lm	5		
	Bends				
F	20mm diameter bends	No.	45		
G	25mm diameter bends	No.	25		
H	32mm diameter bends	No.	10		
I	40mm diameter bends	No.	5		
J	50mm diameter bends	No.	1		
	Tees				
K	25mm equal Tees	No.	25		
L	32mm equal Tees	No.	30		
M	40mm equal Tees	No.	10		
N	50mm equal Tees	No.	2		
	Total carried to collection page				

Item	Description	Unit	Qty	Rate (Kshs)	Amount
	Reducers				
A	25 x 20mm diameter reducer	No.	35		
B	32 x 20mm diameter	No.	10		
C	32 x 25mm diameter	No.	21		
D	40 x 20mm diameter	No.	8		
E	40 x 25mm diameter	No.	10		
F	40 x 32mm diameter	No.	5		
G	50 x 25mm diameter	No.	3		
H	50 x 32mm diameter	No.	2		
I	50 x 40mm diameter	No.	2		
	Unions				
J	20mm diameter pipe unions	No.	18		
K	25mm diameter pipe unions	No.	12		
L	32mm diameter pipe unions	No.	12		
M	40mm diameter pipe unions	No.	9		
N	50mm diameter pipe unions	No.	7		
	Threaded Fittings				
O	20mm male/female threaded 90° bend/Elbow	No.	40		
P	25mm male/female threaded 90° bend/Elbow	No.	32		
Q	32mm male/female threaded 90° bend/Elbow	No.	15		
R	40mm male/female threaded 90° bend/Elbow	No.	12		
Total carried to collection page					

Item	Description	Unit	Qty	Rate (Kshs)	Amount
	Valves				
A	25mm diameter approved medium pressure screw down full way non-rising stem wedge gate valve to BS 5154 PN 20 for series B rating, with wheel and head joints to steel tubing and complete with round male threaded transition fittings. The gate valve to be as PEGLER or approved equivalent.	No.	10		
B	32mm ditto	No.	8		
C	40mm ditto	No.	9		
D	50mm ditto	No.	7		
E	32mm non-return valve	No.	2		
F	32mm medium pressure ball valve	No.	1		
	Pipe Sleeves				
G	65mm diameter heavy duty PVC pipe sleeves for crossing over columns and beams.	Lm	48		
	Total carried to collection page				

Item	Description	Qty	Unit	Rate (Kshs)	Amount
	INTERNAL FOUL WATER DRAINAGE Supply, deliver and install the following UPVC, MUPVC, soil and waste systems respectively to B.S 5255 with fittings fixed to Manufactures Printed instructions and manufactured by reputable manufacturers. Tenderers must allow in their pipework prices for all the couplings, clippings, connectors, joints etc. as required in the running lengths of pipework and also where necessary, for pipe fixing clips, holder bats plugged and screwed for the proper and satisfactory functioning of the system.				
	MuPVC and uPVC Waste and Soil pipework				
A	100mm diameter heavy gauge grey mUPVC pipe	55	Lm		
B	50mm diameter waste pipe	100	Lm		
C	40mm diameter waste pipe	45	Lm		
D	32mm diameter waste pipe	65	Lm		
	Bends				
E	100mm diameter bend with access	4	No.		
F	100mm diameter sweep bend	20	No.		
G	50mm diameter sweep bend	12	No.		
H	40mm diameter sweep bend	16	No.		
I	32mm diameter sweep bend	32	No.		
	Tees				
J	100mm diameter sweep tee	22	No.		
K	50mm diameter sweep tee	15	No.		
L	40mm diameter sweep tee	15	No.		
M	32mm diameter sweep tee	40	No.		
	Total carried to collection page				

Item	Description	Qty	Unit	Rate (Kshs)	Amount
	Access Caps				
A	100mm diameter access cap	24	No.		
B	50mm diameter access cap	10	No.		
C	40mm diameter access cap	16	No.		
D	32mm diameter access cap	42	No.		
	Boss Connectors				
E	100 x 50mm diameter boss connector	8	No.		
F	100 x 40mm diameter boss connector	8	No.		
G	100 x 32mm diameter boss connector	8	No.		
	Reducing Sockets				
H	50 x 40 reducing socket	10	No.		
I	40 x 32 reducing socket	12	No.		
	WC Connectors				
J	100mm diameter WC connector	16	No.		
	Traps				
K	100 x 50mm diameter floor trap and grating	12	No.		
L	100 x 100mm diameter floor drain and grating	2	No.		
	Weathering Slates and Vent Cowls				
N	100mm diameter weathering slate and apron.	29	No.		
O	100mm diameter vent cowl	29	No.		
P	100mm diameter double branch	6	No.		
Q	100mm diameter single branch	10	No.		
Total carried to collection page					

COLLECTION PAGE FOR FOURTH FLOOR PLUMBING AND DRAINAGE WORKS

Item	Description		Amount (Kshs)
1	Total carried forward from page B48	……	
2	Total carried forward from page B49	……	
3	Total carried forward from page B50	……	
4	Total carried forward from page B51	……	
5	Total carried forward from page B52	……	
6	Total carried forward from page B53	……	
7	Total carried forward from page B54	……	
8	Total carried forward from page B55	……	
Total Plumbing and Drainage Works Carried to Summary Page			

Item	Description	Unit	Qty	Rate (Kshs)	Amount
	Bill No.6-Roof Plan Plumbing Works				
	PPR Pipes				
A	25mm diameter pipework	Lm	24		
B	32mm diameter pipework	Lm	80		
C	40mm diameter pipework	Lm	189		
D	50mm diameter pipework	Lm	165		
E	63mm diameter pipework	Lm	145		
	Bends				
F	25mm diameter bends	No.	18		
G	32mm diameter bends	No.	23		
H	40mm diameter bends	No.	26		
I	50mm diameter bends	No.	18		
J	63mm diameter bends	No.	15		
	Tees				
K	50mm equal Tees	No.	12		
L	63mm equal Tees	No.	15		
	Total carried to collection page				

Item	Description	Unit	Qty	Rate (Kshs)	Amount
	Reducers				
A	50 x 32mm diameter reducer	No.	7		
B	50 x 40mm diameter	No.	16		
C	50 x 25mm diameter	No.	7		
D	63 x 25mm diameter	No.	9		
E	63 x 32mm diameter	No.	13		
F	63 x 40mm diameter	No.	9		
G	63 x 50mm diameter	No.	7		
	Unions				
H	20mm diameter pipe unions	No.	2		
I	25mm diameter pipe unions	No.	4		
J	32mm diameter pipe unions	No.	4		
K	40mm diameter pipe unions	No.	14		
L	50mm diameter pipe unions	No.	6		
M	63mm diameter pipe unions	No.	5		
Total carried to collection page					

Item	Description	Unit	Qty	Rate (Kshs)	Amount
	Valves				
A	25mm diameter approved medium pressure screw down full way non-rising stem wedge gate valve to BS 5154 PN 20 for series B rating, with wheel and head joints to steel tubing and complete with round male threaded transition fittings. The gate valve to be as PEGLER or approved equivalent.	No.	4		
B	32mm ditto	No.	4		
C	40mm ditto	No.	14		
D	50mm ditto	No.	12		
E	63mm ditto	No.	10		
F	32mm non-return valve	No.	1		
G	32mm medium pressure ball valve	No.	1		
H	Supply, deliver and Assemble a water tank, made of pressed steel sectional tank plates 6mm thick plates (type 1 and 4) and of size 1000mm x 1000mm capacity of tank to be 40,000 litres of preferred dimensions 5000mm x 4000mm x 2000mm. The tank to come complete with tank cover, mosquito proof inspection vent, internal stays, jointing material, bolts and nuts including applying two coats of non-toxic bituminous paint on the inside and two coats of aluminum paint on the outside.	No.	4		
	Total carried to collection page				

COLLECTION PAGE FOR ROOF SPACE PLUMBING

Item	Description		Amount (Kshs)
1	Total carried forward from page B57	……	
2	Total carried forward from page B58	……	
3	Total carried forward from page B59	……	
Total FOR ROOF Plumbing Works Carried to Summary Page			

Item	Description	Qty	Unit	Rate (Kshs)	Amount (Kshs)
	Bill No.7-Fire Protection				
	Supply, deliver and install the following fire fighting equipment in positions indicated on the contract drawings or as shall be instructed by the Engineer. Supply and install the following fire fighting installation and equipment as described and shown on the drawings. Tenderers should allow for all fittings, jointings couplings including unions and clamps where necessary for the proper functioning of the installation when pricing.				
	Hosereel Installation				
	Hosereel				
A	20mm diameter 30m long swinging type hose reel complete with delivery valve, mild steel feed pipe, isolation valve, guide and all other accessories as "Angus Fire Armour" or equal and approved.	15	No.		
	GMS Pipework, Class B				
B	20mm diameter pipework	45	Lm		
C	25mm diameter pipework	90	Lm		
D	50mm diameter pipework	165	Lm		
	Extra Over Pipework				
	Bends				
E	20mm diameter bends	30	No.		
F	25mm diameter bends	45	No.		
G	50mm diameter bends	30	No.		
	Tees				
H	50mm diameter equal Tees	15	No.		
	Valves				
I	25mm diameter approved medium pressure screw down full way non-rising stem wedge gate valve to BS 1952, with wheel and head joints to steel tubing. The gate valve to be as PEGLER or approved equivalent.	15	No.		
J	50mm diameter ditto	5	No.		
	Reducers				
K	50 x 25 mm diameter reducer	18	No.		
	Total carried to Collection Page				

Item	Description	Qty	Unit	Rate (Kshs)	Amount
	Unions				
A	25mm diameter pipe unions	15	No.		
B	50mm diameter pipe unions	5	No.		
C	Hosereel Pumpset Hosereel pumpset, one duty, the other standby mounted on a frame with a mild steel base plate. Each pump shall have a duty 5m^3/hr. against 50m head as Grundfos model CH 4 - 40 or approved equivalent. In addition, there shall be a 60 litres diaphragm pressure vessel (as Varem or approved equivalent), pressure switches, a switch to protect dry run, 65mm foot valve and strainer, tank connections, gate valves and non-return valves. Control shall be effected via a pressure switch through a pre-wired control panel which shall give automatic change-over from duty to standby pump within 5 seconds should the duty pump fail to deliver for any reason. The pumpset shall include all non-returns valves, timer, isolating valves and pipe connections.	2	Set		
D	Control and Control Panel Control panel for the above pumps with contactors, over voltage and under voltage protection relays, MCBs, start/stop push buttons and indicators lights. All this shall be housed in a lockable cabinet (with integral isolator) made from SWG 18 mild steel sheet that is oven powder coated. The controls shall also include a float switch or flow switch for prevention against dry running complete with its cable.	1	Item		
E	Fire Hose Cabinet Surface mounted fire hose cabinet manufactured from electro galvanised steel sheet with folded edges and curled hose plate edges and painted with electro static powder coating, 180°C baked. The cabinet size shall be capable of housing hosereel and 3No. portable extinguishers and should conform to BS EN 671-1. To be as Germania or equal and approved.	15	No.		
F	Painting Allow for painting of the hosereel installation with 2 coats of super gloss paint on a primer coat to the approval of the Project Engineer.	1	Item		
G	Standard Printed Lable Standard printed lables for the fire cupboards.	15	No.		
	Total carried to Collection Page				

Item	Description	Qty	Unit	Rate (Kshs)	Amount
	Portable Fire Extinguishers Supply, deliver, install, test and commission the following portable fire extinguishers and conforming to BS EN 3 / BS 1449.				
A	Water/Carbon Dioxide Gas Fire Extinguisher 9 litres water/carbon dioxide gas portable fire extinguisher complete with pressure gauge, initial charge and mounting brackets.	15	No		
B	Carbon Dioxide Gas Fire Extinguisher 5kg carbon dioxide gas portable fire extinguisher complete with pressure gauge, initial charge and mounting brackets.	15	No		
C	Dry Chemical Powder Fire Extinguisher 9kg dry chemical podwer portable fire extinguisher complete with pressure gauge, initial charge and mounting brackets.	15	No		
D	Manual Alarm Bell 9" (225mm) manual operated alarm bell (Gong)	15	No		
E	Fire Blanket Fire blanket made of cloth woven with pre-asbestos yarn or any other fire proof material and to measure 1800 x 1210 mm. It shall be fitted with special tapes folded so as to offer instantaneous single action to release blanket from storing jacket to BS 1721.	5	No		
F	Fire Notices Allow for fire signage for the hose reel system, fire exits and fire instructions as as described in the particular specifications and to the Project Engineer's approval.	15	No		
	Total Carried to Collection Page				

COLLECTION PAGE FOR FIRE PROTECTION SERVICES

Item	Description		Amount (Kshs)
1	Total carried forward from page B61	……	
2	Total carried forward from page B62	……	
3	Total carried forward from page B63	……	
Total For Fire Protection Works Carried to Summary Page			

	BILL NO. 8: WATER RETICULATION				
Item	Description	Qty	Unit	Rate Kshs	Amount (Kshs)
	Supply, deliver and install galvanized mild steel pipes to BS 1387, class "B"Tenderers must allow in their pricing of pipework for all couplings, connectors, joints, unions, nipples etc as required in running lengths of pipework. Also where necessary for pipe fixing clips, holderbats plugged or screwed.				
	Excavations				
A	Excavate trench in red soil/murram for small pipe not exceeding 1000mm deep and average 750mm deep, Part return in, fill and surplus cart away.	545	LM		
B	Allow for keeping the excavated trenches free of water either by bailing or by pumping.	1	Sum		
	GMS Pipework				
C	100mm diameter Gms pipework	519	LM		
D	65mm dia. Ditto	78	LM		
E	50mm ditto	148	LM		
F	40mm dia. Ditto	36	LM		
G	32mm dia. Ditto	64	LM		
H	20mm dia ditto	48	LM		
I	15mm dia ditto	0	LM		
	Extra over GMS Pipework for the following:				
	Bends				
J	100mm diameter bends/elbows	18	No		
K	65mm diameter bends/elbows	8	No		
L	50mm diameter bends/elbows	7	No		
M	40mm diameter bends/elbows	9	No		
N	32mm diameter bends/elbows	19	No		
O	20mm diameter bends/elbows	10	No		
P	15mm diameter bends/elbows	0	No		
	Tees				
Q	100mm diameter equal tee	9	No		
R	65mm ditto	7	No		
	Total Carried to collection Page				

Item	Description	Qty	Unit	Rate Kshs	Amount (Kshs)
A	50mm ditto	4	No		
B	40mm ditto	5	No		
C	32mm ditto	5	No		
D	20mm ditto	0	No		
	Reducers				
E	100 x 65mm diameter valve reducing sockets	5	No		
F	100 x 32mm ditto	6	No		
G	100 x 20mm ditto	5	No		
H	65 x 50mm ditto	3	No		
I	65 x 32mm ditto	16	No		
J	50 x 40mm ditto	2	No		
K	50 x 32mm ditto	2	No		
L	40 x 32mm ditto	5	No		
M	32 x 20mm ditto	3	No		
N	20 x 15mm ditto	0	No		
	Valves 100mm diameter high pressure approved pattern brass rising stem fullway gate valve with wheel head and jointing to tubing as “Pegler” or approved equivalent.	5	No		
O	65mm ditto	2	No		
P	50mm diameter ditto	4	No		
Q	40mm diameter ditto	2	No		
R	32mm diameter ditto	4	No		
	Unions				
S	65mm diameter union	5	No		
T	50mm ditto	1	No		
U	40mm ditto	2	No		
V	32mm ditto	15	No		
	Total carried to Collection Page				

Item	Description	Qty	Unit	Rate Kshs	Amount (Kshs)
A	Valve Chamber Valve chamber size 750 x 750 x 600mm deep with 100mm concrete (1: 3: 6) base 100mm block sides rendered all round in cement and sand (1:4) and with approved hinged and flanged cast iron cover and frame including all necessary excavation, disposal and form work.	3	No		
B	Supply, deliver and installl a 65mm diameter screw down type fire hydrant conforming to BS 750:1977 complete with copper alloy spindle complying with requirements of BS 2874 and having a thread machined of trapezoidal form, cast iron spindle cap secured to the spindle by an M12 hexagonal socket set screw to BS 4168. A tapered key suitable for the spindle cap, a screwed outlet with cast iron cap attached to the hydrant body by a chain. All other necessary accesories necessary for the proper functioning of the hydrant. The hydrant to be as 'Greenfield' type or equal and approved.	6	No		
C	Hydrant Key and cover	4	No		
D	65mm drain valve	5	No		
E	25mm air release valve	3	No		
F	Indicator Plates Standard precast concrete sluice valve marker post marked 'SV' set in concrete (1:3:6) base, including formwork, excavations, backfilling and disposal. The plate to be painted with blue gloss oil paint.	3	No		
G	Ditto but marked FH (Fire Hydrant)	3	No		
H	Water Line Markers Standard precast concrete water line marker post marked 'WL' set in concrete (1:3:6) base, including formwork, excavations, backfilling and disposal. The plate to be painted with blue gloss oil paint. The post shall also indicate the pipe size.	9	No		
I	Sluice valve 65mm diameter sluice valve of approved manufacture	2	No		
J	100mm plugs and sockets	4	No		
K	Sterilization Allow for flushing out and sterilizing the whole system with chlorine to the satisfaction of the engineer	1	Sum		
L	Testing and Commissioning Allow for pressure testing and commissioning of the water reticulation installation to the satisfaction of the Engineer.	1	Sum		
	Total carried to Collection Page				

COLLECTION PAGE FOR WATER RETICULATION WORKS

Item	Description		
1	Total carried forward from page B65	……	
2	Total carried forward from page B66	……	
3	Total carried forward from page B67	……	
Total Water Reticulation Works Carried to Summary Page			

SUMMARY PAGE FOR PLUMBING AND DRAINAGE WORKS		
ITEM	**DESCRIPTION**	**AMOUNT**
1	Total for Ground Floor	
2	Total for First Floor	
3	Total for Second Floor	
4	Total for Third Floor	
5	Total for Fourth Floor	
6	Total for Roof Space Plumbing	
7	Total for Fire Protection Services	
8	Total for water reticulation	
	Total for Hospital Sanitary Fittings,Plumbing, Drainage and Fire Protection Works taken to Grand Summary Page	

Item	Description	Unit	Qty	Rate (Kshs)	Amount (Kshs)
	Re-heat solar hot water storage cylinder				
A	The storage cylinder shall be high pressure fabricated from 5.0mm thick mild steel plate and hot dipped galvanised after manufacture, suitable for horizontal mounting. The insulation shall be polyurethane foam 50mm thick injected in the void between outer wall of the storage tank and the outer casings. The outer casing shall be mild steel sheet 24 gauge finished in two coats gloss paint with a red oxide undercoat.The cylinder capacity and connections shall be as follows:-				
	capacity: 2,500 litres connections; -32m diameter water supply feed -40mm diameter hot water outlet -32mm diameter water supply to solar panels -32mm dia. Hot water return from solar panels -15mm diameter drain -15mm diameter automatic air release valve -3No. heating elements of 3kW each	No	8		
	Supporting frames				
B	Allow for support 3mm hollow tubes mild steel angle iron fixed on roof for the above solar panels above solar hot water cylinders to engineers approval	Item	1		
	Pre-heat solar hot water storage cylinder				
C	The storage cylinder shall be high pressure fabricated from 5.0mm thick mild steel plate and hot dipped galvanised after manufacture, suitable for horizontal mounting. The insulation shall be polyurethane foam 50mm thick injected in the void between outer wall of the storage tank and the outer casings. The outer casing shall be mild steel sheet 24 gauge finished in two coats gloss paint with a red oxide undercoat. The cylinder capacity and connections shall be as follows:-				
	capacity: 2,500 litres connections; -32m diameter water supply feed -40mm diameter hot water outlet -32mm diameter water supply to solar panels -32mm dia. Hot water return from solar panels -15mm diameter drain -15mm diameter automatic air release valve	No	4		
	Supporting frames				
D	Allow for support 3mm hollow tubes mild steel angle iron fixed on roof for the above solar panels above solar hot water cylinders to engineers approval	Item	1		
	Total Carried to Next Page				

Item	Description	Unit	Qty	Rate (Kshs)	Amount (Kshs)
	Total carried forward from previous page				
	Solar Panels				
A	Solar panels shall be as 'Thermafin' solar panels manufactured by solatec ltd or equal and approved with heat exchanger of copper tubes, 50mm fibre glass insulation, copper sheet absorber plate and all the necessary inter connetors, dielectric union, washout valves,inlet and outlet valves etc with 2.20 SM nett absorbing area.	No	84		
	Supporting frames				
B	Allow for support 3mm hollow tubes mild steel angle iron fixed on roof for the above solar panels above solar panels heating units to engineers approval	item	1		
	Flushing sheets				
C	Allow IT4 flushing sheets 3000 x 1200mm fixed on roof for the above solar panels for prevention of rain water leakage to Engineer's approval.	item	1		
	Electrical heating booster elements				
D	3kW 240V 50Hz heating element complete with thermostat mounted in the reheat hot water cylinders complete with electrical wiring from local DB switches or isolators.	No	12		
	Time switch				
E	The auxiliary electric water heater elements shall be controlled by a time switch that they come 'ON' during peak hours only. The etime switch must be capable of switching the heater 'ON' and 'OFF' at least two times per day. The time switch though electricalyy operated shall be capable of keeping time for a minimum 48 hours of electric power failure. Allow also for wiring from local isolators, to time switch/contactor and immersion heaters.	No	4		
	Circulation Pumps				
F	Circulation pumpset, one duty, the other standby mounted on a frame with a mild steel base plate. Each pump shall have a duty 2.0m^3/hr. against 8m head as Grundfos hot water circulation pumps or approved equivalent. In addition,the pump shall be supplied complete with electric contactors fitted with overloads and automatic change-over from duty to standby pump within 5 seconds should the duty pump fail to deliver for any reason. The pumpset shall include all non-returns valves, timer, isolating valves and pipe connections.	Set	2		
	Total Carried to Next Page				

Item	Description	Unit	Qty	Rate (Kshs)	Amount (Kshs)
	Total carried forward from previous page				
	Temperature differential controls				
A	The circulation pumps shall be controlled by temperature differential control unit as manufactured by 'fieldway ltd', with adjustable time delay circuit suitable for control of pump. The unit shall have a robust electric temperature sensing device for measuring temperature differences between two points. The sensing circuit of the unit should be stable over 5˚c to 50˚c temperature range. Allow for wiring from the service isolator to differential control to sensors in solar cylinder and pump.	No	4		
	Control Panel				
B	The control and indication gear necessary for the solar heating installation shall be housed in a purpose made control panel. Each item of control and indication gear shall be clearly identified on the frot cover. Allow for suitable deplta connected contactors for heating elements power supply, overload controls and internal wiring.	No	4		
	Dial Thermometer				
C	Dial Thermometer with 100mm diameter dial chart and graduated from 0˚c to 100˚c to be fitted to Engineer's approval.	No	4		
	Automatic Air Eliminator				
D	Air relief valve as manufactured by "Spirax Sarco" model No. AES 50 Air Eliminators for use on hot water services.	No	2		
	Pressure gauge				
E	Pressure gauge as manufactured by Honeywell to be fitted as instructed by the Engineer	No	8		
	Safety Valve				
F	Safety valve set to release when the water in the tanks exceeds 85°C as manufactured by "Spirax Sarco" model No. SV11 Pop type or equal and approved.	No	6		
	Non-Return Valve				
G	50mm diameter screwed-in cap, lift type disc bronze non-return valve to BS 5154 PN 25 for series 'B' ratings. As "Crane model No. D 105 or equal and approved.	No	12		
	Ball Valve				
H	25mm diameter medium pressure ball valve as "PORTSMOUTH" type or approved equivalent with brass stem and plastic float, screwed to threaded socket of tank including union	No	4		
	Total Carried to Next Page				

Item	Description	Unit	Qty	Rate (Kshs)	Amount (Kshs)
	Solar Header Tank				
A	8000Litres capacity pressed steel water storage tank in roof space. Tank 2000 x 2000 x 2000mm high complete with cover and having screwed connections for inlet (20mm), outlet (25mm), overflow (25mm) and 20mm drain.	No	4		
	Foot Valve and Strainer				
B	32mm diameter foot valve with strainer as "PEGLER" type or approved equivalent.	No	4		
C	Allow for lagging of hot water pipework using 25mm thick industrial grade Ämaflex" insulation (85°C) as manufactured by Armstrong Cork	LM	180		
	Manifold, pipework and fittings				
D	84m long 50mm manifold for supplying the solar panels.	Item	1		
E	50mm diameter PPR pipework	Lm	96		
F	40mm ditto	Lm	124		
G	32mm ditto	Lm	148		
H	25mm ditto	Lm	180		
I	50mm diameter pipe bend	No.	84		
J	40mm ditto	No.	32		
K	32mm ditto	No.	24		
L	50mm diameter pipe tee	No.	86		
M	40mm ditto	No.	32		
N	32mm ditto	No.	24		
O	50mm diameter gate valve	No.	6		
P	40mm ditto	No.	12		
Q	32mm ditto	No.	84		
	Sterilization				
R	Allow for flushing out and sterilizing the whole system with chlorine to the satisfaction of the Project Engineer.	Item	1		
	Testing and Commissioning				
S	Allow for setting to work, testing and commissioning of the whole plumbing system to the satisfaction of the Engineer	Item	1		
	Total carried to collection page				

COLLECTION PAGE FOR SOLAR HEATING INSTALLATIONS

Item	Description		Amount (Kshs)
1	Total carried forward from page B70	……	
2	Total carried forward from page B71	……	
3	Total carried forward from page B72	……	
4	Total carried forward from page B74	……	
Total For Solar Hot Water Heating Installations Works Taken to Grand Summary Page			

BOREHOLE DRILLING & EQUIPPING					
Item	**Description**	**Qty**	**Unit**	**Rate (Kshs)**	**Amount (Kshs)**
	NB: All measurements are provisional and are subject to re-measurements once on site.				
A	Allow for application and acquisition of permit for drilling from relevant authorities before commencing the works (Note: No payments to be made before the permit is acquired and submitted to the Client).	1	Item		
B	Mobilization/ demobilization of drilling unit, equipment materials, personnel and all other required supplies. It shall include erecting / dismantling of drilling unit.	1	Item		
C	Hydrological survey expenses	1	Item		
D	Water chemical analyses and borehole completion report.	1	Item		
E	Drilling 200mm diameter borehole from 0-100m below surface.	100	LM		
F	Drilling 200mm diameter borehole from 101-200m below surface	100	LM		
G	Drilling 200mm diameter borehole from 201-300m below surface	100	LM		
H	Supply and installation of 152mm diameter plain steel casing.	200	LM		
I	Supply and installation of 152mm diameter slotted steel casing	100	LM		
J	Supply and installation of filter gravel pack	7	Ton		
K	Development works	12	Hrs		
L	Test pumping to ascertain borehole yield for at least 24 hours including installation and withdrawal of pumping unit and recovery measurements.	1	Item		
M	Construction of concrete plinth size 1.5mx1.5mx1.0m around well head.	1	No		
N	152mm diameter borehole capping	1	No		
O	Allow for all costs involved in providing water for all requirements of the contractor drilling field camp etc.	1	Item		
P	Supply and install 40mm diameter galvanised steel water pipe (observation pipe), Class C.	300	Lm		
Q	Supply and install high quality pressure gauge as Kent or equivalent range 0-7kgf/cm² complete with accessories for mounting on galvanised pipe.	1	No		
Total Carried Forward to Next page					

Item	Description	Qty	Unit	Rate (Kshs)	Amount (Kshs)
	Total Carried from previous page				
A	Supply and install single orifice air valve, complete with pipe mounting accessories.	1	Item		
B	Supply and install 50mm diameter rising main GMS water pipe, Class C.	300	Lm		
C	50mm diameter gate valve as 'pegler' or approved equivalent	1	No		
D	50mm diameter non-return valve as pegler or approved equivalent.	2	No		
E	50mm diameter galvanised steel bend	4	No		
F	50mm diameter water meter as 'Kent' or approved equivalent	1	No		
G	Supply and install a control panel to be mounted off the wall. The control panel shall be water tight with corrosion resistant from hinged lockable door metal enclosure and have Merlin Gerin swith-gear and Telemechanique control gear. The control panel shall have star-delta starter, phase failure, surge protector, isolator, voltemeter, ammeter, MCBs, 150m long float switch cable, float switch and any other necessary controls.	1	Item		
H	6mm² 4-core PVC round hardened PVC submersible electric cable. Waterproof.	350	LM		
I	2.5mm² 4-core PVC round hardened PVC electrode cables waterproof.	350	LM		
J	2.5mm² 4-core PVC/SWA/PVC cable from control panel to water tanks.	80	LM		
K	25mm diameter heavy gauge PVC ducts.	80	LM		
L	$10mm^2$x3 core underground cable	60	LM		
M	$1.5mm^2$x 2 core underground cable	60	LM		
N	Excavate trench of dimensions 300mm x 500mm to invert to lay cables. The laid cable to be covered with 50mm thick layer of fine soil, covered with tiles as "Hatari" then back fill and ram and dispose of excess	50	LM		
O	Electrode pair	2	No.		
P	Level regulator complete with mounting box	2	No.		
Q	Supply and install 50mm diameter galvanised steel water pipe, Class C for supply of water to the storage tank.	50	Lm		
R	Allow for excavation to lay plumbing pipes to deliver water to storage tank installed by others, backfill and ram	50	LM		
	Total Carried Forward to Next page				

Item	Description	Qty	Unit	Rate (Kshs)	Amount (Kshs)
	Total Carried from previous page				
A	Supply and install centifugal multistage borehole pump, continously rated and capable of pumping $8m^3$/hr of water against a total head of 320m. The entire pump-set body, impellers, shaft etc shall be made of heavy duty stainless steel material. The pump shall have inbuilt non-return valve, tail strainer and cable guard. The pump shall be suitable for 3-phase 415V. The pump shall be as 'GRUNDFOS SP9-48' or equal and approved.	1	No.		
B	Allow for testing and commissioning of the borehole	1	Item		
	Total Cost for Borehole Drilling and Equipping				

HIGH & LOW LEVEL WATER TANK-NAROK R & T. HOSPITAL

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
A	**High Level Water Tank** Supply, deliver and Assemble a High level water tanks, made of pressed steel sectional tank plates 6mm thick plates (type 1 and 4) and of size 1220mm x 1220mm capacity of tank to be 108,000 litres (23,760 gallons) and of preferred dimensions 4880mm x 4880mm x 4880mm. The tank to come complete with tank cover, mosquito proof inspection vent, internal stays, jointing material, bolts and nuts including applying two coats of non-toxic bituminous paint on the inside and two coats of aluminum paint on the outside. The tank shall be complete with the following pipe connections:- -100mm diameter overflow -100mm and 65mm diameter outlets -65mm diameter inlet -100mm diameter washout	No	1		
B	Float switch regulator	No	1		
C	Water level indicator	No	1		
D	Internal ladder	No	1		
E	External ladder from tank platform	No	1		
F	Galvanized tower ladder and protection cage of approximately 18 metres high	No	1		
G	Galvanized platform with features described in the particular specifications.	No	1		
H	Galvanized steel tower 18 metres high with features as described in the particular specifications.	No	1		
I	65mm diameter high pressure ball valve	No	1		
	Total Carried Forward to the Collection page				

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
A	**Ground Level Water Tank** Supply, deliver and assemble a Low level water tanks, made of pressed steel sectional tank plates 6mm thick plates (type 1 and 2) and of size 1220mm x 1220mm capacity of tank to be 253,530 litres and of preferred dimensions 7320mm x 7320mm x 4880mm. The tank to come complete with tank cover, mosquito proof inspection vent, internal stays, jointing material, bolts and nuts including applying two coats of non-toxic bituminous paint on the inside and two coats of aluminum paint on the outside. The tank shall be complete with the following pipe connections:- -100mm diameter overflow -100mm and 65mm diameter outlets -50mm diameter inlet -100mm diameter washout	No	1		
B	Float switch regulator	No	1		
C	Water level indicator	No	1		
D	Internal ladder	No	1		
E	External ladder from tank platform	No	1		
F	50mm diameter high pressure ball valve	No	1		
G	100 x 10 mm capping flat steel plate on all dwarf walls	Lm	50		
	Total Carried Forward to the Collection page				

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
A	**BOOSTER PUMPS** Set of automatic electrically driven twin booster pump. One duty and the other one standby with automatic changeover , capable of delivering 6.9 litres per second against a head of 30 meters with a three phase power source. It includes pressure switches, time delay switch, a switch to protect against dry run, timer, gate valves and non-return valves. The pump to be as GRUNDFOS MODEL CR – 30-30 or approved equivalent. Pump to be installed on mild steel platform.	Set	1		
B	**Control Panel** Control panel for above pumps with contactors, over voltage and under voltage protection relays, MCBs, timer, start/stop push buttons, internal buttons with automatic changeover, 'running' and 'trip' neon lights control system and button for for change from automatic to manual operation. All these shall be housed in a lockable cabinet (with integral isolator) made from SWG 18 mild steel sheet that is oven powder coated . There shall also be an adjustable time delay switch to ensure pumping cycles are controlled to not more than 6 per hour, cables, low level cut-out switch in low level tank and regulator. Each pump should run for twelve hours per day.	Item	1		
C	**Electrical Works** Allow for electrical works wiring and fitting to pumps, control panel and float switches from Isolator provided by others	Item	1		
	Total Carried Forward to the Collection page				

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	ASSOCIATED PIPEWORK *Supply, deliver and install galvanized mild steel pipes to BS 1387 class 'B' with screwed and socketed joints to BS 134 and 1256 and of approved manufacturer with galvanizing to BS 729. Tenderers must allow in their pipe work prices for all the couplings, unions, connectors joints, holder bats, reducers etc. as required in the running length of the pipework and also where necessary for pipe fixing clips, plugged and screwed.*				
A	**Pipework** 100mm diameter G.M.S pipe	Lm	68		
B	80mm ditto	Lm	28		
C	65mm ditto	Lm	52		
D	50mm ditto	Lm	68		
E	**Gate Valve** 100mm diameter approved rising stem full way high pressure flanged gate valve with wheel and jointing to tubing	No	6		
F	80mm ditto	No	4		
G	65mm ditto	No	4		
H	50mm ditto	No	6		
I	**Sluice Valve** 100mm diameter Sluice Valve	No	4		
J	75mm dia. Sluice Valve	No	2		
K	50mm dia. Sluice Valve	No	4		
L	**Non Return Valve** 100mm dia. approved high pressure non- return valve to BS 1952. The non-return valve to be as "Pegler" or approved equivalent.	No	4		
M	50mm ditto	No	4		
	Air release Valves				
N	65mm diameter air release valve	No	8		
O	50mm ditto	No	8		
	Drain Valves				
P	65mm diameter drain valve	No	8		
	Total Carried Forward to the Collection page				

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	Tees				
A	100mm diameter equal tee	No	3		
B	50mm ditto	No	3		
C	100 x 65 mm unequal tee	No	3		
	Bends/Elbows				
D	100mm diameter bend/elbows	No	8		
E	65mm ditto	No	8		
F	50mm ditto	No	12		
G	100mm diameter connecting flange	No	3		
	Valve Chamber				
H	Valve chamber size 750 x 750 x 600mm deep with 100mm concrete (1: 3: 6) base 100mm block sides rendered all round in cement and sand (1:4) and with approved hinged and flanged cast iron cover and frame including all necessary excavation, disposal and form work.	No	2		
I	Allow for excavation for the existing pipework at tee and valve points to connect with existing pipework.	Item	1		
	Indicator Plates				
J	Standard precast concrete Sluice valve marker post marked 'SV' set in concrete (1:3:6) base, including formwork, excavations backfilling and disposal. The plate to be painted with blue gloss oil paint.	No	2		
K	Testing and commissioning	Item	1		
	Total Carried Forward to the Collection page				

COLLECTION PAGE

ITEM	DESCRIPTION		
A	Total amount brought forward from page……B78		
B	Total amount brought forward from page……B79		
C	Total amount brought forward from page……B80		
D	Total amount brought forward from page……B81		
E	Total amount brought forward from page……B82		
	Total Amount for High & Low Level Tanks and Booster Pumps		

Item	Description	Qty	Unit	Rate	Amount-Kshs
	Medical Gases Equipment Component cleanliness and protection procedures should be observed with pipes, fittings, components and equipment. Final residual contamination level shall not exceed 100 mg/m² when tested as per ASTM B280. All equipment and items supplied to site should be fully protected against the ingress of dirt and contamination by sealing small components in polythene bags or boxes, individual end capping of pipes, Bundling and sleeving pipework in polythene bags and wrapping or boxing of larger components. All the copper pipes should be cleaned and degreased by oxygen service in accordance with BOC specification 3999394. Fittings should be cleaned, flux removed, dried and degreased for oxygen service in accordance with BOC specification 399856.				
A	Vacuum Plant Supply, deliver and install Vacuum plant capable of providing a net flow rate of 950 Litres per minute. The vacuum plant will consist of the connection manifold and the following:-.				
(i)	2 No. Vacuum Pumps 2 No. air-cooled vacuum pumps, oil flooded rotary vane type driven by electric motor. Each should have a integral non-return valve to protect the vacuum system and receiver vessel from pressurisation due to inadvertent pump reversal. The pump should have a separator filter to ensure virtually oil free exhaust and gas ballast valves to avoid oil contamination and maintain a high water vapour tolerance. The pump inlet shall be filtered and the exhaust shall incorporate an oil filter. Power requirements for each pump: 415V, three phase, 50Hz. Motor rating 2.2Kw, 5.4A.				
(ii)	Bacterial Filter Assemblies Bacteria removing filters shall be fitted on the vacuum pipeline to prevent the spread of infection. The filters shall be duplex system bacterial filters (twin) fitted with manual isolating valves to permit duty and standby operation. Each filter should be fitted with a sterilisable moisture drainage bowl with isolating cock and differential pressure indicator. The system should ensure bacterial removal to 0.005% when tested to BS 3928 at full hospital design flow. The pressure drop through a clean filter passing the system design flow rate will not exceed 25mm Hg.				
(iii)	Receiver Vessels The receiver vessels shall be constructed to BS 5169 or EN 286 and each having an inspection access panel and manual drain to remove any excess welded steel vessel with a mounting saddle which supports both the pumps and the control panels.				
	Total carried to Collection Page				

Item	Description	Qty	Unit	Rate	Amount -Kshs
(iv)	Control Panel A dedicated control panel shall be provided for each vacuum pump, to house the isolating switch, starter, MCB, ammeter, hours run meter, hand/auto switch, vacuum switch and alarm. Under normal conditions the capacity of the plant shall be 100% system design flow with one pump not running. A transducer shall sense the vacuum level and switch the lead pump on or off, maintaining the design vacuum level. During the peak demand the log vacuum pump shall automatically be activated to operate in addition to the lead pump. The pump(s) shall automatically shut down once vacuum levels have been restored. In the event of all pumps failing the second stage remote stage alarm shall be activated by the control panel. Should the primary control circuit fail an independent system with a separate mechanical back-up switch will operate the pumps and also initiate a plant fault alarm. The vacuum plant shall have three stages of alarm conditions:- (a) Plant Faults. (b) Plant Emergency. (c) Pressure Fault.				
	The vacuum plant to be as "Medplus Vacuum Plant C11- 950- P" or equal and approved.	1	No		
B	Medical Compressed Air Plant Supply, deliver and install Medical Compressed Air Plant capable of providing a net flow rate of 1365 litres/min at 7.0 bar with one pump not running (after dryer losses). The plant have duplex air compressors and one receiver and duplex filter/dryer module. The plant will consist of connection manifold and the following:-				
(i)	Air Compressors A total of 2 identical single stage reciprocating air compressors each directly driven by an electric motor and incorporating an air inlet filter and silencer. Each compressor shall be provided with air-blast after-coolers and auto/manual drains. The compressor electric motors shall be squirrel cage type suitable for a 415 volts, AC three phase, 50Hz electricity supply.				
(ii)	Receiver Vessel One vertically mounted welded steel receiver vessel with access panel to enable full internal inspection of the receiver. The total vessel capacity shall be 1160 litres. The receiver shall be protected by a pressure relief valve and fusible plug and shall be provided with an automatic drain with manual by-pass. The vessel to be constructed to BS 5169 or EN 286.				
	Total carried to Collection Page				

Item	Description	Qty	Unit	Rate	Amount-Kshs
(iii)	Filter Dryer Assembly Air delivery shall be via duplexed sets of filters, prefilters, oil filter, dust filter, activated carbon filter and bacteria filter. The filter will be fitted with differential pressure gauges to monitor filter performance. The air shall contain no more than:- water - 115mg/m³, dry particulate - 0.01mg/m3, oil mist< 0.01mg/m3, oil vapour< 0.03mg/m3, carbon monoxide - 5.0mg/m³, 5ppm v/v and carbon dioxide 450mg/m³, 500 ppm v/v.				
(iv)	Control Panel A dedicated control panel shall be provided, for each air compressor, to house the isolating switch, starter, MCB, ammeter, hours run meter, lead compressor selection switch and alarm. The air plant shall have four stages of alarm conditions in putting to the alarm system as follows. 1. Plant faults caused by control circuit failure. 2. Plant Emergency caused by low receiver pressure fault 3.dew point above -26^{0}C at atmospheric pressure. 4. Reserve fault caused by low pipeline or high pipeline pressure. The compressed air plant shall be as "Medplus Medical Compressed Air Plant C-11-1365- M" or equal and approved.	1	No		
	Automatic changeover manifold supply system and Gas Cylinders Supply, deliver and install medical gas cylinders and automatic changeover manifold. The manifold supply system should consist of a cylinder rack which locates vertical gas cylinders retrained by chains or other suitable mechanisms. The cylinder rack will be wall mounted or free standing by filling support legs. The gas cylinders shall be connected by flexible tail pipes to a header assembly which runs along the top of the cylinder rack. The change over cylinder banks will be by differential pressure and monitored by a contact switch pressure gauge. The sizes of the manifold will vary according to the number of gas cylinders. The manifold will be fitted with a zone shut-off valve and an alarm panel housed in a box with a lockable hinged cover. The alarm panel shall be connected to a contact alarm gauge on an autochange manifold and will give a warning when the gas cylinder pressure has fallen and the gas cylinder(s) need replacing. The manifold shall be designed and conform to IGC document 12/80E and BCGA code practice CP4,CP5 and CP6 and HTM 20225.				
C	Fully charged medical liquid oxygen cylinder of nominal capacity 25,800 litres complete with automatic changeover manifold and cylinder support racks	10	No.		
D	Fully charged medical nitrous oxide cylinder of nominal capacity 9,000 litres complete with automatic changeover manifold and cylinder support racks.	10	No.		
	Total carried to Collection Page				

Item	Description	Qty	Unit	Rate	Amount
E	Fully charged medical oxygen and nitrous oxide mixture (Entonox) cylinder of nominal capacity 3,600 litres complete with automatic changeover manifold and cylinder support racks.	10	No.		
F	Fully charged medical nitrogen cylinder of nominal capacity 6,200 litres complete with automatic changeover manifold and cylinder support racks.	10	No.		
G	Flexible Pendant Flexible pendant principally designed for use in operating theatres and anaesthetic rooms and for connection to fixed medical pipeline installations from ceiling level. The pendant should have six medical gas/vacuum services located radially and the Anaesthetic Gas Scavenging Disposal System (AGSS) located centrally and following clockwise sequence when viewed from below:- oxygen, Nitrous oxide, N_2O/O_2 mixture 50%/50%, medical air 400kpa, medical air 700Kpa, medical vacuum with AGSS mounted centrally. Each medical gas/vacuum service is transmitted by reinforced anti-static plastic flexible hose, colour coded in accordance with BS 5682:1984. Each terminal unit should be shrouded by a white plastic cover to minimise the collection of dust or moisture and the shroud to act as a buffer to prevent damage to adjacent terminal units. The pendant shall consist of mounting brackets, first and second fix gas service kits and a shroud which provided a neat appearance at ceiling level. It shall incorporate self closing shuttle valves into each pressure gas first fix assembly to automatically shuff-off when a hose is removed for maintenance. The pressure test kit should be capable of sealing the first fix gas service kit enabling carvass pressure testing. The flexible pendant will incorporate pendant mounted terminal units and AGS (Anaesthetic Gas Scavenging) terminal units with their appropriate probes. The flexible pendant shall fully comply with BS 5682:1984, BS 6834:1987 and IS 9170. The flexible pendant to be as medaes flexible pendant with "Gem 10 terminal units" or equal and approved.	4	No		
H	ICU medical gas outlets	12	No.		
	Total carried to Collection Page				

Item	Description	Qty	Unit	Rate	Amount
	Terminal Units The terminal units shall conform to BS5682:1984 and IS 9170. The terminal unit will be vertical or horizontal configuration with a 150mm stub pipe and suitable for either surface or flush mounting. The unit will consist of a brass pipeline terminal block with copper stub permanently secured between a back plate and a gas specific plate which allows limited radial movement of the copper stub aligned with the pipeline. The first fix shall incorporate a maintenance valve and a test plug to enable carcass pressure testing. The second fix plastic components shall be moulded from fire retardant polycarbonate with the index pin permanently moulded into the gas specific sockets. The sockets assembly shall retain capsule assembly, a sealed unit containing the check valve and probe 'o' ring seal. The terminal units shall accommodate a variable plaster depth of up to a maximum of 16mm. The terminal units shall be gas specific and only accept the correct medical gas probe. Gas specific components shall be pin-indexed to ensure that a correct gas specific assembly is achieved so that in the normal course of dismantling for repair or maintenance, parts from other gases cannot inadvertently be used. The wall mounted terminals shall incorporate an anti-rotation pin to engage with connected downstream medical equipment ensuring correct orientation. The terminal units to be as medical "Gem 10 terminal units" or equal and approved for the following areas:-				
I	Oxygen terminal units	72	No.		
J	Nitrous Oxide terminal units	6	No.		
K	Entonox terminal units	6	No.		
L	Medical Air terminal units	10	No.		
M	Instrument Air terminal units	10	No.		
N	Ward vacuum units and theatre suction units	72	No.		
O	Probes in all the rooms for gases	120	No.		
	Total carried to Collection Page				

Item	Description	Qty	Unit	Rate	Amount
	Pipework and Fittings				
	Supply, deliver and install grease free copper pipes and tubing suitable for medial gases installations and to conform to EN 1057 with screwed and socketed joints. All pipe connections to be unsintered (degreased) PTTF and according to approved manufacturer's specifications. Rates must allow for all Metal/plastic threaded adaptors where required for the connection of fittings, valves, sockets, sliding and fixed joints, support raceways, isolating sheaths, elastic materials, expansion arms and bends, crossovers, couplings, clippings, connectors, pipe fixing clips, holder bats plugged and screwed for the proper and satisfactory functioning of the system. All the fittings to meet all the requirements described in the particular specifications.				
	Copper Pipes				
A	20mm diameter grease free copper pipes suitable for medical gases installations	250	LM		
B	15mm ditto	1500	LM		
	Adaptors/Connectors				
C	20 x 15mm adaptors/connectors	80	No.		
	Equal Tees				
D	20mm diameter tee	100	No.		
E	15mm diameter tee	204	No.		
	Bends/Elbows				
F	20mm diameter bend/elbow	69	No.		
G	15mm ditto	240	No.		
	Valves				
H	20mm diameter line ball valves fitted with copper stub pipes such as Madaes or approved equivalent. The valve to be complete with valve boxe, flow meter and identification marks.	20	No.		
I	15mm ditto	65	No.		
	Total carried to Collection Page				

Item	Description	Qty	Unit	Rate	Amount
	Alarm and Zone Service Unit				
J	Alarm and zone service unit fully complying with BS EN 737-3, HTM 2022 & C11 and NSIT connections to BS EN 739 such as Madaes or approved equivalent. The alarm system to be as described in particular specifications.	18	No.		
K	Main alarm and zone service unit	1	No.		
L	Hospital Information System as described in particular specifications.	1	Item		
	Others				
M	Gases flow meters	24	No.		
N	Robust aluminium cross-section trunking with polymer infill strips and seals service module capable of accommodating three terminal units as Madaes 'environ H Sys' or approved equivalent.	270	Lm		
O	Allow for standby cylinders for compressed air as per particular specifications.	4	No.		
P	Allow for connection of standby cylinders and rack to lines of those for the main banks and reducing sets, gauges and valves.	1	Item		
Q	Allow for two sets of spare trap bowls for vacuum system	1	Item		
R	Allow for copper sleeves for all pipes passing in floors, walls and partitions.	200	Lm		
S	Allow for 15mm copper spare piping from medical gas cylinder storage area to the various rooms.	300	Lm		
T	Allow for permanent and temporary identification of pipelines, valves junctions, valves and ends.	1	Item		
U	Allow for painting and marking of all pipes and fittings	1	Item		
V	Printed catalogues, technical data sheet, manuals and as-built drawings both in hard copy and soft copy. The soft copy to be delivered in compact disc and 2GB flash disk.	1	Item		
W	Allow for flushing the whole system to required cleanliness the satisfaction of the Engineer	1	Item		
X	Testing and commissioning of all medical gases as per the particular specifications and to the satisfaction of the Project Engineer.	1	Item		
	Total carried to Collection Page				

COLLECTION PAGE

Item	Description	Cost (Kshs)
1	Total carried forward from page B84……..……..	
2	Total carried forward from page B85……..……..	
3	Total carried forward from page B86 ……..……..	
4	Total carried forward from page B87……..……..	
5	Total carried forward from page B88 ……..……..	
6	Total carried forward from page B89……..……..	
7	Total carried forward from page B90……..……..	
Total for Medical Gases and Piping Installation		

Item	Description	Qty	Unit	Rate	Amount
A	Oxygen Plant				
	Supply, deliver and install Oxygen plant capable of providing a net flow rate of 500 Litres per minute. The plant to be as per the particular specifacation in the tender document	1	Item		
	Total carried to summary Page				

SUMMARY PAGE

Item	Description		
2	Total for Medical Gases and Piping Installation	……	
3	Total for Oxygen Plant	……	
Total Cost for Medical Gases and piping and Oxygen Plant Installation Works			

MEDICAL WASTE INCINERATOR INSTALLATIONS.

Item	Description	Qty.	Unit	Rate (kshs.)	Amount (Kshs.)
	INCINERATOR INSTALLATION				
A	Supply, deliver, install and test 125kg/hr hospital waste incinerator as a complete packaged unit. The incinerator to be complete with 3No. Burners (ignition and after burners) capable of burning 125kg of mixed hospital waste per hour, FD fan, air receiver, air ductwork unit with its dampers, pressure and temperature gauges, sight glass with fibre glass gaskets and control panel (fully) wired. The incinerator should have two chambers (hearth and after chamber) with upper chamber capable of burning flue waste from lower chamber and eliminating hazardous emissions completely.	1	Item		
B	Self supporting chimney (flue) to be mounted on the incinerator of a length of 10m and a diameter corresponding to the diameter of the incinerator's waste gases outlet but approximately 600mm. The whole chimney to be insulated and it will be mounted on a concrete base constructed by others but as per sub-contactor's instructions.	2	Item		
C	Daily service fuel oil tank, capacity 5000 litres, mounted on a 2.5m high tower. The tank to be complete with access manhole, washout, overflow pipe, access ladder, outlet connections and gate valves.	1	Item		
D	2.5m high steel tower to support the daily service fuel oil tank and steel ladder, all to be approved.	1	Item		
E	Initial filling of the day oil storage tank with class D oil for fire testing and commissioning of the burners.	4000	Litres		
F	Semi-rotary hand transfer pump capable of transferring oil from bulk oil tank to day oil service tank.	1	No.		
	Sub-total carried forward to Next Page				

Item	Description	Qty.	Unit	Rate (kshs.)	Amount (Kshs.)
	Sub-total b/f from previous page				
A	All Associated interconnecting pipe work between the fuel oil storage tank and the incinerators, which shall be 25mm diameter black mild steel pipe class 'C' about 30 metres long .	30	LM		
B	25mm diameter tee	4	No.		
C	25mm diameter bend	6	No.		
D	25mm diameter gate valve with associated unions	3	No.		
E	Control panel, arranged to DOL start and incorporates an isolator, thermal overload magnetic overload protection, on/off/trip indicator lights, auto/manual hand selector switch and contactors, ammeter and phase failure relay, all in steel enclosure with terminals.	1	Item		
F	Electrical wiring	1	Item		
G	Initial fill of bulk oil storage tank with class D oil 16,000 litres	16000	litres		
	Total for Incinerator carried forward to Summary Page …….				

Item	Description	Qty	Unit	Rate (Kshs)	Cost (Kshs)
	Prefabricated Mortuary Coldroom Cabinet				
	A complete prefabricated front loading mortuary cold cabinet with four tiers and four hatches. The cabinet to have one door per four vertical tiers and with labelling hatch in each tier. The chamber to be fabricated from stainless steel both internally and externally with a minimum of 80mm thick polyurethane insulation. It shall operate between 2 to 6 degrees centigrade inside the cold chambers. The package to be complete with digital controls panel, digital electronic thermostat, fan assisted evaporator, air cooled hermatic condensor unit, internal weather proof lights, insulated door, door locking system, stainless steel in-built racks, stainless steel stretchers, stainless steel body trays in each tier and to use R404A or any other non-ozone depleting refrigerant. The cabinet to have complete refrigeration components such as thermostats, thermometer, sight glass with colour coding, thermostatic expansion valve, solenoid valve, filter drier, low and high pressure cut-off switch. The condensor shall be placed on top of the cabinet. The unit to be as LEEC modular cabinets or equal and approved which meets the current European Standards of Refrigeration. The following are the capacity/sizes of each cold cabinet in terms of chamber and body capacity;				
A	4-chamber mortuary refrigerated cabinet for 12 bodies on three tiers/ levels with all the above items and three doors.	4	Item		
B	2-chamber mortuary refrigerated cabinet for 6 bodies on three tiers/ levels with all the above items and five doors.	1	Item		
C	3-chamber mortuary freezer cabinet for 9 bodies on three tiers/ levels with all the above items and two doors. The freezer cabinet shall operate between -18 to -30 degrees centigrade.	1	Item		
	The following Refrigeration Controls. (All refrigeration controls shall be as Zanotti or equal and approved).				
D	Room thermostat to cut compressor in and out, depending on the room temperature.	6	No.		
E	Digital thermometer with a range of -40°C to 50°C	6	No.		
F	Thermostatic expansion valve	6	No.		
G	Solenoid valve	6	No.		
	Total Carried Forward to Collection Page				

Item	Description	Qty	Unit	Rate (Kshs)	Cost (Kshs)
A	Filter drier	6	No.		
B	Low and high cut-out switch	6	No.		
C	Low pressure gauge	6	No.		
D	High pressure gauge	6	No.		
E	Sight glass	6	No.		
	Refrigerant				
F	Refrigerant liquid pipework of hard copper tubing insulated externally with 25mm thick insulation which shall be approved before installation by the project engineer.	165	LM		
G	Refrigerant gas pipework of hard copper tubing insulated externally with 25mm thick insulation which shall be approved before installation by the project engineer.	165	LM		
H	Allow for appropriated gas and liquid line refrigerant pipe valves in each refrigeration line	1	Item		
	Wall Mounted Wired Remote Controller				
I	Fully wired wall mounted remote controller panel complete with digital display, wiring and conduit works including but not limited to interconnecting cable between the outdoor and indoor units.	6	No.		
	Trolley				
J	Metallic powder coated paint hydraulic stacking trolley as LEEC Model MF or approved equivalent.	6	No.		
K	Metallic powder coated paint hydraulic viewing trolley as LEEC Model VT or approved equivalent.	6	No.		
	Tray				
L	Grade 304 stainless steel body storage pressed ribbed tray of size 660x 2070 x 80mm as LEEC Model or approved equivalent. To be fully compatible with refrigerated and body handling systems	63	No.		
	Surge Protector				
M	Power surge protector as Solatek or equal and approved suitable for the cold cabinets for both the evaprators and condensers.	6	No.		
	Perforated Cable/Pipe Tray				
N	Perforated cable/pipe tray of size 450x150mm complete with supports and covering	38	Lm		
	Total Carried Forward to Collection Page				

Item	Description	Qty	Unit	Rate (Kshs)	Cost (Kshs)
	Light Fitting				
A	65W vapour proof light fittings	63	No.		
B	**Associated Electrical** Allow for associated electrical works including but not limited to individual cold cabinet machine isolators and cables to interconnect the evaporator and outdoor unit.	1	Item		
C	**Cleaning and Flushing the Installation** Allow for cleaning and flushing the whole installation with appropriate medium before charging the system with refrigerant.	1	Item		
D	**Autopsy/Post mortem Table** Elevating with stainless steel dissection board (straight table), Dimension:2540mmL x 1000mmW. Integrated sink should have same length and width.Elevating height 800mm to 1000mm up and down pedestal control. All thick gauge heavy duty anticorrosion stainless.. Large double wall Sink with regular removable sprinkle system, Hand spray, rinse facility. Faucets stainless steel. Hand shower: heavy duty chrome plated hand piece durable minimum 8' long flexible hose Hand piece with hose drop in deck	3	No.		
E	**Post mortem Lamp** Spot light, High Intensity,) Source of Light: LED light 1) Minimum 160,000-140,000 Lux at a working distance of 0.5m 2) Height adjustment: ≤440mm and colour rendering (Ra 98). 3) Radial and axial movement of the lamp. 4) To be Ceiling mounted	1	Item		
F	**As-built Drawings Maintenance and Operation Manuals** Allow for as-built drawing, maintenance and operation manuals in both soft and hard copies. Three copies of the as-built drawing shall be submitted in A1 paper in a scale of 1:50 and soft copy in 16GB flash disk.	1	Item		
G	**Training** Allow for training of the maintenance team of the client on all the operation and maintenance of the refrigeration installations	1	Item		
H	**Testing and Commissioning** Allow for setting to work, testing and commissioning of the refrigeration installation to the satisfaction of the Project Engineer	1	Item		
	Total Carried Forward to Collection Page				

Item	Description	Qty	Unit	Rate (Kshs)	Cost (Kshs)
	MECHANICAL VENTILATION SYSTEM				
	Extract fan capable of a volume flow rate of 0.17m3/sec against a pressure drop of 250 pa. Fan to be complete with supports, flexible connections and anti vibrations mountings.To be as S &P' inline extract fan or equal and approved.	1	Item		
A	**Flexible Ducts**				
	Flexible duct of diameter 150 mm	35	lm		
B	Allow for various sizes of transformation pieces as indicated on the contract drawings and necessary for complete ductwork installation.	1	Item		
	Volume control dampers				
C	250 X 200mm oposed blade variable volume control dampers with leaf thickness of 0.8mm (SWG 20) and manual control.	2	No.		
	Extract Air Registers				
D	Eggcrate extract grilles with damper fitted size 150mm x 150mm capable of extracting 0.1m3/sec of air.	4	No.		
	External Weather Louvres				
E	300 mm x 250 mm high external weather louvers with a weather resistant external cover for air outlet openings complete with galvanized coated wire mesh screen on the front face and frame and blades fabricated from extruded aluminium sections. As "TROX" or equal and approved.	1	No.		
	DUCT WORK				
	PAL Duct (Pre-Insulated Ducting system) complete with bends, transformation pieces, hangers, supports, sleeves, flexible connections, etc.	15	No.		
	Total Carried Forward to Collection Page				

COLLECTION PAGE FOR MORTUARY COLD CABINETS INSTALLATION

Item	Description		Amount (Kshs)
1	Total carried forward from page B96	……	
2	Total carried forward from page B97	……	
3	Total carried forward from page B98	……	
4	Total carried forward from page B99	……	
	Total Cost for Mortuary Coldrooms		

PRICED SUMMARY PAGE FOR INSTALLATION MECHANICAL WORKS

Item	Description	Total Cost (Kshs)
1	Total cost for Plumbing and Drainage Works	
2	Total cost for Solar Hot Water Heating-	
3	Total cost for BoreHole drilling and equiping	
4	Total cost for High & Low level water tanks	
5	Total cost for Medical Gases & Oxygen Plant	
6	Total cost for Incinerator	
7	Total cost for Morgue Coldroom	
8	Allow for Contigency	7,6000,000
Total Cost for Mechanical installation Works Carried to Grand Summary Page for Electrical and Mechanical Installation Works Page M&E GSP 01		

Item	Description	Amount KES
	MECHANICAL & ELECTRICAL GRAND SUMMARY PAGE	
1	**TOTAL FOR VOLUME 1 WORKS: ELECTRICAL ENGINERRING SERVICES WORKS B/F FROM ELECTRICAL PRICE SUMMARY PAGE EPSP01**	
2	**TOTAL FOR VOLUME II WORKS:MECHANICAL ENGINERRING SERVICES WORKS B/F FROM MECHANICAL PRICE SUMMARY PAGE B101**	
TOTAL COST FOR ELECTRICAL & MECHANICAL ENGINEERING SERVICES WORKS CARRIED TO THE FORM OF TENDER…….		

TOTAL AMOUNT IN WORDS ……...…….
……
……
……
……..……

TENDERER'S NAME & STAMP
……...……
……
……

SIGNATURE ……. **DATE……**

P.I.N No.,……. **V.A.T CERTIFICATE No…….**

WITNESS…… **ADDRESS…….**

SIGNATURE OF WITNESS…… **DATE…….**

SECTION C

GENERAL MECHANICAL SPECIFICATIONS

GENERAL MECHANICAL SPECIFICATION

2.01 **General**

This section specifies the general requirement for plant, equipment and materials forming part of the Sub-contract Works and shall apply except where specifically stated elsewhere in the Specification or on the Contract Drawings.

2.02 **Quality of Materials**

All plant, equipment and materials supplied as part of the Sub-contract Works shall be new and of first class commercial quality, shall be free from defects and imperfections and where indicated shall be of grades and classifications designated herein.

All products or materials not manufactured by the Sub-contractor shall be products of reputable manufacturers and so far as the provisions of the Specification is concerned shall be as if they had been manufactured by the Sub-contractor.

Materials and apparatus required for the complete installation as called for by the Specification and Contract Drawings shall be supplied by the Sub-contractor unless mention is made otherwise.

Materials and apparatus supplied by others for installation and connection by the Sub-contractor shall be carefully examined on receipt. Should any defects be noted, the Sub-contractor shall immediately notify the Engineer.

Defective equipment or that damaged in the course of installation or tests shall be replaced as required to the approval of the Engineer.

2.03 **Regulations and Standards**

The Sub-contract Works shall comply with the current editions of the following:

a) The Kenya Government Regulations.
a) The United Kingdom Institution of Electrical Engineers (IEE) Regulations for the Electrical Equipment of Buildings.
b) The United Kingdom Chartered Institute of Building Services Engineers (CIBSE) Guides.
c) British Standard and Codes of Practice as published by the British Standards Institution (BSI)
e) The Local Council By-laws.
f) The Electricity Supply Authority By-laws.
g) Local Authority By-laws.
h) The Kenya Building Code Regulations.
i) The Kenya Bureau of Standards

2.04 **Electrical Requirements**

Plant and equipment supplied under this Sub-contract shall be complete with all necessary motor starters, control boards, and other control apparatus. Where control panels incorporating several starters are supplied they shall be complete with a main isolator.

The supply power up to and including local isolators shall be provided and installed by the Electrical Sub-contractor. All other wiring and connections to equipment shall form part of this Sub-contract and be the responsibility of the Sub-contractor.

The Sub-contractor shall supply three copies of all schematic, cabling and wiring diagrams for the Engineer's approval.

The starting current of all electric motors and equipment shall not exceed the maximum permissible starting currents described in the Kenya Power and Lighting Company (KPLC) By-laws.

All electrical plant and equipment supplied by the Sub-contractor shall be rated for the supply voltage and frequency obtained in Kenya, that is 415 Volts, 50Hz, 3-Phase or 240Volts, 50Hz, 1-phase.

Any equipment that is not rated for the above voltages and frequencies shall be rejected by the Engineer.

2.05 **Transport and Storage**

All plant and equipment shall, during transportation be suitably packed, crated and protected to minimise the possibility of damage and to prevent corrosion or other deterioration.

On arrival at site all plant and equipment shall be examined and any damage to parts and protective priming coats made good before storage or installation.

Adequate measures shall be taken by the Sub-contractor to ensure that plant and equipment do not suffer any deterioration during storage.

Prior to installation all piping and equipment shall be thoroughly cleaned.

If, in the opinion of the Engineer any equipment has deteriorated or been damaged to such an extent that it is not suitable for installation, the Sub-contractor shall replace this equipment at his own cost.

2.06 **Site Supervision**

The Sub-contractor shall ensure that there is an English-speaking supervisor on the site at all times during normal working hours.

2.07 **Installation**

Installation of all special plant and equipment shall be carried out by the Sub-contractor under adequate supervision from skilled staff provided by the plant and equipment manufacturer or his appointed agent in accordance with the best standards of modern practice and to the relevant regulations and standards described under Clause 2.03 of this Section.

2.08 **Testing**

2.08.1 General

The Sub-contractor's attention is drawn to Part 'C' Clause 1.38 of the "Preliminaries and General Conditions".

2.08.2 Material Tests

All material for plant and equipment to be installed under this Sub-contract shall be tested, unless otherwise directed, in accordance with the relevant B.S Specification concerned.

For materials where no B.S. Specification exists, tests are to be made in accordance with the best modern commercial methods to the approval of the Engineer, having regard to the particular type

of the materials concerned.

The Sub-contractor shall prepare specimens and performance tests and analyses to demonstrate conformance of the various materials with the applicable standards.

If stock material, which has not been specially manufactured for the plant and equipment specified is used, then the Sub-contractor shall submit satisfactory evidence to the Engineer that such materials conform to the requirements stated herein in which case tests of material may be partially or completely waived.

Certified mill test reports of plates, piping and other materials shall be deemed acceptable.

2.08.3 Manufactured Plant and Equipment – Work Tests

The rights of the Engineer relating to the inspection, examination and testing of plant and equipment during manufacture shall be applicable to the Insurance Companies or Inspection Authorities so nominated by the Engineer.

The Sub-contractor shall give two week's notice to the Engineer of the manufacturer's intention to carry out such tests and inspections.

The Engineer or his representative shall be entitled to witness such tests and inspections. The cost of such tests and inspections shall be borne by the Sub-contractor.

Six copies of all test and inspection certificates and performance graphs shall be submitted to the Engineer for his approval as soon as possible after the completion of such tests and inspections.

Plant and equipment which is shipped before the relevant test certificate has been approved by the Engineer shall be shipped at the Sub-contractor's own risk and should the test and inspection certificates not be approved, new tests may be ordered by the Engineer at the Sub-contractor's expense.

2.08.4 Pressure Testing

All pipe work installations shall be pressure tested in accordance with the requirements of the various sections of this Specification. The installations may be tested in sections to suit the progress of the works but all tests must be carried out before the work is buried or concealed behind building finishes. All tests must be witnessed by the Engineer or his representative and the Sub-contractor shall give 48 hours notice to the Engineer of his intention to carry out such tests.

Any pipe work that is buried or concealed before witnessed pressure tests have been carried out shall be exposed at the expense of the Sub-contractor and the specified tests shall then be applied.

The Sub-contractor shall prepare test certificates for signature by the Engineer and shall keep a progressive and up-to-date record of the section of the work that has been tested.

2.09 **Colour Coding**

Unless stated otherwise in the Particular Specification all pipe work shall be color coded in accordance with the latest edition of B.S 1710 and to the approval of the Engineer or Architect.

2.10 Welding

2.10.1 Preparation

Joints to be made by welding shall be accurately cut to size with edges sheared, flame cut or machined to suit the required type of joint. The prepared surface shall be free from all visible defects such as lamination, surface imperfection due to shearing or flame cutting operation, etc., and shall be free from rust scale, grease and other foreign matter.

2.10.2 Method

All welding shall be carried out by the electric arc processing using covered electrodes in accordance with B.S. 639.

Gas welding may be employed in certain circumstances provided that prior approval is obtained from the Engineer.

2.10.3 Welding Code and Construction

All welded joints shall be carried out in accordance with the following Specifications:

a) Pipe Welding
All pipe welds shall be carried out in accordance with the requirements of B.S.806.

b) General Welding
All welding of mild steel components other than pipework shall comply with the general requirements of B.S. 1856.

2.10.4 Welders Qualifications

Any welder employed on this Sub-contractor shall have passed the trade tests as laid down by the Government of Kenya.

The Engineer may require to see the appropriate to see the appropriate certificate obtained by any welder and should it be proved that the welder does not have the necessary qualifications the Engineer may instruct the Sub- contractor to replace him by a qualified welder.

SECTION D

PARTICULAR SPECIFICATION

FOR

PLUMBING,DRAINAGE AND FIRE FIGHTING,

SOLAR WATER HEATING

BOREHOLE DRILLING & EQUIPPING

INSTALLATION WORKS

PARTICULAR SPECIFICATIONS FOR PLUMBING AND DRAINAGE

3.1 GENERAL

This section specifies the general requirements for plant, equipment and materials forming part of the plumbing and drainage installations.

3.2 MATERIALS AND STANDARDS

3.2.1 Pipe work and Fittings

Pipe work materials are to be used as follows:

a) <u>CPVC Pipework</u>

The pipe work for the plumbing installation shall be chlorinated polyvinyl chloride (CPVC) tubing which meets the requirements of SDR 11 of ASTM F441 and be suitable for potable water installations.

The pipe fittings shall CPVC pipe fittings and shall meet or exceed the requirements of ASTM D2846.
They will conform to ASTM F441 and ASTM F442, ASTM F1970. All changes in direction will be with standard bends or long radius fittings.

All socket type joints shall be assembled employing solvent cements that meet or exceed the requirements of ASTM F493 and primers that meet or exceed the requirements of ASTM F656. The standard practice for safe handling of solvent cements shall be in accordance with ASTM F402. Solvent cement and primer shall be listed by NSF International for use with potable water, and approved by the pipe and fittings manufacturers.

b) <u>Galvanized Steel Pipe work</u>

Galvanized steel pipe work up to 65mm nominal bore shall be manufactured in accordance with B.S. 1387 Medium Grade, with tapered pipe threads in accordance with B.S. 21. All fittings shall be malleable iron and manufactured in accordance with B.S. 143.

Pipe joints shall be screwed and socketed and sufficient coupling unions shall be allowed so that fittings can be disconnected without cutting the pipe. Running nipples and long screws shall not be permitted unless exceptionally approved by the Engineer.

Galvanized steel pipe work, 80mm nominal bore up to 150mm nominal bore shall be manufactured to comply in all respects with the specification for 65mm pipe, except that screwed and bolted flanges shall replace unions and couplings for the jointing of pipes to valves and other items of plant. All flanges shall comply with the requirements of B.S. 10 to the relevant classifications contained hereinafter under Section 'C' of the Specification.

Galvanizing shall be carried out in accordance with the requirements of B.S. 1387 and B.S. 143 respectively.

c) <u>Copper Tubing</u>

All copper tubing shall be manufactured in accordance with B.S. 2871 from C.160 'Phosphorous De-oxidized Non-Arsenical Copper' in accordance with B.S. 1172.

Pipe joints shall be made with soldered capillary fittings and connections to equipment shall be with compression fittings manufactured in accordance with B.S. 864.

Short copper connection tubes between galvanized pipe work and sanitary fitments shall not be used because of the risk of galvanic action.

If, as may occur in certain circumstances, it is not possible to make the connection in any way than the use of copper tubing, then a brass straight connector shall be positioned between the galvanized pipe and the copper tube in order to prevent direct contact.

d) <u>P.V.C. (Hard) Pressure Pipes and Fittings</u>

All P.V.C. pipes and fittings shall be manufactured in accordance with B.S. 3505: 1968.

<u>Jointing</u>

The method of jointing to be employed shall be that of solvent welding, using the pipe and manufacturer's approved cement. Seal ring joint shall be introduced where it is necessary to accommodate thermal expansion.

<u>Testing</u>

Pipelines shall be tested in sections under an internal water pressure normally one and a half times the maximum allowable working pressure of the class of pipe used. Testing shall be carried out as soon as practical after laying and when the pipeline is adequately anchored. Precautions shall be taken to eliminate all air from the test section and to fill the pipe slowly to avoid risk of damage due to surge.

e) A.B.S. Waste System

Where indicated on the Drawings and Schedules, the Sub-contractor shall supply and fix A.B.S. waste pipes and fittings.

The pipes, traps and fittings shall be in accordance with the relevant British Standards, including B.S. 3943, and fixed generally in accordance with manufacturer's instructions and B.S. 5572: 1978.

Jointing of pipes shall be carried out by means of solvent welding, the manufacturer's instructions and B.S. 5572: 1978.

Jointing of pipes shall be carried out by means of solvent welding. The manufacturer's recommended method of joint preparation and fixing shall be followed.
Standard brackets, as supplied for use with this system, shall be used wherever possible. Where the building structure renders this impracticable the Sub-contractor shall provide purpose made supports, centres of which shall not exceed one meter.

Expansion joints shall be provided as indicated. Supporting brackets and pipe clips shall be fixed on each side of these joints.

f) PVC Soil System

The Sub-contractor shall supply and fix PVC soil pipes and fittings as indicated on the Drawings and Schedules. Pipes and fittings shall be in accordance with relevant British Standards, including B.S. 4514 and fixed to the manufacturer's instructions and B.S. 5572.

The soil system shall incorporate synthetic rubber gaskets as provided by the manufacturer whose fixing instructions shall be strictly adhere to.

Connections to WC pans shall be effected by the use of a WC connector, gasket and cover, fixed to suit pan outlet.

Suitable supporting brackets and pipe clips shall be provided at maximum of one metre centres.

The Sub-contractor shall be responsible for the joint into the Gully Trap on Drain as indicated on the Drawings.

3.2.2 **Valves**

a) Draw-off Taps and Stop Valves (Up to 50mm Nominal Bore)

Draw-off taps and valves up to 50mm nominal bore, unless otherwise stated or specified for attachment or connection to sanitary fitment shall be manufactured in accordance with the requirements of B.S.1010.

a) Gate Valves

All gate valves 80mm nominal bore and above, other than those required for fitting to buried water mains shall be of cast iron construction, in accordance with the requirements of B.S. 3464. All gate valves required for fitting to buried water mains shall be of cast iron construction in accordance with the requirements of B.S.1218.

All gate valves up to and including 65mm nominal bore shall be of bronze construction in accordance with the requirements of B.S. 1952.

The pressure classification of all valves shall depend upon the pressure conditions pertaining to the site of works.

c) Globe Valves

All globe valves up to and including 65mm nominal bore shall be of bronze construction in accordance with the requirements of B.S.3061.

The pressure classification of all globe valves shall depend upon the pressure conditions pertaining to the site of works.

3.2.3 **Waste Fitment Traps**

a) Standard and Deep Seal P & S Traps

Where standard or deep seal traps are specified they shall be manufactured in suitable non-ferrous materials in accordance with the full requirements of B.S. 1184.

In certain circumstances, cast iron traps may be required for cast iron baths and in these instances bath traps shall be provided which are manufactured in accordance with the full requirements of B.S.1291.

b) Anti-Syphon Traps

Where anti-syphon traps are specified, these shall be similar or equal to the range of traps manufactured by Greenwood and Hughes Limited, Deacon Works Littleshampton, Sussex, England.

The trade name for traps manufactured by this company is 'Grevak'.

3.2.4 **Pipe Supports**

a) General

This sub-clause deals with pipe supports securing pipes to the structure of buildings for above ground application.

The variety and type of support shall be kept to a minimum and their design shall be such as to facilitate quick and secure fixings to metal, concrete, masonry or wood.

Consideration shall be given, when designing supports, to the maintenance of desired pipe falls and the restraining of pipe movements to a longitudinal axial direction only.

The Sub-contractor shall supply and install all steelwork forming part of the pipe support assemblies and shall be responsible for making good damage to builders work associated with the pipe support installation.

The Sub-contractor shall submit all his proposals for pipe supports to the Engineer for approval before any erection works commence.

b) CPVC Pipework

The pipe work for the plumbing installation shall be chlorinated polyvinyl chloride (CPVC) tubing which meets the requirements of SDR 11 of ASTM F441 and be suitable for potable water installations.

The pipe fittings shall CPVC pipe fittings and shall meet or exceed the requirements of ASTM D2846.
They will conform to ASTM F441 and ASTM F442, ASTM F1970. All changes in direction will be with standard bends or long radius fittings.

All socket type joints shall be assembled employing solvent cements that meet or exceed the requirements of ASTM F493 and primers that meet or exceed the requirements of ASTM F656. The standard practice for safe handling of solvent cements shall be in accordance with ASTM F402. Solvent cement and primer shall be listed by NSF International for use with potable water, and approved by the pipe and fittings manufacturers.

b) Steel and Copper Pipes and Tubes

Pipe runs shall be secured by clips connected to pipe angers, wall brackets, or trapeze type supports. 'U' bolts shall not be used as a substitute for pipe clips without the prior approval of the Engineer.

An approximate guide to the maximum permissible supports spacing in metres for steel and copper pipe and tube is given in the following table for horizontal runs.

Size Nominal Bores	Copper Tube to B.S. 659	Steel Tube to B.S. 1387
15mm	1.25m	2.0m
20mm	2.0m	2.5m
25mm	2.0m	2.5m
32mm	2.5m	3.0m
40mm	2.5m	3.0m
50mm	2.5m	3.0m
65mm	3.0m	3.5m
80mm	3.0m	3.5m
100mm	3.0m	4.0m
125mm	3.0m	4.5m
150mm	3.5m	4.5m

The support spacing for vertical runs shall not exceed one and a half times the distances given for horizontal runs.

c) Expansion Joints and Anchors

Where practicable, cold pipework systems shall be arranged with sufficient bends and changes of direction to absorb pipe expansion providing that the pipe stresses are contained within the working limits prescribed in the relevant B.S. specification.

Where piping anchors are supplied, they shall be fixed to the main structure only. Details of all anchor design proposals shall be submitted to the Engineer for approval before erection commences.

The Sub-contractor when arranging his piping shall ensure that no expansion movements are transmitted directly to connections and flanges on pumps or other items of plant.

The Sub-contractor shall supply flexible joints to prevent vibrations and other movements being transmitted from pumps to piping systems or vice versa.

3.2.5 **Sanitary Appliances**

All sanitary appliances supplied and installed as part of the Sub-contract works shall comply with the general requirements of B.S. Code of Practice 305 and the particular requirements of the latest B.S. Specifications.

3.2.6 **Pipe Sleeves**

Main runs of pipework are to be fitted with sleeves where they pass through walls and floors. Generally the sleeves shall be of P.V.C. except where they pass through the structure, where they shall be mild steel. The sleeves shall have 6mm - 12mm clearance all around the pipe or for insulated pipework all around the installation. The sleeve will then be packed with slag wool or similar.

3.3 **INSTALLATION**

3.3.1 **General**

Installation of all pipework, valves, fittings and equipment shall be carried out under adequate supervision from skilled staff to the relevant codes and standards as specified herein. The Sub-contractor shall be responsible to the Main Contractor for ensuring that all builders work associated with his piping installation is carried out in a satisfactory manner to the approval of the Engineer.

3.3.2 **Above Ground Installation**

a) Water Services

Before any joint is made, the pipes shall be hung in their supports and adjusted to ensure that the joining faces are parallel and any falls which shall be required are achieved without springing the pipe.

Where falls are not shown on the Contract Drawings or stated elsewhere in the Specification, pipework shall be installed parallel to the lines of the buildings and as close to the walls, ceilings, columns, etc., as is practicable. All water systems shall be provided with sufficient drain points and automatic air vents to enable them to function correctly.

Valves and other user equipment shall be installed with adequate access for operation and maintenance. Where valves and other operational equipment are unavoidably installed beyond normal reach or in such position as to be difficult to reach from a small step ladder, extension spindles with floor or wall pedestals shall be provided.

Screwed piping shall be installed with sufficient number of unions to facilitate easy removal of valves and fittings and to enable alterations of pipework to be carried out without the need to cut the pipe.

Full allowances shall be made for the expansion and contraction of pipework, precautions being taken to ensure that any force produced by the pipe movements are not transmitted to valves, equipment or plant.
All screwed joints to piping and fittings shall be made with P.T.F.E. tape.
The test pressure shall be maintained by the pump for about one hour and if there is any leakage, it shall be measured by the quantity of water pumped into the main in that time. A general leakage of 4.5 litres per 25mm of diameter, per 1.6 kilometres per 24 hours per 30 metres head, may be considered reasonable but any visible individual leak shall be repaired.

b) Sanitary Services

Soil, waste and vent pipe system shall be installed in accordance with the best standard of modern practice as described in B.S. 5572 to the approval of the Engineer.

The Sub-contractor shall be responsible for ensuring that all ground waste fittings are discharged to a gully trap before passing to the sewer via a manhole.

The Sub-contractor shall provide all necessary rodding and inspection facilities within the draining system in positions where easy accessibility is available.
Where a branch requires rodding facilities in a position to which normal access is unobtainable, then that branch shall be

extended so as to provide a suitable purpose made rodding eye in the nearest adjacent wall or floor to which easy access is available.

The vent stacks shall terminate above roof level and where stack passes through roof, a weather skirt shall be provided. The Sub-contractor shall be responsible for sealing the roof after installation of the stacks.

The open end of each stack shall be fitted with a plastic coated or galvanised steel wire guard.

Access for rodding and testing shall be provided at the foot of each stack.

c) Sanitary Appliances
All sanitary appliances associated with the Sub-contract works shall be installed in accordance with the best standard of modern practice as described in C.P. 305 to the approval of the Engineer.

3.4 TESTING AND INSPECTION

3.4.1 Site Tests – Pipework Systems

a) Above Ground Internal Water Services Installation
All water service pipe system installed above ground shall be tested hydraulically for a period of one hour to not less than one and half times to design working pressure.

If preferred, the Sub-contractor may test the pipelines in sections. Any such section found to be satisfactory need not be the subject of a further test when system has been completed, unless specifically requested by the Engineer.
During the test, each branch and joint shall be examined carefully for leaks and any defects revealed shall be made good by the Sub-contractor and the section re-tested.

The Sub-contractor shall take all necessary precautions to prevent damage occurring to special valves and fittings during the tests. Any item damaged shall be repaired or replaced at the Sub-contractor's expenses.

Above Ground Soil Waste and Ventilation System
All soil, waste and ventilating pipe system forming part of the above ground installation, shall be given appropriate test procedures as described in B.S. 5572, 1972.

Smoke tests on above ground soil, waste and ventilating pipe system shall not be permitted. Pressure tests shall be carried out before any work which is to be concealed is finally enclosed.

In all respects, tests shall comply with the requirements of B.S. 5572.

3.4.2 Site Test – Performance

Following satisfactory pressure test on the pipework system operational tests shall be carried out in accordance with the relevant B. S. Code of practice on the systems as a whole to establish that special valves, gauges, control, fittings, equipment and plant are functioning correctly to the satisfaction of the Engineer.

All hot water pipework shall be installed with pre-formed fibre glass lagging to a thickness of 25mm where the pipe runs above a false ceiling or in areas where the ambient temperature is higher than normal with the result that pipe "sweating", due
to condensation will cause nuisance.

All lagged pipes which run in a visible position after erection shall be given a canvas cover and prepared for painting as follows:

i) Apply a coating of suitable filler until the canvas weave disappears and allow to dry.

ii) Apply two coats of an approved paint and finish in suitable gloss enamel to colors approved by the Engineer.

All lagging for cold and hot water pipes erected in crawl ways, ducts and above
false ceiling which after erection are not visible from the corridors of rooms, shall be covered with a reinforced aluminium foil finish banded in colours to be approved by the Engineer.

In all respects, unless otherwise stated, the hot and cold water installation shall be carried out in accordance with the best standard of modern practice and described in C.P.342 and C.P.310 respectively to the approval of the Engineer.

The test pressure shall be applied by means of a manually operated test pump or, in the case of long main or mains of large diameter, by a power driven test pump which shall not be left unattended. In either case precautions shall be taken to ensure that the required pressure is not exceeded.

Pressure gauges should be recalibrated before the tests.

The Sub-contractor shall be deemed to have included in his price for all test pumps, and other equipment required under this specification.

The test pressure shall be one and a half times the maximum working pressure except where a pipe is manufactured from a material for which the relevant B.S. specification designates a maximum test pressure.

3.5 **STERILISATION OF COLD WATER SYSTEM**

All water distribution system shall be thoroughly sterilised and flushed out after the completion of all tests and before being fully commissioned for handover.

The sterilisation procedures shall be carried out by the Sub-contractor in accordance with the requirements of B.S. Code of Practice 301, Clause 409 and to the approval of the Engineer.

1.0 PORTABLE FIRE EXTINGUISHER AND HOSE REEL INSTALLATIONS

1.1 General

The particular specification details the requirements for the supply and installation and commissioning of the Portable Fire Extinguishers, Hose Reel, Fire Hydrant and Dry Riser. The Sub-contractor shall include for all appurtenances and appliances not necessarily called for in this specification or shown on the contract drawings but which are necessary for the completion and satisfactory functioning of the works.

If in the opinion of the Sub-contractor there is a difference between the requirements of the Specifications and the Contract Drawings, he shall clarify these differences with the Engineer before tendering.

1.2 Scope of Works

The Sub-contractor shall supply, deliver, erect, test and commission all the portable fire extinguishers, Hose Reel, Fire Hydrant and Dry Riser which are called for in these Specifications and as shown on the Contract Drawings.

1.3 Water/CO2 Extinguishers

These shall be 9-litre water filled CO2 cartridge operated portable fire extinguishers and shall comply with B.S. 1382: 1948 and to the requirements of B.S.4523: 1977. Unless manufactured with stainless steel, bodies shall have all internal surfaces completely coated with either a lead tin, lead alloy or zinc applied by hot dipping. There shall be no visibly uncoated areas.

The extinguishers shall be clearly marked with the following:

a) Method of operation.
b) The words 'WATER TYPE' (GAS PRESSURE) in prominent letters.
c) Name and address of the manufacturer or responsible vendor.
d) The nominal charge of the liquid in imperial gallons and litres.
e) The liquid level to which the extinguisher is to be charged.
f) The year of manufacture.
g) A declaration to the effect that the extinguisher has been tested to a pressure of 24.1 bar (350 psi.).
h) The number of British Standard 'B.S' 1382 or B.S. 5423: 1977.

1.4 Portable Carbon Dioxide Fire Extinguishers

These shall be portable carbon dioxide fire extinguishers and shall comply with B.S. 3326: 1960 and B.S. 5423: 1977.

The body of extinguisher shall be a seamless steel cylinder manufactured to one of the following British Standards; B.S. 401 or B.S. 1288.

The filling ratio shall comply with B.S. 5355 with valves fittings for compressed gas cylinders to B.S.341. Where a hose is fitted it shall be flexible and have a minimum working pressure of
206.85 bar (3000 p.s.i.). The hose is not to be under internal pressure until the extinguisher is operated.

The nozzle shall be manufactured of brass gunmetal, aluminium or stainless steel and may be fitted with a suitable valve for temporarily stopping the discharge if such means are not incorporated in the operating head.

The discharge horn shall be designed and constructed so as to direct the discharge and limit the entrainment of air. It shall be constructed of electrically non-conductive material.

The following markings shall be applied to the extinguishers:-

a) The words "Carbon Dioxide Fire Extinguisher" and to include the appropriate nominal gas content.
b) Method of operation.
c) The words "Re-charge immediately after use".
d) Instructions for periodic checking.
e) The number of the British Standard B.S. 3326: 1960 or B.S. 5423.
f) The manufacturers name or identification markings

1.5 Dry Chemical Powder Portable Fire Extinguisher

The portable dry powder fire extinguishers shall comply with BS3465: 1962 and BS 5423. The body shall be constructed to steel not less than the requirements of BS 1449 or aluminium to BS 1470: 1972 and shall be suitably protected against corrosion.

The dry powder charge shall be not-toxic and retain it s free flowing properties under normal storage conditions. Any pressurizing agent used as an expellant shall be in dry state; in particular compressed air.

The discharge tube and gas tube if either is fitted shall be made of steel, brass, copper or other not less suitable material. Where a hose is provided it shall not exceed 1,060mm and shall be acid and alkali resistant. Provision shall be made for securing the nozzle when not in use.

The extinguisher shall be clearly marked with the following information

a) The word "Dry Powder Fire Extinguisher"
b) Method of operation in prominent letters.
c) The working pressure and the weight of the powder charge in Kilogramme.
d) Manufacturers name or identification mark
e) The words "RECHARGE AFTER USE" if rechargeable type.
f) Instructions to regularly check the weight of the pressure container (gas Cartridge) or inspect the pressure indicator on stored pressure types when fitted, and remedy any loss indicated by either.
g) The year of manufacture.
h) The Pressure to which the extinguisher was tested.
i) The number of this British Standard BS 3465 or BS 5423: 1977.
j) When appropriate complete instructions for charging the extinguisher shall be clearly marked on the extinguisher or otherwise be supplied with the refill.

1.6 Air Foam Fire Extinguisher

These shall be of 9 litres capacity complete with refills cartridges and wall fixing brackets and complying with B.S. 5423 with the following specifications:-

Cylinder:	to B.S. 1449
Necking:	to be 76mm outside diameter steel EN 3A $2^3/_4$ X 8TPI female thread**.**
Head cap:	to be plastic moulding acetyl resin.
CO_2 Cylinder:	to be 75gm P.V.C coated.
Internal Finish:	to be polythene lining on phosphate coating.
External finish:	to be phosphated - One coat primer paint and one coat stove enamel B.S. 381 C.

1.7 Fire Blanket

The fire blanket shall be made from cloth woven with pre-asbestos yarn or any other fire proof material and to measure 1800 x 1210 mm and shall be fitted with special tapes folded so as to offer instantaneous single action to release blanket from storing jacket.

2.0 Boosted Hose Reel System

2.1 General

The Particular Specification details the requirements for the supply, installation and commissioning of the hose reel installation. The hose reel installation shall comply in all respects to the requirements set out in C.O.P 5306 Part 1: 1976, B.S 5041 and B.S 5274. The System shall comprise of a pumped system.

2.2 Hose Reel Pumps

The fire hose reel pumps shall consist of a duplicate set of multi-line centrifugal pumps from approved manufacturers. The pumps shall be capable of delivering 0.76 lit/sec at a running pressure of 2 bars.

The pump casing shall be of cast iron construction with the impeller shaft of stainless steel with mechanical seal.

2.3 Control Panel

The control panel shall be constructed of mild steel 1.0mm thick sheet, be moisture, insect and rodent proof and shall be provided complete with circuit breakers and a wiring diagram enclosed in plastic laminate.

The pump shall be controlled by a flow switch therefore; the control panel shall include the following facilities:

(a) 'On' push button for setting the control panel to live.
(b) Green indicator light for indicating control panel live.
(c) Duty / Stand-by pump auto change over.
(d) Duty pump run green indicator light.
(e) Stand-by pump run green indicator light.
(f) Duty pump fail red indicator light.
(g) Stand-by pump fail red indicator light.
(h) Low water condition pump cut-out with red indicator light.

The pumps are to be protected by a low level cut-out switch to prevent dry pump run when low level water conditions occur in the water storage tank.

2.3.1 Hose Reel

The hose reel to the installation shall consist of a recessed, swing-type hose reel as Angus Fire Armour Model III or from other approved manufacturers.

The hose reel shall comply with B.S. 5274: 1975 and B.S 3161: 1970 and is to be installed to the requirements of C.P. 5306 Part 1: 1976.

The hose reel shall be supplied and installed complete with a first-aid Non-kinking hose 30 meters long with a nylon spray / jet / shut-off nozzle fitted. A screw down chrome - plated globe valve to B.S 1010 to the inlet to the reel is to be supplied.

The orifice to the nozzle is to be not less than 4.8mm to maintain a minimum flow of 0.4 lit / sec to jet.

The hose reels shall be installed complete with electro-galvanized cabinet recessed on the wall.

The hose reels shall be installed at 1.5 meters centre above the finished floor level in locations shown in the contract drawings.

2.3.2 Pipe Work

The pipe work for the hose reel installation shall be galvanized wrought steel tubing heavy grade Class B to B.S 1387: 1967 with pipe threads to B.S 21. The pipe work and all associated fittings shall be in approved colour for fire fittings.

2.3.3 Pipe Fittings

The pipe fittings shall be wrought steel pipe fittings, welded or seamless fittings conforming to B.S. 1740 or malleable iron fittings to B.S 143.
All changes in direction will be with standard bends or long radius fittings. No elbows will be provided.

2.3.4 Non-return Valves

The non-return valves up to and including 80mm diameter shall be to B.S. 5153: 1974.
The valves shall be of cast iron construction with gunmetal seat and bronze hinge pin.

2.3.5 Gate Valves

The gate valves up to and including 80mm diameter shall be non-rising stem and wedge disc to B.S 5154: 1974 with screwed threads to B.S. 21 tapes thread

2.3.6 Sleeves

Where pipe work passes through walls, floors or ceilings, a sleeve shall be provided one diameter larger than the diameter of the pipe, the space between them to be packed with mineral wool, to the Engineer's approval.

2.3.7 Earthing

The hose reel installation shall be electrically earthed by a direct earth connection. The installation of the earthing shall be carried out by the Electrical Sub- contractor.

2.3.8 Finish Painting

Upon completion of testing and commissioning the hose reel installation, the pipe work shall be primed and finish painted with 2 No. coats of paints to the Engineer's requirements.

2.3.9 Testing and Commissioning

The hose reel installation shall be flushed out before testing to ensure that no builder's debris has entered the system. The installation is to be then tested to one and half times the working pressure of the installation to the approval of the Engineer. Simulated fault conditions of the pumping equipment are to be carried out before acceptance of the System by the Engineer.

2.3.10 Instruction Period

The Sub-contractor shall allow in his contract sum for instructing of the use of the equipment to the Client's maintenance staff. The period of instruction may be within the contract period but may also be required after the contract period has expired.

The period of time required shall be stipulated by the Client but will not exceed two days in which time the Client's staff shall be instructed on the operation and maintenance of the equipment.

3.0 Signage-Fire Instruction /Fire Exit

3.1 Fire Instruction Notice

Print fire instruction on the Perspex plates with White Colour Background measuring 510mm length x 380mm width x 4mm thick as follows;

FIRE INSTRUCTION NOTICE

In the event of fire;

1. Raise the alarm by actuating the nearest alarm system point, Sound Siren /gong or **Shout Fire**
2. Attack fire using the nearest available equipment
3. Call nearest fire Brigade or Police 999 and inform your switchboard (PABX) Operator
4. Ensure that all personnel not involved in fire fighting evacuation to safety outside the building.
5. Close but **DO NOT LOCK** doors behind as you leave.
6. Evacuate the building using stairs or fire escapes. Do not use Lifts/escalators. Walk calmly. Avoid panic. Do not stop or return for personal belongings.
7. Assemble as per floor outside the building for roll call.

3.1.1.1 Fire Exit Sign

Print Fire Exit signs on the Perspex plate, 4mm thick, with white colour background as follows:-

1. Lettering **IN RED COLOR** of not less than 50mm in height.
2. A pendant sign bearing words, **FIRE EXIT** and with a directional arrow.

The sign must be capable of being read from both approaches to exit and so is double sided.

3.1.1.2 Hose Reel Label

Print Fire Exit signs on the Perspex plate, 4mm thick, with white colour background as follows:-

1. Lettering **IN RED COLOR** of not less than 50mm in height.
2. A pendant sign bearing words, **HOSE REEL** and with a directional arrow.

The sign must be capable of being read from both approaches to exit and so is double sided.

4.0 The Dry Riser Installation

4.1 Definition

Dry riser installation is a system where a pipe is installed vertically through a building with and inlet breeching provided at a street level through which the fire brigade can pump water.

4.2 Installation

The dry riser is installed with Fire Brigade Breeching inlet installed at street level in front of the building at a position where fire brigade can access and pump water into the building. Landing valves are then installed on each floor above the ground level to which the fire brigade can attach fire fighting hoses.

4.3 Landing Valves

The Hydrant outlets shall comply with the requirements of C.P 5306 Part 1:1976 and B.S 5041 Part 1. The hydrant Riser outlets shall be 2No minimum per floor including the roof and shall be mounted with their centre line between 910mm and 1060mm above finished floor level positioned at the entry lobby on each floor.

4.4 Fire Brigade Breeching Inlets

One of the Brigade Breeching inlets shall consist of four (4No.) 64mm internal diameter instantaneous male coupling for connection to the fire brigade pumps and other two shall consist of two (2No.) 64mm internal diameter instantaneous male coupling.

The breeching inlet shall incorporate a 100mm diameter flanged connection to the 100mm dry riser mains.

The breeching inlet shall be located 1000mm to the centre line of the box above ground level.

The breeching inlet shall be enclosed in a galvanized mild steel cabinet of suitable dimensions to contain all visible pipe work. A 7.5mm thick wired glass front shall be provided with 50mm high, red lettering, **DRY RISER BREECHING CONNECTOR.** The reminder of the box is to be finished in fire red enamel paint.

4.5 Pipework

The pipe work fittings shall be wrought steel pipe fittings welded or seamless fittings conforming to B.S 1740 Part 1971 or malleable iron fittings to B.S 193.
All changes in direction will be standard bends or long radius fittings. **No elbows will be permitted.**

4.6 Flanges

The flanges shall comply with B.S 4504:1969. All flanges shall comply with a nominal Pressure Rating of 16 bars and shall be of either grey cast iron or steel.

4.7 Gaskets

The gaskets for use with flanges to B.S 4504: 1969 shall comply with B.S 4865 Part 1: 1972 for pressure up to 64 bars.

4.8 Air Relief Valves

The dry riser shall terminate 1M above the roof landing valve with an air relief valve. The valve construction shall be of iron Grade E conforming to B.S 1452. Float Guide and Seat Ring shall be of A.B.S plastic with seal ring of moulded rubber, Maximum working pressure of the valve is to be 16 bar.

4.9 Non-Return Valves

The non-return valves up to and including 80mm diameter shall conform to B.S 5153:1974 with flanges to B.S 4504 PN 16. The valves shall be of cast iron construction with gunmetal seat and disc with spring of phosphor bronze.

Non return valves exceeding 80mm diameter and up to 300mm diameter shall be conform to B.S 5153:1974 with flanges to B.S 4504 PN 16. The valve shall be is Cast Iron Construction with Gunmetal seat to B.S 1400.

4.10 Gate Valves

The gate valves up to and including 80mm shall be non rising stem and wedge disc to B.S. 1952:1964 (B.S 5154:1974) with screwed threads to B.S.21(KS ISO 7 – 1) taper thread. The valves shall be of high grade bronze construction.

Gate valves exceeding 80mm and up to 300mm shall be to B.S 5163 with flanges to B.S 4504 PN 16. The valve is to be double flanged cast iron wedge gate valve for water works purposes with cast iron body to B.S 1452 GRADE 14 with rubber covered cast iron gate. The stem is to be of Forged Stainless Steel to B.S 970 with cast iron hand wheel.

4.11 Sleeves

Where Pipework pass through walls or floors or ceiling a sleeve shall be provided one diameter larger than the diameter of the pipe the space between to be the packed with mineral wool, to the Engineers approval.

4.12 Floor and Ceiling Plates

Where pipes pass through floors, walls and ceilings, floor, wall and ceilings plates shall be secured around the pipe. The plated shall be of stainless steel construction and will serve no other purpose than to present a neat finish to the exposed installations.

4.13 Earthing

The dry riser shall be electrically earthed by a direct earth connection. The installation of the earthing to be carried out by the electrical Sub-Contractor

4.14 Finish Painting

Upon completion, testing and commissioning of the dry rise installation the pipe work shall be primed and finish painted with 2No. Coats of paint by the Sub-Contractor to the Engineer's requirements.

4.15 Testing and Commissioning

The installation is to be tested to one and half times the working pressure of the installation, all to the approval of the Engineer. The pressure shall be maintained for about 1 hour ensuring that there is no change in pressure is observed

4.16 Canvas Hose

The canvas hose shall be 65mm diameter 30m long designed for a bursting pressure of 34 bars. The canvas hose shall have attached instantaneous hose coupling, branch pipes and nozzle to B.S 336: 1965.

4.17 Hose Cradle

The hose cradle shall be a high quality fitting designed for use in public buildings. The cradle **shall be made in aluminium** throughout and shall be supplied with a wall bracket and the finish shall be polished or chrome plated

5.0 Fire Hydrant

5.1 Fire Hydrant Details

5.1.1 Definition

The fire hydrant is a system which is installed along the water mains to used as a means of providing water to the fire brigades through the connection of the hose from a stand pipe.

5.1.2 Installation

The fire hydrants are installed along the water mains with the first hydrant at a location which is not more than 60 m from the entry of any building and they should not be more than 120 m apart.

5.1.3 Hydrant body

The body of the hydrant shall be made of grey cast iron complying with the requirements of BS 1452 having a tensile strength not less than that given for grade 14.

5.1.4 Hydrant Valve

The valve shall be faced with suitable resilient material. The threaded part of the valve, which engages with the spindle, shall be of bronze.

Body seating for the valves shall be of copper alloy complying with the requirements of BS 1400 (KS 06 – 744 – 1:1991) or high tensile brass complying with the requirements of BS 2872 or BS 2874.

Turning the spindle cap in a clockwise direction when viewed from above shall close valves and the direction of opening shall be permanently marked on the gland.

5.1.5 Spindle & Spindle Cap

The spindle note shall be either of the same material as the spindle, or of copper alloy complying with the requirements of BS 1400 (KS 06 – 744 – 1:1991). It shall have a squared top formed to receive either a cast iron spindle cap.

The spindle shall be made of copper alloy complying with the requirements of BS 2874 (KS 06 – 744 – 1:1991), and it shall have a threaded machined of trapezoidal form. The spindle cap shall be of a cast iron secured to the spindle by on M12 hexagon socket set screw conforming to BS 4168.

5.1.6 Hydrant Outlet

The outlet flange of the hydrant shall have above nominal diameter 65mm, and shall be fitted with a screwed outlet – Both flanges shall be 50 mm conforming to BS 4504: Part 1: 1969

The screwed outlet shall be provided with a cap of cast iron or other suitable material. The cap shall cover the outlet thread completely and shall be attached to the hydrant by a chain

The distance between the axis of the outlet and the nearest point on the spindle fitting shall be not less than 100 mm.

The screwed outlet shall be made of Copper alloy to BS 1400 (KS 06 – 744 – 1:1991), or Copper alloy to BS 2872, or Suitable Spheroidal graphite iron to BS 2789 protected against corrosion accordance with CP 2008.

5.1.7 Drain Boss

Each shall be provided with a suitable drain boss on the outlet side. This shall be located at the lowest practical point which will permit the filling of self-operating a drilled drip plug.

5.1.8 Jointing

The hydrants shall have machined joint faces through out and the fitting of adjoining parts shall be such as to make sound joints, corresponding parts of hydrants of the same design and manufacture shall be interchangeable.

5.1.9 Hydrant coating

The hydrant shall be coated in accordance to BS. 4164.

5.1.10 Surface Box

The clear opening of hydrant surface boxes at ground level shall not be less than 250mm x 380mm.
The depth of frame shall normally be:

a) For boxes located on footpaths: 100mm
b) For boxes located in roads: 125mm

5.1.11 Marking

Surface box covers shall be clearly marked by having the words **'FIRE HYDRANT'** in letter not less than 30mm high, or the initials **'FH'** in letters not less than 75mm high cost into the cover.

5.1.12 Surface Box Covers & Frames

The surface box frames and covers shall be graded in accordance with BS 497:1967 and shall meet the loading test requirement also given in BS 497

5.2 Stand Pipes

One end of these shall have internal threads to couple with the 80mm diameter external threads of the screw down type or above ground fire Hydrant (BS 750 type 2 hydrants) outlet. It shall have 65mm diameter internal threads to couple with the interconnect or hose of the pump set

5.3 Hose Pipe

Each cotton synthetic fibre rubberized fire hosepipe to be at least 30 metres long with 65mm diameter female instantaneous type connector complete with nozzle.

6.0 Testing

The hydrants shall be deemed to have undergone the necessary hydrostatic and flow test at time of manufacture. Necessary test certificates from the manufacturer shall be needed. The test, to conform to BS 750: 1977:

PARTICULAR SPECIFICATION FOR THE DESIGN, SUPPLY AND ERECTION OF WATER STORAGE TANKS

1.0 Description of Site

The Sub-contractor is deemed to have visited the site at Narok..

No claims will be allowed for the travelling or other expenses, which may be incurred by the sub-contractor's works.

2.0 Scope of Contract

The work to be carried out under, this sub-contract comprises the designs, manufacture, supply, delivery, erection, together with testing and commissioning of steel tank as here-in specified.

All work shall be performed in straightforward manner by competent workmen under skilled supervision to the entire satisfaction of the project manager.

3.0 Compliance with Regulations

The sub-contractor shall comply in all respects to the provisional and regulations of the By-laws of the Local Authority, Kenya Building Code, as 449 Part B5 1964. BS 4211, CP2 chapters V part 1 and 2 MOPW Structural steel work specification (1973) code of practice for design and construction of buildings and structures in Relation to Earthquake (1972) wherever applicable to the sub-contract works.

The Structural Engineer shall be responsible for the design of the foundation subject to giving approval of the sub-contractor's design of the tower and due allowance should be given for this work to be carried out in sub-contractors programme of works. The main contractor is responsible for the construction of the foundation in accordance with approved designs.

4.0 Structural Drawings and Calculations

2No copies of general arrangement and fabrication drawings properly dimensioned and detailed showing the whole tower and its accessories together with 2No copies of the structural calculations complying with all the relevant BS and CP are to be submitted for approval prior to the commencement of the work.

The calculations are to indicate the maximum downward and upward loads on the foundations for the Engineer to design the foundation

5.0 Steel Water Tanks

The tank shall be galvanized pressed steel sectional tank complying in all respects to BS 1564 Types 1 or 2 unless otherwise specified. The jointing materials shall be non-toxic and non-insoluble to water and the tank cover shall be joined throughout the tank top ensuring that the joint is both water proof and dust proof.

Cover framing and members shall be designed to withstand supper imposed loading complying with the requirement complying with the requirements of CP2 Chapter V part 1 and BS 149 Part 2.

All internal stays are to be provided as required by the tank manufacture and the Sub-contractor shall be responsible for ensuring the stays are adequate in number and position and properly tightened. Access manhole with hinged cover together with a filtered vent outlet shall be installed.

The Sub-contractor is to notify the Engineer of the type of panel he is proposing to use and the manufacturer who is to be approved.

The inflow and outflow connection shall be as shown on the drawing.
The outflow supply pipe shall be at least 50mm above the tank bottom while the inflow pipe shall be 200mm below the tank rim. The overflow pipe shall be about 1500mm long, away from the tank. The drain pipe shall be at the lowest part of the tank.

5.1 Roof Tank

As per the BQ specification

6.0 Pipework

The sub-contractor shall supply and fix all pipe work and fitting up to ground level as detailed on the drawing or in this specification. All pipe work shall be adequately supported and secured to the tank structure. The washout pipe shall have a bend leading to a reasonable place where the drainage will not interfere with the structure, preferably at about 300mm above ground.

The inflow, outflow and washout pipes shall be fixed against the tower structure so as to facilitate fixing and good support. All pipe work shall be medium grade galvanized steel and must conform to BS 1987 and 1967 class 'B'.

The sub-contractor shall provide high pressure ball valve capable of coping with the maximum area's local water supply pressure.

7.0 Painting

The tank shall be painted inside with one coat of bituminous non-toxic paint (or any other equivalent and approved) and on the outside with coat of primer before erection. After erection, the tank inside shall be painted with two coats of aluminium paint. The other structures shall be cleaned and painted one coat lead oxide or red lead before erection and two coats of aluminium paints after erection. All the painting shall be approved by the Engineer.

8.0 Testing

Testing shall be done by filling the tank with water after erection. The water will be from the local supply and the main contractor shall apply from the Authority for connection. Testing shall be witnessed by the Project Manager or his representative.

8.1 Guarantee

The sub-contractor shall guarantee the tanks against leaks, and the tower for a period of (12) months form the Handover date. Any damage incurred due to bad workmanship shall be made good by the contractor.

GENERAL SOLAR WATER HEATING SPECIFICATIONS

1.1.0 QUALITY OF MATERIALS AND WORKMANSHIP

1.1.1 General

All materials, equipment and accessories are to be new and in accordance with the requirements of the current rules and regulations where such exist, or in their absence with the relevant British/European standard.

Uniformity of type and manufacture of equipment or accessories is to be preserved as far as practicable throughout the whole work.

If in this specification, the practice is adopted of specifying a particular item as "similar" to that of a particular firm's product, it is to be clearly understood that this is to indicate the type and quality of the equipment required. No attempt is being made to give preference to the equipment supplied by a firm whose name or products is being quoted.

Where particular manufacturers are specified herein, alternative makes will be considered, and the Engineer shall be allowed to reject any other makes.

The tenderer will be entirely responsible for all the materials, apparatus, equipment, etc in connection to his work, and shall take special care to protect all parts of finished work from damage until handed over to the Employer.

The work shall be carried out by competent workmen under skilled supervision. The Engineer shall have authority to have any of the work taken down or changed, which is executed in any unsatisfactory manner.

The works shall be carried out strictly in accordance with:

a) British Standard B.S. 5918, Domestic hot water supply and solar water heating system
b) "British code of Practice" C.P. 310: Water Supply
c) British Standard code of Practice" C.P. 342: Centralized hot water supply
d) All other relevant British standard Specifications and Codes of Practice (herein after referred to as B.S and C.P respectively.)
e) By-Laws of the Local Authority
f) The "Specification" and the "Particular Specification"
g) The tender/working drawings
h) The engineer's Instructions.

The drawings and specifications are to be read as a whole and are to explain each other. Work shown on the drawings and not described in the specifications or vice versa shall be duly executed under the contract.

1.1.2 Solar Panel – Construction

Solar panels shall be flat plate solar collectors. The structure of the collector and its components must withstand local extreme environmental conditions including winds, storm etc.

1.1.2.1 Solar Panel – External Construction

a) Glazing material shall be transparent and non-reflective to solar radiation. Total surface heating area of the solar panel shall be as specified elsewhere. The top of the panel shall be a single transparent glazed glass sheet. The glazed glass shall be as low-iron tempered glass or equivalent. The thickness of the glazed glass shall be 3 mm.
The glazing and the holding construction shall have thermal characteristics to withstand extreme local temperatures and also thermal shock due to storms etc. Gasket for the glazing shall be EPDM gasket or similar.

During accidental breakage of the glazing, the glazed glass sheet shall be replaceable at site.

b) Solar panel collector casement shall be rigid, structurally sound and corrosion resistant. Sides and bottom of panel shall be 24 gauge galvanized mild steel sheet or 2mm aluminium sheet.

Galvanized mild steel sheet shall be etched primed and applied with two coats of approved oil-base paint. 4 mm to 6 mm breathing hole shall be provided on the galvanized mild steel casing for the removal of moisture content formed due to condensation within the panel.

c) The panel/glass construction shall be weather proof. Pipework joints and collector interconnection shall be water proof. Approved silicone gasket or similar to be used at the panel connections.

1.1.2.2 Solar Panel - Internal Construction

a) **Absorber -** Shall be located directly beneath the glass sheet and fully cover the internal area of the panel.

Absorber shall be made of copper sheet or aluminium with a selective surface chemically treated similar to the black chrome finish or similar. The selective surface shall achieve 95% absorptivity of solar radiation and 15 to 20% emissivity of infra-red radiation. The absorber and the selective surface shall not be affected during life span of the absorber.

b) **Heat Exchanger**

Copper tubes and fittings shall be utilized for internal panel pipe work and in accordance with B.S. 2871 or similar. All joints and connections between the riser and header tubing's shall be leak proof and stand to hydraulic pressure tests.

The collector to be pressure tested to withstand a pressure of 8 kg/cm^2. In general, collectors shall be pressure tested at 15 times the rated operating gauge pressure of 8kg/cm^2.

A certificate of pressure testing to be issued when required and requested by the Engineers.

c) **Insulation**

The underside of the absorber, inclusive headers and the outer casing internal sides shall be insulated with 50 mm fibre glass insulation, minimum density 64 kg/m^3. The insulation shall be non-combustible and shall withstand maximum continuous operating temperature of 200°C (and minimum operating temperature of –50°C).

1.1.2.3 Hot Water Solar Cylinder

a) The hot water solar cylinder shall have a nominal capacity as specified on the contract drawing

and particular specification to the designed highest water level. The hot water cylinder shall have a separate feed tank attached to it.

b) The cylinders and the feed tanks shall comply with B.S. 417, 699, 2777, 4214, 1565, 1566 and 3198. Refer also Water Storage tanks as specified elsewhere. The Cylinder and tanks shall be supplied complete with screwed BSPF parallel thread flanged connections for flow, return, vent, overflow and drain pipes.

c) Cylinder shall be provided with a magnesium electrode as corrosion protection, weight: minimum 1.5 kg. and have an inspection cover to facilitate renewal of the electrode.

d) The cylinder shall be galvanized, after manufacture in accordance with the requirements of BS. 729 Part 1 and pressure tested in accordance with the above B.S.

A certificate of pressure testing to be issued when required and requested by the Engineers/Project Manager's Representative. Refer also to "Protection of Metal surface" as specified elsewhere in the specification.

e) Insulation
The cylinder shall be insulated on all the sides with 100 mm fiberglass, or 100 mm thick foam injected polyurethane. At the inspection cover the insulation shall be easily removable.

f) Cladding
The insulation shall be fully laded with 24 gauge galvanized M.S. Sheet.

1.1.2.4 Flow and Return Pipework

Pipework shall be galvanized mild steel medium duty and in accordance with BS. 1387 and insulated as specified.

1.1.3 INSTALLATION

1.1.3.1 Solar panel

a) Location

The solar panel shall where physically possible be installed facing south. Where it is not practical for the solar panel to face due south, the maximum allowance variation shall be 45^0.

b) Angle of Inclination

The solar panels for maximum efficiency should be fitted at an angle equal to the latitude of the installation area. Minimum angle of inclination should be 5^0.

c) Solar panel shall be mounted on angle frame and rise to flow outlet according to manufacturer's specifications.

1.1.3.2 Solar Cylinder

a) For Standard Thermo-syphon

The solar cylinder shall maintain a minimum horizontal distance of 300 mm above the highest point of the solar panel installation

b) For low Thermo-syphon

The solar cylinder shall maintain a flow line up grade of 1:20 minimums where the low profile thermo-syphon system is utilized.

1.1.3.3 Flow and Return Pipework

(a) Joints

All joints between ferrous and copper piping shall be made with dielectric pipe unions for the prevention of electrolytic corrosion.

(b) Penetration through Roof decking.

Where pipes penetrate the roof decking, they shall be provided with a sleeve that fits around the pipe making a weather proof joint between roof and pipe.

(c) Insulation

All pipework between solar panel and storing tank to be insulated with 25 mm fibreglass where exposed to weather, covered with 24 gauges galvanized M.S. sheet cladding and weather proofed.

All insulation for supply and return pipework in roof space shall be covered with cotton canvas.

All insulation shall be in accordance with BS. 1334 unless otherwise specified.

1.1.3.4 Drain, overflow and Vent Pipework

(a) The drain and overflow pipework from the solar cylinder shall terminate approximately 75 mm away from the nearest drain outlet.

(b) Vent pipe from the solar cylinder shall terminate approximately 150 mm over the top water level in the solar cylinder feed tank.

(c) Provided drain valve for the solar panel. Drain valve shall be firmly clamped in order to avoid leaks at the joints during operation.

1.1.3.5 Valves

(a) Copper alloy gate valves complying with BS.1952 shall be installed on flow and return pipework prior to it being connected to the solar cylinder.

(b) The solar cylinder and panel shall be supplied with stop valves for draining and to comply with BS 1010.

1.1.3.6 Inter connection of solar panels

It shall be done utilizing Neoprene tubing or Stainless Steel connector or equivalent, fitted with clamps and able to withstand the working pressure.

1.1.3.7 Precaution

Solar panel glass shall be adequately protected against cracking and the protection removed only when the solar system is commissioned.

1.1.4 Alternate Solar Heating System

Should the contractor intend utilizing an alternate equivalent solar heating system to the one specified under this contract, he shall when submitting his tender provide the Engineer with all necessary information such as material used, construction detail, installation procedure etc. for his approval.

1.1.5 Test and Efficiency Certificates

The Contractor shall provide test and efficiency certificates for the solar panels proposed for the installation in accordance with methods outlined in ASHRAE 23-77.

Certificates for the following tests shall be provided:

1. No flow 30 day exposure
2. Peak exposure test
3. Solar collector Thermal Shock/Water spray test
4. Solar Collector Thermal Shock/Cold Fill test
5. Solar Collector leak and pressure test
6. Thermal efficiency/performance test.

The Contractor shall also provide documentary evidence regarding the absorber sheet, the selective coatings and its optical performances (absorptivity and emissivity factors).

1.1.6 Pipework above Ground

Before any joint is made, the pipes shall be hung in their supports and adjusted to ensure that the joining faces are parallel and any falls which shall be required are achieved without springing the pipe.

Where falls are not shown on the contract drawings or stated elsewhere in the specification, pipework shall be installed parallel to the lines of the building.

All water systems shall be provided with sufficient drain points and automatic air vents to enable them to function correctly. Valves and other user equipment shall be installed with adequate access for operation and maintenance.

Where valves and other operational equipment are unavoidably installed beyond normal reach or in such a position as to be difficult to reach from a short step ladder, extension spindles wit floor or wall pedestals shall be provided.

Screwed piping shall b installed with a sufficient number of unions to facilitate easy removal of valves and fittings, and to enable alterations I=of the pipework to be carried out without the need to cut the pipe.

Full allowance shall be mad for the expansion and contraction of pipework, pre cautions being made to ensure that any forces produced by pipe movements are not transmitted to valves, equipment or plant.

All tubing exposed on faces of walls shall, unless otherwise specified, be fixed at least 25mm clear of adjacent surfaces with approved holder bats built into the walls, cut and pinned to walls in cement mortar. Where fixed to woodwork, suitable clips shall be used.

All tubing's specified as chased into walls shall have the wall face neatly cut and chased, the tubing wedges and fixed and plastered over.

All tubing specified as fixed to ceilings, roofs of roof structures shall be fixed with approved mild steel hangers cut and pinned to ceilings, roofs or roof strictures.

Where three or more tubes are fixed to the ceilings, roofs or roof structures close to each other, they shall be fixed in positions, which leave the lower surfaces at the same horizontal level, unless otherwise specified.

Tubes fixed to steel work shall be fixed with clips and tap screws.
Tubes shall be fixed to true lines parallel to adjacent lines of the building unless otherwise specified.
Where insulated, tubing shall be fixed with the insulation at least 25mm clear of the adjacent surfaces.
Pipe runs shall be secured by pipe clips connected to pipe hangers, wall brackets or trapeze type supports. 'U' bolts shall not be used as a substitute for the pipe clips without prior approval of the Engineer.

An approximate guide to the maximum permissible supports spacing in meters for the steel and copper pipe is given in the following table for horizontal runs.

Size Nominal Bores	**Maximum support Spacing**
15mm	2.0m
20mm	2.5m
25mm	2.5m
32mm	3.0m
40mm	3.0m
50mm	3.0m
65mm	3.5m
80mm	3.5m
100mm	4.0m

Each support shall take its due proportion of the weight of the pipe and shall allow free movement for expansion and contraction.
The support spacing for vertical runs shall not exceed one and a half times the distances given for the horizontal runs.
Sleeves shall be provided where pipes pass through walls and solid floors to allow movement of the pipes without damage to the structure. The overall length of the sleeve shall be such that it projects at least 2mm beyond the finished thickness of the wall or partition.

Sleeves passing through the structure shall be of mild steel. Elsewhere they shall be of PVC. The sleeves shall have 5-15mm clearance all round the pipe, or for insulated pipework, all round the insulation. The sleeves shall be packed with slag wool or similar.

Unless anything else is stated in the specification, the tenderer must include in his tender for all protective and finish painting of the works including colour coding of special requirements, if any, are specified in the text of the particular specification. The painting shall be carried out by skilled painters.

1.1.6.1 Galvanised Mild steel Tubing

Galvanized mild steel tubing shall be in accordance with B.S 1387 with screwed and socketed joints.
Fittings for the same shall be galvanized malleable iron to B.S 143 & 1256 threads to BS 21.
Joints shall be made with fine hemp and an approved jointing compound or with Teflon sealing tape.
Compound containing red lead must be used, unless otherwise specified.
All changes of direction shall be obtained by use of proper fittings. Formed bends shall not be accepted.

Long screw connectors and flat-faced unions shall not be used, unless otherwise specified.
Where chased into walls or cast in concrete, galvanized mild steel tubing carrying hot water shall be wrapped with hair felt secured by copper wire.

The fixing of galvanized mild steel tubing shall be done using:

a) Malleable iron "school board" pattern brackets for building in or screwing to structure or
b) Malleable pipe rings, with either back plate, plugs or girder clips or
c) Purpose made straps to Engineer's Approval.

1.1.6.2 Copper Tubing

Copper tubing shall be light gauge conforming to B.S. 2871 and the fittings shall be capillary or compression fittings to B.S. 864 of approved manufacture. Joints on tubing up to and including 50 mm diameter shall be compression or capillary joints or direct joints using zinc-free self-fluxing silver brazing alloys. Joints on tubing above 50 mm diameter shall be welded or blazed joints.

Copper tubing shall be jointed to steel cisterns by the use of copper-alloy connector having a shoulder to bear on the outside of the cistern and secured by a back nut inside. Washers shall be used both inside the cistern.

Where chased into walls or cast in concrete, copper tubing shall be wrapped with corrugated cardboard or hair felt secured by copper wire.

The fixing of copper tubing shall be done by using:-

a) Copper-alloy holder bats for building in, or screwing to structure.
or
b) Strap clips of copper, copper-alloy or other suitable material.
or
c) Gunmetal holder bats similar to "YORKSHIRE",

Iron or steel supports shall not be used for copper tubing.
All bends and sets shall be formed without diminishing the internal diameter in any part or causing fracture or weakness of the tube walls.

1.1.6.3 Valves, Cocks, Taps etc.

a) Gate Valves

All gate valves up to and including 65mm nominal bore and above, other than those required for fitting to be buried. Water mains shall be of bronze construction in accordance with the requirements of B.S. 5154. The pressure classification of all gate valves shall depend upon the pressure conditions pertaining to the site of the works.
The pressure classification of all gate valves shall depend upon the pressure conditions pertaining to the Site of Works.

b) Globe Valves

All globe valves up to and including 65 mm nominal bore shall be of bronze construction in accordance with B.S. 2060.
All globe valve 80 mm nominal bore and above shall be of cast iron construction in accordance with the requirements of B.S. 3961.

The pressure classification of all globe valves shall depend upon the pressure conditions pertaining

to the Site of Works.

c) Check or Non-Return Valves

All check or non-return valves up to and including 65 mm nominal bore shall be of the swing check type of bronze construction in accordance with B.S. 1953.

All check or non-return valves 80 mm nominal bore and above shall be of the swing check type of cast iron construction in accordance with the requirements of B.S. 4090.

The pressure classification of all check or non-return valves shall depend on the pressure conditions pertaining to the Site of work

d) Ball Float Valves

All ball valves for use in connection with hot and cold water services shall be of the Portsmouth type in accordance with the requirements of B.S. 1212, constructed from bronze or other corrosion resistant materials. These valves fall into three pressure classification as follows:-

(i) Low pressure – 3.588 bar maximum
(ii) Medium pressure – 7. 725 bar maximum.
(iii) High pressure – 12. 620 bar maximum.

The pressure Classification required for each ball valve will be designated in the description of its associated equipment.

e) Safety Valves

Safety valves for thermal storage water heaters shall comply with B.S. 759

Draw-Off Taps and Stop Valves (up to 50 mm nominal bore)

Draw-off taps and stop valves up to 50 m nominal bore, unless otherwise stated or specified, for attachment or connection to sanitary fittings shall be manufactured in accordance with the requirements of B.S. 1010.

Mixing valves for shower fittings and other appliances shall be manufactured in accordance with the requirements of B.S. 1415 from bronze or other corrosion resistant materials.

1.1.6.4 Thermal Insulation

Insulation shall be installed by tenderer specializing in this type of work.

All primary hot (flow and return pipes) and secondary hot water and circulation pipes shall be insulated. Thermal insulating material for hot water supply insulation shall conform to B.S. 1334 unless otherwise specified. Materials shall have fire retardant qualities.

Insulation shall be fiberglass, minimum density 64 kg/m^3. Pre-moulded fittings shall be used, or if unavailable, metered sections or built-up blanket insulation shall be used.

Insulation shall be fastened in concealed locations with aluminium bands or soft annealed wires and shall be fastened in exposed locations with aluminium bands, 30 cm. (12inches).

Each pipe item shall be insulated separately. Insulation must be carried through or around hangers.

All insulating materials, however fixed, shall be in close contact with the surface to which it is applied and all joints shall be sealed after ensuring that edges or ends of any section built up close to one another. Edges or ends shall be cut or sharpened on site as necessary.

All surfaces to be insulated shall be cleaned carefully before fixing the insulating material. Whereby, subject to outside weather or other potentially damp or wet conditions, the insulation shall be adequately protected against moisture pick-up with weather proof jacketing. Elsewhere, the insulation shall be finished with open weave glass cloth and finish coats of adhesive or paint to approval.
Fixing of insulating material shall suit the progress of other installation works in the building.

All thermal insulating materials shall be delivered to the site in a dry condition and housed in a store until drawn upon for use. If nothing else is specified, the minimum thickness of insulating material for hot water pipes shall be 25 mm.

Equipment, such as tanks, shall be insulated with 50 mm fibre glass board and finished with open weave glass cloth and finish coats of adhesive or paint to approval.

1.1.7 Water Storage Tanks

1.1.7.1 Cold Water Storage Tanks
Where specified as galvanized mild steel, water storage tanks shall comply with B.S. 417. Galvanizing shall take place after manufacture.

Pressed steel sectional water storage tanks shall comply with B.S. 1564, and shall be similar in manufacture to “BRAITH-WAITE”.

Water storage tanks shall be mosquito proofed by means of well fitting bolted cover bedded on a thick gasket of felt or bitumen.

Overflow pipes from tanks shall discharge into air or floor gullies where nearby positioned, with splay cut ends mosquito proofed by means of wire gauze tightly bound on with stout galvanized wire or soldered on.

1.1.7.2 Thermal Storage Water Heaters
The pressure and low pressure type’s domestic electric water heaters shall comply with B. S. 843; high pressure types shall be of a Standard not less than the appropriate B.S.

Domestic heaters shall, if nothing else is specified, be supplied with 50 mm thick fibre glass lagging.

Electric thermostatically controlled immersion heaters shall comply with B.S. 3456: Section 2:21 and C.P. 324.202.

Purpose made storage water heaters of the specified size shall comply with B.S.853 and shall be to the specified working and test pressure. The heaters shall be provided with all necessary bosses, coils, etc. and shall be hot dip galvanised after manufacture.

1.1.7.3 Pressure Vessels

Pressure vessels shall be manufactured in accordance with B.S. 1500 A for the specified pressure and be fitted with all necessary openings and connections.

1.1.8 Protection of metal surfaces

Machinery, equipment, etc. shall be tropicalized and with protective treatment fully suitable for application and in the prevailing climatic conditions.

Full details of tropicalization and comprehensive paint treatments, to a dry film thickness of nowhere less than 200 microns, shall be submitted for the approval of the Consultant.

All metalwork shall be protected by either:-

(a) Hot dip galvanizing; where painted treatment shall be 50 microns epoxy primer or 5-10 microns wash-primer; 30 microns modified alkyd undercoat and 30 microns enamel finish,

or,

(b) Metallic lead epoxy primer, epoxy micaceous iron oxide, micaceous iron oxide modified alkyd undercoat and enamel finish, layers minimum 30 microns each.

Surfaces of metalwork shall be thoroughly brushed down with wire brushes to remove all scale, rust, etc., and structural steelwork shall be grit blasted before protective treatment.

All paint shall be applied fully in accordance with the manufacturer's instructions.

All water tanks inclusive covers, machinery casings, claddings and whosesoever specified shall be protected by hot dip galvanizing.

Hot dip galvanized coatings shall be executed in accordance with British Standard BS 729.

The values for coating weight shall be as follows to B.S 729:-

5 mm thick and over	-	610 to 630 g/m (87 –90 um)
Under 5 mm but not less than 2 mm	-	460 to 490 g/m (66 – 70 um)
Under 2 mm but not less than 1 mm	-	335 to 350 g/m (48 – 50 um)
Grey and malleable iron castings	-	610 to 630 g/m (87 – 90 um)
Threaded work and other articles which are centrifuged	-	305 to 315 g/m (44 –45 um)

For conversion to coating thickness unit weight of zinc shall be assumed 7 g/cm^3. The values stated shall be taken as minimum average values for a set of samples. Individual minimum values shall be introduced as the above mentioned minus 10%.

When galvanized coats are damaged, e.g. threaded pipe connections made on site, the exposed parts

shall be repaired with same paints as for additional coating. Colour grey.

1.1.9 Instrumentation

Instrumentation shall be provided as indicated on the drawings and specified in the specifications.

Pressure gauges shall be installed on the pipe at both sides of pumps.

Pressure gauges shall be fitted with shutoff cock, read in the pressure range of system, minim 12 cm. (4 $^1/_2$ inch) dial, adjustable angle face, white face with black figures and pointer.

Thermometers shall be installed with separable sockets. Bronze sockets shall be used in nonferrous systems and stainless steel in ferrous systems. Thermometers shall be mercury actuated, 12 cm (4 $^1/_2$ inch) dial, adjustable angle face with black figures and pointer.
Where recording thermometers are required, they shall have chart 25 cm.(10 inches) in diameter, shall operate with one pen on 24 hour charts, with a range 10^0C to 105^0C (50^0F to 220^0F).

1.2 COMMISSIONG AND MAINTENANCE

1.2.1 Commissioning and Testing

The tenderer for solar heating system shall be responsible for testing and commissioning of the solar installation. The testing and commissioning shall be done in the presence of the Engineer. The tenderer shall be held responsible for any damage to the builder's work, during the installation, initial system testing etc.

When installation is completed, an acceptance test shall be carried out on the tenderer's own expense.

All hot water pipes, including flow and return, solar absorbers, cylinders, cisterns, tanks, calorifiers, pumps, etc. shall be thoroughly sterilized and flushed out after the completion of all tests and before being fully commissioned for handover.

The sterilization procedure shall be carried out by the tenderer or specialists employed by the tenderer in accordance with the requirements of B.S. Code of Practice 310, Clause 409, to the approval of the Engineer.

Before handing over, the tenderer shall confirm that the installation has been examined, tested, is ready for use, that it will operate and can be maintained efficiently.

The whole of the solar heating installation shall be tested to the satisfaction of the Engineer and the Local Authority.

The tenderer shall provide all necessary testing apparatus and facilities for testing the installations and any defective work shall be replaced immediately and shall be the subject of re-testing until found satisfactory.

Where pipes are to be lagged, chased into walls or otherwise concealed, the work shall be tested prior to lagging, making good chases, etc.

The complete solar heating installations, including flow and return pipes shall, if nothing else is specified, be tested to a cold water pressure of not less than 1.5 times the working pressure, minimum 8 kg/cm^2.

The test pressure shall be applied by means of a manually operated test pump or, by a power-driven test pump. Pressure gauges shall be recalibrated before the test.

The test pressure shall be maintained by the pump for about one hour and a leakage as specified in C.P 310, Section 502 J shall be approved, but any visible individual leak shall be repaired.

Valves, cocks and taps shall be absolutely tight under the test pressure for the corresponding pipes as well as under a small pressure.

Upon completion of the work, including re-testing if necessary, the installations shall be thoroughly flushed out and water pipes refilled with clean water ready for use.

Any defects revealed by the tests shall be made good by the tenderer and the test repeated to the approval of the Engineer.

In all other respects, test shall comply with the requirements of B.S. Code of Practice 304.

Following satisfactory pressure tests on the pipework system, operational tests shall be carried out in accordance with the relevant B.S. Codes of practice on the systems as a whole to establish that special valves, gauges, controls, fittings, equipment and plant are functioning correctly to the satisfaction of the Engineer.

1.2.2 Spare Parts

The tenderer shall submit with the tender a guarantee that he will hold a sufficient number of spare parts for the maintenance of the equipment.

If specific requirements for supply of spare parts are specified in the bill of quantities or schedule of prices, these spare parts shall be supplied to the client/employer, when the installations are handed over.

The tenderer shall submit with his tender a priced list of any optional extras, which he recommends should be purchased for the plants and are not supplied as standard with the unit.

1.2.3 Defects Liability and Contractual Maintenance Period

The tenderer shall maintain the complete installation in the total defects liability period and shall be responsible for the initiation and execution of the clients/employer planned programme of maintenance during this period.

During this maintenance period the tenderer shall carry out all necessary adjustments and repairs, cleaning and lubricating, etc. A report of any work shall be submitted to the Client and incorporated in the maintenance records.

The tenderer shall be held responsible for and shall make good all defects in materials that appear

during the maintenance period; he shall supply expendable items, such as gaskets, filters, indicator lamps, etc. The period of liability shall not end until all defects which appear during the maintenance period have been rectified.

The tenderer shall allow in his Contract price for this maintenance and inspection service and shall provide for all tools, instruments, plant and scaffolding, and the transportation thereof, as required for the correct and full execution of these

obligations, and the provision, use or installation of all materials whether they are normal maintenance materials such as oils, greases, sandpaper, etc. and parts which are periodically renewed such as relay contracts or parts which are faulty for any reason whatsoever excepting always Acts of God such as a storm, tempest or flood, lightning and earthquake; civil revolt, acts of war and vandalism.

1.2.4 Maintenance Manual

Upon completion the tenderer shall furnish to the Client four copies of a manual size A4 of loose leaf type containing all the following items:-

a. Description of equipment
b. Full operation and maintenance instructions
c. Valve operation
d. Fault-finding chart
e. Emergency procedure
f. Maintenance and service periods
g. Lubricating instruction
h. Colour code legend
i. Schedule of primary and secondary spares
j. Record drawing – Folded to size A4.

The manual must be specially written and not standard manufacturers manual unless approved by the Engineer.

Tags giving instructions are not permitted. All instructions must be written into the manual with reference to the drawings.

All valves, terminals and controls on the plant shall be labelled to correspond with the maintenance and operation manuals.

1.2.5 Maintenance and Service After Expirations of the Contractual Maintenance Period

The tenderer shall if required, enter into a maintenance and service agreement with the employer for the complete installation, for a period of up to five years from the day of expiration of the contractual maintenance period.

The terms of any such agreement shall not be less beneficial to the Client, than the terms of agreement for other similar installations.

2.0 TECHNICAL QUESTIONNAIRE

The following information shall be supplied by tenderer regarding the solar flat plate collectors proposed:

1. Manufacturer/Trade Mark
   ……
   ……
   ……
   ……..

2. Construction Details of the Collector:

   Aperture Dimensions & Area (m & m^2) …….
   …….

   Gross Dimensions & Area (m & m^2) …….
   …….

   Dimensions and Area absorbing
   Surface (m & m^2) …….
   …….

3. Solar Panel
   - Collector Casement material ……
   - Thickness ……
   - Corrosion Treatment …….

4. Glazing
   - Material …….
   - Thickness …….
   - Physical Properties …….

5. Insulation
   - Material …….
   - Thickness (mm) …….
   - Thermal properties …….

6. Absorber
   - Material Absorber plate …….
   - Material for tubes for heat exchange …….
   - Selective Coating …….
   - Absorption Factor …….
   - Emissivity Factor …….

7. Solar Cylinder
   - Material ……
   - Thickness ……
   - Insulation Material ……
   - Thickness ……

Cladding Material ……

8. Normal Operating Temperature Range ºC …….

9. Minimum and Maximum Transfer Fluid Flow Rate
Kg/sec ……
……

10. Collector's Performance Efficiency ……

11. WARRANTY:
The Sub-contractor shall state the equipment warranty period
……

12. Any other alternative system. Give remarks on its difference to the one described.Additional paper to be attached if the text is much

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PARTICULAR SPECIFICATIONS FOR BOREHOLE DRILLING AND EQUIPPING

1. **Purpose**

The borehole to be drilled, constructed, test pumped and equipped with a submersible pump under this contract will be to provide water intended for domestic use. The maximum ground water abstraction permitted from the borehole shall be $90m^3$/day with the maximum abstraction period not exceeding 10 hours per day.

The execution of the works shall be in full compliance with relevant provisions of the Water Act.

The Sub-contractor is deemed to have visited the site at Narok Referral and Teaching Hospital

No claims will be allowed for the traveling or other expenses, which may be incurred by the sub-contractor's works.

2. **Scope of the Work**

The works included in the contract consist of:-

(i) The drilling of one borehole of sufficient diameter to provide for a finished cased and screened borehole of 200mm diameter to the provisional depth of about 300metres.
(ii) The provision and installation of steel casings, steel screens, and gravel pack, borehole cap, together with cementation works necessary.
(iii) The collection of formation samples at 2 meter interval of drilling progress to the bottom and also water sample at every aquifer struck and at the beginning and at the end of test pumping operation for both chemical and biological analysis.
(iv) Equipping of borehole

NOTE: - These depths and any other works can be varied by the Engineer depending on the actual conditions encountered in the process of executing of the works.

(v) The supply and installation of 1No. Submersible borehole pump, complete with the necessary controls.
(vi) Connection of the water from the borehole to the water storage tanks.
(vii) Installation of elevated and ground water tanks as per the bill of quantities.

3. **Local Conditions**

The borehole will be drilled, constructed and test pump in both unconsolidated and consolidated formation and the contractor must be prepared to carry out the required work through any type of formation in the project area.

4. **Borehole Data**

(a) Total depth – 300m of 200mm diameter from surface (**Provisional**)
(b) Casings to be 152mm diameter and screened depth to be determined after borehole construction.
(c) Static water level – not known
(d) Dynamic water level – not known
(e) Recommended pumping rate – $8m^3$/hr (for the purpose of quotation but to be confirmed after testing)
(f) (Pump) setting level – 200m (for the purpose of quotation but to be confirmed after testing)
(g) Total dynamic head to be determined on site

5. **Casings**

(a) Casings to be used as part of the permanent borehole structure shall be black steel pipe conforming to BS 1387 and having nominal diameter of 200mm.

(b) If any casing other than that to be left permanently in the borehole is required temporarily for execution of work, it shall be supplied by the contractor at the borehole free of charge.

6. **Screens**

The screens to be furnished and installed shall be of the pipe size variety having a minimum nominal diameter of 152mm and can be fabricated in three meter lengths. The screens shall be of continuous slot type and constructed entirely of stainless steel. The screen shall have slot size opening of 1.4m.

7. **Grouting**

Grouting shall be done by either cement or bentomite to seal off unwanted upper aquifers under direction of the Engineer.

8. **Construction Method**

The borehole to be constructed shall be drilled by cable-tool percussion method or the combination air/ hydraulic rotary method. The method of drilling shall be left to the discretion of the Contractor. After drilling to the final depth the Contractor shall proceed to insert permanent casings and screens as directed by the Engineer.

9. **Gravel Pack**

If filter gravel will be necessary, it will consist of durable, naturally rounded quartzitic particles properly washed and cleaned prior to insertion in the borehole. The gravel shall be introduced in the annular space between the wall of the borehole and the 200mm casing from the bottom to about 2 meters below surface. The final casing and screens must be centralized before gravel back and the Contractor must supply suitable equipment for lowering of gravel pack.

10. **Cementation**

The space above the gravel pack shall be grouted with a mix of one part of cement to two parts of sand and two parts of ballast, in order of 1:2:2 concrete may be used near the surface to form an annular plug around the casing of dimensions 1.0 x 1.0 x 1.0 meters. There shall be 2000mm diameter concrete plinth on top of the borehole and shall be constructed as shall be directed by the Project Engineer and the Structural Engineer.

Any other cementation works to be done as directed by the Project Engineer.

11. **Development**

The Contractor shall furnish all necessary pumps, compressor, plungers, bailing or other needed equipment and shall develop the borehole by such approved methods as shall be necessary to give the maximum yield of water per increment of drawdown and extract from the formation of maximum practical quality of such sands as may, during the life of the borehole, be drawn through the screens when the borehole is operating under maximum conditions of draw down.

12. **Test Pumping**

After the borehole has been completed, constructed and developed, the subcontractor shall make necessary arrangements for conducting a 24 hour continuous test pumping up to a maximum of 30hr and 12 hour recovery test under the supervision of the Engineer. Where the Engineer or his representative cannot be present on such pumping test, the Contractor may continue without him keeping accurate records of the test in terms of discharge and drawn down but must seek

permission from the Project Engineer. Should the Contractor fail to keep such records, the Engineer shall order the test to be repeated at no extra cost.

13. **Sample Formation**

The Contractor shall keep an accurate record of the top and bottom of each stratum penetrated and shall save and deliver to the Engineer a sample of materials taken from each 1m of formation, or at every change of formation and at such other intervals as may be ordered by the Engineer. Those samples shall be placed in approved Contractor supplied containers with labels which indicate the depth at which the sample was obtained.

14. **Water Samples**

Water samples shall be collected at every water struck while drilling and also shall be collected at the start of every test and toward the end of the test in a three litre sterilized plastic container for both chemical and bacteriological analysis and submitted in a competent laboratory for analysis.

15. **Reports**

The contractor shall submit to the Engineer daily progress reports showing:-

(i) The depth each day indicating drilling in meters per hour with comments on degree of hardness of materials being penetrated.

(ii) Depth at which each water bearing zone is encountered and the rise and fall of water level in different formations.

(iii) The full details of work carried out in respect of operations which are paid for at hourly rate.

(iv) The full details of the number of hours worked each day.

16. **Cessation of Work**

The Engineer reserves the rights to stop drilling operations if in his opinion:-

(a) A sufficient supply of water has been obtained.

(b) The work is not being carried out in a satisfactory manner or

(c) Further drilling is unlikely to be advantageous or for any other reason

In this event, payment shall be made only for the amount of work done up to the date of stoppage.

17. **Retention Time**

Waiting time shall be such time as the whole of the drilling equipment and staff is on site and is available for use, and all the operation connected with the Contact are at a standstill due to the absence of instructions from the Engineer.

The request for the necessary instructions and/ or guidance to the Project Manager by the Contractor shall be within 48 hours, provided that the Project Manager does not delay the said instructions/ or guidance to the Contractor unnecessarily.

All claims for waiting time shall be made on the basis of a normal 8 hour day, including Sundays and Public holidays.

18. **Supply and Installation of Pump**

The Contractor shall supply and install:-

(a) One electric submersible pump which will conform to the specification stated, for operation on 415 volt, 3-phase.

(b) All necessary electrical equipment for the pump such as control panel with starter, ammeter, single phasing cut-out, low voltage cut-out and all necessary cables for connection.

(c) Suitable diameter Galvanized Steel pipe class 'C' to carry water to the surface/ to water storage tank
(d) Low level cut-out switch
(e) Airline 20mm galvanized steel pipe for water level measurements
(f) Pressure gauge
(g) The gate valves, non-return valves before the master meter
(h) Master meter for measuring the water from the borehole.

In addition the Contractor shall carry out 24 hours test run at the completion of the works. This test has to be certified by the Project Manager.

Note on Pump Installation

The Contractor shall make the necessary electrical connections and include in his prices all cable, starter-panel, switches etc required to put the pump in operation while tendering for this part of the document and return it will full description literature and performance curves for the proposed equipment together with the tender for drilling works.
The installation of the submersible pump into the borehole shall be done immediately the borehole drilling is completed, test pumped and water analysed for suitability for human consumption.

The final production pump to be installed in the newly drilled borehole shall be determined and installed as per the actual conditions encountered on completion of the drilling works. Hence the specifications given under the section of 'borehole data' are only for the purpose of quotation. After establishing the actual conditions of the drilled borehole, only the engineer's approved submersible pump shall be installed.

19. **Electrical works**

It shall be the responsibility of the Contractor to provide all electrical wiring between all items of his Contract to ensure the correct function of his equipment. The Contractor's electrical works shall start from the nearest electrical isolator which will be supplied by others within five metres.

PARTICULAR SPECIFICATIONS FOR MEDICAL GASES PIPELINE AND FITTINGS, OXYGEN PLANT, COMPRESSED AIR PLANT, ANAESTHESTIC GAS SCAVENGING SYSTEM AND VACUUM PLANT

Particular Specifications for Medical Gas Pipeline System (MGPS)

1 Scope of Works

The work shall include for supplying, installing, testing, commissioning, demonstrating and leaving in proper working order a piped centralized supply system for medical gases comprising **oxygen, nitrous oxide, medical air -4 bar, surgical air – 7 bar, medical vacuum and anaesthetic gas scavenging system (AGSS)**

Tender shall comply in all respects with the specification.

The areas to be supplied with the medical gases, vacuum, and anaesthetic gas scavenging system shall be in accordance with Health Technical Memorandum No. 02-01 (HTM 02-01) and Contract Drawings.

2. Oxygen Systems

2.1 Oxygen generating plant 500L/min

The oxygen production system allows to produce oxygen mainly by means of air compressors and an oxygen producer and shall conform to NHS Health Technical Memorandum HTM02-01. The system is mainly formed by: n°2 air compressors water cooled with a single stage rotary compressor driven by an electrical motor with high efficiency TEFC (IP 55), skid, hood soundproof, injection oil screw rotating elements, air valve air filter for intake, oil filter, oil and water cooling coil water cooled, water separator with electronic discharge for elimination of condensate, air-oil separator, control panel board; n°3 oil separators; n° 3 air dryers with refrigerant R404a (CFC free) with condensate separator, hermetic type of compressor for refrigerant gas equipped with pressure switch to prevent ice formations on the suction side equipped with an electrical heater, cooling circuit equipped with pressure switch against high pressure, expansion valve and receiver tank, air coolant condenser, electric fan motor IP54, heat exchangers made of aluminium, control panel on board; n°3 air filter 1 in backup; n°1 oxygen producer based on Pressure Swing Adsorption equipped with inlet pressure regulator, n°2 tanks with zeolites to contain the nitrogen molecules, pneumatic inlet and outlet valves (one pair for each tower), silencer on the exhaust to reduce the noise level during depressurization and regeneration phases, safety valves, microprocessor control panel; n°1 compressed air reservoir; n°1 compressed oxygen reservoir.

2.2 Oxygen Manifold - secondary

The oxygen Manifold system shall be installed in the plant room as shown in the contract drawings.

2.2.1 Capacity

The oxygen manifold system shall be capable of supplying medical grade oxygen (90-95% pure).

2.2.2 Main Features

The system shall consist of gas storage cylinders and automatic changeover from primary to standby system

2.3 Automatic Manifold Systems for Secondary and Third Supplies

Secondary and Third Supplies shall be provided by automatic manifold systems.

The manifold control system shall conform to NHS Health Technical Memorandum No. 02-01 (HTM02-01).

The manifold control system shall provide an uninterrupted supply of medical oxygen gas from equally sized high pressure cylinder banks via a suitable arrangement of pressure regulators, providing a constant downstream nominal pipeline gauge pressure of 400 kPa.

The entire system shall be 'duplexed' such that any single functional component failure will not affect the integrity of the medical oxygen gas supply.

The manifold shall be supplied fully assembled and tested.

2.3.1 Manifold Control System Design

There shall be two separate stages of regulation to enable high peak flow rates without a reduction in line pressure.

Regulators shall comply with BS EN ISO 10524-2 and shall have documented test reports available confirming successful completion of the oxygen ignition tests stated therein.
The manifold control system shall capable of supplying a flow of 1900 *l/min* to the 400 kPa distribution system.
All regulators shall be protected from over-pressurisation by relief valves that are vented to atmosphere.
There shall be a bypass valve fitted across the to the 2nd stage relief valve to enable gas to be vented outside the manifold room during the commissioning stage.
A test point (supplied separately) shall be isolated from the supply with a 15mm ball valve.
The manifold shall be supplied with a non-return valve for connection to the distribution system.
The Control Panel shall be housed in a single panel having a solid construction using epoxy technology in a glass- reinforced polymer moulding for high chemical and corrosion resistance and high impact strength.
The cover shall hinge upwards but shall remain facing outward for manual operation and maintenance accessibility.
To aid maintenance the connections within the panel shall use 'O' rings sealing against flat-face connectors to facilitate easy removal and replacement of components.
For added safety the voltage inside the panel shall not exceed 12V D.C.
The mains supply transformer shall be in its own housing in a moulded recess at the rear of the panel.
To simplify installation there shall be an installation bracket attached to the wall with four screws, the main panel then shall locate on to this bracket and be secured.

2.3.2 Control System Operation

Either the left or right hand manifold bank may be designated "Duty" and the Manifold Control System shall automatically changeover to supply the distribution system from the "Standby" bank when pressure in the "Duty" bank falls to a pre-determined level.
Each side of the Manifold Control System shall be capable of being fully isolated via a full flow ball valve in order to change any regulator without cessation of supply.
The inlet of the 1st stage regulator shall be protected from the particulate matter by a 25µm sintered bronze filter.
There shall be a fail- safe system in the event of power failure so that solenoid valves open and there is full continuity of supply pressure and flow.
Upon power restoration the unit shall revert back to the original bank of cylinders being used.
To avoid inadvertent resetting of the change cylinder alarm the solenoid valves shall be latched so that once changeover has occurred and the cylinders have been replaced, a reset button must be operated to cancel the alarm condition.
There shall be manual changeover buttons so that servicing either side of the system can be simply achieved. The PCB's shall be linked with plug and socket connectors for easy removal.

2.3.3 Materials

All polymers and elastomers in the gas flow that can be subjected to working pressure greater than 3000 kPa shall be halogen-free.

The use of PTFE, PCTFE, Viton and other halogenated polymers in these applications is strictly prohibited. Non-return valves fitted to header manifolds shall have a metallic seat with ceramic ball.
Soft seat non-return valves utilizing polymers or elastomers are not acceptable

2.3.4 Modular Header Manifolds

Modular header manifolds shall provide connection points for flexible cupronickel tailpipes. The header manifold shall have either single or double cylinder connection points.

The headers shall connect directly to the manifold control system.

Non-return valves shall be fitted to each tailpipe connection point to protect the system in the event of a tailpipe fracture.

2.3.5 CE Marking

The manifold control systems shall be 'CE' marked under the Medical Devices Directive 93/42/EEC with approval from a notified body.

The manifold control system shall be as Beacon Medaes MCS2 or approved equivalent.

2.4 J-Size Oxygen Cylinders

The Secondary and Third supplies of oxygen shall have 2 x 10J-Size cylinders each.

Cylinder data

Content = 6,800 litres,

Valve outlet pressure = 137 bar

Valve outlet connection = pin-index (side spindle) Water capacity = 47.2 litres

Approximate dimensions including valve = 1520 mm long x 229 mm diameter. Approximate cylinder wt (empty) = 68.9 kg.

3. Nitrous oxide Systems

3.1 Primary Supply System

The primary supply shall be provided by two banks of equal numbers of gas cylinders which are connected to the pipeline via a control panel.

The changeover from the "duty" to the "stand-by" bank of cylinders shall be automatic. All manifolds shall be capable of passing the full pipeline flow.

Each bank of the manifold shall have sufficient cylinders for two days. Additional cylinders for one complete bank change shall be held in the manifold room.

No. of stand-by bank G- Size N_2O Cylinders = 2

No. of stand-by bank G- Size N_2O Cylinders = 2

Total No. of G- Size N_2O Cylinders = 4

The manifold headers shall incorporate a renewable non-return valve to prevent the discharge of a complete bank of cylinders in the event of "tailpipe" rupture.

No non-metallic flexible connectors shall be used. The connector for nitrous oxide shall be a side outlet valve connector in accordance with BS 341-3:2002.

The automatic manifold system shall be similar to the one described for oxygen system in section 1.2.

3.2 **Secondary Supply System**

This shall be provided from manual manifold supplying via non-interchangeable screw thread (NIST)

connectors. No. of cylinders: 2 x 3 G- Size cylinders of gas content 9,000 litres at 44 bar g.

3.2.1 **Manual Changeover Manifold**

The gas manifold shall be designed to supply constant pressure and flow via control panel from two equal banks of cylinders.

The changeover from 'duty' to 'standby' bank shall take place manually without disruption of pressure/flow and indicate audio visual signals.

The tail pipes of specific gas shall be connected with check valves (non-return valves) and bull-nose connectors. The manifold and control panel shall be designed for 150 bar cylinders and housed in epoxy powder coated steel enclosure having visible status indicator and gauges.

3.3 Third Supply

This shall be provided from manual manifold supplying via non-interchangeable screw thread (NIST) connectors.

No. of cylinders: 2 x 2 G- Size cylinders of gas content 9,000 litres at 44 bar g.

3.4 G-Size Nitrous oxide Gas Cylinders

Cylinder data

Content = 9,000 litres,

Valve outlet pressure = 44 bar g,

Valve outlet connection = hand wheel 11/16'' x 20 tpi (m)

Water capacity = 23.6 litres

Approximate dimensions including valve = 1320 mm long x 178 mm diameter.

Approximate wt (empty) = 34.5 kg.

4. Compressed air Systems

5.1 Primary /Secondary Supplies

The primary and secondary supplies shall be from a single combined medical air and surgical air system.

5.2 Combined Air

The Combined Air System shall conform to NHS Health Technical Memorandum HTM 02. Medical quality to the European Pharmacopoeia monograph shall be delivered at a pressure of 700 kPa (7 bar) gauge for supply of the hospital surgical and medical (via separate regulators) air systems.

The entire system shall be 'duplexed' such that any single functional component failure will not affect the integrity of the medical compressed air supply.

The secondary supply will be made up of two compressors of the quadruplex compressor configuration.

Each compressor shall be capable of supplying half flow (1250 *litres*). The plant shall be suitable for 415 V, 50 Hz, 3 Phase power supply.

5.3 Compressors

Compressors shall be oil injected rotary screw compressors suitable for both continuous and frequent start/stop operation at a nominal outlet pressure of 950 kPa gauge (9.5 bar).
Compressors shall be supplied with a block and fin style after cooler with a dedicated quiet running fan to maximize cooling and efficiency.

A multi-stage oil separator capable of achieving 2ppm oil carry over shall be fitted to minimise contamination and maintenance.
EFF1 (CEMEP) rated TEFC, IP55 class F electric motors shall be used and incorporate maintenance - free greased for life bearings. Motors with lower efficiency ratings are not acceptable.
Each screw compressor shall be supplied with an intelligent user interface to digitally display service and warning indications, working pressure, operating temperatures, number of motor starts, on load running hours and total running hours.
Compressors are to be individually hard-piped to the receiver manifold as standard.

5.4 Dryer/Filter/Regulator System

The duplexed filter and dryer module shall incorporate high efficiency water separators, oil f ilters, heatless regenerative desiccant dryer, dust/activated carbon filters, hopcolite filters
and bacterial filters with autoclavable element.
Contaminants in the delivered air downstream of the bacterial filters shall be maintained at levels below those shown in the following table:

Contaminant	Threshold
H_2O	67 ppm v/v
Dry particulates	Free from visible particulates in a 75 litre sample
Oil (droplet or mist)	0.1 mg/m³
CO	5 ppm v/v
CO_2	500 ppm v/v
SO_2	1 ppm v/v
NO	2 ppm v/v
NO_2	2 ppm v/v

The dryer control system shall incorporate an Energy Management system that shuts off purge air when no compressors are running.

5.5 Control System

The central control panel shall operate at extra low voltage and include BMS connections for plant fault, plant emergency, reserve fault and pressure fault.
A mechanical back-up facility shall ensure continued operation in the event of malfunction. The control system shall normally employ automatic rotation of lead compressor to maximise compressor life and ensure even wear.

5.6 Receiver Assembly

Air receivers shall comply with BS EN 286-1, supplied with relevant test certificates. Each air receiver shall be hot dip galvanised inside and out and fitted with a zero loss electronic drain valve. Float type drain valves are not acceptable.
The receiver assembly shall be fitted with a pressure safety valve capable of passing the maximum flow output of the compressor at 10% receiver overpressure.

The receiver shall be further protected by a fusible plug and include a pressure gauge. The total receiver capacity shall be 850 *litres.*

5.7 Dew Point Monitoring

The dryer shall incorporate a ceramic dew point hygrometer with an accuracy of ±1°C in the range -20 to -80°C
atmospheric dew point and 4-20mA analogue output.
Aluminium oxide or palladium wire sensors are not acceptable. An alarm condition shall trigger on the dryer control panel if the dew point exceeds a -46°C atmospheric set point.

The plant control unit shall incorporate a multifunction LCD displaying, amongst other things, the dew point of the delivered air to enable monitoring of the air quality by the hospitals estates department.

Volt free contacts shall be included to enable the dew point alarm signal to be connected to a central medical gas alarm system and/or building management system (BMS).

To enable periodic calibration of the dew point sensor element, the hygrometer shall be remotely connected downstream of the dryer via a micro-bore tube. It is not acceptable to install the sensor directly into the medical air supply pipeline.

The plant shall be as **Beacon Medaes CA-1650 QGP7** with 2 No. receivers of capacity 850 *litres* each.

5.8 Third Supplies

The third supplies for medical and surgical compressed air shall be from two separate automatic manifold systems to support the whole site.
The automatic manifold system shall be similar to the one described for oxygen system in section 1.2.
The manifold control system shall provide an uninterrupted supply of medical air (MA-4) or surgical air (SA-7) from equally sized high pressure cylinder banks via a suitable arrangement of pressure regulators, providing a constant downstream nominal pipeline gauge pressure of 400 kPa or 700 kPa.
The manifold control system shall be capable of supplying a flow of 1250 *l/min* to a 400 kPa distribution system and a flow of 1000 *l/min* to a 700 kPa distribution system.
The cylinders in the four manifold systems shall be as follows. Medical air: 2 x 10 J-Size cylinders, Surgical air: 2 x 6 J-Size cylinders
Total number of cylinders required for third supply of both MA-4 and SA-7 shall be **32**.

5.8.1 J-Size Medical air Cylinders

Cylinder data
Content = 6,400 litres,
Valve outlet pressure = 137 bar g, Valve outlet connection = pin index Water capacity = 47.2 litres
Approximate dimensions including valve = 1520 mm long x 229 mm diameter.
Approximate wt (empty) = 68.9 kg.

6.0 Central Medical Vacuum System

6.1 Primary/Secondary Supplies

The Medical Vacuum System shall conform to EN ISO 7396-1 and NHS Health Technical Memorandum No. 02-01 (HTM 02-01).
The Medical Vacuum System shall ensure the minimum pipeline vacuum level of 450mmHg is maintained at the plant service connection point at the rated volumetric 'free air' flow rate with two pumps in standby.
The bacteria filtration system shall be 'duplexed' such that each filter can be isolated for replacement of the filter cartridge.

6.1.1 Vacuum Pumps

Vacuum pumps shall be air-cooled, oil lubricated rotary vane type suitable for both continuous and frequent start/stop operation at nominal inlet vacuum levels of between 578mmHg and 728mmHg. Composite carbon fibre rotor blades shall be fitted to minimise the cost of maintenance.

Rotors shall be driven by directly coupled TEFV electric motors. Pump inlets shall include a wire mesh filter and integral non-return valve to prevent oil suck back and pressure increases in the vacuum system. Each vacuum pump shall have an integral separator filter to ensure a virtually oil-free exhaust. Each pump shall be fitted with anti-vibration pads between the pump foot and mounting frame.

6.1.2 Bacteria Filters

The duplex bacteria filter system shall incorporate high efficiency filter elements. A differential vacuum indicator shall be installed across the filter to indicate blockage.

Additional pressure sensors shall be installed at the inlet and outlet of the filter to measure the pressure drop across the filters.

Each filter shall be designed and sized to carry the full plant design flow capacity with a pressure drop not exceeding 33mbar (25mmHg).

Bacteria Filter elements shall have penetration levels not exceeding 0.005% when tested by the sodium flame method in accordance with BS 3928:1969 and utilising particles in the 0.02 to 2 micron size range.

Drain flasks shall be connected to each filter. Drain flasks shall be manufactured from transparent Pyrex® with a polymer coating on the inner and outer surfaces in order to maintain a seal in the event of inadvertent breakage of the Pyrex® flask.

All drain flasks shall be suitable for sterilisation and be connected via a manual isolating valve.

6.1.3 Control System

The central control system shall provide an intelligent human machine interface incorporating on board flash memory and real-time clock for recording operational parameters in the in built event log. The central control system shall operate at low voltage and include BMS connection for common fault.

Visualisation of plant inputs, outputs and status through a web browser, using a simple Ethernet connection shall be available.

The central control unit shall incorporate a user friendly 5.7” high-definition colour display with clear pictograms and LED indicators, providing easy access to system operational information.

Cascading of vacuum pumps shall be achieved by measuring the vacuum level at the plant inlet with a pressure transducer.

A mechanical back-up facility shall ensure continued operation in the event of a control system malfunction.

The control system shall normally employ automatic rotation of the lead pump to maximise pump life and ensure even wear.

6.1.4 Power Supply

The plant shall be suitable for 415 V, 50 Hz, 3 Phase power supply.

6.1.5 Flow

The plant shall be capable of 5400 *l/min* flow.

6.1.6 Receivers

The plant shall have three receivers with total volume of 1800 *litres*.

The vacuum receivers shall be supplied with relevant test certificates and have a total volume of at least 100% of the plant output in 1 minute in terms of free air aspired at normal working pressure.

Each vacuum receiver shall be hot dip galvanised inside and out.

6.1.7 Supplies
Primary supply is provided by two pumps of the quadruplex system.
Secondary supply is provided by the other two pumps of the quadruplex system.
The medical vacuum plant shall be as **Beacon Medaes mVAC- 2560-Q** or approved equivalent.

6.2 Third Supply
Third supply shall be provided by mobile high vacuum suction units (MHVSUs) with gauge, disposable bacteria filter, safety overflow valve and **four autoclavable jars 1800 ml** capacity.
The equipment shall be capable of 650 mm/Hg vacuum, flow of 40 *l/min* and suitable for 110-240V - 50 Hz power supply. The mobile high vacuum suction units (MHVSUs) shall be provided in the hospital areas where vacuum terminal units are installed as shown in the Contract Drawings.

7.0 Anaesthetic Gas Scavenging System (AGSS)
This shall consist of a central disposal plant (located in the plant room), copper piping, receiving systems and terminal units as shown in the contract drawings.
7.1 Anaesthetic Gas Scavenging System
The Anaesthetic Gas Scavenging (AGS) System shall comply with HTM 02-01 and either EN ISO 7396-2 or BS 6834. The AGS system shall be a dedicated, specifically designed active extraction and disposal system for waste anaesthetic gas.
It shall provide a maximum flow rate of 1050/min (EN ISO 7396-2) or 130 l/min (BS 6834) with a 1 kPa resistance to flow, and a minimum of 50 l/min (EN ISO 7396-2) or 80 l/min (BS 6834) with a 2 kPa (EN ISO 7396-2) or 4 kPa (BS6834) resistance to flow at each terminal unit,irrespective of the number of terminal units in use.
The AGS system shall use dedicated radial blowers in a duplex configuration. The AGS pump assemblies shall be skid mounted and included on the skid shall be the duplex pu mps, motor control units with starter/isolator, moisture drain flask and flexible connectors to connect the plant to the pipeline. Each pump shall include an electric motor and directly coupled impeller assembly. Impeller bearings in the pumps shall not require lubrication.
The pumps shall be air cooled and rated for continuous operation.

7.2 Vacuum/Flow Regulating Valve
A vacuum/flow regulating valve shall be provided and positioned at the pump, comprised of a spring-loaded plate valve and inlet silencer. The valve should be changeable with the pipeline inlet in order to provide flexibility on site.
The plate shall control air ingress into the pipeline system, thereby controlling the vacuum level within.
An optional air inlet filter shall be available should the air quality be poor/dusty offering further protection against dirt ingress into the pump.
The vacuum/flow regulating valve shall ensure a maximum vacuum of 200mb below atmospheric pressure is not exceeded and shall be factory preset at 150mb.

7.3 Control System
Each motor control panel shall incorporate an emergency panel isolation switch facility, which controls all electrical power to the exhauster unit, remote start switch panels and system indication lights.

All control and status indication circuitry shall be limited to 24V a.c. A green 'POWER ON' indicator shall be fitted to the starter/isolator panel, and shall illuminate whenever power is available to the 24V control and indication circuit.

A ‘HAND/OFF/AUTO’ switch shall be provided to control operation of the pump, running the pump continuously when selected to ‘HAND’.
When selected to ‘AUTO’, control of the pump shall be passed to the remote start switch panels. Operation of any of the remote start switches shall activate the pump. The pump shall continue to run until all remote switches are selected
‘OFF’.
The starter/isolator panel shall incorporate a thermal protection overload device. The thermal protection overload device shall also monitor the electrical power supply and phase input.
In the event of a fault, the overload device shall break the circuit to the pump, preventing operation until the system is manually re-set.
Operation of the overload device shall also break the circuit to the remote start switch panels, extinguishing the green running indicator.
The duplex unit shall incorporate line pressure switch. This line pressure switch shall monitor vacuum levels and provide an additional control of the remote start switch and starter/isolator panel green ‘RUNNING’ indicators.
The pressure switch shall also include a digital display providing an accurate readout of the vacuum level in the pipeline in order to assist with installation/commissioning and annual re-commissioning. The duplex installation shall use remote start switches that include an amber ‘PLANT FAULT’ indicator. This shall illuminate, if either pump is set to ‘HAND’, or if one of the overloads trip. A red ‘PLANT EMERGENCY’ indicator shall also be provided and shall illuminate on all remote start switch panels if the vacuum level falls below the pressure switch set point level when the pump has been called.
The on/off rocker switch shall include a green illuminated surround to indicate ‘mains on’.
Each pump shall be controlled by a separate motor control panel to enable servicing of either pump or control gear whilst maintaining system operation.

7.4 Terminal Units
Terminal unit shall be provided with an adjustable orifice to allow balancing of the terminal unit flows during commissioning. Venturi style terminal units are not acceptable.
Terminal units shall not be connected to the medical vacuum system.

7.5 Disposal Plant Capacity
The disposal system shall be capable of 2,405 *l/min* flow and suitable for 415 V, 3 Phase, 50 Hz power supply. The active disposal system shall be as **Beacon Medaes AGS-2860 D/3** or approved equivalent.

8.0 Heliox (79%He/21%O_2) System

8.1 Primary Supply
This shall be provided from automatic manifold system. No. of cylinders: 2 x 4 HX - Size cylinders of gas content 1,780 litres at 4 bar g.
8.2 Secondary Supply
This shall be provided from manual emergency reserve manifold system.
No. of cylinders: 2 x 1 HX- Size cylinders of gas content 1,780 litres at 4 bar g.
8.3 Third Supply
This shall be provided from automatic manifold supplying via non-interchangeable screw thread

(NIST) connectors. No. of cylinders: 2 x 1 HX- Size cylinders of gas content 1,780 litres at 4 bar.

9.0 Emergency Reserve Manifolds

The HTM 02-01 style Emergency Reserve Manifold shall be used to support the main manifold and connected downstream of the manifold control panel.

9.1 **Modular Manifolds**

The modular manifold shall conform to HTM 02-01 and C11 and suitable for 4 Bar, 7 Bar and 11 bar g pressures. The regulators shall comply with BS EN ISO 10524-2, test reports shall be availed on request.

A test point (terminal unit) shall be included as per code requirements. Extensions headers shall be provided which can be added to gain extra capacity.

It shall be complete with integral non-return valves, rack and chain to hold cylinder(s) and corner connections made to custom length.

9.2**Tailpipes**

The tail pipes shall be pin- indexed and made of cupro-nickel material to help prevent work hardening. The tail pipes shall conform to CGA and BSP.

9.3 **Duplex Pressure Reducing Sets**

The pressure reducing set shall be installed to regulate the higher pressure plant output to 4 bar suitable for medical use.

It shall be complete with isolating valves, relief valves and gauges.

9.4**Simplex Pressure Reducing Sets**

The simplex pressure reducing set shall be capable of reducing pressure from 7 bar to 4 bar g. It shall be complete with gauge, isolating valves and relief valve.

It shall be capable of 1000 *l/min*, 2000 *l/min* or 3000 *l/min* flow rates.

9.5 **Simplex Adjustable Pressure Reducing Sets**

Simplex adjustable pressure reducing regulator shall be installed for high pressure surgical air systems, to provide nominal 7 bar at the point of use.

It shall be complete with 0-10 bar gauge

10.0 Terminal Units

The medical gas terminal units shall conform to BS EN ISO 91701:2008 and accept probes to BS5682: 1998. Terminal units shall be capable of single-handed insertion and removal of the medical gas probe.

The anaesthetic gas scavenging (AGS) terminal unit shall conform to BS6834: 1987.

The wall mounted first fix assembly shall consist of brass pipeline termination block with copper stub pipe secured between a back plate and a gas specific plate to allow limited radial movement of the copper stub to align with the pipeline.

The gas specific plate shall be fixed to the backplate by means of a tamperproof clip-fit mechanism.

The first fix shall incorporate a maintenance valve (except for vacuum) and a test plug. The test plug shall provide an effective blank to enable carcass pressure testing.

The second fix plastic components shall be manufactured with the pin index permanently moulded into the gas specific socket.

The socket assembly shall retain a capsule assembly, containing the check valve and probe 'O' ring seals.

The replaceable capsule assembly shall enable all working parts subject to wear through usage to be replaced as a factory tested assembly, thereby reducing maintenance time.

Each termination block assembly shall be pressure tested by the pressure decay method.

10.1 Gas Specificity

Terminal units shall be gas specific and only accept the correct medical gas probe.

Gas specific components shall be pin-indexed to ensure that a correct gas specific assembly is achieved so that in normal course of dismantling for repair or maintenance, parts from other gases cannot inadvertently be used.

Wall mounted terminal units shall incorporate an anti-rotation pin to engage with connected downstream medical equipment ensuring correct orientation.

10.2 Materials

All screws, probe roller pins, locking springs and the anti-rotation pin shall be manufactured from stainless steel. The second fix assembly shall incorporate three injection moulded parts in fire - retardant nylon 66.

All wetted parts (except seals) shall be brass or copper. Copper stubs pipes shall be manufactured from phosphorous de - oxidised non-arsenical copper to BS EN 1412:1996 grade CW024A, manufactured to metric outside diameters in accordance with BS EN 13348:2001 R250 (half hard).

All elastomeric seals shall be manufactured from Viton with a Shore hardness of 75.

10.3 Antimicrobial Additive

All user accessible parts, 2nd fix, gas ID ring, plaster box, fascia cover and inks shall include a silver antimicrobial additive for inherent antimicrobial protection.

Sample	Species	Reduction
Gas ID	E coli	≥ 99.50%
Gas ID Ring	MRSA	≥ 99.52%
Plaster Box	E coli	≥ 99.94%
Plaster Box	MRS	≥ 99.35%

10.4 Pipeline Connections

Terminal units installed in walls, bedhead trunking, headwalls or fixed pendants shall be connected to the pipeline with a copper stub pipe.

Pressure gases and vacuum shall incorporate a 12mm copper stub pipe with a swaged end for direct connection to a 12mm O/D copper tube without the need for an extra fitting, thereby requiring only a single brazed joint to be made. Terminal units for anaesthetic gas scavenging shall incorporate a 15mm O/D copper stub pipe.

Terminal units installed in booms or moveable pendants shall be attached to their respective flexible gas hose by a gas specific non-interchangeable screw thread (NIST) fitting to BS EN 739:1998.

Terminal units shall be fitted with a male NIST and nut for connection to hoses with a female NIST connection.

10.5 Performance

Pressure drops across the terminal unit shall comply with clause 4.4.11 of BS EN ISO 9170-1:2008.

The terminal units shall be as BeaconMedæs Gem 10® Medical Gas Terminal Units **or approved equivalent.**

11. Pendants

11.1 Rigid & Retractable Pendants

The pendant shall be designed for installation into operating theatres and anaesthetic rooms, providing medical gases, electrical power, data and extra low voltage services in a convenient prefabricated assembly.

The pendant shall be supplied pre-piped, pre-wired and fully tested.

The pendant shall be manufactured and installed to provide a 2000mm clearance above finished floor level (in retracted position for retractable pendants).

The pendant shall fully comply with HTM 2022, HTM02-01 NHS Model Engineering Specification C11, BS EN ISO 11197:2004 and the IEE Wiring Regulations.

The pendant shall be capable of surface or concealed mounting, with a shroud extension being provided for surface installations.

A separate shroud shall be supplied to enclose the 1st fix mounting arrangement, electrical terminations and gas service connections.
The shroud shall be adjustable to compensate for variation in the finished ceiling thickness. The body of the pendant shall be manufactured from 1.6mm thick Zintec steel. The pendant body shall be supplied with an 'easy clean' high quality RAL9002 polyester powder coated finish.
The gas fascia plate shall be manufactured in 2mm thick grade 304 stainless steel and shall have a non-reflective satin brushed grain finish. All pendants shall have a soft bumper strip around the bottom edge.
The pendants shall be octagonal in section, capable of mounting up to 8 medical gas/vacuum terminal units plus an anaesthetic gas scavenging terminal unit, along with 8 double gang and 8 single gang e lectric sockets/devices.
Medical gas/vacuum services shall incorporate BeaconMedæs Gem 10 terminal units and the anaesthetic gas scavenging disposal system shall incorporate a BeaconMedæs terminal unit to BS 6834:1987.

Medical gas/vacuum services shall be arranged in accordance with HTM 02-01 recommendations.
Electrical installations shall conform to the IEE wiring regulations and BS EN ISO 11197:2004, routed through flexible conduit and terminate in a junction box.

11.2 Rigid Pendant

The Rigid Pendant shall be rigidly piped in accordance with the requirements of BS EN ISO 11197:2004. Flexible hose assemblies shall not be used.
The compartment for housing medical gas pipes shall be capable of running up to 9 gas pipes generously spaced to facilitate simple on-site brazing to the piped distribution system.

Copper pipes shall be manufactured from phosphorous de-oxidised non-arsenical copper to BS EN 1412:1996 grade
CW024A and be manufactured to metric outside diameters in accordance with BS EN 13348:2001R250 (half hard).

Degreasing of pipe shall be such that there is less than 20mg/m^2 (0.002mg/cm^2) of hydrocarbons on the degreased surface when tested by the method specified in ASTM B280 clause 12.

11.3 Retractable Pendant

The retractable Pendant shall be supplied with colour coded flexible hoses to BS EN 739:1998 with the appropriate NIST fittings permanently attached.

Pressure gas systems shall incorporate a self-closing check valve in the 1st fix termination to enable hose replacement without disruption of the system. Hoses shall have a minimum internal bore of 6.35mm (1/4") for all pressure gases except surgical air, which shall have a minimum internal bore of 8.02mm in order to provide a higher flow/lower pressure drop for surgical tools.

Vacuum hoses shall also have a minimum internal bore of 8.02mm.
The retractable pendant shall extend and retract through a vertical range of 300 mm at an approximate rate of 20 mm/s and shall be powered by a single-phase linear actuator.
The linear actuator shall operate from a 230V, 50 Hz electrical power supply (110V, 60 Hz also available) fused at 5A. An extra-low voltage (12V) remote hand controller shall operate the pendant and internal micro-switches shall break the control circuit at the limits of travel.
Thermal overload protection with automatic reset shall be incorporated within the linear actuator control circuits. The pendant shall be as **Beacon Medaes Series 9A Rigid and Retractable Pendants** or approved equivalent.

11.4. **Flexible Pendant**

The flexible pendant shall be thinly secured to the ceiling by a fabricated first fix plate which holds the first fix NIST connectors complete with blank nuts to allow for testing of the fixed pipework prior to the fixing of the colour coded hoses and spun ceiling shroud.
The shroud shall conceal the fixing plates and NIST connectors and shall be suitable for either flush or surface mounting.
The flexible pendant shall accommodate any combination of Medical gases/Vacuum services up to a total of six with or without AGS.
AGS shall be mounted centrally if required and shall secure the shroud.

The flexible hose shall be manufactured from colour-coded, reinforced anti-static plastic hose with the appropriate

NIST connection at one end and the corresponding BS 5682 outlet point on the other.

The first fix NIST connector shall incorporate a self-closing check valve to automatically close when a hose is removed for maintenance.

The terminal units shall be contained in an 'easy clean white plastic cover designed to minimise the collection of dust or moisture.

11.5 **Multi movement Pendant**

The Multi - Movement Pendant shall be specially designed to channel all medical gases and electrical services into one dedicated multi- function service head.

The pendant can be installed at either the anaesthetist or surgeon positions to ensure that all services are easily accessible.

The Multi-Movement Pendant shall consist of two separate assemblies, the first fix support assembly and the pendant main body.

Pendant Characteristics

1. Vertical lift of 600mm controlled from a hand held remote pneumatic handset.
2. Rotates 310° about the main ceiling bearing.
3. The head will also rotate 240° about the support column.
4. Accepts up to 9 gas outlets plus 4 duplex power sockets.
5. Two sections of medical wall are installed on the side faces of the pendant body.
6. Will accept BS, DIN and American services.

12.0 Distribution System

12.1 Medical Gas Pipes

The piped distribution system shall use copper pipes manufactured from phosphorous de-oxidised non-arsenical copper to BS EN 1412:1996 grade CW024A (Cu-DHP), manufactured to metric outside diameters and having mechanical properties in accordance with BS EN 13348:2001- R250 (half hard) for sizes up to 54mm or BS EN
13348:2001 - R290 for larger sizes.

Pipes shall be degreased suitable for oxygen use and cleanliness is to be maintained by filling each pipe with dry, clean, oil and oxygen free nitrogen, fitting suitable end caps and protectively wrapping.

All pipework materials shall be manufactured by BS EN ISO 9001:2001 registered companies.

12.2 Marking

For sizes up to 54mm, copper pipes shall be permanently and durably marked at regular intervals along its length with the following information:

a) The harmonised standard number EN 13348;
b) BSI kite mark/statement/equivalent approval;
c) Nominal dimensions, diameter x wall thickness;
d) Temper designation to EN 1173;
e) Manufacturer's identification;
f) Date of production: year and month (1 to 12)
g) Confirmation of degreasing for oxygen;

Example: BS EN 13348 22x0.9 R250 WIELAND LAWTON KITEMARKED DEG/MEDICAL 05 01
Following installation, pipelines shall be clearly identified with 150 mm wide adhesive labels.
Labels shall be fitted near walls, risers, valves and junctions. Colour coding and labelling shall be in accordance with BS 1710:1984.
Arrows to identify the direction of gas flow shall be fitted adjacent to each identification label.

12.3 Medical Gas Pipeline Fittings

Fittings shall be end feed type, manufactured from the same grade of copper as the pipes and be in accordance with the requirements of BS EN 1254-1:1998 Part 1. Fittings shall be degreased suitable for oxygen use and be supplied individually sealed in protective polythene bags.

12.4 Component Cleanliness

Degreasing of pipe shall be such that there is less than 20mg/m^2 (0.002 mg/cm^2) of hydrocarbons on the degreased surface when tested by the method specified in EN 723.

The degreasing of fittings shall be such that there is less than 100mg/m^2 (0.01mg/cm^2) of hydrocarbons on the degreased surface when tested by the aforementioned method. All pipeline components shall also be free of any visible liquid detergent washing or solvent degreasing. Other methods may be used if they are proven and can be guaranteed to achieve acceptable results without degradation of the component or the environment.

12.5 Brazed Pipeline Joints

Copper to copper joints shall be made on site using a silver-copper-phosphorous brazing alloy type CP1 or CP4 to BS
1845 using a dry, clean, oil and oxygen free nitrogen inert gas shield with no flux. Copper to brass or gunmetal joints shall not be made on-site.
Copper to brass or gunmetal joints made off-site shall utilise silver brazing material type AG13 to AG18 to BS 1845 with a flux. Such shall joints be subsequently cleaned and degreased prior to use.
Where pipes are cut on site they shall be cut clean and square with the pipe axis, using wheel cutters where possible and deburred, re-rounded and cleaned off.
Expanded joints shall only be used for straight pipe joints and shall not be used for pipe sizes greater than 28mm outside diameter. Expansion joints shall only be made using apparatus specifically designed for the purpose.

12.6 Pipeline Supports

Pipelines shall be supported at the intervals specified in HTM 02-01 using a suitable metallic, non-ferrous material or a ferrous material suitably treated to prevent corrosion and electrolytic action.

Plastic supports shall only be used for support of drops to terminal u nits. Maximum intervals between pipe supports as specified in HTM 02-01:

Pipe outside diameter (mm)	HTM02-01 Horizontal and Vertical Runs (m)

12	1.5
15	
1.5	
22	2.0
28	2.0
35	2.5
42	2.5
54	2.5
76	3.0

12.7 Installation

Where pipeline pass through walls they shall be provided with copper sleeves and filled with suitable intumescing fire stopping compound.

Pipeline joints shall not be located inside copper sleeves.

The pipes shall be as **Beacon Medaes Medical Gas Pipes** or approved equivalent.

13. Line Ball Valves c/w NISTS

Medical gas line ball valves complete with lockable NIST connections and blanking spade shall be provided as a means of isolation on medical gas pipelines at positions specified in the medical gas pipeline system contract drawings. Line ball valves assemblies shall comply with NHS Health Technical Memorandum 02-01 (HTM02-01).

Valves shall operate from the fully open to the fully closed position by manual operation of a lever through 90°. Valve nominal bores shall be equal to the nominal pipework size.

All line ball valves shall be cleaned for oxygen service.

Smaller type V assemblies (15 to 54mm inclusive) shall have flat-face connectors with 'O' ring seals.

The larger VF type (76 to 108mm inclusive) shall be flanged and installed with stainless steel bolts, nuts and spring washers with 3mm VitonÒ sealing gaskets. PTFE tape or any other thread sealing media is not acceptable.

Each Medical gas line ball valve assembly shall terminate in copper stub pipes to enable brazing direct into the distribution system using the fluxless brazing technique.

Valve assemblies shall incorporate a sliding lock mechanism on the handle, which can be locked in either the open or closed position using a standard padlock with a 6mm (1/4") diameter shackle.

NIST blanking nuts shall be capable of being padlocked onto the NIST bodies.

13.1 Materials

Medical gas line ball valve assemblies shall be constructed in a two-piece full-bore design with brass body, TeflonÒ ball seals, stem 'O' ring seal and a hard-chrome plated brass ball.

The valves shall be designed to have a tight shut-off and blow out proof stem for protection against pressure surges. Copper stub pipes shall be manufactured from medical grade copper pipe to BS EN 13348:2001.

Copper stub pipes shall be of sufficient length to enable brazing directly into the distribution system without the need for disassembly on site.

13.2 Test Certificates

All ball valve assemblies shall be pressure tested for valve tightness and leakage prior to packing and test certificates shall be availed to the Project Engineer.

The valves shall be as **Beacon Medaes Line ball valves** or approved equivalent.

14. Zone Service Unit (Area Valve Service Unit)

The Area Valve Service Unit (AVSU) shall conform to BS EN 739:1998, HTM 02-01 and BS EN ISO 7396-1:2007. The AVSU shall provide a zone isolation facility, for use either in an emergency or for maintenance purposes.

It shall also provide a physical breakpoint to allow work to be safely carried out on the pipeline.

A red coloured physical barrier (spade) shall be capable of insertion when required on either side of the valve, without the need to totally dismantle the line valve.

During normal service, full-flow gaskets with an 'O' ring groove on one side shall be coloured white and provide sealing between the flat face connector and ball valve.

The line valve shall be brass 22mm or 28mm ball valve with PTFE seals/seats, operated by a quarter turn handle with over-travel prevention in both directions.

The ball valve shall connect by 22mm or 28mm copper stub pipes to the distribution system.

The assembly shall be housed in a valve box, which shall be capable of both surface and concealed installation. The box shall made from extruded aluminum with die-cast aluminum end caps to prevent corrosion, offer high strength, and resist high temperatures from brazing in close proximity.

The box shall be finished in RAL 9010 polyester powder coat finish. A hinged door shall lock in the closed position and AVSUs installed adjacent to each other shall be operated by different key/lock combinations.

The AVSU door shall open through a minimum of 160° to provide maximum access, and provide for natural ventilation to prevent build up of gas within the valve box.

A blank zone identification label shall be provided with each AVSU's 2nd fix assembly. Each AVSU assembly shall be factory tested for gas tightness.

14.1 Emergency Access

The 2nd fix shall include a transparent plastic window incorporating the words 'Pull in Emergency and Close Valve'. In order to gain access in an emergency, a ring pull shall be fitted to the removable portion of the window. The emergency access mechanism shall be safely operable by a 5th percentile woman without the use of a tool.

Glass windows shall not be used. It shall not be possible to refit or reset the means of emergency access.

14.2 Door Tamper Alarm

A door tamper alarm facility shall be available, with a reed switch initiating a system alarm indication on the local alarm panel when the emergency access window is removed. Normally only oxygen and medical air AVSUs controlling high acuity care areas, resuscitation bays and accident and emergency wards shall be fitted with the door tamper facility.

14.3 Materials

The second fix assembly shall be manufactured from fire retardant V0 rated ABS. All wetted parts (except seals and gaskets) shall be brass or copper.

Copper stub pipes shall be manufactured from phosphorous de-oxidised non-arsenical copper to EN 1412:1996 grade

CW024A, manufactured to metric outside diameters in accordance with BS EN 13348:2008 R250 (half hard). Rubber pipe grommets shall be provided to ensure any leaking gas does not escape from the box into a wall cavity.

All elastomeric gas seals shall be manufactured from Viton with a Shore hardness of 75. Mild steel components shall not be used.

Sacrificial protection (e.g. galvanising), passivation or painting shall not be used to provide corrosion protection. Materials shall be inherently resistant to corrosion.

14.4 Gas Specific Connections

The AVSU shall be fully gas specific and labelled to identify the medical gas service.
The gas specific shrouds shall clearly show the gas service and use colour coding to BS EN 739:1998. Shrouds shall be pin indexed such that the only the correct shroud can be fitted to each 1st fix.

Gas specific NIST connections to BS EN 739:1998 shall be incorporated on each side of the line valve and include a permanently fitted gas identification label.

Pressure gas service (not vacuum) NIST connections shall incorporate 100% self sealing valves which, held closed by gas pressure until insertion of the appropriate gas specific male NIST fitting.
Additional sealing of NIST fittings shall be achieved using blank NIST nuts, with a knurled outer diameter. The blank NIST nuts shall include an internal 'O' ring groove and 'O' ring to seal on the smooth outer diameter of the female NIST.
Blank NIST nuts shall be hand tightened only. Each NIST connection shall be capable of providing a free air flow rate of 300 l/min with a pressure drop of 0.4 bar from a 4 bar nominal inlet pressure.

14.5 Local Alarm Pressure Switches

The AVSU shall incorporate minimum leak pressure switch connection ports on the left and right-hand sides to enable installation of a line pressure switch inside the box.
The AVSU shall be as BeaconMedæs ZSU2 **or approved equivalent.**

15.0 Area Service Module

The Area Service Module shall contain a local area medical gas alarm and eight area valve service units. The Area Service Module shall be pre-piped, wired and tested ready for installation into a finished building. Medical gas/vacuum services shall be fixed copper, piped to and from their respective area valve service unit s, and shall normally terminate in 22mm copper stub pipes for pressure gas installations and 22 or 28mm stub pipes for oxygen and vacuum installations.
Pipes shall normally be connected at ceiling level.
The AVSUs shall be **BeaconMedæs ZSU2** type and shall conform to BS EN 739:1998, HTM 02-01 and BS EN 737-3:1998.
The AVSU shall provide a zone isolation facility, for use either in an emergency or for maintenance purposes.

15.1 Emergency Access

The 2nd fix shall include a transparent plastic window incorporating the words 'Pull in Emergency and Close Valve'. In order to gain access in an emergency, a ring pull shall be fitted to the removable portion of the window.
The emergency access mechanism shall be safely operable by a 5th percentile woman without the use of a tool. Glass windows shall not be used. It shall not be possible to refit or reset the means of emergency access.

15.2 Door Tamper Alarm

A door tamper alarm facility shall be available, with a reed switch initiating a system alarm indication on the local alarm panel when the emergency access window is removed. Normally only oxygen and medical air AVSUs controlling high acuity care areas, resuscitation bays and accident and emergency wards shall be fitted with the door tamper facility.

15.3 Materials

The second fix assembly shall be manufactured from fire retardant V0 rated ABS moulded corner pieces connecting an extruded aluminium frame in which a high pressure compact laminate fascia plate is positively retained. The fascia plate shall have a colour to match the chosen hospital décor.
All wetted parts (except seals and gaskets) shall be brass or copper.

Copper pipe shall be manufactured from phosphorous de-oxidised non-arsenical copper to EN 1412:1996 grade CW024A, manufactured to metric outside diameters in accordance with EN 13348:2001R250 (half hard).
Copper to copper joints shall be made using a silver-copper-phosphorous brazing alloy type CP1 or CP4 to BS 1845 using a dry, clean, oil and oxygen free nitrogen inert gas shield with no flux.
Each Area Service Module assembly shall be factory tested for gas tightness. Rubber pipe grommets shall be provided to ensure any leaking gas does not escape from the Area Service Module into a wall cavity.
All elastomeric gas seals shall be manufactured from Viton with a Shore hardness of 75.
All visible aluminium surfaces shall be powder coated RAL9010 60% gloss by a DuPont/Akzo Nobel approved powder coating specialist, offering a minimum guaranteed service life of 25 years.

15.4 Gas Specific Connections
The area valve service unit shall be fully gas specific and labelled to identify the medical gas service. The gas specific shrouds shall clearly show the gas service and use colour coding to BS EN 739. Shrouds shall be pin indexed such that the only the correct shroud can be fitted to each 1st fix.
Gas specific NIST connections to BS EN 739:1998 shall be incorporated on each side of the line valve and include a permanently fitted gas identification label.
Pressure gas service (not vacuum) NIST connections shall incorporate 100% self sealing valves which, held closed by gas pressure until insertion of the appropriate gas specific male NIST fitting.
Additional sealing of NIST fittings shall be achieved using blank NIST nuts, with a knurled outer diameter.
The blank NIST nuts shall include an internal 'O' ring groove and 'O' ring to seal on the smooth outer diameter of the female NIST. Blank NIST nuts shall be hand tightened only.
Each NIST connection shall be capable of providing a free air flow rate of 300 l/min with a pressure drop of 0.4 bar from a 4 bar nominal inlet pressure.

15.5 Local Alarm Pressure Switches
The area valve service unit shall normally accommodate local alarm pressure switches.
Pressure switch connections shall incorporate minimum leak pressure switch connection ports.
Wetted parts of pressure switches shall be manufactured from inherently corrosion proof materials. Plating or sacrificial protection on mild steel is not acceptable.

The area service module shall be as BeaconMedæs Medizone Area Service Modules **or approved equivalent.**

16.0 Monitoring Equipment
15.1. Medical Gas Central Alarm System
The Central Alarm System shall be capable of carrying at least gas services.
The medical gas central alarm shall fully comply with the requirements of HTM 02-01, C11, BS EN 60601-1 and BS EN 60601-1-2 and BS EN ISO 7396-1.
The cover, back box and bezel (if required) shall be polyester powder coated in a RAL9010 30% gloss finish. A single tamperproof fastener shall be used to gain access to the hinged door. The hinge shall operate through a minimum of 120^0 to provide adequate access.

16.1.1 System Operation
Configuration of the Central Alarm System shall be done via switches on the panel, allowing easy and flexible configuration.
Each panel shall display and / or input up to five gas services or up to twenty point alarms.
Each gas service shall consist of a bank of five dual-circuit LED indicators, one green (for a "Normal" indication) and three yellow and one red (for four input conditions) as standard, although panels shall be customisable for individual requirements.

The gas service inputs shall be connected to a five way connector block.
The alarm shall monitor the cable connection from the source equipment, and provide a fault alarm in the event of a short circuit or open circuit fault. This shall be distinguishable from a source equipment fault. There shall be a test facility to check the integrity of all the LED indicators on the panel, and the audible alarm. The test facility shall also provide diagnostic information to aid in fault finding.
An adjustable volume audible alarm shall be fitted to the panel to allow installation in all environments, and there shall be a facility to connect the alarm to a remote sounding unit to repeat the audible alarm at other locations, for example a nurse base at the other end of a ward.
There shall be a mute facility which silences the audible alarm for a period of fifteen minutes, or until another alarm condition occurs.
There shall be a selectable option to indicate to other repeater panels around the system that an alarm condition has been acknowledged and appropriate action is being taken.
A volt free contact shall be provided to output normal/fault status for the panel.

16.1.2 Panel Operation
Each panel shall be wired on to a dedicated data transmission cable and shall be permanently connected to the "Essential Supply" within the hospital via a 3A fused spur.
Each gas service will display a green "Normal" indication when all four conditions are not in a fault condition. When an input condition faults, the respective LED shall indicate the type of failure.
Any data communication errors shall cause a "System Fault" alarm.
A rechargeable battery shall provide a "System Fault" alarm in the event of a power failure.
Source equipment shall connect directly to the input alarm panel. It is not acceptable to install a separate connection box to convert switch signals to a data signal.
The Central Alarm System shall be as BeaconMedæs Medipoint 125 Medical Gas Central Alarms **or approved equivalent.**

16.2. Medical Gas Area Alarm
Each medical gas area alarm panel shall be capable of monitoring 6 medical gas services by means of pressure sensors, which detect deviations from the normal operating limits of either pressure or medical vacuum.
The medical gas area alarm shall fully comply with the requirements of HTM 02-01, C11, BS EN 60601-1 and BS EN 60601-1-2 and BS EN ISO 7396-1.
The cover, backbox and bezel (if required) shall be polyester powder coated in a RAL9010 30% gloss finish.
A single tamperproof fastener shall be used to gain access to the hinged door. The hinge shall operate through a minimum of 120^0 to provide adequate access.

16.2.1 System Operation
Each gas service shall be displayed by coloured LED's to show 'Normal' (green), 'Low' and 'High Pressure' (red) conditions.
Medical vacuum systems shall be displayed in the 'Normal' (green) and 'Low Vacuum' (red) conditions only. Failure indicators shall be displayed by flashing lights and normal indications shall be steady.
Each LED block indicator shall be a plug-in component with individual long life LED's connected in parallel in two banks to provide duplex circuits.
An audible warning shall sound simultaneously with any failure indication and a mute facility shall be provided.

Following a mute selection the audible will resound after approximately 15 minutes, or shall operate simultaneously should a further alarm condition occur.

A “Mute” switch shall be provided inside the panel; for use during any maintenance resulting in prolonged pipeline or plant shutdown. This facility shall automatically reset when the gas service returns to normal. The alarm panel shall have a ‘Test’ facility to prove the integrity of the internal circuits, LED’s and audible warning.

The alarm panel shall incorporate a volt free normally closed relay to allow for interconnection to either a medical gas central alarm system or an event recording circuit of a building management system.Each alarm shall provide a green LED to indicate that electrical power is available at the panel and a red LED to indicate ‘System alarm’.

In the event of an electrical power supply failure the ‘System alarm’ LED shall illuminate (flashing) and the audible warning shall be delayed for 20 seconds to enable standby generator tests.

Line contact monitoring circuits shall be provided to constantly monitor the integrity of the input sensors and interconnecting wiring. In the event of any fault the line contact monitoring circuits shall initiate the specific gas service failure indication, a ‘System Alarm’ indication and an audible warning.

Further aids to fault diagnosis shall be provided by means of varying flashing rates whilst operating the ‘Test’ switch.

16.2.2 Pressure and Vacuum Switches

Pressure and vacuum switches shall be manufactured with brass wetted parts and house a PCB with line contact monitoring resistors.

Electrical connectors shall be designed for frequent disassembly. Spade connectors are not acceptable. Pressure switches shall include both high and low pressure settings in the same switch, using only a single ¼” BSPPthreaded pipeline connection to minimise the number of sealed joints.

The body and housing of the pressure switch shall be manufactured from impact resistance, rigid and inherently corrosion proof materials. Elastomers and plated or coated mild steel are not acceptable materials.

Pressure switches shall connect directly to the area alarm panel. It is not acceptable to install a separate connection box to convert switch signals to a data signal.

The area alarm shall be as BeaconMedæs Medipoint 26 Medical Gas Area Alarms **or approved equivalent.**

17.0. Vertical Headwall Trunking System

The Vertical headwall shall be constructed from custom designed extruded aluminium sections with powder coated 60% gloss finish fascia panels.

Fascia panels shall be cut prior to painting to ensure all surfaces are coated, providing a tight seal between panels to prevent dust traps. Cover strips on the front fascia panels shall not be allowed.

All visible extruded aluminium sections shall be powder coated RAL9010 60% gloss by a DuPont/Akzo Nobel approved powder coating specialist, offering a minimum guaranteed service life of 25 years. End caps shall be manufactured from 2.5mm thick UV stabilised and fire retardant high-impact Fabex 578.

A removable UV stabilised polymer extrusion shall cover the fascia fixing screws, providing a tight seal to prevent dust traps. A UV stabilised elastomeric wall seal shall run the full length of the bedhead unit, providing a dust tight seal between the bedhead unit and the wall and shall cater for a 10mm tolerance in the flatness of the mounting surface. A segregated service compartment (Vertical) shall run the length of the unit to carry medical gas pipes, low-voltage electrical cables and ELV/data, with segregation of services being maintained throughout.

Each bedhead unit shall be supplied pre-piped, wired and certified.

The design and configuration of the bedhead units shall fully comply with all relevant applicable standards, including

HTM 2007, HTM 2011, HTM 2015, HTM 2020, HTM 2022, HTM02-01, HTM08-03, BS EN ISO 11197, BS EN

60601-1, BS EN 60598-1 and BS EN 60598-2-25, BS 6496, BS 7671, BS EN 60439, IEC 60364-7-

710, CIE, CIBSE LG2, CIBSE LG3.

17.1. Medical Gases

The *vertical headwall system* compartment for housing medical gas services shall be capable of running pipes of 15mm diameter generously spaced to facilitate simple on-site brazing to the piped distribution system.

The headwall shall be capable of housing at least three terminal units in a horizontal array.

Copper pipes shall be manufactured from phosphorous de-oxidised non-arsenical copper to BS EN 1412:1996 grade CW024A and be manufactured to metric outside diameters in accordance with BS EN 13348:2001R250 (half hard).

Degreasing of pipe shall be such that there is less than 20mg/m2 (0.002mg/cm^2) of hydrocarbons on the degreased surface when tested by the method specified in ASTM B280 clause 12.

The type of terminal unit installed shall be in accordance with contract drawings. Hoses shall not be used to connect the medical gas terminal units to the distribution system.

17.2. Lighting

Diffusers shall be manufactured from extruded fire-retardant Lexan® ML3290 polycarbonate resin, incorporating prismatic inner surfaces to maximise efficiency of light distribution from the chosen source. Efficiency shall be further enhanced by the use of mirror finish reflectors manufactured from Alanod Miro4 or Miro27 aluminium, achieving a minimum clarity and total reflection to TR-2 or DIN 5036-3 of 95%. Luminaires shall be provided with electronic ballast's suitable for use with TL5 high efficiency fluorescent tubes, with a power factor rating of at least cosø=0.93.

Lighting controls shall include options for local and/or remote control, control via the nurse call handset or control via a Digital Addressable Lighting Interface (DALI) or equivalent system.

17.3. Electrical Sockets

Electrical sockets shall normally be fitted in the side panels of the **vertical headwall system**, with additional sockets being fitted to the front fascia panel as required.

Electrical sockets shall be wired in ring or radial mains to circuits as specified by the customer.

17.4. Communications

Provision for or fitting of the nurse call system shall be co-ordinated by the bedhead unit supplier.

Data sockets, including, but not limited to RJ45 and telephone sockets shall be installed in the bedhead unit at the time of manufacture.

The headwall system shall be as Beacon Medaes Vertical V-Sys headwall system **or approved equivalent.**

18.0 Medical Gas Cylinder Trolleys

The trolley shall consist of a flexible retaining strap to secure the cylinders safely, big anti-static wheels to ensure safe movement, .

18.1 Material Specification

Frame: Steel **Finish**: Powder coated **Handle:** Glass filled nylon **Retaining strap**: Neoprene **Bumpers**: Polyethylene

Wheels: Anti-static 200 mm solid rubber

18.2 Trolley sizes

i) Trolley capable of carrying 2 x 10 litre HX- Size BOC cylinders, ii) Trolley capable of carrying 2 x 33 litre G- Size BOC cylinders, iii) Trolley capable of carrying 2 x 40-50 litre J- Size BOC cylinders.

19. Particular Specifications for Portable Fire Extinguishers

19.1 Water/CO_2 Extinguishers

These shall be 9-litre water filled CO2 cartridge operated portable fire extinguishers and shall comply

with B.S. 1382: 1948
and to the requirements of B.S.4523: 1977. Unless manufactured with stainless steel, bodies shall have all internal surfaces completely coated with either a lead tin, lead alloy or zinc applied by hot dipping. There shall be no visibly uncoated areas.
The extinguishers shall be clearly marked with the following:

a) Method of operation.

b) The words 'WATER TYPE' (GAS PRESSURE) in prominent letters.

c) Name and address of the manufacturer or responsible vendor.

d) The nominal charge of the liquid in imperial gallons and litres.

e) The liquid level to which the extinguisher is to be charged.

f) The year of manufacture.

g) A declaration to the effect that the extinguisher has been tested to a pressure of 24.1 bar (350 psi.).

h) The number of British Standard 'B.S' 1382 or B.S. 5423: 1977.

19.2 Portable Carbon dioxide Fire Extinguishers
These shall be portable carbon dioxide fire extinguishers and shall comply with B.S. 3326: 1960 and B.S. 5423: 1977.
The body of extinguisher shall be a seamless steel cylinder manufactured to one of the following British Standards; B.S. 401 or B.S. 1288.

The filling ratio shall comply with B.S. 5355 with valves fittings for compressed gas cylinders to B.S.341. Where a hose is fitted it shall be flexible and have a minimum working pressure of 206.85 bar (3000 p.s.i.). The hose is not to be under internal pressure until the extinguisher is operated.

The nozzle shall be manufactured of brass gunmetal, aluminium or stainless steel and may be fitted with a suitable valve for temporarily stopping the discharge if such means are not incorporated in the operating head.

The discharge horn shall be designed and constructed so as to direct the discharge and limit the entrainment of air. It shall be constructed of electrically non-conductive material.

The following markings shall be applied to the extinguishers:-

a) The words "Carbon Dioxide Fire Extinguisher" and to include the appropriate nominal gas content.

b) Method of operation.
c) The words "Re-charge immediately after use".
d) Instructions for periodic checking.
e) The number of the British Standard B.S. 3326: 1960 or B.S. 5423.
f) The manufacturers name or identification markings

19.3 Dry Chemical Powder Portable Fire Extinguisher
The portable dry powder fire extinguishers shall comply with BS3465: 1962 and BS 5423. The body shall be constructed to steel not less than the requirements of BS 1449 or aluminium to BS 1470: 1972 and shall be suitably protected against corrosion.
The dry powder charge shall be not-toxic and retain it s free flowing properties under normal storage conditions. Any pressurizing agent used as an expellant shall be in dry state; in particular compressed air.
The discharge tube and gas tube if either is fitted shall be made of steel, brass, copper or other not less

suitable material . Where a hose is provided it shall not exceed 1,060mm and shall be acid and alkali resistant. Provision shall be made for securing the nozzle when not in use.
The extinguisher shall be clearly marked with the following information

a) The word "Dry Powder Fire Extinguisher"
b) Method of operation in prominent letters.
c) The working pressure and the weight of the powder charge in Kilogramme. d) Manufacturers name or identification mark
e) The words "RECHARGE AFTER USE" if rechargeable type.
f) Instructions to regularly check the weight of the pressure container (gas Cartridge) or inspect the pressure indicator on stored pressure types when fitted, and remedy any loss indicated by either.
g) The year of manufacture.
h) The Pressure to which the extinguisher was tested.
i) The number of this British Standard BS 3465 or BS 5423: 1977.
j) When appropriate complete instructions for charging the extinguisher shall be clearly marked on the extinguisher or otherwise be supplied with the refill.

19.4 Air Foam Fire Extinguisher
These shall be of 9 litres capacity complete with refills cartridges and wall fixing brackets and complying with B.S. 5423
with the following specifications:- Cylinder: to B.S. 1449

Necking: to be 76mm outside diameter steel EN 3A $2^3/_4$ X 8TPI female thread.

Head cap: to be plastic moulding acetyl resin.

CO_2 Cylinder: to be 75gm P.V.C coated.

Internal Finish: to be polythene lining on phosphate coating.

External finish: to be phosphated - One coat primer paint and one coat stove enamel B.S. 381 C

20. Testing and Commissioning

The objective of testing and commissioning is to ensure that all the necessary safety and performance requirements of the MGPS will be met.

Testing and commissioning of MGPS shall be carried out in accordance with the requirements of HTM

02-01-Part A. The contractor shall provide instrumentation for the functional tests. The Quality Control

Pharmacist shall provide instrumentation for the quality tests.
Calibration certificates shall be available for all instrumentation.

20.1 Summary of Tests

20.1.1 Tests and Checks on the Pipeline Carcass
The following tests shall be carried out after installation of the pipeline carcass but before concealment:
a. visual check of pipeline labelling, marking, sleeving and support;
b. leakage test;
c. tests for cross-connection;
d. valve tests for closure, zoning and leakage.
(These tests will be repeated as part of the pipeline system tests and the contractor may wish to defer closure and leakage, but may choose to carry out a zoning check.)

20.1.2. Tests on the Pipeline System
The following tests and checks shall be carried out after complete installation of the pipeline system:
a. tests for leakage on each MGPS;
b. tests of AVSUs for closure, correct service and control of the terminal units in the zone:
checks for correct labelling of AVSUs for zone reference and identity of terminal units controlled and flow direction indication;

c. tests of LVAs for closure and identification;
d. tests for cross-connection, flow, pressure drop, mechanical function and correct identity of the terminal units: checks for correct labelling and association with AVSUs (this is only required when, within a specific area, there are separate circuits for the same service, for example dual/ split circuits);
e. tests for mechanical function and identity of NIST connectors;

f. performance tests of the pipeline system;

g. functional tests of all supply systems;

h. checks of safety valve certification;

j. tests of warning systems;

k. tests for particulate contamination/odour/taste: these may be carried out immediately after installation, using medical air, or after purging and filling with the specified gases.

Note
Nitrous oxide and nitrous oxide/oxygen mixture are not tested for odour.

20.1.3 Tests before use
The following tests shall be carried out after purging and filling with the working gas:
a. tests for particulate contamination

b. tests for gas identity;

c. tests for gas quality.

20.2 General Requirements for Testing
Testing for leakage shall be carried out in two stages: the first to the pipeline carcass, the second to the completed distribution system, which will include terminal units and medical supply units as appropriate.

Purging and testing shall be carried out with clean, oil-free, dry air or nitrogen, except for those tests where medical air or the specific working gas is prescribed.

All test gases shall meet the particulate contamination requirements set out in HTM 02-01- Part A.

Cylinders of medical air shall be used as the source of test gas for oxygen, nitrous oxide, entonox heliox systems in order to prevent the possibility of contamination with oil.

In the case of oxygen system the use of cylinders will be impracticable for the total system performance test. The total system performance test shall be carried out by using the medical air compressor system, provided that the quality tests have been satisfactorily carried out to demonstrate that the criteria set out in HTM 02-01- Part A, Table 30 have been met and that the air supply plant is continuously monitored for moisture during the test.
Once tests have been completed, the system shall be maintained under pressure by means of air supplied from medical gas cylinders until filled with the working gas, when full QC checks will be carried out.
The results of all tests shall form part of the permanent records of the hospital and should show details of the services and areas tested.

For total system pressure tests on oxygen, nitrous oxide and entonox, the system under test shall be physically isolated from the source of supply (for example by the use of spades).

In the case of compressed air and vacuum systems, the pressure at the plant shall be respectively below and above pipeline distribution pressure.
All errors found during testing shall be rectified, and the relevant systems retested as appropriate before the records are signed.

The contractor (MGPS) shall provide all engineering forms, labour, materials, instruments and equipment required to carry out the tests described in this specification.

In the case of engineering tests, this must include all cylinders of test gas together with "open" bore NIST connector probes, pressure-measuring equipment and gas specificity/flow pressure testing device(s), metered leaks and AGS disposal system test equipment.
The Quality Controller (MGPS) shall be responsible for supplying all QC forms, unless otherwise requested by the hospital management, calibrated test equipment, connections etc.

Note
If there is to be a delay between completion of the MGPS and when it is taken into use, it shall be necessary to carry out the particulate and odour test
prior to purging and filling with specific gases.
In such cases the contractor shall also provide labour, materials and equipment to carry out these tests.

The Quality Controller (MGPS) shall provide the test equipment specified in HTM 02-01- Part A,Appendices D, E and F. The Quality Controller
(MGPS) shall provide all equipment for gas quality and identity testing.

Flow meters, anaesthetic trolleys etc shall not be moved into rooms until commissioning tests have been satisfactorily completed.

20.3 Requirements for Pipeline Carcass Tests
For sectional testing to be performed, it is essential that as-fitted drawings are available so that the extent of the system(s) under test can be identified.
For the purpose of the leakage test, all pressure gas systems may be interlinked, provided that the test can be performed at the highest pressure required. (This also has the advantage that the pipeline carc ass could be assigned to a different service.)

Notes
In the event of a leak, it will be necessary to test each system separately.
It is advantageous to perform the tests with nitrogen, since – in the event of a leak or cross-connection – remedial action can be taken immediately.

When connecting systems together, vacuum systems shall not be included, as particulates from an unpurged vacuum system may be drawn into any part of any pressure gas system by venturi effects.
20.3.1 Labelling and Marking
A visual check shall be made on each pipeline system to ensure that the pipelines are labelled in accordance with the contract specification, and that the terminal unit base blocks are marked in accordance with BS EN 737-1:1998.
The results of the checks shall be recorded on Form E1 .
20.3.2 Sleeving and Supports
A visual check shall be made on each pipeline system to ensure that the pipelines are sleeved, where required, and supported in accordance with HTM 02-01 Part A, Table 25. The results of the checks shall be recorded on Form E1
20.3.3 Leakage
The aim of this test is to establish that there is no leakage from the piped medical gas systems. This shall be demonstrated by the use of electronic pressure measuring equipment with a minimum resolution of 0.2 kPa in 1000 kPa and 0.5 kPa in 2000 kPa.
Note
With suitable equipment it is possible to carry out this test during a relatively short period to minimise the effect of
temperature change.
During a test period of two hours, the maximum pressure loss shall be less than 0.2 kPa for 400 kPa systems and vacuum, and 0.5 kPa for 700 kPa systems. No allowance shall be normally made for variation of pressure with temperature; if, however, the accuracy of the available pressure - measuring equipment is in doubt and recourse is made to a 24-hour test, HTM 02-01 Part A, Appendix B contains information on the method of calculation.
Systems shall be tested at a working pressure of 18.0 bar for medical compressed air systems for surgical use, 10.0 bar for all other compressed medical gas systems and 5.0 bar for vacuum systems constructed in copper (1 bar forsystems constructed in plastic).
This test shall be carried out with AVSUs, LVAs and other service valves open; any safety valves and pressure-sensing devices installed may be removed and the connections blanked off. The results of the test may be recorded on Form E1.

20.3.4 Cross-connection

Before performing these tests, any links between systems shall be removed and all pipelines be at atmospheric pressure with all AVSUs etc open.

A single pressure source shall be applied to the inlet of the system to be tested and at least one terminal unit base block on all other systems be fully open.

Each terminal unit base block on the pipeline under test shall be opened in turn, checked for flow and then re-blanked. (To permit refitting of blanking caps, it is necessary to partially open at least one base unit – but it is still necessary to achieve a detectable flow.) When the test on one pipeline has been completed, the pressure source shall be removed and

the pipeline left open to atmospheric pressure by removing at least one base block blanking plate. The test shall be repeated for other systems, one at a time. The results shall be recorded on Form E2.

20.4 Requirements for Pipeline System Tests

There shall be no links between the pipeline systems. Engineering (pressure) tests shall be carried out with electronic pressure-measuring equipment with a minimum resolution of 0.2 kPa in 1000 kPa, and 0.5 kPa in 2000 kPa.

The scope of the system and scale of provision of terminal units, AVSUs, LVAs and warning and alarm system panel indicators shall be checked for compliance with HTM 02-01, Part A, Table 11 and any deficiencies noted.

20.4.1 Leakage from Total Compressed Medical Gas Systems

This test shall be carried out on the completed system with all terminal units, AVSUs, pressure safety valves and

pressure transducers fitted. Once the test pressure has been applied, the system shall be isolated from the plant. For the purpose of this test, the supply system shall extend from the last valve(s) nearest to the plant detailed on the appropriate schematic drawing. This point shall be identified on the contract drawings. The test shall be performed at pipeline distribution pressure. During a test period of two hours, the maximum pressure loss shall be less than 0.2 kPa for 400 kPa systems and vacuum, and 0.5 kPa for 700 kPa systems. The test results shall be recorded on Form E3.

20.4.2 Leakage into Total Vacuum Systems

Prior to testing, the vacuum plant shall be operated to allow any moisture in the system to evaporate. With the system at

pipeline distribution pressure and with the source isolated, the pressure increase in the pipeline must not exceed 1 kPa after one hour. There is no additional allowance for temperature correction in this test. The test results shall be recorded on Form E4.

20.4.3 Closure of Area Valve Service Units (AVSUs) and Line Valve Assemblies (LVAs)

For pressurised systems, the system upstream of the closed AVSU under test shall be maintained at pipeline distribution pressure and the downstream line pressure reduced to about 100 kPa.

The downstream pressure shall be recorded, and no change in pressure over a period of 15 minutes.

For vacuum systems, the systems on the supply plant side of the closed valve shall be maintained at pipeline distribution pressure and the terminal unit side should be at about 15 kPa. The upstream (terminal unit side) pressure shall be recorded, and there shall be no change in vacuum over a period of 15 minutes.

For LVAs, a similar test procedure shall be adopted. There shall be no change in the time for vacuum. The test results shall be recorded on Form E5.

20.4.4 Zoning of AVSUs and Terminal Unit Identification

This test shall be performed to ensure that each AVSU in the pipeline controls only those terminal units intended by the

design. Each terminal unit shall be checked to ensure that it is for the correct service and that it is in accordance with BS EN 737-1:1998; unambiguous cross-referenced labelling of AVSUs and terminal units controlled by them is essential.

Notes

The contractor may wish to carry out this test as part of the carcass tests before any section of the pipeline is "enclosed". Terminal-unit first-fix back blocks inadvertently fitted upside-down will result in inverted second-fix components, unless gas-specific components are

deliberately removed. Therefore, a selection of terminal unit second-fixes, for example one per ward area, should be removed and examined to ensure that no gas-specific components have been removed.

The test shall be performed by turning off an individual AVSU and venting the zone to atmospheric pressure. A check shall then be made to establish that only those terminal units controlled by the AVSU are at atmospheric pressure. All other terminal units, including those for other gas services, shall be at the operating pressure. Once a zone has been vented, it shall not be necessary to re-pressurise. The other AVSUs shall then be tested successively.

Notes
These tests can be performed at the same time as the cross-connection/terminal unit pressure drop tests.
Where pneumatically activated pendant fittings are installed, a check shall be made to ensure that the source of air has been taken from the correct
AVSU zone.

The test results shall be recorded on Form E5.

20.4.5 Cross-connection
All systems shall be checked to ensure that there is no cross-connection between pipelines for different gases and
vacuum.

The tests shall not commence until all installations are complete and plant operational. (The tests can be performed using "test" gas or "working" gas.)
Note

Oxygen and vacuum can be tested simultaneously, followed by medical air and surgical air simultaneously, followed by the other gases, that is, nitrous oxide, entonox and heliox.

The sequence of the test shall be, first, to open all valves on all systems (for example AVSUs, LVAs and any other valves). For oxygen and vacuum systems, the main plant isolation valves shall be opened (the main plant isolation valves on other systems remain closed).
A check shall be made to ensure that there is a flow at every oxygen terminal unit and suction at every vacuum terminal unit, and that the systems are at the correct operating pressure; there shall be no flow at any other terminal unit for the other gases.
For the next stage, the main isolation valves for medical air and surgical air shall be opened. (It is not necessary to return the oxygen and vacuum systems to atmospheric pressure.)
A check shall be made to ensure that there is a flow at every medical air terminal unit and every surgical air terminal unit and that the operating pressure is correct; there shall be no flow from the nitrous oxide and/or entonox terminal units and heliox.

The process shall then be repeated for nitrous oxide – again there is no necessity to return any of the previously tested systems to atmospheric pressure.
A check shall be made to ensure that there is flow at every nitrous oxide terminal unit and that the operating pressure is correct; there shall be no flow from the entonox and heliox terminal units.
The process shall then be repeated for entonox and finally heliox.
Note
The tests can be carried out on a total system basis, departmental basis or sub-departmental basis, having previously checked for cross-connection up to the appropriate AVSUs. When carrying out the tests on a sectional basis, it is essential that as-fitted drawings are available such that the extent of the system(s) can be established.
The test results shall be recorded on Form E6.
20.4.6 Flow and Pressure Drop at Individual Terminal Units, Mechanical Function and Correct Installation
These tests can be carried out as part of the cross-connection tests above using appropriate test devices as described in HTM 02-01 Part A, Appendix C with the correct probes inserted for the pipeline(s) under test. The pressure must achieve the values given in HTM 02-01, Part A, Table 28 at the specified flows.

Note
When performing these tests as part of the cross-connection tests, there is the possibility that the 400 kPa and vacuum test devices could be connected to the incorrect service, particularly a vacuum and oxygen reversal. The instruments used, therefore, should include appropriate directional check valves. (There is a possibility of damaging the gauges. Alternatively an open probe can be used to determine pressure or vacuum.)
It shall be demonstrated for each terminal unit that the appropriate gas-specific probe can be inserted,

captured and released, and it shall be visually confirmed that an anti-swivel pin is present, or absent, in terminal units with a horizontal or vertical axis, respectively.

Notes

Terminal units to BS EN 737-1:1998 need not be challenged with the full complement of BS 5682:1998 test probes. The terminal unit should be fitted complete with bezel plates etc. The clearance hole should be reasonably concentric with the terminal unit rim – it must not be in contact.

The results of the tests shall be recorded on Form E7

All NIST connectors shall be checked to ensure that gas flow is achieved when the correct NIST probe is inserted and mechanical connection made.

The correct identification of gas flow direction shall be confirmed for AVSUs (that is, which are the upstream and downstream NIST connectors). NIST connectors can be checked when performing other tests on AVSUs and LVAs.

Note

Whereas it should not be necessary to carry out these tests on AVSUs bearing a CE Mark, in certain circumstances factory-assembled units are dismantled for installation purposes and can be subsequently incorrectly re-assembled. In the case of LVAs (whether or not CE marked), disassembly and subsequent incorrect re-assembly or, indeed, insertion into an incorrect line, is also possible. The primary purpose of the test is to ensure that whenever it is necessary to make a connection, the appropriate connectors will be to hand; the test is a further safety aid, although it is assumed that personnel making connections to NIST fittings are appropriately qualified and authorised to do so.

It shall be demonstrated (except for vacuum) for each NIST connector that the self-sealing device substantially reduces the flow of gas when the connector is removed without hazard to personnel or reduction in pipeline pressure.

The results shall be recorded on Form E8.

20.5 Performance Tests on the Pipeline System

The performance of individual pipeline systems shall be measured by introducing a sufficient number of calibrated metered leaks (with orifice sizes providing different flows that replicate the range of medical devices for which the pipeline is designed; see Table 12) to represent the total "diversified" system design flow, less the flow generated by the test device.

Thereafter, a representative number of terminal units (see note below) shall be tested for pressure and flow: the diversified flows shall be derived from the data in HTM 02-01 Part A,Tables 13, 15, 16, 18, 20 and 21.

Notes

In a 28-bed ward module a representative number would be in the order of two terminal units furthest from the AVSU, two near the entrance, and the treatment room, if applicable for each gas and vacuum. In an operating department, a representative number would be one terminal unit in each operating suite and 20% of terminal units in recovery for each gas and vacuum. For oxygen, one metered leak should be 100 L/min to represent oxygen "flush". It is not necessary to insert metered leaks into the actual number of terminal units used to calculate the "diversified" design flow, provided the numbers used are evenly distributed and orifice sizes are selected to achieve this flow.

The metered leaks shall be stamped or similarly be identified to show the flow (air equivalent) at, for example, 10, 20,100, and 275 L/min for 400 kPa systems, and 350 L/min for 700 kPa systems; the results of the tests shall be recorded on Form E9.

Note

In principle it is permissible, although unlikely to be practicable for large installations, to test all systems simultaneously, particularly oxygen and vacuum, where terminal units are installed in pairs and where they require different metered leaks (this includes vacuum when testing oxygen will not significantly increase the time needed).

20.6 Functional Tests of Supply Systems

All supply systems shall be tested for normal and emergency operation, according to the manufacturers' manuals and contract specifications. For the purpose of the tests, the systems shall be connected to both the normal and stand-by power supplies. The results of these tests shall be recorded on Form E10.

20.7 Pressure Safety Valves

Pressure safety valves are not tested. They shall be examined to ensure that they are correctly rated for the pipeline system and are in accordance with the contract specification. Each shall be provided with a test certificate confirming the certificated discharge pressure.

Records of safety valve details shall be noted on Form E11.

Check that the specified pressure safety valves, line valves and non-return valves have been fitted.

Verify that the pressure safety valves are certified to operate in accordance with the contract

specification and conform to BS EN ISO 4126-1: 2004.

20.8 Warning and Alarm Systems

The operation of warning and alarm systems shall be tested in all normal operating and emergency modes. Particular attention shall be paid to the following:

a. that all systems operate within the specified tolerance limits at all operating parameters and fault conditions, and can be seen and heard as specified in HTM 02-01 Part A,Tables 23 and 24;

b. that systems react correctly following return to normal status;

c. that all indicator panels and switches are correctly marked d. that all functions on all indicator panels operate correctly;

e. that the system will operate from the essential supply stand-by power source;

f. that all indicator panels are labelled to show the areas they serve, or as detailed in the contract specifications. The following tests shall also be carried out:

a. for central indicator panels, check that the operation of the mute switch cancels the audible alarm and converts the flashing signals to steady, for all systems and conditions;

b. for repeater indicator panels, check that the mute switch cancels the audible alarm and that the f lashing signals are converted to steady only on the central alarm panel, for all systems and conditions;

c. for area indicator panels, check that the operation of the mute switch cancels the audible only, for all systems and conditions;

d check power failure operates red "system fault" indicator and the audible alarm;

e. check that a contact line fault operates the "system fault" indicator, the main alarm displays and the audible alarm;

f. check audible reinstatement for each alarm panel;

g. check that the audible signal can be continuously muted via operation of the internal push-button for gas service alarm conditions only;

h. check for correct identification of each gas service on alarm panels and "departmental" or plant specifying labels;

j. check that each alarm panel emits the correct (two-tone) audible alarm. (Some manufacturers supply panels set for a single tone – in use, staff may confuse this sound with that emitted by some models of patient monitoring equipment.)

The results of the tests are recorded on Form E12.

20.9 Verification of As-Installed Drawings

The As-Installed drawings shall be checked to ensure that all variations from the contract drawings have been recorded and the results recorded on Form E13.

20.20 Filling with Medical Air

All MGPS shall be left filled with medical air at pipeline distribution pressure until they are filled with the specific working gas shortly before use. The medical vacuum pipeline need not be maintained under vacuum.

When the construction contract has finished, the contractor shall record the removal of all special connectors and cylinders from site.

20.21 Purging and Filling with Specific Gases

Each pipeline system shall be purged with the specific working gas shortly before use. The following cond itions shall apply:

a. all sources of test gas must be disconnected;

b. all special connectors must be removed from site;

c. each pipeline system must be at atmospheric pressure with all AVSUs open;

d. each system must be filled to pipeline distribution pressure with the specific gas from the supply system;

e. with the supply system on, each terminal unit must be purged at a known flow with a volume of gas at least equal to the volume of the pipeline section being tested;

f. all oxygen, nitrous oxide, entonox and heliox discharged during the process must be released to a safe place. The results of the purging process shall be recorded on Form E14.

Purging is not necessary for vacuum systems.

20.22 Quality of Medical Gas Systems

20.22.1 Particulate Matter

MGPS shall be free from particulate contamination, as they have been constructed using chemically cleaned, capped components and joined in a controlled process using a filtered shield gas.

However, on-site contamination can occur from ingress of building materials, dust etc. The presence of such particles can adversely affect the quality of the delivered gases. Therefore, tests to indicate their absence are important.

New systems shall be purged until the particulate filter is completely clear of visible particles when viewed in a good light.

The test for particulate matter shall be carried out at every terminal unit on a new system. It can be carried out either after completion of the construction phase using medical air or after the system has been filled with the specified gas.

Once the system is filled with working gas, it shall not be necessary to repeat the test at every terminal unit. The actual number of terminal units sampled shall be at the discretion of the Quality Controller (MGPS).

20.22.2 Oil

This test shall be carried out at the plant test point of all newly installed medical/surgical compressed air plant.

Oil may be present as liquid, aerosol or vapour, and an appropriate test device is described in HTM 02-01 Part A, Appendix E.

The total oil content shall be in accordance with HTM 02-01 Part A, Table 28. Care shall be taken in siting the test point to ensure a representative sample.

20.22.3 Water

This test is intended to identify contamination of the pipeline system by moisture.

Notes

When testing terminal units supplied via low pressure, flexible connecting assemblies, it is often found that – on initial testing – moisture levels exceed the 0.05 mg/L limit; this is the result of desorption of minute quantities of moisture into the gas stream. This is particularly noticeable where the test flow is low, and should not cause undue concern. The Quality Controller (MGPS) should establish, however, that the elevated readings at such terminal units result from this effect and not water contamination of the pipeline. (For example, the results should be compared with the readings achieved at nearby terminal units supplied by copper pipework.) New developments in hose materials may lead to hoses with reduced water vapour permeability characteristics. The effects of flow rate through dryer units and sampling times on detection equipment indications should also be taken into account when measuring water content.

The plant test point and a representative sample of terminal units distributed throughout the pipeline systems shall be tested for total water content.

The water content shall not exceed 67 vpm (equivalent to an atmospheric pressure dew-point of approximately –46°C). The typical water content of medical gas cylinders is normally below 5 vpm.

Water vapour content may be measured using the appropriate test device described in HTM 02-01 Part A, Appendix E.

20.22.4 Carbon monoxide

The most distant terminal units on each branch of a medical/surgical air pipeline system supplied from a compressor plant and PSA systems shall be tested for carbon monoxide, although it would not normally be necessary to test more than five terminal units.

The concentration of carbon monoxide shall not exceed 5 ppm v/v. This may be measured at up to five terminal units in each system using the appropriate test devices described in HTM 02-01 Part A, Appendix E.

20.22.5 Carbon dioxide

The most distant terminal unit on each branch of a medical/surgical air pipeline system supplied from a compressor or an oxygen concentrator plant must be tested for carbon dioxide.

The concentration of carbon dioxide shall not exceed 500 ppm v/v in medical air or 300 ppm v/v in oxygen from an oxygen concentrator plant.

Notes

Increasing or fluctuating carbon dioxide readings in air or PSA-generated oxygen can be an early

indication of dryer failure or poor compressor maintenance.

20.22.6 Sulphur dioxide
The most distant terminal units in medical/surgical air pipeline systems supplied from a compressor plant, and oxygen
terminal units supplied from a PSA plant, shall be tested for sulphur dioxide. (It will not normally be necessary to test more than five terminal units in a single system.)
The concentration shall not exceed 1 ppm v/v.

20.22.7 Oxides of nitrogen (NO and NO_2) _
The most distant terminal units in medical/surgical air pipeline systems supplied from a compressor plant, and oxygen terminal units supplied from a PSA plant, must be tested for oxides of nitrogen. (It will not normally be necessary to test more than five terminal units in a single system.)
The concentration should not exceed 2 ppm v/v.

20.22.8 Nitrogen
Oxygen-free nitrogen is used as the inert gas shield, and all terminal units of all gas systems shall be tested to ensure that
the systems have been adequately purged.

For oxygen systems and entonox, an oxygen analyser shall be used to ensure that the oxygen concentration is not less than that given in HTM 02-01 Part A, Table 30.

For nitrous oxide systems, an instrument based on thermal conductivity, or an infrared meter, shall be used to check that the system has been adequately purged at every terminal unit.

If a thermal conductivity meter is used, it shall be necessary to prove absence of carbon dioxide (which could have been used inadvertently as a shield gas) by the use of a chemical reagent tube.

20.22.9 Pipeline Odour/Taste
An odour test shall be performed because it incorporates, qualitatively, many impurity checks, as several contaminants are detectable by odour.

This test shall be carried out as the final test with the working gases, except for nitrous oxide, and entonox which should not be inhaled.
The odour threshold of particulate matter is approximately 0.3 mg/m^3.

20.22.10 Gas Identification
The identity of the gas shall be tested at terminal units on medical gas pipeline systems. This shall include all new
terminal units
All systems must have been filled with the specific gas in accordance with HTM 02-01, Part A, paragraph 15.100. The composition of all compressed gases shall be positively identified. This can be accomplished using an oxygen
analyser for oxygen, nitrous oxide/oxygen and air, and a thermal conductivity or infrared meter for nitrous oxide.

When checking the identity of nitrous oxide and entonox, the gas shall be discharged in a manner that minimises pollution and personnel exposure.

When testing pipelines for heliox , an initial test shall be carried out with nitrogen connected after completing the particulate test.
An oxygen analyser shall be used and all terminal units tested. After a zero reading is achieved, product cylinders shall be connected and the system purged.

A second test shall be performed with an oxygen analyser; the oxygen content shall be as in Table 31.

20.22.11 Test Results
The test results for quality and gas identity shall be recorded on Form E16.

20.23 AGS Disposal Systems

20.23.1 Performance Tests

All equipment shall be tested to ensure that it performs satisfactorily during continuous operation under full load for one hour.

All electrically powered equipment shall be tested as follows:

• check for correct rotation;

• check the current through the powered device at full load.

The disposal system shall be tested to ensure that it meets the requirements set out in the table below, with the number of terminal units for which it has been designed in use.

	Disposal system standard			
	Pressure drop		**Flow rate**	
	BS 6834:1987	**ISO DIS 7396-2: 2005**	**BS 6834: 1987**	**ISO DIS 7396-2:2005**
Maximum	1 kPa	1 kPa	130 L/min	80 L/min
Minimum	4 kPa	2 kPa	80 L/min	50 L/min
Maximum static pressur	20 kPa (–ve)	15 kPa (–ve)	This check is made before performing the flow tests	

The test shall be carried out as described in Appendix K of BS 6834:1987. The test device shall be inserted into each terminal unit in turn and checked for pressure at flows of 80 L/min and 130 L/min for BS systems, and 50 L/min and
80 L/min for ISO systems. Adjustment shall then be made if necessary.

The test device and a number of metered leaks shall then be inserted into the system to replicate the design flow. The measurements above are shall be repeated. If the test results are satisfactory, the test device shall be removed and substituted by a metered leak.

AGSS terminal units shall be checked for correct mechanical operation and that the check valve operates satisfactorily.

20.24 Requirements Before a Medical Gas Pipeline System is Taken into Use

20.24.1 General

Before a system is used, the appropriate persons shall certify in writing that the tests and procedures required in this
specification have been completed, and that all systems comply with the requirements.

This shall include certification that all drawings and manuals required by the contract have been supplied and as-fitted drawings are correct (see Form E17).

All certificates shall be dated and signed by the appropriate witnesses, by the Project Engineer and by the representative of the contractor.

20.24.2 Removal of Construction Labels

When all tests have been completed satisfactorily, the “Danger – do not use” labels affixed to terminal units shall be
removed on the authority of, Hospital Management.

1. MGPS Carcas Test

FORM E1

Leakage Test, Labelling and Marking, Sleeving and Supports

This is to certify that a Leakage test in accordance with HTM 02-01, Part A, paragraphs 15.49–15.51 was carried out on the piped system on this scheme and that during the test, a pressure, as shown in column 2 below, was held as follows.

A certified gauge number ---------- was used.

Section tested	Test pressure (kPa)	Hours on test	Pressure drop (kPa)	Pressure loss (kPa/h)	Pass/Fail <0.2/2h (400 kPa systems) <0.5/2h (700 kPa

For the purpose of carrying out this test, the following links have been made:
….....
.....
.....
This is to certify that the above tests have been carried out and that the following links have been removed:
….....
.....
.....

Contractor's Representative
Designation….....Sign ….....Date ….....

..... Name ….....

Project Engineer
Designation ….....Sign….....Date ….....

. Name ….....

Cross-Connection Test

This is to certify that a Cross-Connection test in accordance with HTM 02-01, Part A, paragraphs 15.52–15.55 was carried out on the following medical gas pipeline systems:

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

2. MGPS Total System Tests

FORM E3

Leakage Test from Total Compressed Gas System

This is to certify that a Leakage test in accordance with HTM 02-01, Part A, paragraphs 15.59–15.60 was carried out on
the piped system on this scheme and that during the test, a pressure of ……kPa was held for …….. hours with a pressure drop of…….kPa.

Section tested	Test pressure (kPa)	Hours on test	Pressure drop (kPa)	Pressure loss (kPa/h)	Pass/Fail <0.2/2h (400 kPa systems) <0.5/2h (700 kPa systems)

Contractor's Representative
Status .....Sign .....Date .....

Name .....

..... Project Engineer

Designation .....Sign .....Date .....

Name .....

Witnessed on behalf of .....
By .....

Designation .....

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

Leakage into Total Vacuum System Test

This is to certify that a Leakage test in accordance with HTM 02-01, Part A, paragraph 15.61 was carried out on the
piped vacuum system at a system pressure of……,kPa.

The pressure increase after 1 hour was ……..kPa (max 10 kPa)

Contractor's Representative

Designation ….....

Sign ….....Date ….....

.....

Name ….....

.....

Project Engineer

Designation ….....

..... Sign….....

Date ….....

.....

Name ….....
.....

Witnessed on behalf

of ….....

.....

By ….....

Designation ….....

Sign ….....Date ….....
.....

FORM E5

Area Valve Service Units – Closure and Zoning Tests

This is to certify that Closure and Zoning of the AVSUs was tested in accordance with HTM 02-01, Part A, paragraphs
15.63–15.68 on the pipeline system as follows:

AVSU No.	Test Pressure (kPa)	Downstream/upstream Change after 15 mins (kPa)	Terminal units Controlled (Total No.)	Terminal unit labelling

Contractor's Representative
Designation …..... Sign….....

Date ….....

Name ….....

..... Project Engineer
Designation …..... Signed ….....

Date ….....

Name ….....

Witnessed on behalf

of ….....

By ….....

Designation ….....Sign….....Date ….....

Cross-Connection Test

This is to certify that a Cross-Connection test in accordance with HTM 02-01, Part A, paragraphs 15.70–15.74 was
carried out on the following medical gas pipeline systems:
.....
.....
.....

FORM E7

Functional Tests of Terminal Units

(in accordance with the contract specification and HTM 02-01, Part A, paragraphs 15.77–15.78)

System.....

flow ..... L/min ……..

Specified pressure drop ..... kPa

Terminal Unit No.	Room No.	Specified flow achieved YES/NO	Specified pressure drop achieved YES/NO	Mechanical function	Gas specificity

Contractor's Representative
Designation.....……Sign…… ….....Date .....

Name .....

..... Project Engineer
Designation ..... Sign.....Date .....

Name .....Witnessed on behalf of .....

By .....

Designation.....Sign..... Date .....

Functional Tests NIST Connectors

(in accordance with the contract specification and HTM 02-01, Part A, paragraphs 15.80–15.81)

System .....

NIST Gas	Location or Identificatio	Room No.	Gas specificity PASS/FAIL	Self sealing ADEQUATE/INADEQUATE

Contractor's Representative
Designation.....

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

Name.....

Project Engineer
Designation..... Sign…….....Date .....

Name .....

Witnessed on behalf

of .....

By .....

Designation.....Sign..... Date .....

FORM E9

Design Flow Performance

(in accordance with HTM 02-01, Part A, paragraphs 15.83–

15.84) System gas .....

System design flow ..... (L/min)

Total number of terminal units in system at test flows						
40 l/min	80 l/min	100 l/min	275 l/min	350 l/min	Total flow l/min	Single point test flows

Contractor's Representative

Designation.....

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

Name .....

.....

Project Engineer
Designation..... Sign…….....Date .....

Name .....

Witnessed on behalf

of .....

By .....

Designation.....Sign..... Date .....

Functional Tests of Supply Systems

This is to certify that the following sources of supply have been tested in accordance with HTM 02-01, Part A, paragraph 15.85 and the attached sheets and found to comply with the specification.

Source of Supply	Contractor's Representative Name/ Sign	Project Engineer Name/ Sign
Manifold		
Manifold		
Manifold		
Liquid Oxygen Plant		
Air Compressor		
Vacuum Plant		
Oxygen Concentrator		

Witnessed on behalf

of .....

By .....

Designation.....Sign..... Date .....

FORM E11

Pressure Safety Valves

The pressure safety valves fitted to the pipeline systems have been inspected together with their certification and are in
accordance with the contract specification and HTM 02-01, Part A, paragraphs 15.86–15.88.

Location	Valve Number	Position	Pipeline distribution pressure (A)	Certified discharge pressure (B)	B/A (%)

If certificates are not provided, do not sign. Contractor's

Representative

Designation..... Sign.....Date .....

Name .....

Project Engineer
Designation..... Sign…….....Date .....

Name .....

Witnessed on behalf

of .....

By .....

Designation.....Sign..... Date .....

Warning Systems

This is to certify that Warning Systems on the following medical gas pipeline systems have been tested in accordance with HTM 02-01, Part A, paragraphs 15.89–15.91 as follows:

System	O_2	N_2O	N_2O/O_2	MA-4	SA-7	MVAC
Specified warning pressure						
Observed warning pressure						
Warning given						
Return to normal						
Marking						
All functions on all stations						
Stand-by power						

Contractor's Representative

Name .....

Designation..... Sign.....Date .....

Project Engineer
Name.....

Designation..... Sign…….....Date .....

Witnessed on behalf of .....

By.....

Designation.....Sign..... Date .....

Verification of Drawings

This is to certify that in accordance with HTM 02-01, Part A, paragraph 15.92, the as-fitted drawings of the following
systems record all variations from the contract drawings:

System	Drawing No.	Contractor's representative Name/Designation	Project Engineer Name/Designation	Date
O_2				
N_2O				
N_2O/O_2				
MA-4				
SA-7				
MVAC				
AGS				
He/O_2				

Witnessed on behalf of .....

By .....

Designation .....Sign..... Date .....

FORM E14

Purging and Filling

This is to certify that medical gas systems have been purged and filled with **medical air/O_2 free nitrogen/the working gases** (delete as appropriate) in accordance with HTM 02-01, Part A, paragraphs 15.93–15.99 and/or 15.100–15.101 as follows:

Action	O_2	N_2O	N_2O/O_2	MA-4	SA-7	MVAC	He/O_2	CO_2
Special connectors/cylinders removed from site								
Filling								
Purging all terminal units								
Venting								
Tick if particulate tests have been performed and specifications met.								
Tick if odour tests have been performed and specifications met								

Contractor's Representative

Name.....

Designation..... Sign.....Date .....

Project Engineer
Name.....

Designation..... Sign…….....Date .....

Witnessed on behalf of .....

By .....

Designation.....Sign.....Date.....

Quality Specifications for Medical Gas Piepline Tests (Working Gases)

This is to certify that medical gas systems have been tested in accordance with HTM 02-01, Part A, paragraphs 15.109–15.162 as follows:

Gas and source	Particulates	Oil	Water	CO	CO_2	NO and NO_2	SO_2	Poly- test tube (optional)	Odour	Tick when parameters are met
Oxygen from PSA plant	Free from visible particles in a *75 l* sample	≤0.1 mg/m³	≤67 vpm (≤0.05 mg/l, atmospheric dew point of -46ºC)	≤5 mg/m³ ≤5 ppm v/v	≤300 ppm v/v	≤2 ppm v/v	≤1 ppm v/v	No discoloration	None	
N_2O	Free from visible particles in a *75 l* sample	-	≤67 vpm (≤0.05 mg/l, atmospheric dew point of -46ºC)	-	-	-	-	No discoloration	SAFETY Not performed	
N_2O/O_2	Free from visible particles in a *75 l* sample	-	≤67 vpm (≤0.05 mg/l, atmospheric dew point of -46ºC)	-	-	-	-	No discoloration	SAFETY Not performed	
MA-4/SA-7	Free from visible particles in a *75 l* sample (for MA-4) and 175 *l* sample (for SA-7)	≤0.1 mg/m³	≤67 vpm (≤0.05 mg/l, atmospheric dew point of -46ºC)	≤5 mg/m³ ≤5 ppm v/v	≤900 ppm v/v ≤500 ppm v/v	≤2 ppm v/v	≤1 ppm v/v	No discoloration	None	
Dental compressed air	Free from visible particles in a *75 l* sample	≤0.1 mg/m³	≤1020 vpm (≤0.78 mg/l, atmospheric dew point of -20ºC)	≤5 mg/m³ ≤5 ppm v/v	≤900 ppm v/v ≤500 ppm v/v	≤2 ppm v/v	≤1 ppm v/v	No discoloration	None	
Synthetic air	Free from visible particles in a *75 l* sample	-	≤67 vpm (≤0.05 mg/l, atmospheric dew point of -46ºC)	-	-	-	-	No discoloration	None	
Oxygen from bulk liquid or cylinders	Free from visible particles in a *75 l* sample	-	≤67 vpm (≤0.05 mg/l, atmospheric dew point of -46ºC)	-	-	-	-	No discoloration	None	
He/ O_2 O_2 < 30%	Free from visible particles in a *75 l* sample	-	≤67 vpm (≤0.05 mg/l, atmospheric dew point of -46ºC)	-	-	-	-	No discoloration	None	

Contractor's Representative
Name .....Designation.....
Sign.....Date .....
Project Engineer
Name .....Designation..... Sign…….....Date
Witnessed on behalf of By .....

Designation.....Sign..... Date .....

FORM E16

3.14. Identification of Medical Gas Pipeline Working Gases

This is to certify that medical gas systems have been tested in accordance with HTM 02-01, Part A, paragraphs 15.163–
15.167 and the results are as follows (insert values for gases – tick for vacuum):

Gas and source	Paramagnetic oxygen analyser reading	Thermal conductivity/ infra- red instrument reading	Carbon dioxide detector tube indication If TC meter used	Vacuum probe
O_2 from liquid or cylinders				
O_2 from concentrator				
N_2O				
N_2O/O_2				
MA-4 /SA-7				
Synthetic air				
MVAC				
Nitrogen shield gas				
He/O_2 Test 1 Test 2				

Contractor's Representative
Name .....

Designation.....

Sign.....Date ..... Project Engineer
Name.....

Designation..... Sign…….....Date

Witnessed on behalf of.

By .....

Designation.....Sign..... Date .....

FORM E

Certificate of Completion

Hospital: .....

Medical Gas Installations – Location

.....

This is to confirm that the following tests have been performed:

1. Mechanical functions tests

1. Quality and gas identity tests
2. in accordance with Health Technical Memorandum 02-01 Part A, Chapter 15, and that the results are satisfactory.
3.
4.
5. Sign ..... Quality Controller (MGPS)
6.
7. Sign ..... Contractor's Representative (MGPS)
8.
9. Signed ..... Client Representative
10.
11. Witnessed .....
    Designation: ……. Date.....
12. We, MGPS Main Contractor accept responsibility for the systems above and undertake to carry out any future work in accordance with the recommendations of Health Technical Memorandum 02-01 and the permit-to-work procedures.

    Sign.....Date……

PARTICULAR SPECIFICATION

FOR

MEDICAL WASTE INCINERATOR

PARTICULAR SPECIFICATIONS FOR INCINERATOR

A. SCOPE OF SUB-CONTRACT WORKS

This section specifies the general requirements and scope for plant, equipment and materials forming part of the medical waste incinerator

The scope of works specified in the contract shall include:

i. Supply, installation and commissioning of modern medical waste Incinerator rated at 125Kg/hr as provided in the technical specifications and are complaint with the existing Nema & International environmental standards.

ii) Construction of the incinerator housing shed designed to accommodate the incinerator, day service tank and
temporary waste storage area.

iii) Construction of the ash pit as per the NEMA standards.

iv) Provision of essential support services including water, 3 phase power supply and associated pipe works

Waste type: Mixed type 0,1,2,3 & 4 Hospital/Clinical bio hazard waste

Waste density: 125 to 350Kg/M³ Waste CV: 4000 KCAL/Kg
Moisture content: 10-25%
Estimated ash residue: 5-10%
Nominal capacity: 125Kg/hour batch load
Secondary chamber: 2second@ 850ºC (NEMA stipulates 1 sec)
Environmental: NEMA ACT (EMCA) 1999(Kenya) Clean Air Act 1999BS3316 1987

Equipment

Incinerator should comprise: -

a) Manual Loading door

b) Horizontal solid hearth, refractory lined primary combustion chamber, load/ash removal door

c) 1 off diesel-fired ignition burner –temperature controlled
d) 1 off combustion air supply fan and distribution system, automatic control
e) High capacity secondary combustion chamber2second@ >850ºC
f) 1 off diesel-fired after burner –temperature controlled
g) Control panel –automatic operation
h) Temperature indication primary and secondary chambers 0-1200ºC
i) Stainless Steel chimney to a height of 10M

Terms and Conditions

Subject to our terms and conditions (available upon request)

Warranties/Guarantees

The guarantee period should be at least 18 months ex works or 12 months from commissioning whichever is the sooner.

Installation Equipment/Services necessary for installation Carnage for off-loading and erecting the chimney
Diesel oil storage tank

Fuel and connection
Electrical connection to control panel 220-440V –50/60Hz, 1/3phaseFlat base

Operating Period
Anticipated daily operating period 8 hours Maximum operating period 12 hours

Primary Combustion Chamber

The primary combustion chamber is the main structure of the incinerator, fabricated from mild steel plate and stiffened with rolled steel sections. It is carried from the floor level on a substantial steel support frame.

Internally the shell is lined with calcium silicate insulation and a hot face combination of super duty brickwork or high strength constable.

The primary chamber is provided with flanges and fittings for mounting.
-1Diesel fired Ignition Burner
-1 set combustion air distribution pipe work

` -1Observation port with protective glass -1Thermocouple

-1Flue gas outlet to secondary combustion chamber

The chamber will be refractory lined to the following standard:
Hearth and lower section of chamber walls

1.Hot face material Super duty firebrick

Limiting continuous service limit 1500°C

Thickness 100mm

Thermal conductivity 1.3W/mk

2.Insulation Calcium silicate

Limiting continuous service limit 1000°C

Thickness 25mm

Thermal conductivity 0.095 W/mk

Insulation

3. Burner Quarls Ultra high alumina ceramic bonded moldable.

Limiting service temperature 1600°C

Thermal conductivity 1.62 W/mk

Secondary Chamber

The secondary chamber is designed to minimize and destroy the partial products of combustion, such as carbon monoxide and the containment combustion products such as nitrogen oxides, volatile organic compounds and particulate.

The secondary chamber is mounted directly above the primary chamber and incorporates several design criteria that ensure efficient combustion. The criteria are heat, oxygen, turbulence and residence.

To ensure the products of combustion are sufficiently heated and oxygenated to complete combustion in the gaseous phase, both heat and oxygen in the form of air are added to the secondary chamber. Heat input from the afterburner is

controlled directly by the control system, such that in the event of temperatures in excess of 950°C ~ 1,000°C being transferred from the primary chamber the afterburner will switch off to conserve fuel.

During low temperatures i.e. less than 900°C, the afterburner will be signaled to fire at high rate to maintain combustion temperatures above 850°C. These operating temperatures are infinitely adjustable to promote higher operating temperatures where required. To ensure the combustion gases are subject to adequate oxidizing conditions, high-pressure air is introduced into the chamber via several jets. These air jets input turbulence into the gases and together with several internal baffles and changes of direction, ensure intimate contact between the combustion gases and the introduced heat/air.

Refractory Lining Hot face refractory

Material –Coarse-grained 50% alumina castable

Continuous service temperature 1600°C

Thickness 100mm

Thermal Conductivity 1.35 W/mk

Insulation Layer Material –Calcium Silicate Slab

Limiting continuous service temperature 1000°C

Thickness 25mm

Thermal Conductivity 0.09 W/mk

The insulation materials are supported by stainless steel anchors welded to the combustion chamber shell. The hot face refractory is cast onto the same anchors.

Burners

The plant is fitted with a single diesel fired packaged primary burner and a single secondary afterburner. The burners incorporate an individual air fan, ignition system, flame detector and control unit. They are designed to fire light oil having a viscosity of $6mm^2/s$ to preserve fuel and maintain the optimum combustion conditions the burners are temperature controlled. As waste in the primary chamber increases the chamber temperature, the burners will be signaled to switch off. As heat is released from combustion of waste and as the refractory lining becomes "soaked" with heat, the required heat input from the secondary burner will be progressively reduced. There are substantial changes in the required auxiliary heat input as the nature and feed rate of waste changes. The burners accommodate these changes by varying its output according to a series of temperature signals interpreted by the control equipment.

Combustion air System

Combustion air is delivered to strategic areas of the combustion chambers, via a centrifugal fan, distribution and air injection system .The combustion air fan driven by an electric motor is mounted on an air distribution manifold located on the incinerator. Galvanized ducts incorporating butterfly dampers, transport air from the combustion air fan, to plenum chambers in both the primary and secondary combustion zones. Air jets located within the plenum chambers distribute high velocity air into the process to ensure intimate contact of the air with the solid and gaseous waste. Accurate metering of the induced combustion air is carried out by adjustment of the butterfly dampers.

Control

The total installation will be policed by a time and temperature dedicated control system, housed within an incinerator mounted control cabinet. The control panel will incorporate visual display of both the primary and secondary temperatures and will provide status indication of the plant cycles. Within the control system design the incinerator shall be monitored for all aspects of control and self-correction of any out of limit parameter will take place. Automatic correction of plant conditions is constantly achieved by a variety of controllable functions.

Chimney

Incinerator mounted chimney having an overall height of 8metres from firing floor level and an internal bore of 350mm. The chimney is manufactured as stainless steel. External lifting lugs will be fitted to aid chimney erection. The chimney is designed to provide the necessary system under pressure.

Ignition Burners

Fully packaged oil type, complete with electric ignition and flame failure controls, wired with continuous running fan and complete with all valves, fan and motor.

No fitted: One

Maximum rating: 450kW/hour

Burner: arranged for on/off operation

Maximum consumption: 16 litres/hour

Average consumption: 5 litres/hourLoad door

Load Door
Full sized hinged door. The loading door would be arranged so that immediately the door is unclamped the blower fan and ignition burner would cut out.

Wiring

All items on the incinerator would be wired up to the incinerator mounted control panel. The wiring would be carried out in PVC sheathed cable run in steel conduits and trucking.

Pipe work

The unit will be completely piped and tested prior to dispatch. Each burner will incorporate individual filters and isolation valves.

Electrical Supply

The electrical equipment provided would be suitable for an electricity supply of 220volts, single phase and 50Hz.

Tools

One off 2.2metre long rake
Painting

All external metal parts would be given one coat of etch primer and finished with two coats of machine enamel.

Casing: Gloss paint finish

Doors: Matt black

Chimney: Heat resistant black

Operating and Maintenance Instructions

Two sets of operating and maintenance instructions/manuals should be provided

OPERATIONAL CYCLES

Pre-Heat Cycle

This cycle is selected either prior or during the removal of ash from the primary chamber. The object of this cycle is to raise the secondary chamber temperature prior to the ignition of waste in the primary chamber, to ensure the waste when ignited is immediately subject to temperatures in excess of 850°C. Therefore on selecting "PRE-HEAT" only the operation of the secondary burner will be available unit the secondary temperature is monitored above 850°C.

Burn Cycle

This cycle automatically initiated by the control system, once the PRE HEAT period has been proved by the control panel logic. When in BURN CYCLE, selection of primary ignition burner becomes available. During this period waste can be continually introduced into the primary chamber. A combination of timers and temperature controllers monitor, correct and stabilize the operational functions, to maximize throughput and minimize fuel usage. Periodically, as interlocked by the plant time and temperature conditions, the control system will indicate the availability of the next charge. Once all waste has been consumed the control system will cycle into a "BURN OUT" cycle.

Cool Down

This cycle is dedicated to ensuring the remaining waste is reduced to ash, and preparing the unit for de-dashing. When selected "COOL DOWN" disables the operation of the primary burner controlled by time and temperature, both combustion air and the secondary burner continue to operate to ensure complete burn out of the carbon residue in the waste. After a set period and subject to a sufficiently low temperatures being achieved the plant will automatically switch off.

PARTICULAR SPECIFICATION

FOR

MORTUARY COLD ROOM

PARTICULAR SPECIFICATIONS FOR MORTUARY COLD ROOMS

B. SCOPE OF SUB-CONTRACT WORKS

The works to be carried out comprises of the supply, delivery, installation, setting to work, testing and commissioning of all materials and equipment called for in this specification and/or shown in the contract drawings.

The sub-contractor shall include for all appurtenances and appliances not particularly called for in this specification or on the contract drawings but which are necessary for the completion and satisfactory functioning of the system.

No claim for extra payment shall be accepted from the contractors for non-compliance with the above requirements.

If in the opinion of the tenderer there exists difference between the specification and the contract drawings, the tenderer shall clarify the difference with the engineer before tendering.

The Works to be installed under the contract shall comply with the requirements for contract works under "GENERAL MECHANICAL SPECIFICATION".

C. Design Conditions

(a) Mortuary cold room temperatures -2 ± 1^0C
(b) Evaporator Temperatures -7 ± 2^0C
(c) Cool down three bodies in 6 hours

D. Installation

Installation of the mortuary body cold stores shall compromise of the following:
4No. cold chambers (4No.compartments) with Three (3No.) bodies each.
1No. cold chamber (3No.compartments) with Three (3No.) bodies each.
1No. cold chamber (2No.compartments) with Three (3No.) bodies each.

Each compartment shall have 1No. single hinged coldroom doors 3No. body racks with 3 No. Tiers and 3 No. stretchers

E. Condensing Units

The condensing unit shall be of such capacity to cope with evaporator cooling load while using R-134A refrigerant as the cooling media or other approved ozone friendly refrigerant under the specified conditions. The condensing units shall be air-cooled, hermetic with automatic capacity control for evaporator demand.

They shall be provided with suitable vibration mountings and initial oil charge in the compressor. The units shall be complete with compressor, electric motor, air-cooled condenser of non-ferrous construction, liquid receiver, all mounted on a common base. The units shall be as BITZER or other approved equivalent and shall be mounted as directed on site/compressor room.

It shall be the responsibility of the contractor to provide all the necessary anti-vibration mountings and mounting bolts.

If prefabricated refrigerated mortuary cabinets are used, then they shall be front loading mortuary cold cabinet with four tiers and four hatches. The cabinet to have one door per four vertical tiers and with labelling hatch in each tier. The chamber to be fabricated from stainless steel both internally and externally with a minimum of 100mm thick polyurethane insulation. It shall operate between 2 to 6 degrees centigrade inside the cold chambers. The package to be complete with digital controls panel, digital electronic thermostat, fan assisted evaporator, air cooled hermatic condensor unit, internal weather proof lights, insulated door, door locking system, stainless steel in-built racks, stainless steel stretchers, stainless steel body trays in each tier and to use R134A or any other non-ozone depleting refrigerant. The cabinet to have complete refrigeration components such as thermostats, thermometer, sight glass with colour coding, thermostatic expansion valve, solenoid valve, filter drier, low and high pressure cut-off switch. The condensor shall be placed on top of the cabinet. The unit to be as LEEC modular cabinets or equal and approved which meets the current European Standards of Refrigeration.

F. Cooling Units

Each coil unit shall consist of a cooling coil, air circulating fan and fan-guard, defrost electric heater element, and a thermostatic expansion valve. A timer unit shall be mounted in the control panel to both the de-frosting intervals and defrosting periods, both of which shall be variable.
The cooling coil unit shall adequate cooling capacity under the specified conditions, and shall be of the dry expansion type, and preferably of similar make as that of the condensing units.

The coil shall be manufactured from seamless copper tubing with aluminium fins mechanically bonded to the tubes.

A defrost heater element shall be fitted alongside the cooling coil. Electric defrosting shall occur daily by a time switch. The panel shall be interlocked such, that on energizing the heater, the compressor, condenser and evaporator fan shall be de-energized and only re-energized when the heater is switched off by a evaporator mounted thermostat. A manual overriding switch shall by-pass the timer switch.
The air-circulating fan shall be manufactured from rigid aluminium sheet and finished in white casing. A drip tray with 25mm diameter connections shall be incorporated in the base of the casing.

G. Refrigeration Plant.

Pipework shall be approved copper tubing and fitting and shall be properly fixed in conformity with 'TRANE REFRIGERATION MANUAL'. Good workmanship shall be required to ensure that all the connections are completely airtight. The suction line shall be insulated with at least 25mm thickness of Armaflex or other approved mate al, which shall not have insulating properties inferior to those of cork.

H. Refrigeration System Components

The system shall be provided with the following components all similar to or equal to those manufactured by DANFOSS

- Filter drier with silica gel charge
- 15mm diameter hard copper tubing for suction line
- 10mm ditto for liquid line
- Sight glass with moisture indicator
- Solenoid valve
- HP/LP cut out
- Suction & delivery gauges
- Room thermostat
- 100mm diameter surface mounted digital thermometer in degree Celsius
- Liquid receiver / blow out plug.

I. Control Panel and Controls

Each refrigeration system shall incorporate complete controls to ensure continuous system services. Such controls shall include protection against any possible motor overload and over-heat.
Each system shall be provided for with a purpose made control panel shall be fabricated from mild steel sheet of minimum SWG18 with a hinged door and then powder coated after manufacture. It shall be provided with an integral lock. It shall be complete with;

- Isolator
- Contactors
- Controlling thermostat with temp range from -10^{0}C to +30^{0}C
- 80mm dial thermometer with temp range from -10^{0}C to +30^{0}C
- Motor starters & current overload relays
- MCBs
- Phase failure relay with over and under voltage protection
- Timer switch for defrost control
- Push buttons for start and stop
- Audible and visual high temperature alarm with manual reset

The panel shall also have green light running indicators, red "door open" light and equipment circuit trip lights.
The running control shall be by an on/off thermostat energizing and de-energising respectively a solenoid valve on rise or fall in temperature in the cold room. The system shall then pump down and cut out the compression on low pressure. The compressor shall not start on a rise in suction pressure unless there is temperature change.

Electric defrosting shall occur daily by a time switch. The panel shall be interlocked such, that on energizing the heater,

the compressor, condenser and evaporator fan shall be de-energized and only re-energized when the heater is switched off by a evaporator mounted thermostat. A manual overriding switch shall by-pass the timer switch.

J. E**lectrical installation**

The electrical sub-contractor shall be responsible for providing power to the control panel and for providing a fused local Isolator and connecting power to it. The cold room sub-contractor shall be responsible for the final connections to the above equipment, all control wiring and for all wiring within the control panel.

K. Internal electrical fittings

The sub-contractor shall supply and install a bulkhead vapor sealed 60W incandescent light fittings in the cold room and a suitable door operated switch. Upon opening the door, the door switch shall put "on" the light and at the same time put "off" the air circulating fan.

L. Ductwork

Ductwork shall be constructed from 20SWG galvanized mild steel sheet, manufactured to BS 2989. The construction shall conform to the specification for sheet metal ductwork DW/121 for low pressure, low velocity systems.

The duct shall be stiffened as necessary with 25mm x 25mm x3mm thick mild steel angle sections and supported adequately at intervals not exceeding 1500mm.

Ductwork shall be insulated externally with 25mm thick polystyrene/polyurethane insulation or other approved equivalent and shall be finished with 2 coats of bitumastic paint and cladded with a galvanised mild steel 22SWG sheet.

M. Grilles

Supply air and extract grilles shall be similar or equal to non-vision grilles type "z" as manufacture by Myson Group Ltd. They shall be manufactured from high-grade extruded aluminium bars with alum silver grey finish and 32mm beveled edges fixing flanges.

N. Insulation and final wall finishes

The insulating material shall be polyurethane (or equal and approved) with a conductivity of approximately 0.035 W/M^0C and a density of approx. $25Kg/m^3$ for the walls and ceiling and $40Kgs/m^3$ for the floor. It shall be applied in two layers each 50 mm thick with the second layer breaking joints with the first layer.

Care must be taken to avoid breaking the vapor seal when fixing the insulation. Two more coats of vapour seal shall then be applied after application of insulation

The insulation shall be fixed by means of bitumen adhesive and wooden fixing pegs. Hard wood battens shall be provided at regular intervals between insulation to facilitate fixing of chicken wire mesh all over the insulation. The wall shall then be finished with 1mm aluminium sheet.

O. Insulated door

Each cold room shall be provided with a door and which shall open clear outwards as shown in the contract drawings. The door shall be double rebated insulated 100mm door with reinforced internal structure and each door shall have "wipe clean" identity plate or drop in label holder.

Each door shall be of the double rebate type, constructed from well seasoned timber and polyurethane foam injected into the void between the outer timbers. The internal and external finishes shall be matched with corresponding walls of the cold rooms.

Door fasteners shall include spring and roller bolt type mechanism. The locking devices shall provide for the doors to be opened from both outside and inside the cold stores.

Each door shall be complete with enough gaskets to ensure an air-tight seal. The doorjambs and silts shall be metal clad for protection and door fittings shall be chrome plated and to be complete with light sensor to switch off internal lighting when the door is closed whilst switching on the compressor and vice versa.

P. Purging and charging the system

After completion of erection, the sub-contractor shall purge the system to get off air, moisture etc. and in order to purge effectively, the system shall be evacuated by drawing of vacuum with a vacuum pump and then feeding in a charge of refrigerant which shall then be evacuated again and so on. The compressor of the system shall be set at 2^0C – 60^OC.

Q. Mortuary Racks

The rack shall be made from 38mm diameter stainless steel tubing with 25mm diameter pin welded to the shaft.

The shaft to be made from 38mm diameter stainless steel and to have 15mm radius groove all round to accommodate the stretcher and to be complete with ball bearings.

R. Stretchers

The metal stretchers of overall dimensions 2070x660mm each made from 1.6mm grade 304 stainless steel sheet, bent, formed, stiffened and welded to 25mm diameter stainless steel tube welded on the lower side of the stretcher and along the lengths of the stretcher.

S. Hydraulic Stacking Trolley

The trolley shall be hand operated hydraulic, scissor action, mortuary trolley robustly constructed from 40mm heavy duty, square section and welded steel tube. It shall be simple to use and built to withstand continual and heavy use. It shall have full width, free running PVC coated rollers and easy clean surfaces. It shall have the following;

- Finished in metallic powder coated paint, easy clean surfaces
- Full width, free running PVC coated rollers, easy clean surfaces
- 4No, 152mm braked castors, protective front bumpers
- Reliable hydraulic system with dual action hydraulic hand pump and ram
- End handled with tray retaining mechanism
- Rated to 180kg weight
- Minimum lift height of 390mm to 1780mm
- Dimensions: 655mm (W) x 2070mm (L) x 1070 (H) handle
- Compatible with refrigeration cabinets and racks

T. Testing and commissioning

Before insulation of the suction pipe the refrigeration system shall be tested for pressure and leaks using the combined pressure and leaks testing method. The refrigeration system shall be charged with R131a refrigerant and entire system raised to test pressure using nitrogen or other inert gas. The test pressure shall be twice the working pressure for the system.

Leaks shall be checked using soap bubble followed by using of electronic leak detector. After system is proved leak proof, it shall be maintained under test pressure for 24 hours. If at the end of this time the gauge pressure has fallen, the complete system shall be re-tested. After the successful completion of the test, the system shall be evacuated using vacuum for 24 hours. If there is loss of vacuum the system shall be dehydrated again and left under vacuum for a further 24 hrs until the system is effectively dehydrated.

After this the system shall be charged with the correct type and quantity of the refrigerant. The system shall then be set to work and adjusted to ensure that it operates correctly and design conditions are archived. It shall be left to operate for 72 Hrs and room temperatures recorded for this period using an automatic room temperature sensor/recorder.

The compressor shall be provided with identification plates stating the type of refrigerant used and the quantity required for the system.

SECTION I - CONTRACT FORMS

FORM No. 1 - NOTIFICATION OF INTENTION TO AWARD

FORM No. 2 - NOTIFICATION OF AWARD - LETTER OF

ACCEPTANCE FORM No. 3 - CONTRACT AGREEMENT

FORM No. 4 - PERFORMANCE SECURITY [Option 1 - Unconditional Demand Bank Guarantee]

FORM No. 5- PERFORMANCE SECURITY [Option 2–

Performance Bond]

FORM No. 6 - ADVANCE PAYMENT SECURITY

FORM No. 7 - RETENTION MONEY SECURITY

FORM No 1: NOTIFICATION OF INTENTION TOAWARD OF CONTRACT

This Notification of Award shall be sent to each Tenderer that submitted a Tender and was not successful. Send this Notification to the Tenderer's Authorized Representative named in the Tender Information Form on the format below.

FORMAT

1. For the attention of Tenderer's Authorized Representative

   i) Name: *[insert Authorized Representative's name]*

   ii) Address: *[insert Authorized Representative's Address]*

   iii) Telephone: *[insert Authorized Representative's telephone/fax numbers]*

   iv) Email Address: *[insert Authorized Representative's email address]*

   [IMPORTANT: insert the date that this Notification is transmitted to Tenderers. The Notification must be sent to all Tenderers simultaneously. This means on the same date and as close to the same time as possible.]

2. Date of transmission: [*email*] on [*date*] (local time)

   This Notification is sent by (*Name and designation*) _____

3. Notification of Award

   i) Procuring Entity: *[insert the name of the ProcuringEntity]*

   ii) Project: *[insert name ofproject]*

   iii) Contract title: *[insert the name of thecontract]*

   iv) ITT No: *[insert ITT reference number from ProcurementPlan]*

   This Notification of Intention to Award (Notification) notifies you of our decision to award the above contract. The transmission of this Notification begins the Standstill Period. During the Standstill Period, you may:

4. Request a debriefing in relation to the evaluation of your tender by submitting a Procurement-related Complaint in relation to the decision to award the contracts.

   a) The successful tenderers

   i) Name of successful Tender_____

   ii) Address of the successful Tender _____

   iii) Contract price of the successful Tender Kenya Shillings _____

   (in words_____)

   b) The reasons for your tender being unsuccessful are as follows:

   c) OtherTenderers

   Names of all Tenderers that submitted a Tender. If the Tender's price was evaluated include the evaluated price as well as the Tender price as read out.

SNo	Name of Tender	Tender Price as read out	Tender's evaluated price (Note a)	One Reason Why Not Evaluated
1				
2				
3				
4				
5				

(Note a) State NE if not evaluated

5. How to request a debriefing

a) DEADLINE: The dead line to request a debriefing expires at midnight on [*insert date*] (*local time*).

b) You may request a debriefing in relation to the results of the evaluation of your Tender. If you decide to request a debriefing your written request must be made within three (5) Business Days of receipt of this Notification of Intention to Award.

c) Provide the contract name, reference number, name of the Tenderer, contact details; and address the request for debriefing as follows:
   i) Attention: [*insert full name of person, if applicable*]
   ii) Title/position: [*insert title/position*]
   iii) Agency: [*insert name of Procuring Entity*]
   iv) Email address: [*insert email address*]

d) If your request for a debriefing is received within the 3 Days deadline, we will provide the debriefing within five (3) Business Days of receip tof your request. If we are unable to provide the debriefing within this period, the Standstill Period shall be extended by five (3) Days after the date that the debriefing is provided. If this happens, we will notify you and confirm the date that the extended Standstill Period will end.

e) The debriefing may be in writing, by phone, video conference call or in person. We shall promptly advise you in writing how the debriefing will take place and confirm the date and time.

f) If the deadline to request a debriefing has expired, you may still request a debriefing. In this case, we will provide the debriefing as soon as practicable, and normally no later than fifteen (15) Days from the date of publication of the Contract Award Notice.

6. How to make a complaint?

a) Period: Procurement-related Complaint challenging the decision to award shall be submitted by midnight, [*insert date*] (local time).

b) Provide the contract name, reference number, name of the Tenderer, contact details; and address the Procurement-related Complaint as follows:
   i) Attention: [*insert full name of person, if applicable*]
   ii) Title/position: [*insert title/position*]
   iii) Agency: [*insert name of Procuring Entity*]
   iv) Email address: [*insert email address*]

c) At this point in the procurement process, you may submit a Procurement-related Complaint challenging the decision to award the contract. You do not need to have requested, or received, a debriefing before making this complaint. Your complaint must be submitted within the Standstill Period and received by us before the Standstill Period ends.

d) Further information: For more information refer to the Public Procurement and Disposals Act 2015 and its Regulations a vailable from the Website www.ppra.go.ke.

You should read these documents before preparing and submitting your complaint.

e) There are four essential requirements:
   i) You must be an 'interested party'. In this case, that means a Tenderer who submitted a Tender in this tendering process and is the recipient of a Notification of Intention to Award.
   ii) The complaint can only challenge the decision to award the contract.
   iii) You must submit the complaint within the period stated above.
   iv) You must include, in your complaint, all of the information required to support your complaint.

7. Standstill Period

i) DEADLINE: The Standstill Period is due to end at midnight on [*insert date*] (local time).
ii) The Standstill Period lasts ten (14) Days after the date of transmission of this Notification of Intention to Award.
iii) The Standstill Period may be extended as stated in paragraph Section 5(d) above.

If you have any questions regarding this Notification please do not hesitate to contact us. On behalf of the Procuring Entity:

Signature:_____

Name:_____

Title/position:_____

_____

Telephone:_____

FORM NO 2: LETTER OF AWARD

[letterhead paper of the Procuring Entity]

[date]

To: *[name and address of the Contractor]*

This is to notify you that your Tender dated *[date]* for execution of the *[name of the Contract and identification number, as given in the Contract Data]* for the Accepted Contract Amount *[amoun tin numbers and words] [name of currency]*, as corrected and modified in accordance with the Instructions to Tenderers, is here by accepted by…… *(name of Procuring Entity)*.

You are requested to furnish the Performance Security within in accordance with the Conditions of Contract, using, for that purpose, one of the Performance Security Forms included in Section VIII, Contract Forms, of the Tender Document.

Authorized Signature: .....

Name and Title of Signatory: .....

Name of Procuring Entity: .....

Attachment: *Contract Agreement:* .....

FORM NO 3: CONTRACTAGREEMENT

THIS AGREEMENT made the day of…… 20……., between……. ……...of……. (hereinafter "the Procuring Entity"), of the one part, and_____of _____(hereinafter "the Contractor"), of the other part:

WHEREAS the Procuring Entity desires that the Worksknownas_____should be executed by the Contractor, and has accepted a Tender by the Contractor for the execution and completion of these Worksand the remedying of any defects there in,

The Procuring Entity and the Contractor agree as follows:

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

2. The following documents shall be deemed to form and be read and construed as part of this Agreement. This Agreement shall prevail over all other Contract documents.

   a) theNotification of Award
   b) the Form of Tender
   c) the addenda Nos_____(if any)
   d) the Special Conditions of Contract
   e) the General Conditions of Contract;
   f) the Specifications
   g) the Drawings; and
   h) the completed Schedules and any other documents forming part of the contract.

3. In consideration of the payments to be made by the Procuring Entity to the Contractor as specified in this Agreement, the Contractor here by covenants with the Procuring Entity to execute the Works and to remedy defects therein in conformity in all respects with the provisions of the Contract.

4. The Procuring Entity here by covenants to pay the Contractor in consideration of the execution and completion of the Works and the remedying of defects there in, 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.

   INWITNESS where of the parties here to have caused this Agreement to be executed in accordance with the Laws of Kenya on the day, month and year specified above.

   Signeda nd sealed by_____(for the Procuring Entity)

   Signed and sealed by_____(for the Contractor).

FORM NO. 4 - PERFORMANCE SECURITY

[Option 1 - Unconditional Demand Bank Guarantee]

[Guarantor letterhead]

Beneficiary: *[insert name and Address of Procuring Entity]*

Date: _____*[Insert date of issue]*

Guarantor: *[Insert name and address of place of issue, unless indicated in the letterhead]*

1. We have been informedthat_____(hereinafter called "the Contractor") has entered into Contract No._____dated____with (*name of Procuring Entity*)_____(the Procuring Entity as the Beneficiary), for the execution of _____(hereinafter called "the Contract").

2. Furthermore, we understand that, according to the conditions of the Contract, a performance guarantee is required.

3. Atthe request of the Contractor, we as Guarantor, here by irrevocably undertake to pay the Beneficiary any sum or sums not exceeding in total an amount of (*in words*),[1] such sum being payable in the types and proportions of currencies in which the Contract Price is payable, upon receipt by us of the Beneficiary's complying demand supported by the Beneficiary's statement, whether in the demand it self or in a separate signed document accompanying or identifying the demand, stating that the Applicant is in breach of its obligation(s) under the Contract, without the Beneficiary needing to prove or to show grounds for your demand or the sum specified therein.

4. This guarantee shall expire, no later than the……...Day of……,2...…[2], and any demand for payment under it must be received by us at the office indicated above on or before that date.

5. The Guarantor agrees to a one-time extension of this guarantee for a period not to exceed *[six months] [one year],* inresponse tot he Beneficiary's written request for such extension, such request to be presented to the Guarantor before the expiry of the guarantee." .....

[Name of Authorized Official, signature(s) and seals/stamps]

Note: *All italicized text (including footnotes) is for use in preparing this form and shall be deleted from the final product.*

[1]*The Guarantor shall insert an amount representing the percentage of the Accepted Contract Amount specified in the Letter of Acceptance, less provisional sums, if any, and denominated either in the currency of the Contract or a freely convertible currency acceptable to the Beneficiary.*

[2]*Insert the date twenty-eight days after the expected completion date as described in GC Clause 11.9. The Procuring Entity should note that in the event of an extension of this date for completion of the Contract, the Procuring Entity would need to request an extension of this guarantee from the Guarantor. Such request must be in writing and must be made prior to the expiration date established in the guarantee.*

FORM No. 5- PERFORMANCE SECURITY

[Option 2– Performance Bond]

*[**Note:** Procuring Entities a readvised to use Performance Security – Unconditiona lDemand Bank Guarantee in stead of Performance Bond due to difficulties involved in calling Bond holder to action]*

[Guarantor letterhead or SWIFT identifier code]

Beneficiary: *[insertnameandAddressof*ProcuringEntity*]*

Date: _____*[Insert date of issue]*

PERFORMANCE BONDNo.:_____

Guarantor: *[Insert name and address of place of issue, unless indicated in the letterhead]*

1. By this Bond_____ as Principal (hereinafter called "the Contractor") and_____] as Surety (hereinafter called "the Surety"),are held and firmly bound unto_____] as Obligee (hereinafter called "the Procuring Entity") in the amount of_for the payment of which sum well and truly to be made in the types and proportions of currencies in which the Contract Price is payable, the Contractor and the Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

2. WHEREAS the Contractor has entered into a written Agreement with the Procuring Entity dated the _____day of_____,20_____, for_____in accordance with the documents, plans, specifications, and amendments there to, which to the extent here in provided for, are by reference made part here of and are here in after referred to as the Contract.

3. NOW, THEREFORE, the Condition of this Obligation is such that, if the Contractor shall promptly and faithfully perform the said Contract (including any amendments thereto), then this obligation shall be null and void; otherwise, it shall remain in full force and effect. Whenever the Contractor shall be, and declared by the Procuring Entity to be, in default under the Contract, the Procuring Entity having performed the Procuring Entity's obligations there under, the Surety may promptly remedy the default, or shall promptly:

   a) Complete the Contract in accordance with its terms and conditions; or

   b) Obtain a tender or tenders from qualified tenderers for submission to the Procuring Entity for completing the Contract in accordance with its terms and conditions, and upon determination by the Procuring Entity and the Surety of the lowest responsive Tenderers, arrange for a Contract between such Tenderer, and Procuring Entity and make a vailable as work progresses (even though there should be a default or a succession of defaults under the Contract or Contracts of completion arranged under this paragraph) sufficient funds to pay the cost of completion less the Balance of the Contract Price; but not exceeding, including other costs and damages for which the Surety may be liable hereunder, the amount set forth in the first paragraph hereof. The term "Balance of the Contract Price," as used in this paragraph, shall mean the total amount payable by Procuring Entity to Contractor under the Contract, less the amount properly paid by Procuring Entity to Contractor; or

   c) Pay the Procuring Entity the amount required by Procuring Entity to complete the Contract in accordance with its terms and conditions upto a total not exceeding the amount of this Bond.

4. The Surety shall not be liable for a greater sum than the specified penalty of this Bond.

5. Any suit under this Bond must be instituted before the expiration of one year from the date of the issuing of the Taking-Over Certificate. No right of action shall accrue on this Bond to or for the use of any person or corporation other than the Procuring Entity named here in or the heirs, executors, administrators, successors, and assigns of the Procuring Entity.

6. In testimony whereof, the Contractor has here unto set his hand and affixed his seal, and the Surety has caused these presents to be sealed with his corporate seal duly at tested by the signature of his legal representative, this day _____of_____20_____.

SIGNED ON_____on behalf of_____

By_____in the capacity of_____

Inthepresenceof_____

SIGNED ON_____on behalf of_____

By_____in the capacity of_____

Inthepresence of_____

FORM NO. 6 - ADVANCE PAYMENT SECURITY

[Demand Bank Guarantee]
[Guarantor letterhead]

Beneficiary:_____*[Insert name and Address of*

ProcuringEntity*]* **Date:**_____*[Insert date of issue]*

ADVANCE PAYMENT GUARANTEE No.: *[Insert guarantee reference number]*

Guarantor: [*Insert name and address of place of issue, unless indicated in the letterhead]*

1. We have been informed that_____(hereinafter called "the Contractor") has entered into Contract No._____*dated*_____with the Beneficiary, for the execution of_____ (hereinafter called" the Contract").

2. Furthermore, we understand that, according to the conditions of the Contract, an advance payment in the sum _____(*in words*_____) is to be made against an advance payment guarantee.

3. At the request of the Contractor, we as Guarantor, here by irrevocably undertake to pay the Beneficiary any sum or sums not exceeding in total an amount of_____(*in words*_____)[1] upon receipt by us of the Beneficiary's complying demand supported by the Beneficiary's statement, whether in the demand itself or in a separate signed document accompanying or identifying the demand, stating either that the Applicant:
   a) Has used the advance payment for purposes other than the costs of mobilization in respect of the Works; or
   b) Has failed to repay the advance payment in accordance with the Contract conditions, specifying the amount which the Applicant has failed to repay.

4. A demand under this guarantee may be presented as from the presentation to the Guarantor of a certificate from the Beneficiary's bank stating that the advance payment referred to above has been credited to the Contractor on its account number_____at_____.

5. The maximum amount of this guarantee shall be progressively reduced by the amount of the advance payment repaid by the Contractor as specified in copies of interim statements or payment certificates which shall be presented to us. This guarantee shall expire, at the latest, upon our receipt of a copy of the interim payment certificate indicating that ninety (90) percent of the Accepted Contract Amount, less provisional sums, has been certified for payment, oronthe_____dayof_____,2_,[2] whichever is earlier. Consequently, any demand for payment under this guarantee must be received by us at this office on or before that date.

6. The Guarantor agrees to a one-time extension of this guarantee for a period not to exceed *[six months] [one year]*, in response to the Beneficiary's written request for such extension, such request to be presented to the Guarantor before the expiry of the guarantee.

[Name of Authorized Official, signature(s) and seals/stamps]

Note: *All italicized text (including footnotes) is for use in preparing this form and shall be deleted from the final product.*

[1]*The Guarantor shall insert an amount representing the amount of the advance payment and denominated either in the currency of the advance paymen tas specified in the Contract.*

[2]*Insert the expected expiration date of the Time for Completion. The Procuring Entity should note that in the event of an extension of the time for completion of the Contract, the Procuring Entity would need to request an extension of this guarantee from the Guarantor. Such request must be in writing and must be made prior to the expiration date established in the guarantee.*

FORM NO. 7 – RETENTION MONEY SECURITY

[Demand Bank Guarantee]

[Guarantor letterhead]

Beneficiary:_____*[Insert name and Address of* Procuring Entity*]*

Date:_____*[Insert date of issue]*

Advance payment guarantee no. *[Insert guarantee reference number]*

Guarantor: *[Insert name and address of place of issue, unless indicated in the letterhead]*

1. We have been informed that_____*[insert name of Contractor, which in the case of a joint venture shall be the name of the joint venture]* (hereinafter called "the Contractor") has entered into Contract No. _____*[insert reference number of the contract]* dated_____with the Beneficiary, for the executionof_____*[insert name of contract and brief description of* Works*]* (hereinafter called "the Contract").

2. Furthermore, we understand that, according to the conditions of the Contract, the Beneficiary retains moneys upto the limit set forth in the Contract ("the Retention Money"), and that when the Taking-Over Certificate has been issued under the Contract and the first half of the Retention Money has been certified for payment, and payment of *[*insert the second half of the Retention Money] is to be made against a Retention Money guarantee.

3. At the request of the Contractor, we, as Guarantor, hereby irrevocably undertake to pay the Beneficiary any sum or sums not exceeding in total an amount of *[insert amount in figures]*____ (*[insert amount in words*_____*])*[1] upon receipt by us of the Beneficiary's complying demands upported by the Beneficiary's statement, whether in the demand itself or in a separate signed document accompanying or identifyingthedemand, stating that the Contractor is in breach of its obligation(s) under the Contract, without your needing to prove or showgrounds for your demand or the sum specified there in.

4. A demand under this guarantee may be presented as from the presentation to the Guarantor of a certificate from the Beneficiary's bank stating that the second half of the Retention Money as referred to above has been credited to the Contractor on its account number_at_____*[insert name and address ofApplicant's bank]*.

5. This guarantee shall expire no later than the.....Day of.....2.....[2], and any demand for payment under it must be received by us at the office indicated above on or before that date.

6. The Guarantor agrees to a one-time extension of this guarantee for a period not to exceed *[six months] [one year],* in response to the Beneficiary's written request for such extension, such request to be presented to the Guarantor before the expiry of the guarantee.

_____

[Name of Authorized Official, signature(s) and seals/stamps]

Note: *All italicized text (including footnotes) is for use in preparing this form and shall be deleted from the final product.*

[1]*The Guarantor shall insert an amount representing the amount of the second half of the Retention Money.*

[2]*Insert a date that is twenty-eight days after the expiry of retention period after the actua lcompletion date of the contract. The Procuring Entity should note that in the event of an extension of this date for completion of the Contract, the Procuring Entity would need to request an extension of this guarantee from the Guarantor. Such request must be in writing and must be made prior to the expiration date established in the guarante*