



REPUBLIC OF KENYA

MINISTRY OF HEALTH

**TENDER NAME: PROPOSED CONSTRUCTION OF ISOLATION
WARD AT ALUPE SUB-COUNTY HOSPITAL IN BUSIA**

MAIN WORKS TENDER DOCUMENTS

TENDER NUMBER: MOH/GESDeK/ONT/08/2021/2022

**W.P. ITEM NO. D108/WE/BSA/2021 JOB NO 10819E
VOLUME 1**

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TENDER CLOSING/OPENING DATE: 20TH JANUARY,2022 AT 11:00AM

PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL IN BUSIA

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PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL IN BUSIA

Prepared by: -

Quantities and Contracts Department,
State Department for Public Works,
P.O Box 30743-00100
NAIROBI.

The contract for the above-mentioned works entered into this day of 2021 by the undersigned refers to these Bills of Quantities and the Ministry of Works General Specification dated March, 1976 (together with any amendments issued thereto) shall be read and construed as part of the said contract.

..... CONTRACTOR
PRINCIPAL SECRETARY,
MINISTRY OF HEALTH,
P.O. BOX 30016-00100,
NAIROBI.

Date.....
Date.....

SPECIAL NOTES

- 1) The Contractor is required to check the numbers of the pages of these Bills of Quantities and should he find any missing or in duplicate or figures indistinct he must inform the Principal Secretary, State Department of Public Works, Ngong Road, Nairobi at once and have the same rectified.
- 2) Should the Contractor be in doubt about the precise meaning of any item or figure for any reason whatsoever, he must inform the Principal Secretary, Stated Department of Public Works, Ngong Road, Head Office in order that the correct meaning may be decided before the date for submission of tenders.
- 3) No liability will be admitted nor claim allowed in respect of errors in the Contractor's Tender due to mistakes in the Specifications which should have been rectified in the manner described above.

SIGNATURE PAGE AND NOTES

INVITATION TO TENDER

PROCURING ENTITY: MINISTRY OF HEALTH

CONTRACT NAME AND DESCRIPTION: PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL IN BUSIA

Ministry of Health invites sealed tenders for the **PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL IN BUSIA.**

1. Tendering will be conducted under Open National Tender method *using* a standardized tender document.
2. 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 *0800hrs to 1700 hours* at Supply Chain Management Office located at Afya House 5th Floor, Room 514. Tender documents may be viewed and/or downloaded from the Ministry of Health website www.health.go.ke.
4. A complete set of tender documents may be purchased or obtained by interested tenders upon payment of a non- refundable fees of Kshs. 1,000.00/= Banker's Cheque and payable to the address given below. Tender documents may be obtained electronically from the Ministry of Health Website www.health.go.ke and Public Procurement Information Portal www.tenders.go.ke. Tender documents obtained electronically will be free of charge.
5. Tender documents may be viewed and downloaded for free from the website www.tenders.go.ke or www.health.go.ke. Tenderers who download the tender document must forward their particulars immediately to the Email address Procurement@health.go.ke to facilitate any further clarification or addendum.
6. Tenders shall be quoted in Kenya Shillings and shall include all taxes. Tenders shall remain valid for 140 days from the date of opening of tenders.
7. All Tenders must be accompanied by a tender Security of **Kshs.500,000** from a reputable bank or insurance company approved by PPRA and that is valid for 150 days from the date of tender opening
8. The Tenderer **shall** chronologically and sequentially serialize all pages of the tender documents submitted in the numerical format of 1, 2, 3, 4, 5... including the cover page and all other pages and Tape Bound. (Spiral Binding and use of Spring or box files will not be accepted and will lead to automatic disqualification)
9. Completed tenders must be delivered to the address below on or before as indicated in the tender invitation. Electronic Tenders will not be permitted.
10. Late tenders will be rejected.
11. The addresses referred to above are:

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

Ministry of Health
P.O. Box:30016–00100
NAIROBI.

Afya House 5th Floor Room 514

B. Address for Submission of Tenders.

Ministry of Health
P.O. BOX:30016–00100
NAIROBI

Tender Box located at Afya House, 1st Floor

C. Address for Opening of Tenders.

GTZ Boardroom located at Afya House, Ground Floor on

20th January, 2022 At 11:00am

**HEAD, SUPPLY CHAIN MANAGEMENT SERVICES
FOR: PERMANENT SECRETARY**

PART1: TENDERING PROCEDURES

SECTION I - INSTRUCTIONS TO TENDERERS

A GENERAL PROVISIONS

1.0 Scope of tender

1.1 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.

1.2 Throughout this tendering document:

- a) The term “in writing” 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.

2.0 Fraud and corruption

2.1 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.

2.2 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.

2.3 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.

2.4 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 information that would in that respect give such firm any unfair competitive advantage over competing firms.

3.0 Eligible tenderers

3.1 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 agreement with the intent to enter into 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**.

- 3.2** 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.
- 3.3** 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 another tenderer;
 - b) Receives or has received any direct or indirect subsidy from another tenderer;
 - c) Has the same legal representative as another tenderer;
 - d) 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;
 - 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 conflict stemming from such relationship has been resolved in a manner acceptable to the Procuring Entity throughout the tendering process and execution of the Contract.
- 3.4** 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
- 3.5** 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.
- 3.6** A Tenderer may have the nationality of any country, subject to the restrictions pursuant to ITT3.9.

A Tenderer 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.

- 3.7** 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.
- 3.8** 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 enterprise to enable it compete with firms in the private sector on an equal basis.
- 3.9** 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) by an act of compliance with a decision of the United Nations Security Council taken under Chapter VII of the Charter of 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.
- 3.10** 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 *“SECTION II - EVALUATION AND QUALIFICATION CRITERIA, Item 9”*.
- 3.11** 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.
- 3.12** 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.

3.13 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.

4.0 Eligible goods, equipment, and services

4.1 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.

4.2 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.

5.0 Tenderer's responsibilities

5.1 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.

5.2 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 be at the tenderer's own expense.

5.3 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 against all 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.

5.4 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

6.0 Sections of Tender Document

- 6.1** 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 to Tenderers
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

- 6.2** 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. In case of any contradiction, documents obtained directly from the Procuring Entity shall prevail.

- 6.3** 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.

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

- 7.1** 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** prior 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.

- 7.2** 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.

7.3 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.

7.4 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.

7.5 The Procuring Entity shall also 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.

8.0 Amendment of Tender Documents

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

8.2 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.

8.3 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.

11.0 Documents Comprising the Tender

11.1 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 accordance with ITT20.3;
- f) **Qualifications**: documentary evidence in accordance with ITT 17 establishing the Tenderer's qualifications to perform 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**.

11.2 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 tender liable 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 without 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.

14.0 Tender Prices and Discounts

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

14.2 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.

14.3 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.

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

14.5 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.

14.6 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 same time.

14.7 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.

15.0 Currencies of Tender and Payment

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

15.2 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.

- 15.3** 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.

17.0 Documents Establishing the Eligibility and Qualifications of the Tenderer

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

- 17.2** 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.

- 17.3** If a margin of preference applies as specified in accordance with ITT 33.1, national 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.

- 17.4** 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.

- 17.5** 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.

- 17.6** The Tenderer shall provide further documentary proof, information or authorizations that the Procuring Entity may request in relation to ownership and control which information 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.

- 17.7** 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.

17.8 If a tenderer fails to submit the information required by these requirements, its tender will be rejected.

Similarly, if the Procuring 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.

17.9 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 be disqualified from the procurement process, ii) if the contract has been awarded to that tenderer, the contract award will be set as depending 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 have committed any criminal offence.

17.10 If a tenderer submits information pursuant to these requirements that is incomplete, inaccurate 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 tenderer.

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). A tender 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 request Tenderers to extend the period of validity of their Tenders. The request and the responses shall be made in 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 Tender security. A Tenderer granting the request shall not be required or permitted to modify its Tender.

19.0 Tender Security

19.1 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.

19.2 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.

19.3 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.

- 19.4** 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.
- 19.5** 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.
- 19.6** 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.
- 19.7** 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) sign the 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.
- 19.8** Where tender securing declaration is executed, the Procuring Entity shall recommend to the PPRA to debar the Tenderer from participating in public procurement as provided in the law.
- 19.9** 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.
- 19.10** A tenderer shall not issue a tender security to guarantee itself.

20.0 Format and Signing of Tender

- 20.1** 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 land the copies, the original shall prevail.
- 20.2** 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.
- 20.3** The original and all copies of the Tender shall be typed or written vin indelible ink and shall be signed by a person 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.

- 20.4** In case 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.
- 20.5** 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

21.0 Sealing and Marking of Tenders

- 21.1** 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 an 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.
- 21.2** 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.

22.0 Deadline for Submission of Tenders

- 22.1** Tenders must be received by the Procuring Entity at the address specified in the **TDS** and no later than the date and time also specified in the **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**.
- 22.2** The Procuring Entity may, at its discretion, extend the deadline for the submission of Tenders by amending the Tender Documents in accordance 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 submission of 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.

24.0 Withdrawal, Substitution, and Modification of Tenders

24.1 A Tenderer may withdraw, substitute, or modify its Tender after it has 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 withdrawal 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.

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

24.3 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 choose 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 authorization to request the modification and is read out at Tender opening.

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 Entity shall 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 Tendered and 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 Tenderers or any 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 Notwithstanding 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.

27.0 Clarification of Tenders

- 27.1 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 a response. Any clarification submitted by a tenderer that is not in response to a request by the Procuring Entity shall not 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.
- 27.2 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.

28.0 Deviations, Reservations, and Omissions

- 28.1 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.

29.0 Determination of Responsiveness

- 29.1 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.

- 29.2** A substantially responsive Tender is one that meets the requirements of the Tender document without material deviation, reservation, or omission. A material deviation, reservation, or omission is one that, if accepted, would:
- Affect in any substantial way the scope, quality, or performance of the Works specified in the Contract;
 - limit in any substantial way, inconsistent with the tender document, the Procuring Entity's rights or the tenderer's obligations under the proposed contract;
 - if rectified, would unfairly affect the competitive position of other tenderers presenting substantially responsive tenders.
- 29.3** 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.
- 29.4** 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.
- 30.0 Non-material Non-conformities**
- 30.1** Provided that a tender is substantially responsive, the Procuring Entity may waive any non-conformities in the tender.
- 30.2** 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.
- 30.3** 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.
- 31.0 Arithmetical Errors**
- 31.1** 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.
- 31.2** Provided that the Tender is substantially responsive, the Procuring Entity shall handle errors on the following basis: -
- 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.
 - Any errors in the submitted tender arising from a miscalculation of unit price, quantity, subtotal and total bid price shall be considered as a major deviation that affects the substance of the tender and shall lead to disqualification of the tender as non-responsive. and
 - if there is a discrepancy between words and figures, the amount in words shall prevail
- 31.3** 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 as specified in the TDS.

33.0 Margin of Preference and Reservations

- 33.1** 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.
- 33.2** A margin of preference shall not be allowed unless it is specified so in the **TDS**.
- 33.3** Contracts procured on basis of international competitive tendering shall not be subject to reservations exclusive to specific groups as provided in ITT 33.4.
- 33.4** Where it is intended to reserve a contract to a specific 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.

34.0 Nominated Subcontractors

- 34.1** 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. In case the Procuring Entity 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.
- 34.2** 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.
- 34.3** 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 Subcontractors proposed by the Tenderer may be added to the qualifications of the Tenderer.

35. Evaluation of Tenders

- 35.1** The Procuring 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 the Lowest Evaluated Tender in accordance with ITT 40.
- 35.2** To evaluate a Tender, the Procuring Entity shall consider the following:
- a) Price adjustment 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) price adjustment due to quantifiable non material non-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 considered in 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.

37.0 Abnormally low tenders and abnormally high tenders

Abnormally Low Tenders

37.1 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 Tenderers is compromised.

37.2 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 other requirements of the Tender document.

37.3 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

37.4 An abnormally 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.

37.5 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 accept 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.

37.6 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.

38.0 Unbalanced and/ or front-loaded tenders

38.1 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.

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

- a) accept the Tender;
- 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,

39.0 Qualifications of the tenderer

39.1 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.

39.2 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.

39.3 An affirmative determination shall be a prerequisite for award

39.4 A negative determination shall result in disqualification of the Tender, in which event the Procuring Entity shall proceed to 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.

40.0 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) Most responsive 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. In case 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.

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

Up on award 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;
- e) instruction son how to request a debriefing and/ or submit a complaint during the stand still period;

44.0 Stand still Period

44.1 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.

44.2 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.

45.0 Debriefing by The Procuring Entity

45.1 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.

45.2 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.

47.0 Signing of Contract

47.1 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.

47.2 Within fourteen (14) days of receipt of the Contract Agreement, the successful Tenderer shall sign, date, and return it to the Procuring Entity.

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

48.0 Performance Security

48.1 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.

48.2 Failure of the successful Tenderer to submit the above-mentioned Performance Security and other documents 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.

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

49.0 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**.

Section II - 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.

Reference to ITC Clause	PARTICULARS OF APPENDIX TO INSTRUCTIONS TO TENDERS
A. General	
ITT 1.1	The name of the contract is: PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL IN BUSIA The reference number of the contract is: TENDER NUMBER: MOH/GESDeK/ONT/08/2021/2022
ITT 2.3	The information made available on competing firms is as follows: Not required
ITT 2.4	The firms that provided consulting services for the contract being tendered for: Not Applicable
ITT 3.1	Maximum number of members in the Joint Venture (JV) shall be: 5
B. CONTENTS OF TENDER DOCUMENTS	
ITT 7.1	For clarification of Tender purposes, for obtaining further information and for purchasing tender documents, the Procuring Entity's address is: <ol style="list-style-type: none"> 1. Name of Procuring Entity: MINISTRY OF HEALTH 2. Physical address for hand Courier Delivery to an office or Tender Box (City, Street, Building Floor Number and Room): Tender Box located Afya House, 1st Floor 3. Postal Address: P.O. BOX 30016–00100, Nairobi 4. Insert Name, telephone number e-mail address of the officer to be contacted: Head, Supply Chain Management Services, Email: Procurement@health.go.ke
ITT 7.2	(A)Pre-Tender site visit shall not take place (B)Pre-Tender meeting shall not take place
ITT 7.3	Tenderer will submit any questions in writing to reach the procuring entity no later than 10 days before submission of the tenders.
ITT 7.5	The Procuring Entity's website where Minutes of the pre-Tender meeting and the pre-arranged pretender will be published is..... Shall not apply

C. Preparation of Tenders	
ITT 11.1(h)	<p>The Tenderer shall submit the following additional documents in its Tender:</p> <ol style="list-style-type: none"> 1. Copy of Certificate of Registration/Incorporation 2. Valid Tax Compliance Certificate 3. Copy of Registration Certificate with The National Construction Authority in The Stated Category 4. Certified Copy of Recent Cr12 Form – 12 Months 6. Written Power of Attorney, Certified Signed by Commissioner for Oaths 7. Any other documents specified in the evaluation criteria
ITT 13.1	Alternative Tenders shall not be considered.
ITT 13.2	Alternative times for completion shall not be <u>Permitted</u>
ITT 13.4	<p>Alternative technical solutions shall be permitted for the following parts of the Works:</p> <p>----- NOT APPLICABLE -----</p>
ITT 14.5	The prices quoted by the Tenderer Shall be <u>FIXED</u>
ITT 15.2 (a)	Foreign currency requirements not allowed.
ITT 18.1	The Tender validity period shall be 140 days .
ITT 18.2	<p>(a) The Number of days beyond the expiry of the initial tender validity period will be 30 days.</p> <p>(b) The Tender price shall be adjusted by the following percentages of the tender price:</p> <p>NOT APPLICABLE</p>
ITT 19.1	Tenderers shall provide a Tender Security. The type of Tender security shall be Bank Guarantee in the amount of Kenya shillings 500,000 of bid amount. (IN THE FORMAT PROVIDED)
ITT 20.1	In addition to the original of the Tender, the number of copies is: NONE
ITT 20.3	The written confirmation of authorization to sign on behalf of the Tenderer shall consist of: Power of Attorney in form of Sworn Affidavit, issued by the director if the signatory of the tender is not a director. It should be signed and certified by a commissioner of Oaths.

D. Submission and Opening of Tenders	
ITT 22.1	<p>(A) For <u>Tender submission purposes</u> only, the Procuring Entity's address is: The Tender documents shall be submitted to the following address</p> <p>Ministry of Health P.O. Box 30016–00100 Nairobi. Afya House, Cathedral Road, Nairobi</p> <p>Tenders shall not submit tenders electronically.</p>
ITT 25.1	<p>The Tender opening shall take place at the time and the address for Opening of Tenders provided below:</p> <p>VENUE: GTZ Boardroom located at Afya House Ground Floor DATE: 20th January,2022 TIME: 11:00 AM</p>
ITT 25.1	Submission of tenders ELECTRONICALLY SHALL NOT be allowed.
ITT 25.5	<p>The tenders shall be initialed by representatives of the Procuring Entity attending Tender opening.</p> <p>Initialization shall be conducted as follows:</p> <p>ALL MEMBERS OF TENDER OPENING COMMITTEE PRESENT SHALL INITIALIZE ALL BOQ PAGES INCLUDING THE SUMMARY PAGE, FORM OF TENDER AND ANY OTHER PAGE THAT THE COMMITTEE DEEMS NECESSARY</p>

E. Evaluation, and Comparison of Tenders	
ITT 33.2	Margin of preference SHALL NOT BE APPLICABLE.
ITT 33.4	The invitation to tender is extended to ALL bidders who qualify.
ITT 34.1	At this time, the Procuring Entity does not intend to execute certain specific parts of the Works by sub-contractors selected in advance.
ITT 34.2	Contractor's may propose subcontracting: Maximum percentage of subcontracting permitted is: <i>10% (or more depending on the utilities needed) of the total contract amount.</i> Tenderers planning to subcontract more than 10% of total volume of work shall specify, in the Form of Tender, the activity (ies) or parts of the Works to be subcontracted along with complete details of the subcontractors and their qualification and experience.
ITT 34.3	The parts of the Works for which the Procuring Entity permits Tenderers to propose Specialized Subcontractors are designated as follows: Not Applicable
ITT 35.2	Additional requirements apply. These are detailed in the evaluation criteria in Section III, Evaluation and Qualification Criteria.
ITT 48.1	Other documents required in addition to the Performance Security are: NONE
ITT 49.1	<p>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 PPRA Website www.ppra.go.ke or email complaints@ppra.go.ke.</p> <p>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:</p> <p>For the attention: <i>PRINCIPAL SECRETARY</i></p> <p>Title/position: <i>PRINCIPAL SECRETARY</i></p> <p>Procuring Entity: <i>MINISTRY OF HEALTH</i></p> <p>Email address: <i>ps@health.go.ke</i></p> <p>In summary, a Procurement-related Complaint may challenge any of the following (among others):</p> <ul style="list-style-type: none"> (i) the terms of the Tender Documents; and (ii) the Procuring Entity's decision to award the contract.

SECTION III - EVALUATION AND QUALIFICATION CRITERIA

10 GENERAL PROVISIONS

- 11** 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 evaluating Tenders.
- 12** 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.
 - (c) 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.

13 EVALUATION AND CONTRACT AWARD CRITERIA

The Procuring 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 THE EVALUATION WILL BE UNDERTAKEN IN 3 STAGES AS FOLLOWS:

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

STAGE 1: PRELIMINARY EXAMINATION FOR DETERMINATION OF RESPONSIVENESS

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.

TENDER EVALUATION CRITERIA

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

1. Preliminary examination;
2. Technical evaluation;
3. Financial Evaluation; and

STAGE 1: 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 shall include provision of the following: -

ITEM	MANDATORY REQUIREMENT (MR) – MAIN WORKS
MR1	Copy of Certificate of incorporation/ Registration of Business.
MR2	Valid Tax Compliance Certificate.
MR3	Valid copy of Single Business Permit;
MR4	CR12/CR13 for Main contractor issued not earlier than 12 months from tender opening date;
MR5	Current Category of Registration with National Construction Authority (NCA) in the relevant trade; (NCA 6 and Above for Building Works);
MR6	Current Class of Licenses with NCA;
MR7	Provision of a tender Security/Bid Bond of Ksh. 500,000 , addressed and bound to the Client, that is in the required format, amount, from a reputable bank or insurance company approved by PPRA and that is valid for 150days from the date of tender opening;
MR 8	The tenderer SHALL dully fill, sign and stamp the Form of Tender,
MR 9	Dully filled, Signed and Stamped Confidential Business Questionnaire;
MR10	Dully filled, signed, dated and stamped form SD1 (Anti-debarment form) (Must be commissioned by a Commissioner for Oaths)
MR 11	Dully filled, signed, dated and stamped form SD2(Anti-corruption form) (Must be commissioned by a Commissioner for Oaths)
MR 12	Dully filled, signed, dated and stamped form DEC 1 (Code of Ethics form)
MR 13	Dully filled, signed, dated and stamped Tenderer Information Form ELI
MR 14	Power of Attorney Authorized by a magistrate or commissioner of Oaths indicating the Authorized signatory for the Documents of the bidder if the signatory is not a director.
MR 15	Signed and stamped by Commissioner of oaths a pre-contract agreement between Main contractor and sub-contractors
MR 16	Main Contractor Must team up with Domestic Sub-Contractors registered by NCA as Listed below. The Domestic Subcontractor must comply with Specialist Works specifications as per domestic Sub-Contractors preliminary and technical criteria in each subcontractor's works section. i) Internal lighting and power points, power distribution, lighting

	protection and earthing, Data and CCTV points and fire alarm system Category - 8 and Above Conforms =YES; Does not Conforms =NO
ii)	Internal Plumbing and Drainage, Solar Water Heating, Water Storage Tanks and Fire Protection Works Category -8 and Above Conforms =YES; Does not Conforms =NO
iii)	Medical Gases Pipeline system Installation Works Category -3 and Above Conforms =YES; Does not Conforms =NO

Note:

The employer/procuring entity may seek further clarification/confirmation if necessary to confirm authenticity/compliance of any condition of the tender. Further, in case of a discrepancy between the amounts stated in the appendix to instruction to tenderers and the one stated in the advertisement or invitation letter, the bid security shall be taken as the amount in the advertisement/ letter of invitation.

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

STAGE 2: TECHNICAL EVALUATION

A) Assessment for eligibility

The tender document shall be examined based on clause 17.0 of the Instruction to Tenderers

The assessment for eligibility for the STANDARD FORMS considered in this section shall be as shown below

<u>PARAMETER</u>	<u>ACTION</u>
(i) Key Personnel.....	PASS/FAIL
(ii) Contract Completed in the last Five (5)	PASS/FAIL
(iii) Schedules of on-going projects	PASS/FAIL
(iv) Schedules of contractors equipment	PASS/FAIL
(v) Audited Financial Report for the last 3 years	PASS/FAIL
(vi) Evidence of Financial Resources	PASS/FAIL
(vii) Name, Address and Telephone of Bank (Contractor to provide)	PASS/FAIL
(viii) Litigation History	PASS/FAIL
OVERALL REMARKS	<u>PASS/FAIL</u>

The detailed Assessment for Eligibility shall be as shown in table 1 below: -

TABLE 1: Assessment for Eligibility (Main Contractor)

Item	Description	Remarks
i	Key Personnel (Attach evidence)	
	Director of the firm ((Building and Civil Engineering Construction Related Field) <ul style="list-style-type: none"> Holder of a diploma and above in relevant Engineering field 	PASS/FAIL
	At least 1No. degree/diploma holder of key personnel in relevant Engineering field (Building and Civil Engineering Construction Related Field) <ul style="list-style-type: none"> With over 5 years relevant experience 	PASS/FAIL
	At least 1No certificate holder of key personnel in relevant Engineering field (Building and Civil Engineering Construction Related Field) <ul style="list-style-type: none"> With over 10 years relevant experience 	PASS/FAIL
	At least 2No artisan (trade test certificate in relevant Engineering field) – (Building and Civil Engineering Construction Related Field) <ul style="list-style-type: none"> Artisans with over 10 years relevant experience 	PASS/FAIL
ii	Contract completed in the last five (5) years - Provide Evidence (Attach Award letter, Contract Agreement and Completion Certificate) <ul style="list-style-type: none"> 5No. Projects of similar nature and magnitude or 7 No. Projects of similar nature but of lower value than the one in consideration 	PASS/FAIL
iii	On-going projects – <u>Provide Evidence (Award letter and Contract Agreement)</u> Maximum of three (3No.) ongoing projects	PASS/FAIL
iv	Schedule of contractors equipment and transport (proof or evidence of ownership/Lease) a) Relevant means of transport (pick ups, lorries, trucks- at least 2 no.)	PASS/FAIL
	b) Relevant Tools and Equipment (Excavators, Tractors, hoists/cranes, scaffolds, drills, welding Machines – <ul style="list-style-type: none"> At least 5 no. relevant equipment for work being tendered 	PASS/FAIL
v	Financial report	
	a) Attach Audited financial report (last three (3) years)- 2020,2019,2018 (Signed and Stamped by Auditors)	PASS/FAIL

	b) Average Annual Turnover c) With an Average Annual Turn-over of 100% of the cost of the project Or d) With an Average Annual Turn-over above 50% but below 100% of the cost of the project	PASS/FAIL
	b) Evidence of Financial Resources (cash in hand, lines of credit, over draft facility etc)- Bank/Creditors/Letters of access to credit specific to the tender.	PASS/FAIL
vi	Attach dated, signed and stamped Bank Details	PASS/FAIL
vii	Attach dated, signed and stamped form of Litigation History signed and Stamped by an Attorney/ Commissioner for Oaths	PASS/FAIL
	OVERALL REMARKS	PASS/FAIL

**Monthly Cash Flow = Tender Sum/Contract Period*

Note: Any bidder who attains a PASS shall be considered for further evaluation

STAGE 3: FINANCIAL EVALUATION

Upon completion of the technical evaluation a detailed financial evaluation shall follow. The financial evaluation shall proceed in the manner described in the Public Procurement and Asset Disposal Act (2015).

The evaluation shall be in **three parts**;

- a) Determination of the Corrected Tender Sums;
- b) Comparison of Rates for major components of Works; and
- c) Consistency of the Rates.

A) Determination of the corrected tender sums

All arithmetic errors are to be noted and reported accordingly

NOTE:

Arithmetic Errors will be determined 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 tender figure in the Main summary of the Bills of Quantities, the amount as stated in the Form of Tender shall prevail.
- ii) 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;
- iii) Tenders with arithmetic errors shall be disqualified as per Clauses 74(2) and 75(1) of the Public Procurement and Asset Disposal Regulations 2020 which states:
Clause 74(2): "Subject to section 79(2)(b) of the Act any errors in the submitted tender arising from a miscalculation of unit price quantity subtotal and total bid price shall be considered as a major deviation that

affects the substance of the tender and shall lead to disqualification of the tender as non-responsive.”

Clause 75(1): “A procuring entity shall reject all tenders which are not in conformity to the requirements of section 79 of the Act and regulation 74 of these Regulations”

B) Comparison of Rates for major components of Works

The evaluation committee will compare the rates for major components of works and make note.

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.

RECOMMENDATION FOR AWARD

The successful bidder shall be the tenderer with the lowest evaluated tender price.

ASSESSMENT OF THE BIDDER (OR JOINT VENTURES)

S/No.	Bidders	Builders Works	Civil works	Mechanical works	Electrical Works	Landscaping Works	Compliant/ Not Compliant

Any bidder who is non-compliant in any of the above sub bids will not be evaluated further.

3.0 TENDER EVALUATION (ITT 35.2)

Price evaluation: in addition to the criteria listed in ITT 35.2 (a) – (d) the following criteria shall apply:

4.0 MULTIPLE CONTRACTS

4.1 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)

An alternative 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.

6.0 MARGIN OF PREFERENCE

- 6.1** 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 citizens is less than fifty- one percent (51%).
- 6.2** 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.
- 6.3** 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%).
- 6.4** 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 for award. If not, the lowest evaluated tender from Group B based on the first evaluation price shall be selected.
- 7. Post qualification and Contract award (ITT 39), more specifically,**
- a) In case the tender was subject to post-qualification, the contract shall be awarded to the lowest evaluated tenderer, subject to confirmation of pre-qualification data, if so required.
 - b) Incase the tender was not subject to post-qualification, the tender that has been determined to be the lowest evaluated tenderer shall be considered for contract award, subject to meeting each of the following conditions.
- (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 average 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) At least..... (insert number) 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..... 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]
- (vi) 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 **3 (three) years**. The required information shall be furnished in the appropriate form.

b) **Pending Litigation**

Financial position and prospective long-term profit 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) **Litigation History**

There shall be no consistent history of court/arbitral award decisions against the Tenderer, in the last **3 (Three) 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 under its 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.

SECTION IV - 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	Local materials			
1				
2				
3				
4				
5				
D				
1				
2				
3				
4				
5				
E				
1				
2				
3				
4				
5				
6				
	TOTAL COST LOCAL CONTENT		XXXXXX	
	PERCENTAGE OF CONTRACT PRICE			

2. FORM EQU 1: EQUIPMENT SCHEDULE

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 for alternative 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 the source of the equipment		
	Indicate source of the equipment	
Omit the following information for equipment owned by the Tenderer.	<input type="checkbox"/> Owned <input type="checkbox"/> Rented <input type="checkbox"/> Leased <input type="checkbox"/> Specially manufactured	
Owner		
	Name of owner	
	Address of owner	
	Telephone	Contact name and title
Agreements	Details of rental / lease / manufacture agreements specific to the project	
	Fax	
	Telex	

3. FORM PER -1: CONTRACTOR'S REPRESENTATIVE AND KEY PERSONNEL SCHEDULE

Tenderers should provide the names and details of the suitably qualified Contractor's Representative 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	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: [insert 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][<i>title of position from Form PER-1</i>]		
Personnel information	Name:	Date of birth:
	Address:	E-mail:
	Professional qualifications:	
	Academic qualifications:	
	Language proficiency: [<i>language and levels of speaking, reading and writing skills</i>]	
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
<i>[main project details]</i>	<i>[role and responsibilities on the project]</i>	<i>[time in role]</i>	<i>[describe the experience relevant to this position]</i>

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 qualifications and my experience.

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:

	Details
	<i>[insert period (start and end dates) for which this Contractor's Representative or Key Personnel is available to work on this contract]</i>
	<i>[insert period (start and end dates) for which this Contractor's Representative or Key Personnel is available to work on this contract]</i>

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 the Tender;
- 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.

5.1 FORM ELI -1.1 TENDERER INFORMATION FORM

Date: _____

ITT No. and title: _____

Tenderer's name
In case of Joint Venture (JV), name of each member:
Tenderer's actual or intended country of registration: <i>[indicate country of Constitution]</i>
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 <input type="checkbox"/> 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 <input type="checkbox"/> In case of JV, letter of intent to form JV or JV agreement, in accordance with ITT 3.5 <input type="checkbox"/> In case of state-owned enterprise or institution, in accordance with ITT 3.8, documents establishing: <ul style="list-style-type: none">• 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. and title: _____

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 <input type="checkbox"/> 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. <input type="checkbox"/> 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.

5.3 FORM CON –2

Historical Contract Non-Performance, Pending Litigation and Litigation History

Tenderer's Name:

Date: _____

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

Non-Performed Contracts in accordance with Section III, Evaluation and Qualification Criteria			
<input type="checkbox"/> Contract non-performance did not occur since 1 st January <i>[insert year]</i> specified in Section III, Evaluation and Qualification Criteria, Sub-Factor 2.1.			
<input type="checkbox"/> Contract(s) not performed since 1 st January <i>[insert year]</i> specified in Section III, Evaluation and Qualification Criteria, requirement 2.1			
<input type="checkbox"/> Contract(s) withdrawn since 1 st January <i>[insert year]</i> 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)
<i>[insert year]</i>	<i>[insert amount and percentage]</i>	Contract Identification: <i>[indicate complete contract name/ number, and any other identification]</i> Name of Procuring Entity: <i>[insert full name]</i> Address of Procuring Entity: <i>[insert street/city/country]</i> Reason(s) for nonperformance: <i>[indicate main reason(s)]</i>	<i>[insert amount]</i>
Pending Litigation, in accordance with Section III, Evaluation and Qualification Criteria			
<input type="checkbox"/> No pending litigation in accordance with Section III, Evaluation and Qualification Criteria, Sub-Factor 2.3.			
<input type="checkbox"/> 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			
<input type="checkbox"/> No Litigation History in accordance with Section III, Evaluation and Qualification Criteria, Sub-Factor 2.4. <input type="checkbox"/> 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)
<i>[insert year]</i>	<i>[insert percentage]</i>	Contract Identification: <i>[indicate complete contract name, number, and any other identification]</i> Name of Procuring Entity: <i>[insert full name]</i> Address of Procuring Entity: <i>[insert street/city/country]</i> Matter in dispute: <i>[indicate main issues in dispute]</i> Party who initiated the dispute: <i>[indicate "Procuring Entity" or "Contractor"]</i> Reason(s) for Litigation and award decision <i>[indicate main reason(s)]</i>	<i>[insert amount]</i>

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)	_____				
		Year2		Year4	
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*

Financial Situation and Performance

Tenderer's Name: _____

Date: _____

JV Member's Name _____

ITT No. and title: _____

5.4.3 Financial documents

The Tenderer and its parties shall provide copies of financial statements for **3** 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 statements¹ for the **3** years required above; and complying with the requirements.

¹If 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.

5.5 FORM FIN – 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
<i>[indicate year]</i>	<i>[insert amount and indicate currency]</i>		
Average Annual Construction			

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

5.6 FORMFIN 3.3:

Financial Resources

Specify proposed sources of financing, such as liquid assets, unencumbered real assets, lines of credit, and other financial means, 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)
2		
4		

FORM FIN – 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.

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

5.8 FORM EXP -4.1

General Construction Experience

Tenderer's Name: _____ Date: _____

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

Page _____ of _____ pages

Starting Year	Ending Year	Contract Identification	Role of Tenderer

5.9 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	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				
2				
3				
4				
5				
6				

5.10 FORM EXP - 4.2 (b)

Construction Experience in Key Activities

Tenderer's Name: _____

Date: _____

Tenderer's JV Member Name: _____

Sub-contractor's Name² (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:

Information				
Contract Identification				
Award date				
Completion date				
Role in Contract	Prime Contractor <input type="checkbox"/>	Member in JV <input type="checkbox"/>	Management Contractor <input type="checkbox"/>	Sub-contractor <input type="checkbox"/>
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)	
Year 1				
Year 2				
Year				
Procuring Entity's Name:				
Address:				
Telephone/fax number				
E-mail:				

²If applicable

OTHER FORMS

6. FORM OF TENDER FORM TEN 1

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) *All italicized 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*

Date of this Tender submission: [.....]

Request for Tender No.: [.....]

Name and description of Tender [.....]

Alternative No.: [.....]

To: [.....]

Dear Sirs,

1. In accordance 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 sum³ of Kenya Shillings [[*Amount in figures*]_____ Kenya Shillings [*amount in words*]_____

The above amount includes foreign currency⁴ amount(s) of [*state figure or a percentage and currency*] [figures]_____

_____ [words]_____ The
foreign currencies.

2. We undertake, 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 adhere by 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 under signed, further declare that:

- i) No reservations: We have examined and have no reservations to the tender document, including Addenda issued in accordance 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, in case of one lot: Total price is: *[insert the total price of the Tender in words and figures, indicating the various amounts and the respective currencies]*; or
Option 2, 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 obtain Performance Security in accordance with the Tendering document;
- xii) One Tender Per Tender: We are 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.")

This sum should be carried forward from the Summary of the Bills of Quantities.

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 person acting 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 not in any conflict of interest.
 - (b) Certificate of Independent Tender Determination - to declare that we completed the tender without colluding with other tenderers.
 - (a) Self-Declaration of 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 person signing the Tender]*

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 *[insert date of signing]* day of *[insert month]*, *[insert year]*

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**

FORM TENDER 2

Instruction to Tenderer

Tender is instructed to complete the particulars required in this Form, *one form for each entity if Tender is a JV*.

Tenderer is further reminded that it is an offence to give false information on this Form.

(a) Tenderer's details

ITEM	DESCRIPTION
Name of the Procuring Entity	
Reference Number of the Tender	
Date and Time of Tender Opening	
Name of the Tenderer	
Full Address and Contact Details of the Tenderer.	2. 4. 6.
Current Trade License Registration Number and Expiring date	
Name, country and full address (postal and physical addresses, email, and telephone number) of Registering Body/Agency	
Description of Nature of Business	
Maximum value of the Tenderer handles.	
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			
1				
2				

(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			
2				

(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		
2			

(ii) **Conflict of interest disclosure FORM TEN 3**

	pe of Conflict	Disclosure YES OR NO	If YES provide details of the relationship with Tenderer
1	Tenderer is directly or indirectly controls, is controlled by or is under common control with another tenderer.		
2			
3	Tenderer receives or has received any direct or indirect subsidy from another tenderer.		
4	Tenderer has the same legal representative as another tenderer		
5	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		
6	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		
7	subject of the tender.		
8	Tenderer would be providing goods, works, non-consulting services or consulting services during implementation of the contract Specified in this Tender Document.		
9	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 the date of submission.

Full Name_____

Title or Designation_____

(Signature)

(Date)

b) CERTIFICATE OF INDEPENDENT TENDER DETERMINATION FORM TEN 4

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:

I certify, on behalf of _____

[Name of Tenderer] 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. I am the 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. The Tenderer 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) the Tenderer 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. In particular, 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 intention or 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 pursuant to 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 to paragraph(5)(b) above;

8. The terms of the 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, whichever comes first, unless otherwise required by law or as specifically disclosed pursuant to paragraph (5)(b) above.

Name _____
Title _____
Date _____

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

(c) SELF- DECLARATION FORMS

FORM SD1

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/Director of 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 the fore said Bidder, its servants and/or agents/subcontractors will not engage in any corruptor fraudulent 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 FORM DEC 1

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 Procurement and 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 subsection 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 who has 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 conflict of interest to the procuring entity;

- 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 set forth 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 process or the 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 award¹ 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 inspect² 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 include, 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, such as 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 copy or electronic format) deemed relevant for the investigation/audit, and making copies thereof 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 FORM TEN 5

Beneficiary: _____

Request for Tenders No: _____

Date: _____

TENDER GUARANTEE No.: _____

Guarantor: _____

1. We have been informed that _____ (here in after called "the Applicant") has submitted or will submit to the Beneficiary its Tender (here in after 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 on or before that date.

[signature(s)]

4. FORM OF TENDER SECURITY (TENDER BOND) FORM TEN 6

[The Surety shall filling this Tender Bond Form in accordance with the instructions indicated.] BOND NO.____

1. BY THIS BOND [.....] 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_____day of _____, 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) has failed to furnish 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 our obligation(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 I am /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 to Tender

Schedule of Currency requirements

Summary of currencies of the Tender for _____ *[insert name of Section of the Works]*

<i>Name of currency</i>	<i>Amounts payable</i>
Provisional sums expressed in local currency	

PART II - WORKS REQUIREMENTS

SECTION V - 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. In order 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 out in 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 the following sections:
 - a) Preambles
 - b) Preliminary items
 - c) Work Items
 - d) Daywork Schedule;
 - and
 - e) Provisional items
 - f) 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 a 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.

Unit	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. A rate or price 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 rates and 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 against each 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- Clause 13.5 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 item or 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. Quantities should be rounded up where appropriate.

5.4 Where the measured items are 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 be done before such work is cover-up.

5.5 All items that have not been measured and therefore not subject to tender 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 percentage to be entered by the tenderer against each 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 THE STANDARD METHOD OF MEASUREMENT.
2. The Site is situated in Alupe, Busia **county**. It is approximately 938 Kilometers from Nairobi. Access to the site shall be through Alupe Sub-**County Referral Hospital** Which is an existing public road. Any damage caused to the surfaces of this road shall be made good at the Contractor's expense. The Contractor shall visit the site and acquaint itself with its nature and position, the nature of the ground, substrata and other local conditions, positions of existing power, water and other services, access roads or any other limitations that might affect his cost or progress. No claim for extras shall be considered on account of lack of knowledge in this respect.
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 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.
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. No claim for 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 progress on 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 areas 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 area and 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 therewith.
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 give his whole time to the superintendence of the works. (Including works of sub – contractors). Such Agent or Representative shall receive on behalf of the Contractor directions 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 work yards, 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 contractor shall source then at own cost.
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 existing and 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 15th October 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-up of 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 temporary fencing, 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 inclement weather, all finished work and unfixed materials, including that of Sub-Contractors, etc., to the satisfaction of the Architect until the completion of the 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 to leave clean all floors and windows and to move all paint and cement all rubbish and 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 shall 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 for 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 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.
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 6th June 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 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.
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

SECTION VI - SPECIFICATIONS

Notes for preparing Specifications

1. Specifications must be drafted to present a clear and precise statement of the required standards of materials, and workmanship for tenderers to respond realistically and competitively to the requirements of the Procuring Entity and ensure responsiveness of tenders. The Specifications should require that all materials, plant, and other supplies to be permanently incorporated in the Works be new, unused, of the most recent or current models, and incorporating all recent improvements in design and materials unless provided otherwise in the Contract. Where the Contractor is responsible for the design of any part of the permanent Works, the extent of his obligations must be stated.
2. Specifications from previous similar projects are useful and may not be necessary to re-write specifications for every Works Contract.
3. There are considerable advantages in standardizing **General Specifications** for repetitive Works in recognized public sectors, such as high ways, urban housing, irrigation and water supply. The General Specifications should cover all classes of workmanship, materials and equipment commonly involved in constructions, although not necessarily to be used in a particular works contract. Deletions or addenda should then adapt the General Specifications to the particular Works.
4. Care must be taken in drafting Specifications to ensure they are not restrictive. In the Specifications of standards for materials, plant and workmanship, existing Kenya Standards should be used as much as possible, otherwise recognized international standards may also be used.
5. The Procuring Entity should decide whether technical solutions to specified parts of the Works are to be permitted. Alternatives are appropriate in cases where obvious (and potentially less costly) alternatives are possible to the technical solutions indicated in tender documents for certain elements of the Works, taking into consideration the comparative specialized advantage of potential tenderers.
6. The Procuring Entity should provide a description of the selected parts of the Works with appropriate reference to Drawings, Specifications, Bills of Quantities, and Design or Performance criteria, stating that the alternative solutions shall be at least structurally and functionally equivalent to the basic design parameters and Specifications.
7. Such alternative solutions shall be accompanied by all information necessary for a complete evaluation by the Procuring Entity, including drawings, design calculations, technical specifications, breakdown of prices, proposed construction methodology, and other relevant details. Technical alternatives permitted in this manner shall be considered by the Procuring Entity each on its own merits and independently of whether the tenderer has priced the item as described in the Procuring Entity's design included with the tender documents.

SECTION VII - DRAWINGS

Note A list of drawings should be inserted here. The actual drawings including Site plans should be annexed in a separate booklet.

PART III - THE CONDITIONS OF CONTRACT AND CONTRACT

(a) SECTION VIII - GENERAL CONDITIONS OF CONTRACT (GCC)

.....[Name of Procuring Entity]

.....[Name of Contract]

.....[Architect Name and Address]

(b) General Conditions of Contract

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” means the date of completion of the Works as certified by the Engineer.

“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's Personnel” 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 time by 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 or a Section (as the case maybe) under Sub-Clause 11.1 [Completion of Outstanding Work and Remedying Defects], which extends over the days stated in the Special Conditions of Contract.

“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 [Application for Final Payment Certificate]. **“Force Majeure”** is defined in Clause 19 [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.

“Tests on Completion” means the tests which are specified in the Contract 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, sent or transmitted to the address for 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 address from which the request was issued.

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 of the 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 format annexed 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 assign 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 by the 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, the Party 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 As agreed 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 Entity for 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 permit or 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 of the Procuring Entity's inspection and audit rights constitute a prohibited practice subject to contract termination (as well as to a determination of ineligibility 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 the time (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 of any foundation, 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's Personnel

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 similar to those which the Contractor is required to take under sub-paragraphs (a), (b) and (c) of Sub-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 Architect is required to obtain the approval of the Procuring Entity before exercising a specified authority, the requirements shall be as stated in the **Special 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 approval is required, then (for the purposes of the Contract) the contractor shall require the Architect to provide evidence 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 shall be deemed to act for the Procuring 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) any act 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-Clause 13.4: Specifying the amount payable in each of the applicable three currencies.
- 3.1.7 Notwithstanding 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

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 be necessary 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 Architect or 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

If the Procuring Entity intends to replace the Engineer, the Procuring Entity shall, in not less than 21 days before the intended date of replacement, 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-Clause 3.5 to agree or 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, and shall 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 design or 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 Architect the "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 executed and 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.

- 424 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.
- 425 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.
- 426 The Procuring Entity shall return the Performance Security to the Contractor within 14 days after receiving a copy of the Taking-Over Certificate.
- 427 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

- 431 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**.
- 432 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 withheld 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 another suitable person for such appointment.
- 433 The Contractor shall not, without the prior consent of the Engineer, revoke the appointment of the Contractor's Representative or appoint another person.
- 434 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.
- 435 The Contractor's Representative shall, on behalf of the Contractor, receive instructions under Sub-Clause 3.3 [Instructions of the Engineer].
- 436 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.
- 437 The Contractor's Representative shall be fluent in the language for communications defined in Sub-Clause 1.4 [Law and Language]. If the Contractor's Representative's delegates are not fluent in the said language, the Contractor shall make competent interpreters available during all working hours in a number deemed sufficient by the Engineer.

4.4 Sub-contractors

- 441 The Contractor shall not subcontract the whole of the Works. The contractor may however subcontract the works as provided in Clause 34.2.
- 442 The Contractor shall be responsible for the acts or defaults of any Subcontractor, his agents or

employees, as if they were the acts 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].

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

444 Where practicable, 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

461 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.

462 Any such instruction shall constitute a Variation if and to the extent that it causes the Contractor to suffer delays and/or to incur 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.

463 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

471 The Contractor shall set out the Works in relation to original points, lines and levels of reference specified in the Contract 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.

472 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.

473 If the Contractor suffers delay and/or incurs Cost from executing work which was necessitated by an error in 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.

4.7.4 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 this.

48 Safety Procedures

The Contractor shall:

- a) Comply with all applicable safety regulations,
- b) Take care 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.

49 Quality Assurance

49.1 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 entitled to audit any aspect of the system.

49.2 Details of all procedures and compliance documents shall be submitted to the Architect for 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 The Contractor 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 shall describe 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 Contractor when submitting the Tender, which shall be made available by the Contractor, but shall not be bound by the Contractor's interpretation of any such evidence.

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 between 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 availability 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 the transport 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 shall 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 Entity shall 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-Clause 3.5 [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, defect or 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 [Nominated Subcontractors]),
 - 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 adjacent land.
- 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

- 424.1 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.
- 424.2 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 his obligations 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, direct to 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 the Contractor.

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

No work 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 local health 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 its occurrence. 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 of the Works.

- 6.92 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 Site an 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 at all 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 employment or 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 in 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 thereafter 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 place for the 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, notwithstanding other provisions of the Contract.
- 7.4.4 The Architect shall give the Contractor not less than 24 hours' notice of the Architect's 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's 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 the specified tests have been completed, 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 Notwithstanding any previous test or certification, the Architect may instruct the Contractor to:
- 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 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.

- 7.64 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 incorporated 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) The disposal of material from demolitions and excavations and of other surplus material (whether natural or man-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 have 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-Clause 6.2 [Termination by Contractor].

- 8.1.3 The Contractor shall commence the execution of the Works as soon as is reasonably practicable after the Commencement Date and shall then 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 Tests on 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 within 14 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:
 - i) 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 Architect shall 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

- 8.61 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.
- 8.62 Unless the Architect notifies otherwise, the Contractor shall adopt these revised methods, which may require 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.
- 8.63 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

- 8.71 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.
- 8.72 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

- 8.81 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 against any deterioration, loss or damage.
- 8.82 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

- 8.91 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.
- 8.92 After receiving this notice, the Architect shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine these matters.

- 893 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 Prolonged Suspension

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 receiving from the Architect an 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 results of 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 Tests on 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 at 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 as accurate.

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-Clause 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 Contractor 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 Contractor, stating the date on which the Works or Section were completed in accordance with the Contract, except for any minor outstanding 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 under this 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 the last 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.

- 1023 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.
- 1024 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.
- 1025 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

- 1031 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.
- 1032 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.
- 1033 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.
- 1034 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 (fair wear and tear excepted) by the expiry date of the relevant Defects Notification Period or as soon as practicable thereafter, 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).

11.12 If a defect appears or damage occurs, the Contractor shall be notified accordingly by the Engineer.

11.2 Cost of Remedying Defects

11.21 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.

11.22 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

11.31 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.

11.32 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 apply to any defects or 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

11.41 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.

11.42 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 [Cost of 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) Require the 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 Contract as 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 Contract 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 defect or 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

Until the 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 defect on 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 thereafter 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 Completion 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 AND 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 Contractor shall 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 agree the records 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 payment of the 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 work done 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 Clause 13 [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.

- 123.6 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.
- 123.7 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*.

124 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, would have been 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 invalidate 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 other characteristics 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 Prior to any 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.

1322 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 Works rendered useless by any such variation,
- b) The cost of 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 finance costs, 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.

1323 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-Clause 31.3.

133 Value Engineering

- 133.1 The Contractor 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.
- 133.2 The proposal shall be prepared at the cost of the Contractor and shall include the items listed in Sub-Clause 13.3 [Variation Procedure].
- 1323 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.

- 13.3.3 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.

134 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 writing as 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.

135 Payment in 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.

136 Provisional Sums

- 13.6.1 Each Provisional Sum shall only be used, in whole or in part, in accordance with the Architect instructions, and the Contract Price shall be adjusted accordingly. The total sum paid to the Contractor shall include only such 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, Material so 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.
- 13.7 The Contractor shall, when required by the Engineer, produce quotations, invoices, vouchers and accounts or receipts in substantiation.

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 deliver each 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 Notwithstanding 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 amounts 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:

$$P = A + B \frac{I_m}{I_o}$$

where:

P is the adjustment factor for the portion of the Contract Price payable.

A and **B** are 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 **I_o** 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.

- 1394 The cost indices or reference prices stated in the table of adjustment data shall be used. If their source is in doubt, it shall 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.
- 1395 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.
- 1396 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.
- 1397 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 applicable on 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.
- 1398 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 Clause 12 [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.

14.12 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

14.21 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**.

14.22 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.

14.23 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 advance 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.

14.24 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.

14.25 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 the case 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 a form 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 parton the progress during this month in accordance with Sub-Clause 4.21 [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 If the 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 are satisfied:
- 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-Clause 14.2 [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 Statement if 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], whichever 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 [Termination by 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 is issued.

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 be half (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 be half (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 Architect shall 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-Clause 13.8 [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 becomes 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 outstanding 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 30 days 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 the Contractor 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 indemnification 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) other payments and deductions 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 these acts 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, in competing for or in executing the Contract.

1522 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.

1523 The Procuring Entity's election to terminate the Contract shall not prejudice any other rights of the Procuring Entity, under the Contractor otherwise.

1524 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.

1525 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.

1526 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

As soon 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 [Procuring 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-Clause in 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 be and 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 [Termination

by Contractor].

16.13 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.

16.14 If the Contractor suffers delay and/or incurs 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-Clause 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 Contract 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 Payment on Termination

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 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 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 Contractor is responsible for 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.

- 1724 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 radiation 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

- 1741 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.
- 1742 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 Time for Completion], and
 - (b) Payment of any such Cost, which shall be included in the Contract Price. In the case of subparagraphs (e) and (g) of Sub-Clause 17.3 [Procuring Entity's Risks], Accrued Costs shall be payable.
- 1743 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

- 1751 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.
- 1752 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.
- 1753 The Procuring Entity shall indemnify and hold the Contractor harmless against and from any claim alleging an infringement which is or was:

- a) An unavoidable result of the Contractor's compliance with the Contract, or
- b) A result of any Works being used 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 against any 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 If a Party is entitled to be indemnified 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 plant or equipment 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 contractor has received the rights to grant sub-licenses and shall also grant to the Procuring Entity a non-exclusive and non-transferable right (without the right to sub-license) to use the knowhow and other technical information disclosed to the contractor or under the contract. Nothing contained herein shall be construed as transferring ownership of any patent, utility model, trademark, design, copyright, knowhow 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 any works, loss of profit, loss of any contractor for any indirect 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, liabilities or 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, Materials and 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) Shall be 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, this 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) a part of the Works which is lost or damaged in order 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].

1825 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 as the 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

183.1 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.

1832 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.

1833 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

184.1 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.

1842 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 Contractor or any other of 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.

1843 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 overcome, 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, so long 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 maybe attributable to the Contractor's use of such munitions, 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 Notwithstanding 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-Clause 18.2 [Insurance for Works and Contractor's Equipment].

- 19.4.2 After receiving this notice, the Architect shall proceed in accordance 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) the amounts payable for any work carried out for which a price is stated in the Contract;
- 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's disposal;
- 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

Notwithstanding 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 Party of such event or circumstance:

- 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.

- 20.12 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.
- 20.13 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.
- 20.14 The Contractor shall keep such contemporary records as may be necessary to substantiate any claim, either on the Site or at another 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.
- 20.15 Within 42 days 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 event or circumstance, or within such other period as may be proposed by the Contractor and approved by the Engineer.
- 20.16 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.
- 20.17 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.
- 20.18 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.
- 20.19 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.

202 Procuring Entity's Claims

- 2021 If the Procuring Entity considers itself to be entitled to any payment under any Clause of these Conditions or 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.
- 2022 The notice shall be given as soon as practicable and no longer than 30 days after the 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.
- 2023 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].
- 2024 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.

203 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 arbitration after 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.

204 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.

205 Arbitration

- 205.1 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.
- 205.2 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.

- 2053 Notwithstanding 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.
- 2054 The Arbitrator shall, without prejudice to the generality of his powers, have powers to direct such measurements, computations, tests or valuations as may in his opinion be desirable in order to determine the rights of the parties and assess and award any sums which ought to have been the subject of or included in any certificate.
- 2055 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.
- 2056 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.
- 2057 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.
- 2057 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.
- 2058 The terms of the remuneration 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

- 2061 If the Contract is with national contractors, arbitration proceedings will be conducted in accordance with the Arbitration Laws of Kenya. 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
- 2062 The institution written to first by the aggrieved party shall take precedence over all other institutions.

20.7 Arbitration with Foreign Contractors

- 207.1 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.
- 207.2 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-Clause 1.4 [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 Failure to Comply with Arbitrator's Decision

209.1 The award of such Arbitrator shall be final and binding up on the parties.

209.2 In the event that 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 the Procuring Entity shall pay the Contractor any monies due the Contractor.

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	Ministry of Health
Name and Reference No. of the	Heading and 3.1.1	MOH/GESDeK/ONT/08/2021/2022
Engineer's Name and Address	Heading and 3.1.1	Principal Secretary, Ministry of Health, 30016-00100, Nairobi, Kenya
Time for completion		Twenty Six (26) WEEKS AFTER START DATE
Contractor's Representative's Name	4.3.1	(Insert the name of the Representative agreed by the entity prior to contract
Key Personnel names	1.1	(Insert the name of the Representative agreed by the entity prior to contract
Defects notification period	1.1	180 days
Sections	1.1	If sections are to be used, refer to table: Summary of sections below
Electronic submission systems	1.3	Shall NOT BE Applicable
Time for the parties entering into a contract agreement	1.6	Within 30days
Commencement date	8.1.1	
Time for access to the site	2.1	The Site Possession Date Shall be as AGREED WITH THE PROJECT
Architect duties and authority	3.1.6(b) (ii)	Variation resulting in an increase of the accepted contract amount shall require approval of the procuring entity
Performance security	4.2.1	The performance security will be in the form of a performance bond in the amount(s) of 5% (percent) of the accepted contract amount and in the same currency (ies) of the accepted contract amount
Normal working hours	6.5	Normal working hours shall be 8:00 a.m. to 5:00 p.m. on weekdays, including lunch break from 1.00 p.m. to 2.00 p.m. and 8:00 a.m. to 1:00 pm on Saturdays, with Sunday being set aside as a day of rest.
Delay damages for the work	8.7 & 14.15(b)	0.05% of the contract price per day

Maximum amount of delay damages	8.7	Kshs. 50,000 per week
Adjustments for Changes in Cost	13.8	The Price Adjustment Clause <u>Shall Not</u> apply
Total advance payment	14.2.1	Advance Payment may be granted
Repayment amortization rate	14.2.5 (b)	NOT APPLICABLE
Percentage of Retention	14.3.2 (c)	10 %
Limit of Retention Money	14.3.2 (c)	5 % of the Accepted Contract Amount
Plant and Materials	14.5(b)(i)	SHALL NOT APPLY
	14.5(C)(i)	SHALL NOT APPLY
Minimum Amount of Interim Payment Certificates	14.6	N/A
Periods for submission of insurance:a. evidence of insurance. Relevant policies	18.1	<u>14</u> days
Maximum amount of deductibles for insurance of the Procuring Entity's risks	18.2.4 (d)	As per policy
Minimum amount of third- party insurance	18.3	As instructed
The place of arbitration	20.7.2	Nairobi, Kenya.

SECTION X - 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 TO AWARD 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 Procuring Entity]*
- ii) Project: *[insert name of project]*
- iii) Contract title: *[insert the name of the contract]*
- iv) ITT No: *[insert ITT reference number from Procurement Plan]*

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) Other Tenderers

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
<u>2</u>				
<u>4</u>				

(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 receipt of 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 available 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 *[amount in 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: CONTRACT AGREEMENT

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 Works known as should be executed by the Contractor, and has accepted a Tender by the Contractor for the execution and completion of these Works and 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) The Notification 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.

Signed and 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 _____ informed _____ that (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. 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 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 itself 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]*, 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 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 are advised to use Performance Security – Unconditional Demand Bank Guarantee in stead of Performance Bond due to difficulties involved in calling Bond holder to action]

[Guarantor letterhead or SWIFT identifier code]

Beneficiary:.....

[insert name and Address of Procuring Entity]

Date: _____ *[Insert date of*

issue] **PERFORMANCE BOND No.:** _____

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 Oblige (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 available 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 _____

In the presence of _____

SIGNED ON _____ on behalf of _____

By _____ in the capacity of _____

In the presence of _____

FORM NO. 6 - ADVANCE PAYMENT 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 _____ (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, or on the _____ day of _____, 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

¹The Guarantor shall insert an amount representing the amount of the advance payment and denominated either in the currency of the advance payment as specified in the Contract.

²Insert 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 Execution of _____ *[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 up to 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 demand supported by the Beneficiary's statement, whether in the demand itself or in a separate signed document accompanying or identifying the demand, 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 of Applicant's bank]*.
5. This guarantee shall expire no later than the.....Day of.....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/stamp]

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 actual completion 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 guarantee*

1. FORM NO. 8 – RETENTION MONEY SECURITY

2. [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]

3. 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 execution of _____ [insert name of contract and brief description of Works] (hereinafter called "the Contract").
4. 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.
5. 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 demand supported by the Beneficiary's statement, whether in the demand itself or in a separate signed document accompanying or identifying the demand, 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.
6. 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 of Applicant's bank].
7. 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.
8. 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.

¹The Guarantor shall insert an amount representing the amount of the second half of the Retention Money.

²Insert a date that is twenty-eight days after the expiry of retention period after the actual completion 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 guarantee.

9. FORM NO. 9 BENEFICIAL OWNERSHIP DISCLOSURE FORM

INSTRUCTIONS TO TENDERERS: DELETE THIS BOX ONCE YOU HAVE COMPLETED THE FORM

This Beneficial Ownership Disclosure Form ("Form") is to be completed by the successful tenderer. In case of joint venture, the tenderer must submit a separate Form for each member. The beneficial ownership information to be submitted in this Form shall be current as of the date of its submission.

For the purposes of this Form, a Beneficial Owner of a Tenderer is any natural person who ultimately owns or controls the Tenderer by meeting one or more of the following conditions:

- Directly or indirectly holding 25% or more of the shares.*
- Directly or indirectly holding 25% or more of the voting rights.*
- Directly or indirectly having the right to appoint a majority of the board of directors or equivalent governing body of the Tenderer.*

Tender Reference No.: _____ [insert identification

no] Name of the Assignment: _____ [insert name of the assignment]

to: _____ [insert complete name of Procuring Entity]

In response to your notification of award dated _____ [insert date of notification of award] to furnish additional information on beneficial ownership: _____ [select one option as applicable and delete the options that are not applicable]

I) We here by provide the following beneficial ownership information.

10. Details of beneficial ownership

Identity of Beneficial Owner	Directly or indirectly holding 25% or more of the shares (Yes / No)	Directly or indirectly holding 25 % or more of the Voting Rights (Yes / No)	Directly or indirectly having the right to appoint a majority of the board of the directors or an equivalent governing body of the Tenderer (Yes / No)
[include full name (last, middle, first), nationality, country of residence]			

OR

ii) We declare that there is no Beneficial Owner meeting one or more of the following conditions: directly or indirectly holding 25% or more of the shares. Directly or indirectly holding 25% or more of the voting rights. Directly or indirectly having the right to appoint a majority of the board of directors or equivalent governing body of the Tenderer.

OR

We declare that we are unable to identify any Beneficial Owner meeting one or more of the following conditions. [If this option is selected, the Tenderer shall provide explanation on why it is unable to identify any Beneficial Owner]

Directly or indirectly holding 25% or more of the shares. Directly or indirectly holding 25% or more of the voting rights.

Directly or indirectly having the right to appoint a majority of the board of directors or equivalent governing body of the Tenderer]”

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 [insert date of signing] day of..... [Insert month], [insert year]

PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL, BUSIA.

PARTICULAR PRELIMINARIES

ITEM	DESCRIPTION	AMOUNT (Kshs).
<p>A</p>	<p>PRICING ITEMS OF PRELIMINARIES</p> <p>Prices SHALL BE INSERTED against items of “preliminaries” in the tenderer’s priced Bills of Quantities. The Contractor shall be deemed to have included in his prices or rates for the various items in the Bills of Quantities or Specification for all costs involved in complying with all the requirements for the proper execution of the whole of the works in the Contract. The contractor is advised to read and understand all preliminary items.</p> <p>B</p> <p>SCOPE OF THE CONTRACT</p> <p>The works to be carried out under this contract comprise of construction of Isolation Ward and Plant Room as per these Bills of Quantities.</p> <p>C</p> <p>FLOOR AREA</p> <p>Total gross floor area is approximately Seven Hundred and Fourty Three Square metres for Isolation ward and Fifty Five Square metres for Plant room .The total gross area is given without warranty but for guidance only.</p> <p><u>Isolation Ward</u></p> <p>Ground Floor 743 SM</p> <p><u>Plant Room</u></p> <p>Ground Floor 337 SM</p> <p>Total Approx Floor area <u>1080 SM</u></p> <p>D</p> <p>LOCATION OF SITE</p> <p>The site is located at Alupe Sub-County Hospital in Busia County. The Contractor is advised to visit the site, to familiarize with the nature and position of the site. No claims arising from the Contractor’s failure to do so will be entertained.</p> <p>The Contractor is advised to visit the site, to familiarize with the nature and position of the site. No claims arising from the Contractor’s failure to do so will be entertained.</p> <p>E</p> <p>DESCRIPTION OF THE WORKS</p> <p>The works to be carried out under this contract involves construction of Isolation ward and Plant Room comprised of substructures, superstructures, walling, roofing, finishes, windows , Doors, fitting and fixtures, balustrading , Civil and landscaping works , associated Mechanical works, Medical gases piping and Electrical works.</p>	
	<p align="center">Carried to Collection</p>	

PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL, BUSIA.

ITEM	DESCRIPTION	AMOUNT (Kshs).
<p>A</p>	<p>MEASUREMENTS</p> <p>In the event of any discrepancies arising between the Bills of Quantities and the actual works, the site measurements shall generally take precedence. However, such discrepancies between any contract documents shall immediately be referred to the PROJECT MANAGER in accordance with Clause 22 of the Conditions of Contract. The discrepancies shall then be treated as a variation and be dealt with in accordance with Clause 22 of the said Conditions.</p> <p>B</p> <p>CLEARING AWAY</p> <p>The Contractor shall remove all temporary works, rubbish, debris and surplus materials from the site as they accumulate and upon completion of the works, remove and clear away all plant, equipment, rubbish, unused materials and stains and leave in a clean and tidy state to the reasonable satisfaction of the Project Manager.</p> <p>The whole of the works shall be delivered up clean, complete and in perfect condition in every respect to the satisfaction of the Project Manager.</p> <p>C</p> <p>CLAIMS</p> <p>It shall be a condition of this contract that upon it becoming reasonably apparent to the Contractor that he has incurred losses and/or expenses due to any of the contract conditions, or by any other reason whatsoever, he shall present such claim or intent to claim notice to the PROJECT MANAGER within the contract period. No claims shall be entertained upon the expiry of the said contract period.</p> <p>D</p> <p>PAYMENTS</p> <p>The tenderer's attention is drawn to the fact that the GOVERNMENT DOES NOT MAKE ADVANCE PAYMENTS but pays for work done and materials delivered to site: all in accordance with Clause 23 of the Conditions of Contract Agreement. In order to facilitate this, a list of the general component elements for the works is given at the summary page of these specifications and the tenderer is requested to break down his tender sum commensurate to the said elements</p>	
	<p>Carried to Collection</p>	

PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL, BUSIA.

ITEM	DESCRIPTION	AMOUNT (Kshs).
A	<p>PREVENTION OF ACCIDENT, DAMAGE OR LOSS</p> <p>The Contractor is notified that these works are to be carried out on a restricted site where the client is going on with other normal activities. The Contractor is instructed to take reasonable care in the execution of the works as to prevent accidents, damage or loss and disruption of normal activities being carried out by the Client. The Contractor shall allow in his rates any expense he deems necessary by taking such care within the site.</p>	
B	<p>WORKING CONDITIONS</p>	
	<p>The contractor must control noise and dust throughout the course of the contract.</p>	
C	<p>SIGNBOARD</p>	
	<p>Allow for providing, erecting, maintaining throughout the course of the Contract and afterwards clearing away a signboard as designed, specified and approved by the Project Manager.</p>	
D	<p>LABOUR CAMPS</p>	
	<p>The Contractor shall not be allowed to house labour on site. Allow for transporting workers to and from the site during the tenure of the contract.</p>	
E	<p>MATERIALS FROM DEMOLITIONS</p>	
	<p>Any materials arising from demolitions and not re-used shall become the property of the government. The Contractor shall allow in his rates the cost of transporting the demolished materials to the County Works Offices, Industrial Area, Nairobi.</p>	
F	<p>EXCAVATION</p>	
	<p>Excavation and disposal of soil is measured nett before excavation, filling is measured nett after consolidation.</p> <p>Prices for excavating shall include all handling etc of any extra bulk after excavating, any extra excavation required for formwork or planking and strutting, circular work, grubbing up any old drains, roots etc, that may be encountered, for trimming, levelling and ramming bottoms, forming stepping and battens as required for well watering bottoms before laying concrete unless specifically measured.</p>	
G	<p>PRICING RATES</p>	
	<p>The tenderer shall include for all costs in executing the whole of the works, including transport, replacing damaged items, fixing, all to comply with the said Conditions of Contract.</p>	
	<p>Carried to Collection</p>	

PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL, BUSIA.

ITEM	DESCRIPTION	AMOUNT (Kshs).
<p>A</p>	<p>SECURITY</p> <p>The Contractor shall allow for providing adequate security for all the works stores, materials, plant, personnel, etc., both his own and sub-contractors' and must provide all necessary watching, lighting and other precautions as necessary to ensure security against theft, loss or damage and the protection of the public and the workers in the course of execution of this contract. No claim will be entertained from the Contractor for not maintaining adequate security for both the works and workers.</p> <p>B</p> <p>URGENCY OF THE WORKS</p> <p>The Contractor is notified that these “works are urgent” and should be completed within the period stated in these Particular Preliminaries. The Contractor shall allow in his rates for any costs he deems that he may incur by having to complete the works within the stipulated contract period.</p> <p>C</p> <p>PAYMENT FOR MATERIALS ON SITE</p> <p>All materials for incorporation in the works must be stored on site before payment is effected, unless specifically exempted by the Project Manager. This is to include materials of the Contractor, nominated sub-Contractors and nominated suppliers.</p> <p>D</p> <p>EXISTING SERVICES</p> <p>Prior to the commencement of any work, the Contractor is to ascertain from the relevant authority the exact position, depth and level of all existing services in the area and he/she shall make whatever provisions may be required by the authorities concerned for the support, maintenance and protection of such services.</p> <p>E</p> <p>BID SECURITY</p> <p>The Bidder shall furnish, as part of his bid, a security as specified in the tender advertisement.</p> <p>The bid security shall, at the bidder’s option, be in the form of a certified cheque, bank draft, standby letter of credit or guarantee from a reputable bank located in Kenya or foreign bank which has been determined by the bidder to be acceptable to the Government. The format of the bank guarantee shall be in accordance with the sample forms of bid security included in the post qualification forms, other formats may be permitted, subject to the prior approval of the Government. Letters of credit, bank</p> <p>Guarantees issued as surety for the bid shall be valid for a period of One Hundred and Fifty (150) days from the date of Tender Opening.</p>	
	<p>Carried to Collection</p>	

PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL, BUSIA.

ITEM	DESCRIPTION	AMOUNT (Kshs).
<p>A</p> <p>B</p> <p>C</p> <p>D</p> <p>E</p>	<p>VALUE ADDED TAX</p> <p>PERFORMANCE BOND</p> <p>The Contractor shall find and submit on the Form of Tender an approved bank and who will be willing to be bound with the Government in and amount equal to five per cent (5%) of the Contract amount for the due performances of the Contract up to the date of completion as certified by the PROJECT MANAGER and who will when and if called upon, sign a Bond to that effect on the relevant standard form included herein. (without the addition of any limitations) on the same day as the Contract Agreement is signed, by the Government, the Contractor shall furnish within seven days another Surety to the approval of the Government.</p> <p>No payment on account for the works executed will be made to the contractor until he has submitted the Performance Bond to the Project Manager duly signed, sealed and stamped from an approved Bank</p> <p>TENDER DOCUMENTS</p> <p>Tender documents are as listed in Clause 2.1 of the Instruction to Tenderer's Page 7</p> <p>DELIVERY OF TENDER</p> <p>Tenders will be opened at the time specified in the letter accompanying these Tender Documents or as indicated in the advertisement. Tenders delivered/received later than the above time will not be opened.</p> <p>The Contractor's attention is drawn to the Legal Notice in the Finance Act part 3 Section 21(b) operative from 1st September, 1993 which requires payment of VAT on all contracts. The Contractor should therefore include allowance in his rates and prices for VAT and any other Government taxes currently in force.</p> <p>NB: VAT SHALL BE INCLUDED IN THE RATES</p> <p>FIRM PRICE CONTRACT</p> <p>Unless otherwise specifically stated, this is a firm price contract and the Contractor must allow in his tender rates for any increase in the cost of labour and/or materials during the currency of the contract.</p>	
	<p>Carried to Collection</p>	

PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL, BUSIA.

ITEM	DESCRIPTION	AMOUNT (Kshs).
	<p style="text-align: center;"><u>SPECIAL PRELIMINARIES</u></p> <p><u>PROECT MANAGER'S SUPERVISION EXPENSES</u></p> <p><u>Transport for supervision team from state department of public works</u></p> <p><u>Provide a 14,seater Van (in good supervised condition) for transporting 8No. Ministry of Transport,Infrastructure,Public Works,Housing and Urban Development. (State Department for Public Works) Officers to Alupe in Busia County and back to Public Works Headquarters for 10 No. trips approximately 938 kilometres per trip including a competent and qualified driver, fuel and lubricants and comprehensive insurance.</u></p> <p>A Allow for provision of vehicle as described including, drivers, maintenance, fuel, oil and lubricant, licences and comprehensive insurance Allow rate of Ksh..... per visit X 10 no visits</p> <p><u>Project Management expenses</u></p> <p>B Provisional sum of Kenya shillings, Two Million (KShs.2,000,000.00) only for Subsistence allowances for Project Manager's Supervision Team.</p> <p>C Allow for profits and attendance ----- %</p> <p><u>Clerk of Works Expenses</u></p> <p>D Allow a sum of Kenya Shillings Five Hundred Thousand (KShs.500,000.00) only for Clerk of Works allowances</p> <p>E Allow for profits and attendance ----- %</p>	<p>2,000,000.00</p> <p>500,000.00</p>
	Carried to Collection	

PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL, BUSIA.

ITEM	DESCRIPTION	AMOUNT (Kshs).
	<p style="text-align: center;"><u>PARTICULARS OF INSERTIONS TO BE MADE IN APPENDIX TO CONTRACT AGREEMENT</u></p> <p>The following are the insertions to be made in the appendix to the contract Agreement:-</p> <p>A Period of Final Measurement.....3 Months from Practical Completion</p> <p>B Defects Liability Period.....6 Months from Practical Completion</p> <p>C Date for Possession..... To be agreed with the Project Manager</p> <p>D Date for Completion.....26 WEEKS from the Date of possession</p> <p>E Liquidated and Ascertained Damages. At a rate of KSh 50,000 Per week or part thereof</p> <p>F Period of Interim Certificates.....Monthly</p> <p>G Period of Honouring Certificates.....30 Days</p> <p>H Percentage of Certified Value Retained10%</p> <p>H Percentage of limit of retention 5%</p>	
	Carried to Collection	

PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL, BUSIA.

ITEM	DESCRIPTION	AMOUNT (Kshs).
	<p style="text-align: center;"><u>COLLECTION</u></p> <p>Brought forward from page PP/1</p> <p>Brought forward from page PP/2</p> <p>Brought forward from page PP/3</p> <p>Brought forward from page PP/4</p> <p>Brought forward from page PP/5</p> <p>Brought forward from page PP/6</p> <p>Brought forward from page PP/7</p>	
	TOTAL FOR PARTICULAR PRELIMINARIES CARRIED TO GRAND SUMMARY	

PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL, BUSIA.

ITEM	DESCRIPTION	AMOUNT
	<p style="text-align: center;">GENERAL PRELIMINARIES</p> <p>A. PRICING OF ITEMS OF PRELIMINARIES AND PREAMBLES</p> <p>Prices will be inserted against items of Preliminaries in the Contractor's priced Bills of Quantities and Specification.</p> <p>The Contractor shall be deemed to have included in his prices or rates for the various items in the Bills of Quantities or Specification for all costs involved in complying with all the requirements for the proper execution of the whole of the works in the Contract.</p> <p>B. ABBREVIATIONS</p> <p>Throughout these Bills, units of measurement and terms are abbreviated and shall be interpreted as follows:-</p> <p><i>C.M.</i> Shall mean cubic metre</p> <p><i>S.M.</i> Shall mean square metre</p> <p><i>L.M.</i> Shall mean linear metre</p> <p><i>MM</i> Shall mean Millimetre</p> <p><i>Kg.</i> Shall mean Kilogramme</p> <p><i>No.</i> Shall mean Number</p> <p><i>Prs.</i> Shall mean Pairs</p> <p><i>B.S.</i> Shall mean the British Standard Specification Published by the British Standards Institution, 2 Park Street, London W.I., England.</p> <p><i>Ditto</i> Shall mean the whole of the preceding description except as qualified in the description in which it occurs.</p> <p><i>m.s.</i> Shall mean measured separately.</p> <p><i>a.b.d</i> Shall mean as before described.</p>	
	<i>Carried to collection</i>	

PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL, BUSIA.

ITEM	DESCRIPTION	AMOUNT
<p>A.</p>	<p>EXCEPTION TO THE STANDARD METHOD OF MEASUREMENT</p> <p><i>Attendance</i> ; Clause B19(a) of the Standard Method of Measurement is deleted and the following clause is substituted:-</p> <p>Attendance on nominated Sub-Contractors shall be given as an item in each case shall be deemed to include: allowing use of standing scaffolding, mess rooms, sanitary accommodation and welfare facilities; provision of special scaffolding where necessary;providing space for office accommodation and for storage of plant and materials;providing light and water for their work: clearing away rubbish; unloading checking and hoisting: providing electric power and removing and replacing duct covers, pipe casings and the like necessary for the execution and testing of Sub- Contractors' work and being responsible for the accuracy of the same.</p> <p>Fix Only:-</p> <p>"Fix Only" shall mean take delivery at nearest railway station (Unless otherwise stated), pay all demurrage charges, load and transport to site where necessary, unload, store, unpack, assemble as necessary, distribute to position, hoist and fix only.</p> <p>B. EMPLOYER</p> <p>The "Employer" is MINISTRY OF HEALTH</p> <p>The term "Employer" and "Government" wherever used in the contract document shall be synonymous</p> <p>C. PROJECT MANAGER</p> <p>The term "P.M." wherever used in these Bills of Quantities shall be deemed to imply the Project Manager as defined in Condition 1 of the Conditions of Contract or such person or persons as may be duly authorised to represent him on behalf of the Government.</p> <p>D. ARCHITECT</p> <p>The term "Architect" shall be deemed to mean "The P.M." as defined above whose address unless otherwise notified is State Department for Public Works, P.O. Box 30743, NAIROBI.</p>	
	<p><i>Carried to collection</i></p>	

PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL, BUSIA.

ITEM	DESCRIPTION	AMOUNT
<p>A</p> <p>QUANTITY SURVEYOR</p> <p>The term "Quantity Surveyor" shall be deemed to mean "The P.M." as defined above whose address unless otherwise notified is State Department for Public Works, P.O. Box 30743, NAIROBI.</p> <p>B</p> <p>ELECTRICAL ENGINEER</p> <p>The term "Electrical Engineer" shall be deemed to mean "The P.M." as defined above whose address unless otherwise notified is State Department for Public Works, P.O. Box 30743, NAIROBI.</p> <p>C</p> <p>MECHANICAL ENGINEER</p> <p>The term "Mechanical Engineer" shall be deemed to mean "The P.M." as defined above whose address unless otherwise notified is State Department for Public Works, P.O. Box 30743, NAIROBI.</p> <p>D</p> <p>STRUCTURAL ENGINEER</p> <p>The term "Structural Engineer" shall be deemed to mean "The P.M." as defined above whose address unless otherwise notified is State Department for Public Works, P.O. Box 30743, NAIROBI.</p> <p>E</p> <p>FORM OF CONTRACT</p> <p>The Form of Contract shall be as stipulated in the Republic of Kenya's Standard Tender Document for Procurement of Building Works(2006 Edition) included herein The Conditions of Contract are also included herein Conditions of Contract These are numbered from 1 to 37 as set out in pages 20 to 48 of these tender documents.Particulars of insertions to be made in the Appendix to the Contract Agreement will be found in the Particular Preliminaries part of these Bills of Quantities</p>		
	<p><i>Carried to collection</i></p>	

PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL, BUSIA.

ITEM	DESCRIPTION	AMOUNT
<p>A.</p> <p>PLANT, TOOLS AND VEHICLES</p> <p>Allow for providing all scaffolding, plant, tools and vehicles required for the works except in so far as may be stated otherwise herein and except for such items specifically and only required for the use of nominated Sub-Contractors as described herein. No timber used for scaffolding, formwork or temporary works of any kind shall be used afterwards in the permanent work.</p> <p>B</p> <p>MATERIALS AND WORKMANSHIP.</p> <p>All materials and workmanship used in the execution of the work shall be of the best quality and description unless otherwise stated. The Contractor shall order all materials to be obtained from overseas immediately after the Contract is signed and shall also order materials to be obtained from local sources as early as necessary to ensure that they are onsite when required for use in the works. The Bills of Quantities shall not be used for the purpose of ordering materials.</p> <p>C</p> <p>SIGN FOR MATERIALS SUPPLIED.</p> <p>The Contractor will be required to sign a receipt for all articles and materials supplied by the PROJECT MANAGER at the time of taking deliver thereof, as having received them in good order and condition, and will thereafter be responsible for any loss or damage and for replacements of any such loss or damage with articles and/or materials which will be supplied by the PROJECT MANAGER at the current market prices including Customs Duty and V.A.T., all at the Contractor's own cost and expense, to the satisfaction of the PROJECT MANAGER</p> <p>D</p> <p>STORAGE OF MATERIALS</p> <p>The Contractor shall provide at his own risk and cost where directed on the site weather proof lock-up sheds and make good damaged or disturbed surfaces upon completion to the satisfaction of the PROJECT MANAGER Nominated Sub-Contractors are to be made liable for the cost of any storage accommodation provided especially for their use.</p>		
	<p><i>Carried to collection</i></p>	

PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL, BUSIA.

ITEM	DESCRIPTION	AMOUNT
<p>A. SAMPLES</p>	<p>The Contractor shall furnish at his own cost any samples of materials or workmanship including concrete test cubes required for the works that may be called for by the PROJECT MANAGER for his approval until such samples are approved by the PROJECT MANAGER and the PROJECT MANAGER, may reject any materials or workmanship not in his opinion to be up to approved samples. The PROJECT MANAGER shall arrange for the testing of such materials as he may at his discretion deem desirable, but the testing shall be made at the expense of the Contractor and not at the expense of the PROJECT MANAGER. The Contractor shall pay for the testing in accordance with the current scale of testing charges laid down by the Ministry of Public Works.</p> <p>The procedure for submitting samples of materials for testing and the method of marking for identification shall be as laid down by the PROJECT MANAGER The Contractor shall allow in his tender for such samples and tests except those in connection with nominated sub-contractors' work.</p> <p>B. GOVERNMENT ACTS REGARDING WORKPEOPLE ETC.</p> <p>Allow for complying with all Government Acts, Orders and Regulations in connection with the employment of Labour and other matters related to the execution of the works. In particular the Contractor's attention is drawn to the provisions of the Factory Act 1950 and his tender must include for all costs arising or resulting from compliance with any Act, Order or Regulation relating to Insurances, pensions and holidays for workpeople or so the safety, health and welfare of the workpeople. The Contractor must make himself fully acquainted with current Acts and Regulations,including Police Regulations regarding the movement, housing, security and control of labour, labour camps , passes for transport, etc. It is most important that the Contractor, before tendering, shall obtain from the relevant Authority the fullest information regarding all such regulations and/or restrictions which may affect the information regarding all such regulations and/or restrictions which may affect the organisation of the works, supply and control of labour, etc., and allow accordingly in his tender.</p> <p>No claim in respect of want of knowledge in this connection will be entertained.</p>	
	<p style="text-align: right;"><i>Carried to collection</i></p>	

PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL, BUSIA.

ITEM	DESCRIPTION	AMOUNT
<p>A. PUBLIC AND PRIVATE ROADS.</p> <p>Maintain as required throughout the execution of the works and make good any damage to public or private roads arising from or consequent upon the execution of the works to the satisfaction of the local and other competent authority and the PROJECT MANAGER</p> <p>B. EXISTING PROPERTY.</p> <p>The Contractor shall take every precaution to avoid damage to all existing property including roads, cables, drains and other services and he will be held responsible for and shall make good all such damage arising from the execution of this contract at his own expense to the satisfaction of the PROJECT MANAGER</p> <p>C. VISIT SITE AND EXAMINE DRAWINGS.</p> <p>The Contractor is recommended to examine the drawings and visit the site the location of which is described in the Particular Preliminaries hereof. He shall be deemed to have acquainted himself therewith as to its nature, position, means of access or any other matter which, may affect his tender. No claim arising from his failure to comply with this recommendation will be considered.</p> <p>D. ACCESS TO SITE AND TEMPORARY ROADS.</p> <p>Means of access to the Site shall be agreed with the PROJECT MANAGER prior to commencement of the work and Contractor must allow for building any necessary temporary access roads for the transport of the materials, plant and workmen as may be required for the complete execution of the works including the provision of temporary culverts, crossings, bridges, or any other means of gaining access to the Site. Upon completion of the works, the Contractor shall remove such temporary access roads; temporary culverts, bridges, etc., and make good and reinstate all works and surfaces disturbed to the satisfaction of the PROJECT MANAGER</p> <p>E. AREA TO BE OCCUPIED BY THE CONTRACTOR</p> <p>The area of the site which may be occupied by the Contractor for use of storage and for the purpose of erecting workshops, etc., shall be defined on site by the PROJECT MANAGER</p>		
	<p><i>Carried to collection</i></p>	

PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL, BUSIA.

ITEM	DESCRIPTION	AMOUNT
<p>A. OFFICE ETC. FOR THE PROJECT MANAGER</p> <p>The Contractor shall provide, erect and maintain where directed on site and afterwards dismantle the site office of the type noted in the Particular Preliminaries, complete with Furniture. He shall also provide a strong metal trunk complete with strong hasp and staple fastening and two keys. He shall provide, erect and maintain a lock-up type water or bucket closet for the sole use of the PROJECT MANAGER including making temporary connections to the drain where applicable to the satisfaction of Government and Medical Officer of Health and shall provide services of cleaner and pay all conservancy charges and keep both office and closet in a clean and sanitary condition from commencement to the completion of the works and dismantle and make good disturbed surfaces. The office and closet shall be completed before the Contractor is permitted to commence the works. The Contractor shall make available on the Site as and when required by the "PROJECT MANAGER" a modern and accurate level together with levelling staff, ranging rods and 50 metre metallic or linen tape.</p> <p>B. WATER AND ELECTRICITY SUPPLY FOR THE WORKS</p> <p>The Contractor shall provide at his own risk and cost all necessary water, electric light and power required for use in the works. The Contractor must make his own arrangements for connection to the nearest suitable water main and for metering the water used. He must also provide temporary tanks and meters as required at his own cost and clear away when no longer required and make good on completion to the entire satisfaction of the PROJECT MANAGER . The Contractor shall pay all charges in connection herewith. No guarantee is given or implied that sufficient water will be available from mains and the Contractor must make his own arrangements for augmenting this supply at his own cost. Nominated Sub--contractors are to be made liable for the cost of any water or electric current used and for any installation provided especially for their own use.</p> <p>C. SANITATION OF THE WORKS</p> <p>The Sanitation of the works shall be arranged and maintained by the Contractor to the satisfaction of the Government and/or Local Authorities, Labour Department and the PROJECT MANAGER</p>		
	<p><i>Carried to collection</i></p>	

PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL, BUSIA.

ITEM	DESCRIPTION	AMOUNT
<p>A</p>	<p>SUPERVISION AND WORKING HOURS</p> <p>The works shall be executed under the direction and to the entire satisfaction in all respects of the PROJECT MANAGER who shall at all times during normal working hours have access to the works and to the yards and workshops of the Contractor and sub-Contractors or other places where work is being prepared for the contract.</p> <p>B</p> <p>PROVISIONAL SUMS.</p> <p>The term "Provisional Sum" wherever used in these Bills of Quantities shall have the meaning stated in Section A item A7(i) of the Standard Method of Measurement. Such sums are net and no addition shall be made to them for profit.</p> <p>C</p> <p>PRIME COST (OR P.C.) SUMS.</p> <p>The term "Prime Cost Sum" or "P.C. Sum" wherever used in these Bills of Quantities shall have the meaning stated in Section A item A7 (ii) of the Standard Method of Measurement . Persons or firms nominated by the PROJECT MANAGER to execute work or to provide and fix materials or goods are described herein as Nominated Sub-Contractors. Persons or firms so nominated to supply goods or materials are described herein as Nominated Suppliers.</p> <p>D</p> <p>PROGRESS CHART.</p> <p>The Contractor shall provide ,before signing the contract and in agreement with the PROJECT MANAGER, a Progress Chart for the whole of the works including the works of Nominated Sub-Contractors ; one copy to be handed to the PROJECT MANAGER and a further copy to be retained on Site. Progress to be recorded and chart to be amended as necessary as the work proceeds.</p>	
	<p><i>Carried to collection</i></p>	

PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL, BUSIA.

ITEM	DESCRIPTION	AMOUNT
A	<p>ADJUSTMENT OF P.C. SUMS.</p> <p>In the final account all P.C. Sums shall be deducted and the amount properly expended upon the PROJECT MANAGER'S order in respect of each of them added to the Contract sum. The Contractor shall produce to the PROJECT MANAGER such quotations, invoices or bills, properly receipted, as may be necessary to show the actual details of the sums paid by the Contractor. Items of profit upon P.C. Sums shall be adjusted in the final account pro-rata to the amount paid. Items of "attendance" (as previously described) following P.C. Sums shall be adjusted pro-rata to the physical extent of the work executed (not pro-rata to the amount paid) and this shall apply even though the Contractor's priced Bill shows a percentage in the rate column in respect of them. Should the Contractor be permitted to tender and his tender be accepted of any work for which a P.C. Sum is included in these Bill of Quantities profit and attendance will be allowed at the same rate as it would be if the work were executed by a Nominated Sub-Contractor.</p>	
	<i>Carried to collection</i>	

PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL, BUSIA.

ITEM	DESCRIPTION	AMOUNT
<p>A.</p> <p>ADJUSTMENT OF PROVISIONAL SUMS.</p> <p>In the final account all Provisional Sums shall be deducted and the value of the work properly executed in respect of them upon the PROJECT MANAGER's order added to the Contract Sum. Such work shall be valued , but should any part of the work be executed by a Nominated Sub-Contractor, the value of such work or articles for the work to be supplied by a Nominated Supplier, the value of such work or articles shall be treated as a P.C. Sum and profit and attendance comparable to that contained in the priced Bills of Quantities for similar items added.</p> <p>B.</p> <p>NOMINATED SUB-CONTRACTORS</p> <p>When any work is ordered by the PROJECT MANAGER to be executed by nominated sub-contractors, the Contractor shall enter into sub-contracts and shall thereafter be responsible for such sub-contractors in every respect. Unless otherwise described the Contractor is to provide for such Sub-Contractors any or all of the facilities described in these Preliminaries. The Contractor should price for these with the nominated Sub-contract Contractor's work concerned in the P.C. Sums under the description "add for Attendance".</p> <p>C.</p> <p>DIRECT CONTRACTS</p> <p>Notwithstanding the foregoing conditions, the Government reserves the right to place a "Direct Contract" for any goods or services required in the works which are covered by a P.C. Sum in the Bills of Quantities and to pay for the same direct. In any such instances, profit relative to the P.C. Sum the priced Bills of Quantities will be adjusted as described for P.C. Sums and allowed.</p> <p>D.</p> <p>ATTENDANCE UPON OTHER TRADESMEN, ETC.</p> <p>The Contractor shall allow for the attendance of trade upon trade and shall afford any tradesmen or other persons employed for the execution of any work not included in this Contract every facility for carrying out their work and also for use of his ordinary scaffolding. The Contractor, however, shall not be required to erect any special scaffolding for them. The Contractor shall perform such cutting away for and making good after the work of such tradesmen or persons as may be ordered by the PROJECT MANAGER and the work will be measured and paid for to the extent executed at rates provided in these Bills.</p>		
	<p><i>Carried to collection</i></p>	

PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL, BUSIA.

ITEM	DESCRIPTION	AMOUNT
<p>A. INSURANCE</p> <p>The Contractor shall insure as required in Conditions No. 30 of the Conditions of Contract. No payment on account of the work executed will be made to the Contractor until he has satisfied the PROJECT MANAGER either by production of an Insurance Policy or and Insurance Certificate that the provision of the foregoing Insurance Clauses have been complied with in all respects. Thereafter the PROJECT MANAGER shall from time to time ascertain that premiums are duly paid up by the Contractor who shall if called upon to do so, produce the receipted premium renewals for the PROJECT MANAGER's inspection.</p> <p>B. PROVISIONAL WORK</p> <p>All work described as "Provisional" in these Bills of Quantities is subject to remeasurement in order to ascertain the actual quantity executed for which payment will be made. All "Provisional" and other work liable to adjustment under this Contract shall left uncovered for a reasonable time to allow all measurements needed for such adjustment to be taken by the PROJECT MANAGER Immediately the work is ready for measuring, the Contractor shall give notice to the PROJECT MANAGER. If the Contractor makes default in these respects he shall if the PROJECT MANAGER so directs uncover the work to enable all measurements to be taken and afterwards reinstate at his own expense.</p> <p>C. ALTERATIONS TO BILLS, PRICING, ETC.</p> <p>Any unauthorised alteration or qualification made to the text of the Bills of Quantities may cause the Tender to be disqualified and will in any case be ignored. The Contractor shall be deemed to have made allowance in his prices generally to cover any items against which no price has been inserted in the priced Bills of Quantities. All items of measured work shall be priced in detail and the Tenders containing Lump Sums to cover trades or groups of work must be broken down to show the price of each item before they will be accepted.</p>		
	<p><i>Carried to collection</i></p>	

PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL, BUSIA.

ITEM	DESCRIPTION	AMOUNT
<p>A</p>	<p>BLASTING OPERATIONS</p> <p>Blasting will only be allowed with the express permission of the PROJECT MANAGER 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 PROJECT MANAGER governing the use and storage of explosives.</p> <p>B</p> <p>MATERIALS ARISING FROM EXCAVATIONS</p> <p>Materials of any kind obtained from the excavations shall be the property of the Government. Unless the PROJECT MANAGER directs otherwise such materials shall be dealt with as provided in the Contract. Such materials shall only be used in the works, in substitution of materials which the Contractor would otherwise have had to supply with the written permission of the PROJECT MANAGER Should such permission be given, the Contractor shall make due allowance for the value of the materials so used at a price to be agreed.</p> <p>C</p> <p>PROTECTION OF THE WORKS.</p> <p>Provide protection of the whole of the works contained in the Bills of Quantities,including casing , casing up, covering or such other means as may be necessary to avoid damage to the satisfaction of the PROJECT MANAGER and remove such protection when no longer required and make good any damage which may nevertheless have been done at completion free of cost to the Government.</p> <p>D</p> <p>REMOVAL OF RUBBISH ETC.</p> <p>Removal of rubbish and debris from the Buildings and site as it accumulates and at the completion of the works and remove all plant, scaffolding and unused materials at completion.</p>	
	<p><i>Carried to collection</i></p>	

PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL, BUSIA.

ITEM	DESCRIPTION	AMOUNT
<p>A</p>	<p>WORKS TO BE DELIVERED UP CLEAN</p> <p>Clean and flush all gutters, rainwater and waste pipes, manholes and drains, wash (except where such treatment might cause damage) and clean all floors, sanitary fittings, glass inside and outside and any other parts of the works and remove all marks, blemishes, stains and defects from joinery, fittings and decorated surfaces generally, polish door furniture and bright parts of metalwork and leave the whole of the buildings watertight, clean, perfect and fit for occupation to the approval of the PROJECT MANAGER</p> <p>B</p> <p>GENERAL SPECIFICATIONS</p> <p>For the full description of materials and workmanship, method of execution of the work and notes for pricing, the Contractor is referred to the Ministry of Roads and Public Works and Housing General Specification dated 1976 or any subsequent revision thereof which is issued as a separate document, and which shall be allowed in all respects unless it conflicts with the General Preliminaries, Trade Preambles or other items in these Bills of Quantities.</p> <p>C</p> <p>TRAINING LEVY</p> <p>The Contractor's attention is drawn to legal notice No. 237 of October, 1971, which requires payment by the Contractor of a Training Levy at the rate of 1/4 % of the Contract sum on all contracts of more than Kshs. 50,000.00 in value.</p> <p>D</p> <p>MATERIALS ON SITE</p> <p>All materials for incorporation in the works must be stored on or adjacent to the site before payment is effected unless specifically exempted by the PROJECT MANAGER. This includes the materials of the Main Contractor, Nominated Sub-Contractors and Nominated Suppliers.</p>	
	<p><i>Carried to Collection</i></p>	

PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL, BUSIA.

ITEM	DESCRIPTION	AMOUNT
A	HOARDING The Contractor shall enclose the site or part of the works under construction with a hoarding 2400 mm high consisting of iron sheets on 100 x 50 mm timber posts firmly secured at 1800 mm centres with two 75 x 50 mm timber rails for a total length of approximately three hundred meters. The Contractor is in addition required to take all precautions necessary for the safe custody of the works, materials, plant, public and Employer's property on the site.	
B	CONTRACTOR'S SUPERINTENDENCE/SITE AGENT 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 give his whole experience in the kind of work involved and shall give his whole time to the superintendence of the works. Such Agent or Representative shall receive on behalf of the Contractor all directions and instructions from the Project Manager and such directions shall be deemed to have been given to the Contractor in accordance with the Conditions of Contract.	
C	PROGRESS PHOTOGRAPHS The contractor is to allow for taking, processing and supplying Twelve (12) full colour plate size photos to the project manager per month throughout the construction period.	
	<i>Carried to Collection</i>	

PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL, BUSIA.

ITEM	DESCRIPTION	AMOUNT
	<p style="text-align: center;"><u>COLLECTION</u></p> <p>Brought Forward From Page GP/1</p> <p>Brought Forward From Page GP/2</p> <p>Brought Forward From Page GP/3</p> <p>Brought Forward From Page GP/4</p> <p>Brought Forward From Page GP/5</p> <p>Brought Forward From Page GP/6</p> <p>Brought Forward From Page GP/7</p> <p>Brought Forward From Page GP/8</p> <p>Brought Forward From Page GP/9</p> <p>Brought Forward From Page GP/10</p> <p>Brought Forward From Page GP/11</p> <p>Brought Forward From Page GP/12</p> <p>Brought Forward From Page GP/13</p> <p>Brought Forward From Page GP/14</p>	
	TOTAL FOR GENERAL PRELIMINARIES CARRIED TO GRAND SUMMARY	

PREAMBLES AND PRICING NOTES

A. GENERALLY

All work to be carried out in accordance with the Ministry of Roads, Public Works and Housing General Specifications for Building Works issued in 1976 or as qualified or amended.

B. MANUFACTURERS' NAMES

Where manufacturers' names and catalogue references are given for guidance to quality and standard only, alternative manufacturer of equal quality will be accepted at the discretion of the Project Manager.

C. WALLING

All precast concrete blocks shall be manufactured by the methods and to the sizes specified in the Ministry of Roads, Public Works and Housing "Specification for Metric Sized Concrete Blocks for Building (1972)"

Walling of 100 mm thickness or under shall be reinforced with hoop iron every alternate course.

Prices for walling must allow for all costs in preparing, packing and sending sample blocks for testing as and when required by the Project Manager.

D. CARPENTRY

The grading rules for cypress shall be the same as for podocarpus and all timber used for structural work shall be select (second grade).

All structural timber must conform to the minimum requirements for moisture content and preservative treatment and timber prices must allow for preparing, packing and sending samples for testing when required.

Prices must also include for all nails and fasteners.

A. JOINERY

Cypress for joinery shall be second grade in accordance with the latest grading rules of the Kenya Government.

Where Mahogany is specified, this refers to prime grade only. The Contractor may with the approval of the Project Manager, use either Msharagi or Mvuli in lieu of Mahogany but such approval will be given only in the case of shortages of the hardwoods specified.

Plugging shall be carried out by drilling walling or concrete with masonry drill and filling with propriety plugs of the correct sizes. Cutting with hammer and chisel will not be allowed.

Prices for joinery must include for pencil rounded arises, protection against damage, nails, screws, framing and bedding in cement mortar as required.

Sizes given for joinery items are nominal sizes and exact dimensions of doors, etc, must be ascertained on site.

B. IRONMONGERY

Ironmongery shall be as specified in the Bills of Quantities or equal and approved.

Prices must include for removing and re-fixing during and after painting, labeling all keys, and for fixing to hardwood, softwood, concrete or blockwork.

Catalogue references given for ironmongery are for purposes of indicating quality and size of item(s). Should the Contractor wish to substitute the specified item(s) with others of equal quality, he must inform the Project Manager and obtain approval in writing.

C. STRUCTURAL STEELWORK

All structural steelwork shall comply with the Ministry of Public Works "Structural Steelwork Specification (1973) and shall be executed by an approved Sub-contractor.

A. PLASTERWORK AND OTHER FINISHES

All finishings shall be as described in the general specifications and in these Bills of Quantities.

Prices for pavings are to include for brushing concrete clean, wetting and coating with cement and sand grout 1:1.

Rates for glazed wall tiling are to include for a 12 mm cement and sand (1:4) backing screed unless otherwise specified in these Bills of Quantities.

B. GLAZING

Where polished plate glass is specified, this refers to general glazing quality.

Prices for glazing shall include for priming of rebates before placing putty.

The Contractor will be responsible for replacing any broken or scratched glass and handing over in perfect condition.

C. PAINTING

All paint shall be 1st quality "Crown" or other equal and approved

Painting shall be applied in accordance with the manufacturers' instructions.

Prices for painting are to include for scaffolding, preparatory work, priming coats, protection of other works and for cleaning up on completion. Prices for painting on galvanized metal are to include for mordant solution as necessary.

PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL, BUSIA

ITEM	DESCRIPTION	UNIT	QTY	RATE	KSHS.	CTS
	<u>ISOLATION WARD</u>					
	<u>ELEMENT NO. 1</u>					
	<u>SUBSTRUCTURES (ALL PROVISIONAL)</u>					
	<u>Site clearance</u>					
A	Clear site of works off grass, shrubs and small trees and grub up roots and burn the arising debris.	SM	856			
	<u>Excavations</u>					
	<u>Excavations including maintaining and supporting sides of excavation from fallen soil, mud or sub-surface water by baling, pumping or otherwise.</u>					
B	For mass excavation, 0-1500mm to reduce levels from the ground level and load and cart away.	CM	260			
C	For strip foundations, 0-1500mm deep in murram from the stripped levels.	CM	256			
D	Extra over for excavation in rock irrespective of class	CM	19			
	<u>Disposal</u>					
E	Return, fill in and ram selected excavated material around foundation walls and columns.	CM	119			
F	Load and cart away surplus excavated material and dispose off as per local authority directions.	CM	137			
	<u>Imported filling</u>					
G	300mm thick hardcore filling to make up levels handpacked and well compacted in 150mm thick layers to Structural Engineer's approval.	SM	678			
H	50mm Thick quarry dust blinding spread over hardcore bed and ram over by roller while moist for proper consolidation.	SM	678			
	<u>Anti-termite treatment</u>					
I	Chemical anti- termite treatment as "Gladiator TC" or other equal and approved termicide sprayed over surfaces of hardcore bed and walls.	SM	743			
	<u>Damp proof membrane.</u>					
J	1000 Gauge polythene sheeting damp proof membrane spread over hardcore bed and walls with 300mm side laps and end laps (measured nett with no allowance for overlaps).	SM	743			
	To collection			Kshs.		

PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL, BUSIA

ITEM	DESCRIPTION	UNIT	QTY	RATE	KSHS.	CTS
	<u>Concrete Works</u>					
	<u>Mass concrete class 15/20 aggregates as described in:-</u>					
A	50mm thick blinding under strip footing	SM	222			
	<u>Reinforced concrete class 25/20 aggregate as described in:-</u>					
B	Strip footing	CM	44			
C	150mm Thick ground floor slab	SM	743			
	<u>Reinforcement</u>					
	<u>B.R.C Mesh Reinforcement</u>					
D	Fabric Mesh reinforcement to Ref. A142 laid in slab with minimum 300mm side and end laps (<i>measured nett with no allowance for overlaps</i>)	SM	743			
	<u>Bar Reinforcement</u>					
	<u>High tensile square twisted bar reinforcement to B.S 4449 complete with precast concrete spacer blocks ;supplied, cut, bent and fixed as described in:-</u>					
E	Bar reinforcement of assorted sizes	KG	5720			
	<u>Formwork</u>					
	<u>Sawn softwood/steel formwork as described to:-</u>					
F	Sides of strip footing	SM	148			
G	Edges of floor slab 75- 150mm girth	LM	139			
	<u>Foundation walling</u>					
	<u>Approved natural quarry stone of minimum crushing strength of 7.5N/mm² built in courses of cement/sand (1:3) mortar mix as described in:-</u>					
H	200mm Thick natural stone walling reinforced at each alternate course with and including 24gauge galvanized mild steel hoop iron and staggered.	SM	463			
	<u>Damp proof course</u>					
I	200mm Wide hessian type damp proof course laid under walls with and including 20mm thick cement/sand(1:3) setting screed.	LM	360			
	To collection			Kshs.		

PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL, BUSIA

ITEM	DESCRIPTION	UNIT	QTY	RATE	KSHS.	CTS
	<u>Plinth finishes</u>					
	<u>Cement/sand (1:3) render as described to:-</u>					
A	16mm Thick render to plinths.	SM	41			
	<u>Cladding</u>					
B	Approved rough mazeras stones of appropriate colour jointed with and including cement/sand (1:3) mortar to the sides of plinths.	SM	41			
	<u>Pre-cast concrete paving slabs as described in:-</u>					
C	600 x 600 x 50mm Thick precast concrete paving slabs, laid on and including 100mm thick bed of sand and pointed at the joints with cement sand (1:3) mortar	SM	166			
					Kshs.	
	<u>COLLECTIONS</u>					
	From page : W/1					
	: W/2					
	From above					
	<u>TOTAL TO ISOLATION WARD SUMMARY</u>				KSHS.	

PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL, BUSIA

ITEM	DESCRIPTION	UNIT	QTY	RATE	KSHS.	CTS
	<u>SECTION No. 3</u>					
	<u>ELEMENT NO. 2</u>					
	<u>R.C. SUPERSTRUCTURE</u>					
	<u>Reinforced concrete class 20/20 aggregate as described in:-</u>					
A	Beams.	CM	35			
	<u>Bar Reinforcement</u>					
	<u>High tensile square twisted bar reinforcement to B.S 4449 complete with precast concrete spacer blocks :supplied, cut, bent and fixed as described in:</u>					
B	Bar reinforcement of assorted sizes	KG	4200			
	<u>Formwork</u>					
	<u>Sawn softwood/steel formwork as described to:-</u>					
C	Sides of columns	SM	424			
	<u>TOTAL TO ISOLATION WARD SUMMARY</u>				KSHS.	

PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL, BUSIA

ITEM	DESCRIPTION	UNIT	QTY	RATE	KSHS.	CTS
	<u>SECTION No. 3</u>					
	<u>ELEMENT No. 3</u>					
	<u>WALLING</u>					
	<u>External Walling</u>					
	<u>Approved Natural stone load bearing wall of minimum crushing strength 5N/mm² bedded and jointed in cement/sand mortar (mix 1:3)</u>					
A	200mm Thick machine cut stone walling reinforced at each alternate course with and including 24 Gauge galvanized mild steel hoop iron and staggered.	SM	274			
	<u>Internal Walling</u>					
	<u>Approved natural load bearing stone wall of minimum crushing strength of 5N/mm² built in courses of cement/sand (1:3) mortar mix.</u>					
B	200mm Thick machine cut stone walling reinforced at each alternate course with and including 24 Gauge galvanized mild steel hoop iron and staggered.	SM	495			
C	100mm thick walling, ditto	SM	45			
	<u>TOTAL TO ISOLATION WARD SUMMARY</u>				KSHS.	

PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL, BUSIA

ITEM	DESCRIPTION	UNIT	QTY	RATE	KSHS.	CTS
	<u>SECTION No. 3</u>					
	<u>ELEMENT No. 4</u>					
	<u>ROOFING AND RAINWATER DISPOSAL</u>					
	<u>Roof covering</u>					
A	28 gauge IT5 roofing sheets of approved colour fixed on timber with and including 0.2mm supersisalation fixed to roof structure (m/s)with and including approved roofing nails and rubber washers to Structural Engineer's approval.	SM	989			
B	Extra over for ridge caps 600mm girth.	LM	33			
C	Ditto for valley caps	LM	38			
D	Ditto for hip caps	LM	91			
E	Extra over for raking cutting on sheets	LM	324			
	<u>Fascia/Eaves</u>					
	<u>Wrot prime grade cypress</u>					
F	Ex 100 x 25mm Wrot prime grade cypress T&G Fixed with tuck nails to and including 50 x 50mm sawn celcured cypress brandering at 600mm c/c	SM	83			
	<u>Wrot prime grade cypress as described in:-</u>					
G	Ex 20mm Quarter round beading to junctions of fascia/barge boards and T&G and wall with T& G.	LM	290			
H	Ex 225 x 25mm fascia and barge boards nailed to rafters.	LM	145			
	<u>Painting and Decorating</u>					
	<u>Prepare, knot, prime, stop and apply three coats gloss oil paint from approved source to:</u>					
I	Surfaces of woodwork, 0-100mm girth	LM	290			
J	Surfaces of fascia and barge boards, 200-300mm girth.	LM	145			
	<u>Prepare and apply three coats of polyurethane stained varnish to:</u>					
K	General surfaces of T&G eaves	SM	83			
	To collection				Kshs.	

PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL, BUSIA

ITEM	DESCRIPTION	UNIT	QTY	RATE	KSHS.	CTS
	<u>Roof structure</u>					
	<u>The following in sawn celcured cypress fully seasoned and and treated with water based preservative applied by pressure impregnation including all fasteners and labours of hoisting to roof level as described in:-</u>					
A	150 x 50mm Trussed Rafters.	LM	467			
B	Ditto Tie beam/ceiling joist.	LM	394			
C	Ditto King post.	LM	92			
D	100 x 50mm Struts and ties.	LM	1041			
	<u>Independent timber members in:</u>					
E	150 x 50 Common rafters.	LM	1367			
F	100 x 50mm Purlins.	LM	1412			
G	150 x 50mm Ridge board.	LM	33			
H	100 x 50mm Sawn celcured cypress wall plate fixed to ring beam with and including 12mm diameter J-bolts at 1500mm c/c	LM	138			
	<u>Rainwater goods</u>					
	<u>22 Gauge metal sheet as described in:-</u>					
I	150 x 150mm Boxed gutter jointed with mastic and hemp gasket and held to fascia boards with and including mild steel brackets at 600mm c/c primed with one coat of zinc chromate antirust primer.	LM	145			
J	Extra over for boxed ends size 150 x 150mm ditto.	No.	8			
	<u>Heavy gauge UPVC as described in:-</u>					
K	100mm Diameter grey down pipes held onto walls with and including mild steel holder bats at 1000 c/c.	LM	18			
L	Extra over for swanneck, 600mm long.	No.	6			
M	Ditto for shoe ditto.	No.	6			
	<u>Prepare and apply first quality gloss oil paint to:-</u>					
N	General surfaces of gutters.	SM	65			
	To collection				Kshs.	

PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL, BUSIA.

ITEM	DESCRIPTION	UNIT	QTY	RATE	KSHS.	CTS
	<p><u>COLLECTIONS</u></p> <p>From page : W/6</p> <p>: W/7</p> <p><u>TOTAL TO ISOLATION WARD SUMMARY</u></p>				KSHS.	

PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL, BUSIA

ITEM	DESCRIPTION	UNIT	QTY	RATE	KSHS.	CTS
	<u>SECTION No. 3</u>					
	<u>ELEMENT No. 5</u>					
	<u>FINISHES</u>					
	<u>FLOORS</u>					
	<u>Cement/sand (1:3) screed mix as described in:-</u>					
A	32mm Thick paving to receive Ceramic tiles	SM	164			
B	38mm Thick pavings to receive epoxy floor finish	SM	495			
	<u>Ceramic tiles from approved source as described in:-</u>					
C	330mm x 330 x 8mm Thick coloured non-slip ceramic tiles laid from the centre in 6mm thick continuous joints both ways and including cement mortar backing and grouted.	SM	164			
D	330mm long x 100mm high x 10mm thick ceramic tiles skirting to walls, fixed with cement mortar backing and grouted .	LM	443			
	<u>Epoxy floor finish as described in:-</u>					
E	2mm Thick Epoxy floor finish in approved pigmentation poured on screed bed(m.s) and polished to client's approval	SM	495			
	<u>Wall finishes</u>					
	<u>Plaster</u>					
F	Apply 9mm Thick first coat of cement/sand (1:3) and then 5mm thick second coat of cement/lime (1:5) putty steel trowelled smooth.	SM	1,186			
G	Ditto to door and window reveals and jambs.	SM	114			
	<u>Ceramic tiles</u>					
	<u>Ceramic tiles from approved source as described in:-</u>					
H	300 x 250 x 6mm Thick glazed tiles laid up to 2100mm high on keyed rendered backgrounds on cement/mortar backings and pointed with approved grout complete with plastic edging strips.	SM	330			
	<u>Ceiling finishes</u>					
	<u>Acoustic ceiling</u>					
I	20mm thick acoustic minatone ceilings in 600 x 600mm panels suspended from roof structure with metal hangers including taping as required.	SM	660			
	To collection				Kshs.	

PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL, BUSIA

ITEM	DESCRIPTION	UNIT	QTY	RATE	KSHS.	CTS
	<u>Painting and Decorating</u>					
	<u>Prepare, touch up one misty coat universal undercoat and apply three coats silk vinyl emulsion paint from approved source to:-</u>					
A	Plastered wall surfaces.	SM	1,300			
	<u>External wall finish</u>					
	<u>Cement/sand (1:3) render as described to:-</u>					
B	16mm Thick render to beams finished with wood float.	SM	66			
C	Extra over fair faced walls for key pointing with cement /sand (1:4) mortar in flush vertical and recessed horizontal joints	SM	274			
	<u>Painting and Decorating</u>					
D	Prepare and apply three coats exterior Duraplast quality paint from approved sources to rendered surfaces.	SM	66			
	To collection below				Kshs.	
	<u>COLLECTIONS</u>					
	From page : W/9					
	From above					
	<u>TOTAL TO ISOLATION WARD SUMMARY</u>				KSHS.	

PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL, BUSIA

ITEM	DESCRIPTION	UNIT	QTY	RATE	KSHS.	CTS
	<u>ELEMENT No. 6</u>					
	<u>WINDOWS</u>					
	<u>Window Cill</u>					
A	Precast concrete window cill size 150 x 200 x 50mm one side weathered and throated, bedded and jointed in cement/sand (1:3)mortar mix.	LM	61			
	<u>Wrot prime grade cypress as described in:</u>					
B	Ex 200 x 20 mm Bull nosed window boards plugged.	LM	51			
	<u>Wrot iron as described in:-</u>					
C	30mm Diameter spray painted rods with moulded ends complete with rings and a pair of moulded brackets fixed to walls	LM	56			
	<u>Aluminium Windows</u>					
	<u>Purpose made powder coated aluminium framed windows of frame size 100 x 50mm complete with fixing lugs, stays, permanent vents, locking mechanisms and building into masonry works.</u>					
D	Window size 2000 x 1500mm high	No.	16			
E	Ditto 1500 x 1500mm high	No.	5			
F	Ditto 1200 x 1500mm high	No.	7			
G	Ditto 1500 x 900mm high	No.	2			
H	Ditto 1200 x 900mm high	No.	3			
I	Ditto 900 x 600mm high	No.	10			
	<u>Glazing</u>					
J	<u>Provide size as per detail</u> x 5mm thick clear glass. Glazing units installed with glazing putty.	SM	72			
K	Ditto obscure glass ditto	SM	12			
	<u>Painting and decoration</u>					
	<u>Prepare and apply three coats stained polyurethane varnish from approved sources to:-</u>					
L	Surface of woodwork, 100-200mm girth	LM	51			
	<u>TOTAL TO ISOLATION WARD SUMMARY</u>				KSHS.	

PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL, BUSIA

ITEM	DESCRIPTION	UNIT	QTY	RATE	KSHS.	CTS
	<u>ELEMENT No.7</u>					
	<u>DOORS AND FANLIGHTS</u>					
	<u>Door frames and fittings in wrot prime grade mahogany in:-</u>					
A	Ex 50 x 15mm Moulded architrave with three labours	LM	153			
B	Ex 25mm Quadrant beadings.	LM	153			
C	Ex 50 x 15mm Glazing beads.	LM	71			
D	Ex 100 x 50mm Frames with three labours.	LM	110			
E	Ex 200 x 50mm Ditto.	LM	181			
	<u>Flush doors to B.S 459 (Part 2) in:-</u>					
F	45mm Thick solid core flush door size 900 x 2100mm high comprising of 6mm thick plywood and hardwood lipped on exposed edges.	No.	16			
G	Ditto double door size 1200 x 2100mm high, ditto.	No.	3			
H	Ditto double door size 1500 x 2100mm high, ditto.	No.	2			
I	45mm Thick semi-solid core flush door size 900 x 2100mm high comprising of 6mm thick plywood and hardwood lipped on exposed edges.	No.	22			
	<u>Panel Door</u>					
J	50mm thick solid mahogany panel double door , size 1500 x 2100mm high in 2 No. equal openable door leaves ,comprising of 100 x 50mm top and middle rails ,lock and hinges stiles , on curved mullions .All to architect details.	No.	4			
K	Ditto size 900 x 2100mm high, ditto.	No.	1			
	<u>Ironmongery</u>					
	<u>Supply and fix the following ironmongery as per union catalogue complete with matching screws.</u>					
L	Brass butt hinges.	Prs.	85.5			
M	2- Lever cylinder door locks with a pair of moulded nickel brass yanise handles.	No.	21			
N	3- Lever cylinder door locks with a pair of moulded nickel brass yanise handles.	No.	5			
O	Vacant/Engaged door locks	No.	22			
P	Rubber door stops with rawl bolts	No.	20			
Q	Approved stainless steel door signage	No.	25			
	To collection				Kshs.	

PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL, BUSIA

ITEM	DESCRIPTION	UNIT	QTY	RATE	KSHS.	CTS
	<u>Painting and Decorating</u>					
	<u>Prepare and apply three coats of gloss oil paint as described to:-</u>					
A	General surfaces of timber doors	SM	98			
B	Surface of woodwork, 0-100mm girth	LM	377			
C	Ditto 100-200mm girth	LM	291			
	<u>Fanlight glazing</u>					
D	<u>Provide size as per detail</u> x 5mm thick clear glass fanlights. Glazing units installed with timber beads (m.s)	SM	9			
	To collection below				Kshs.	
	<u>COLLECTIONS</u>					
	From page : W/12					
	From above					
	<u>TOTAL TO ISOLATION WARD SUMMARY</u>				KSHS.	

PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL, BUSIA

ITEM	DESCRIPTION	UNIT	QTY	RATE	KSHS.	CTS
	<u>SECTION No. 3</u>					
	<u>ELEMENT No.8</u>					
	<u>FITTINGS AND FIXTURES</u>					
A	Nurse station counter overall size 4500 x 900 x 1200mm high shaped to details comprising of 20mm thick granite slab worktop fixed onto 20mm thick blockboard, 20mm thick laminated MDF doors, dividing panels, frontal faces with decorations to details.	No.	1			
B	Low level worktop overall size 6200 x 600 x 900mm high comprising of 20mm thick granite top fixed onto 20mm thick blockboard, 20mm laminate MDF board facings, shelves, doors divisions and all necessary ironmongery to details.(Kitchenette)	No.	1			
C	Ditto size 3200 x 600 x 900mm ditto (Nurses office & sample collection room)	No.	2			
D	High level cupboard overall size 4000 x 450 x 600mm high comprising of 20mm thick block boards to sides, shelvings, doors and divisions and all necessary ironmongery, well furnished. All to Architects details (Kitchen)	No.	1			
E	Reception counter overall size 4000 x 900 x 1200mm high shaped to details comprising of 20mm thick granite slab worktop fixed onto 20mm thick blockboard, 20mm thick laminated MDF doors, dividing panels, frontal faces with decorations to details.	No.	1			
F	Store shelves in 5No. Tiers size 3150 x 450mm in laminate MDF boards to shelves, fixed to 50 x 25mm wrot prime grade cypress bearers, painted and 100mm thick mass concrete class 15/20 plinths including formwork to edges, 75-150mm girth, (Linen store)	No.	2			
G	Ditto size 2500 x 450mm , ditto (Donning area)	No.	1			
H	Ditto size 3500 x 450mm , ditto (Donning)	No.	1			
	<u>TOTAL TO ISOLATION WARD SUMMARY</u>				KSHS.	

PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL, BUSIA

ITEM	DESCRIPTION	KSHS.	CTS
<u>PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL, BUSIA.</u>			
<u>ISOLATION WARD</u>			
	<u>SUMMARY</u>	<u>PAGE No.</u>	
1.0	SUBSTRUCTURE <i>(ALL PROVISIONAL)</i>	W/3	
2.0	R.C. SUPERSTRUCTURE	W/4	
3.0	WALLING	W/5	
4.0	ROOFING AND RAINWATER DISPOSAL	W/8	
5.0	FINISHES	W/10	
6.0	WINDOWS	W/11	
7.0	DOORS AND FANLIGHTS	W/13	
8.0	FITTINGS & FIXTURES	W/14	
<u>TOTAL CARRIED TO BUILDERS WORK SUMMARY</u>		KSHS.	

PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL, BUSIA.

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	<u>OXYGEN PLANT (HOUSE)</u>				
	<u>ELEMENT NO. 1</u>				
	<u>SUBSTRUCTURE (ALL PROVISIONAL)</u>				
	<u>Site clearance</u>				
A	Clear site of works off grass, shrubs, small trees and grub up roots and burn the arising debris.	SM	337		
	<u>Excavations</u>				
	<u>Excavations including maintaining and supporting sides of excavations from fallen soil, mud by plunking or strutting and sub-surface water by baling, pumping or otherwise</u>				
B	Mass excavation to reduce levels, 0-1500mm from the ground level and load and cart away from site.	CM	118		
C	For strip foundations, 0-1500mm deep in murram from the stripped levels.	CM	93		
D	For column bases ditto	CM	40		
E	Excavation in soft rock class I	CM	10		
F	Excavation in Medium hardrock class II	CM	5		
G	Excavation in hard rock class III	CM	5		
	<u>Disposal</u>				
H	Return, fill in and ram selected excavated material around foundation walls and columns.	CM	68		
I	Load and cart away surplus excavated materials away from site of work and dispose off as per local authority directives	CM	65		
	<u>Imported filling</u>				
L	300mm thick imported hardcore filling to make up levels handpacked and well compacted in 150mm thick layers to Structural Engineer's approval.	SM	311		
K	50mm Thick quarry dust blinding spread over hardcore bed and ram over by roller while moist for proper consolidation.	SM	311		
	To collection			Kshs.	

PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL, BUSIA.

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	<u>Anti-termite treatment</u>				
A	Chemical anti- termite treatment as "Gladiator TC" or other equal and approved termicide sprayed over surfaces of hardcore bed and walls.	SM	337		
	<u>Damp proof membrane.</u>				
B	1000 Gauge polythene sheeting damp proof membrane spread over hardcore bed and walls with 300mm side laps and end laps (<i>measured nett with no allowance for overlaps</i>).	SM	337		
	<u>Concrete Works</u>				
	<u>Mass concrete class 15/20 aggregates as described in:-</u>				
C	50mm thick blinding under strip footing	SM	84		
D	Ditto under column bases	SM	36		
	<u>Vibrated reinforced concrete class 25/20 aggregates as described in:-</u>				
E	Strip footing	CM	17		
F	Column bases	CM	15		
G	Columns	CM	2		
H	Ramp	CM	2		
I	150mm Thick ground floor slab	SM	337		
	<u>Reinforcement</u>				
	<u>Fabric mesh reinforcement to B.S 4483 as described in:-</u>				
J	B.R.C fabric mesh reinforcement to Ref No. A142 laid in surface bed with minimum 200 mm side and end laps (<i>measured net with no allowance for overlaps</i>) with and including precast concrete spacer blocks	SM	337		
	<u>Bar reinforcement to B.S 4449 complete with precast spacer blocks supplied, cut, bent and fixed as described in:-</u>				
K	Bar reinforcement of assorted sizes	KG	4420		
	To collection			Kshs.	

PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL, BUSIA.

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	<u>Formwork</u>				
	<u>Sawn cypress formwork as described to:-</u>				
A	Sides of strip footing	SM	56		
B	Sides of column bases	SM	38		
C	Sides of columns	SM	22		
D	Edges of ground floor slabs, 75-150mm girth	LM	96		
	<u>Foundation walling</u>				
	<u>Approved natural load bearing square shaped quarry stone wall of minimum crushing strength of 7.5/mm² - built to courses of cement/sand (1:3) mortar mix as described in:-</u>				
E	200mm Thick natural stone foundation walling reinforced at each alternate course with and including 24 gauge galvanized mild steel hoop iron and staggered.	SM	154		
	<u>Damp proof course</u>				
F	200 mm Wide 3-ply Hessian based bituminous felt damp proof course laid on and including 200mm cement/sand (1:4) setting screed under external walling	LM	117		
	<u>Plinth finishes</u>				
	<u>Cement/sand (1:3) render as described to:-</u>				
G	16mm Thick render to plinths.	SM	35		
	<u>Prepare and apply three coats bituminous emulsion paint from Crown Paints or other equal and approved sources to:-</u>				
H	General surfaces of rendered plinths	SM	35		
	<u>Precast concrete units as described in:-</u>				
I	600 x 600 x 50mm Thick precast concrete paving slabs, laid on and including 100mm thick bed of sand and pointed at the joints with cement/sand (1:3) mortar.	SM	58		
	To collection			Kshs.	

PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL, BUSIA.

ITEM	DESCRIPTION	UNIT	QTY	RATE	KSHS CTS
	<u>COLLECTION</u> From page : OP/1 : OP/2 : OP/3 <u>TOTAL TO OXYGEN PLANT SUMMARY</u>				
				KSHS.	

PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL, BUSIA.

ITEM	DESCRIPTION	UNIT	QTY	RATE	KSHS CTS
	<u>ELEMENT NO. 2</u>				
	<u>REINFORCED CONCRETE SUPERSTRUCTURE</u>				
	<u>Vibrated reinforced concrete class 25/20 aggregates as described in:-</u>				
A	Beams	CM	8		
B	Ring Beam	CM	8		
C	Columns	CM	9		
D	150mm Thick suspended roof slab, concrete to include penetrone admixture from Mau West mixed in ratios as per printed instructions or other equal and approved by the structural engineer.	SM	337		
E	Extra over labour and materials for leaving pipe sleeves through slabs, 150mm diameter.	No.	30		
	<u>Bar reinforcement to B.S 4449 complete with precast spacer blocks supplied, cut, bent and fixed as described in:-</u>				
F	Bar reinforcement of assorted sizes	KG	9066		
	<u>Sawn cypress formwork as described to:-</u>				
G	Sides of columns	SM	101		
H	Sides and soffits of beams	SM	168		
I	Soffits of first floor suspended slab and landings	SM	337		
J	Edges of suspended slabs, 75-150mm girth	LM	96		
	<u>TOTAL TO OXYGEN PLANT SUMMARY</u>			KSHS.	

PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL, BUSIA.

ITEM	DESCRIPTION	UNIT	QTY	RATE	KSHS CTS
	<u>ELEMENT NO. 3</u>				
	<u>WALLING</u>				
	<u>Approved natural load bearing quarry stone wall of minimum crushing strength of 7.5N/mm² built to courses in cement/sand (1:3) mortar mix as described in:-</u>				
A	200mm Thick machine cut stone walling reinforced at each alternate course with and including 24 gauge galvanized mild steel hoop iron and staggered.	SM	112		
B	200mm Thick ditto, but parapet walls	SM	86		
	<u>Precast concrete units as described in:-</u>				
C	300mm Wide x 50mm thick precast concrete wall coping twice weathered and throated, jointed and bedded to walls with and including cement/sand (1:3) mortar mix.	LM	96		
	<u>Internal Walling</u>				
	<u>Approved natural load bearing stone wall of minimum crushing strength of 5N/mm² built in courses of cement/sand (1:3) mortar mix.</u>				
D	200mm Thick machine cut stone walling reinforced at each alternate course with and including 24 Gauge galvanized mild steel hoop iron and staggered.	SM	190		
	<u>Precast Concrete Louver Vent blocks</u>				
E	200mm thick approved precast Concrete louvred Vent blocks laid with cement /sand (1:4) mortar, complete with wire gauze.	SM	252		
	<u>TOTAL TO OXYGEN PLANT SUMMARY</u>			KSHS.	

PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL, BUSIA.

ITEM	DESCRIPTION	UNIT	QTY	RATE	KSHS CTS
	<u>ELEMENT NO. 4</u>				
	<u>ROOFING AND RAIN WATER DISPOSAL</u>				
	<u>Waterproofing</u>				
	<u>Cement/sand (1:3) waterproof screed as described to:-</u>				
A	20mm Thick pavings to receive APP membrane (m.s) laid to falls.	SM	337		
B	Extra over for rounding up edge points with 45 ⁰ angle fillets	LM	96		
	<u>Water proofing to roof slab</u>				
C	3mm Thick EPDM membrane laid over screeded roof slab, (m.s) with and including all labours for gas heating and rolling with 300mm high skirting on walls.	SM	337		
	<u>Precast concrete units as described in:-</u>				
D	20mm Thick precast concrete interlocking tiles of approved patterns fixed onto waterproofing layer (m.s) with and including cement mortar backing.	SM	337		
	<u>Rainwater disposal</u>				
	<u>Fulbora outlets</u>				
E	100mm Diameter cast iron fulbora rainwater outlets complete with grating, raising ring, PVC adaptor and other accessories including connecting to downpipe.	No.	30		
	<u>Medium gauge UPVC pipes as described in:-</u>				
F	100mm Diameter grey downpipes held onto walls with approved mild steel holder bats.	LM	32		
G	Extra over for swan neck bends, 800mm long	No.	7		
H	Ditto for shoes, 300mm long	No.	7		
	<u>TOTAL TO OXYGEN PLANT SUMMARY</u>			KSHS.	

PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL, BUSIA.

ITEM	DESCRIPTION	UNIT	QTY	RATE	KSHS CTS
	<u>ELEMENT NO. 5</u>				
	<u>FINISHES</u>				
	<u>Internal finishes</u>				
	<u>Floor finishes</u>				
	<u>Insitu cement/sand (1:4) screed as described in:-</u>				
A	40mm Thick screed steel finished smooth with red oxide	SM	287		
B	30mm Thick pavings to receive non-slip ceramic tiles	SM	24		
	<u>Ceramic floor tiles as "SAI" or other equal and approved as described in:-</u>				
C	600 x 300 x 10mm Thick coloured ceramic tiles laid in 6mm thick continuous joints both ways and fixed with and including spacers and cement/sand (1:4) mortar mix backing and grouted.	SM	24		
D	600 x 100 x 10mm Thick to skirting ditto	LM	12		
	<u>Wall finishes</u>				
	<u>Plaster</u>				
E	Apply 9mm thick first coat of cement/sand (1:3) plaster and then 3mm thick second coat of cement /lime (1:5) putty steel trowelled smooth to walls including skimming.	SM	456		
F	Extra over plaster to window reveals and doors openings	SM	35		
	<u>Ceramic wall tiles as "SAI" or other equal and approved as described in:-</u>				
G	600 x 300 x 10mm Thick coloured glazed ceramic wall tiles fixed to keyed rendered wall with and including cement mortar mix and grouted complete with chrome edging strips.	SM	50		
	<u>Ceiling finishes</u>				
	<u>Plaster</u>				
H	Apply 9mm thick first coat of cement/sand (1:3) plaster and then 3mm thick second coat of cement /lime (1:5) putty steel trowelled smooth to soffits of slabs including skimming.	SM	311		
	To collection			Kshs.	

PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL, BUSIA.

ITEM	DESCRIPTION	UNIT	QTY	RATE	KSHS CTS
	<u><i>Prepare, touch up one coat universal undercoat and three coats vinyl matt emulsion paint from Crown Paints or other equal approved sources to:-</i></u>				
A	Plastered wall surfaces	SM	441		
B	Plastered soffits of suspended slabs and landings	SM	311		
	<u><i>External finishes</i></u>				
	<u><i>Gauged cement/sand (1:4) render as described in:-</i></u>				
C	16mm Thick render to external walls, beams and columns finished with wood float.	SM	198		
	<u><i>Painting and decorating</i></u>				
	<u><i>Prepare surfaces and apply textured wall finish as "RUFF N' TUFF" from Crown-Berger (K) Ltd on plastered masonry or concrete surfaces to:-</i></u>				
D	Rendered surfaces of external walls, beams and columns.	SM	198		
	To collection below				
	<u>COLLECTION</u>				
	From page : OP/8				
	From above				
	<u>TOTAL TO OXYGEN PLANT SUMMARY</u>			KSHS.	

PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL, BUSIA.

ITEM	DESCRIPTION	UNIT	QTY	RATE	KSHS CTS
	<u>ELEMENT NO. 6</u>				
	<u>WINDOWS</u>				
	<u>Window Cills</u>				
A	Precast concrete window cills size 150 x 50mm one side weathered and throated, bedded and jointed in cement/sand (1:3) mortar mix.	LM	6		
	<u>Wrot prime grade mahogany as described in:</u>				
B	Ex 200 x 20mm Bull nosed window boards, plugged.	LM	3		
	<u>Wrot iron curtain rods as described in:-</u>				
C	30mm Diameter spray painted rods with moulded ends complete with rings and a pair of moulded brackets fixed to walls	LM	3		
	<u>Mild steel casement windows</u>				
	<u>Purpose made mild steel casement windows in 3mm thick angle and T-sections complete with fixing lugs, brass stay bars, fasteners and permanent vents with 3-ply mosquito gauze at the top and hood complete with in-built burglar grilles in small openings in 4mm thick flats and building into masonry works, including bedding frames in cement/sand (1:3) mortar mix and pointing in mastic all round as described in:-</u>				
D	Window size 900 x 1000mm high	No.	3		
E	Ditto size 1400 x 1500mm high	No.	1		
	<u>Glazing</u>				
F	<u>Provide size as per details</u> x 5mm thick clear glass. Glazing units installed with good quality glazing putty.	SM	5		
	<u>Painting and decoration</u>				
	<u>Prepare, touch up one coat grey oxide primer and apply three coats of first quality gloss oil paint from approved sources to:-</u>				
G	General surface of metal windows and grilles	SM	10		
	<u>Prepare and apply three coats stained polyurethane varnish from approved sources to:-</u>				
H	Surface of woodwork, 100-200mm girth	LM	3		
	<u>TOTAL TO OXYGEN PLANT SUMMARY</u>			KSHS.	

PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL, BUSIA.

ITEM	DESCRIPTION	UNIT	QTY	RATE	KSHS CTS
	<u>ELEMENT NO. 7</u>				
	<u>DOORS</u>				
	<u>Door frames and fittings in wrot mahogany as described in:-</u>				
A	Ex 50 x 15mm Moulded architrave with three labours	LM	17		
B	Ex 25mm Quadrant.	LM	17		
C	Ex 15 x 15mm Glazing beads.	LM	4		
D	Ex 100 x 50mm Frames with three labours.	LM	35		
	<u>Flush doors</u>				
E	45mm Thick solid core flush door size 900 x 2100mm high high comprising of 6mm thick plywood and hardwood lipped on exposed edges.	No.	3		
F	45mm Thick semi-solid core flush door size 800 x 2100mm high comprising of 6mm thick plywood and hardwood lipped on exposed edges.	No.	3		
	<u>Steel casement door</u>				
	<u>Mild steel doors</u>				
G	50mm Thick mild steel double leaf door overall size 3000 x 2400mm high complete with steel frames and all ironmongery, primed with grey oxide. All to architect's details.	No.	4		
H	Ditto double door size 2000 x 2400mm high, ditto.	No.	1		
I	Ditto double door size 1500 x 2400mm high, ditto.	No.	1		
	<u>Supply and fix the following ironmongery with screws to match 'Union' Catalogue or equal and approved:</u>				
J	3-Lever mortice lock complete with brass handles	No.	3		
K	2- lever ditto.	No.	3		
L	100mm Long brass butt hinges	Prs.	9		
M	40mm Diameter half moon chrome door stops with rawl bolts	No.	3		
N	Stainless steel "Male/Female" door signages	No.	6		
	<u>Fanlight glazing</u>				
O	<u>Provide size as per details</u> x 4mm thick clear glass. Glazing units installed with timber beads (m.s)	SM	3		
	To collection			Kshs.	

PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL, BUSIA.

ITEM	DESCRIPTION	UNIT	QTY	RATE	KSHS CTS
	<u><i>Prepare and apply three coats stained polyurethane varnish from approved sources to:-</i></u>				
A	Surfaces of woodwork, 0-100mm girth	LM	34		
B	Ditto, 200-300mm girth	LM	35		
C	General surfaces of flush and panel doors	SM	21		
	<u><i>Prepare and apply three coats first quality gloss oil paint to:-</i></u>				
D	General surfaces of mild steel doors.	SM	79		
	To collection below			Kshs.	
	<u>COLLECTION</u>				
	From page : OP/11				
	From above:				
	<u>TOTAL TO OXYGEN PLANT SUMMARY</u>			KSHS.	

PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL, BUSIA.

ITEM	DESCRIPTION	UNIT	QTY	RATE	KSHS CTS
	<u>ELEMENT NO. 8</u>				
	<u>FITTINGS AND FIXTURES</u>				
A	High level cupboard overall size 2000 x 450 x 600mm high comprising of 20mm thick block boards to sides, shelvings, doors and divisions and all necessary ironmongery, well furnished. All to Architects details (<i>Office</i>)	No.	1		
	<u>TOTAL TO OXYGEN PLANT SUMMARY</u>			KSHS.	

PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL, BUSIA.

ITEM	DESCRIPTION	KSHS CTS
	<u>PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL, BUSIA.</u>	
	<u>OXYGEN PLANT (HOUSE)</u>	
	<u>SUMMARY</u>	<u>PAGE No.</u>
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8.0	FITTINGS AND FIXTURES	OP/13
	<u>TOTAL CARRIED TO BUILDERS WORK SUMMARY</u>	KSHS.

PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL, BUSIA.

ITEM	DESCRIPTION	KSHS. CTS
	<p><u>PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL, BUSIA.</u></p> <p>BUILDERS WORK SUMMARY</p> <p><u>SUMMARY</u> <u>PAGE No.</u></p> <p>1.0 ISOLATION WARD W/15</p> <p>2.0 OXYGEN PLANT HOUSE PR/14</p> <p><u>TOTAL FOR BUILDERS WORK CARRIED TO GRAND SUMMARY</u> KSHS.</p>	

***TENDER SPECIFICATIONS AND BILLS OF QUANTITIES
FOR SUPPLY, INSTALLATION, TESTING AND COMMISSIONING
OF ELECTRICAL ENGINEERING SERVICES WORKS – ALUPE
ISOLATION WARD AND MEDICAL GASES PLANT***

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SECTION A

TENDER EVALUATION CRITERIA

Note.

This criterion shall be used to evaluate the bidders proposed to carry out the specialized works who shall be domestic subcontractors to the main bidder on award of the contract.

TENDER EVALUATION CRITERIA

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

1. Preliminary Evaluation;
2. Technical Evaluation;

Note: This criterion shall be used to evaluate sub contracts

STAGE 1: PRELIMINARY EVALUATION

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

These conditions shall include the following:

S/No	MANDATORY REQUIREMENTS(MR)
MR1	Valid Copy of certificate of incorporation/ Registration;
MR2	Valid Current Tax Compliance Certificate from Bidding Company, and if Consortium, from each member of the consortium;
MR3	Submission of valid CR12 form showing the list of directors /shareholding (issued within the last 12 months) or National Identity Card(s) for Sole Proprietorship / Partnership;
MR4	Valid copy of NCA Registration Certificate, NCA 8 and above in Electrical installation works;
MR5	Valid copy of NCA Registration Certificate, NCA 8 and above in Structured cabling (Telecommunication) installation works;
MR6	Current annual contractors practicing license from NCA for works listed in items MR4, and MR5.
MR7	Copy of current License in Electrical installation works with EPRA- Class B1 and above;
MR8	Copy of valid License from Communication Authority of Kenya (CA);
MR9	Copy of valid Compliance Certificate from Communication Authority of Kenya (CA);
MR10	Manufacture's authorization for active components in structured cabling works;
MR11	Domestic sub-contractors must sign and stamp the summary page of their respective specialist works on the tender document.

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

STAGE 2: TECHNICAL EVALUATION

The assessment for eligibility for the STANDARD FORMS considered in this section shall be as shown below

PARAMETER

ACTION

- (i) Key personnel.....PASS/FAIL
- (ii) Contract Completed in the last Five (5) years.....PASS/FAIL
- (iii) Schedules of on-going projects..... PASS/FAIL
- (iv) Schedules of Contractor's equipment..... PASS/FAIL
- (v) Litigation History..... PASS/FAIL

OVERALL REMARKS

PASS/FAIL

The detailed Assessment for Eligibility shall be as shown in table 1 below: -

TABLE 1: Assessment for Eligibility

Item	Description	Remarks
1.	Key Personnel (Attach evidence)	
	Director of the firm <ul style="list-style-type: none"> <input type="checkbox"/> Holder of degree in relevant Engineering field <input type="checkbox"/> Holder of diploma in relevant Engineering field <input type="checkbox"/> Holder of certificate in relevant Engineering field <input type="checkbox"/> Holder of trade test certificate in relevant Engineering field <input type="checkbox"/> No relevant certificate 	PASS/FAIL
	At least 1No. degree/diploma holder of key personnel in relevant field <ul style="list-style-type: none"> <input type="checkbox"/> With over 10 years of relevant experience <input type="checkbox"/> With over 5 years of relevant experience <input type="checkbox"/> With under 5 years of relevant experience 	PASS/FAIL
	At least 1No certificate holder of key personnel in relevant field <ul style="list-style-type: none"> <input type="checkbox"/> With over 10 years of relevant experience <input type="checkbox"/> With over 5 years of relevant experience <input type="checkbox"/> With under 5 years of relevant experience 	PASS/FAIL
	At least 2No artisan (trade test certificate in relevant field) <ul style="list-style-type: none"> <input type="checkbox"/> Artisan with over 10 years of relevant experience <input type="checkbox"/> Artisan with under 10 years of relevant experience <input type="checkbox"/> Non skilled worker with over 10 years of relevant experience 	PASS/FAIL
2.	Contracts completed in the last five (5) years (Max of 3No. Projects) - Provide Evidence <ul style="list-style-type: none"> <input type="checkbox"/> Project of similar nature, complexity or magnitude <input type="checkbox"/> Project of similar nature but of lower value than the one in consideration <input type="checkbox"/> No completed project of similar nature 	PASS/FAIL
3.	On-going projects – Provide Evidence <ul style="list-style-type: none"> <input type="checkbox"/> No Project of similar nature, complexity and magnitude <input type="checkbox"/> Three and below Projects of similar, nature complexity and magnitude <input type="checkbox"/> Four and above Projects of similar nature, complexity and magnitude 	PASS/FAIL
4.	Schedule of contractors equipment and transport (proof or evidence of ownership/Lease)	
	a) Relevant Transport <ul style="list-style-type: none"> <input type="checkbox"/> Means of transport (Vehicle <input type="checkbox"/> No means of transport 	PASS/FAIL
	b) Relevant Equipment <ul style="list-style-type: none"> <input type="checkbox"/> Has relevant equipment for work being tendered <input type="checkbox"/> No relevant equipment for work being tendered 	PASS/FAIL

Item	Description	Remarks
5.	Litigation History <input type="checkbox"/> Duly Filled <input type="checkbox"/> Not filled	PASS/FAIL
	OVERALL REMARKS	PASS/FAIL

Note: Any bidder who FAILS shall not be considered for further evaluation.

3.1. COMPLIANCE WITH TECHNICAL SPECIFICATIONS FOR MAJOR ITEMS

Tenderers shall submit offers that comply with the requirements of the tendering documents, including the basic technical design as indicated in the Drawings and Specifications.

Tenderers shall be required;

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

The bid will then be analyzed, using the information in the technical brochures, to determine compliance with key technical specifications for the works/items as indicated in the tender document.

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

Bidders not complying with any of the key technical specifications shall be considered noncompliant to the technical specifications while those meeting all the key technical specifications shall be considered compliant.

Compliance in this section shall be as shown below:

Description	COMPLIANT / NON-COMPLIANT
Compliance with Technical Specifications <i>(Note:</i> 1) <i>Tender Evaluation Committee to evaluate compliance to all technical specifications (Electrical, Data, and access control Installation Works) as detailed in the Section C (Particular specs) of this document</i> 2) <i>Bidders who do not highlight catalogue number and model of the proposed items shall be considered non-compliant.</i> 3) <i>Non-compliance to any of the specifications shall render the whole system non-compliant</i>	

Any bidder who is compliant shall be considered for further evaluation.

SECTION B

GENERAL SPECIFICATIONS

OF

MATERIALS AND WORKS

PART 1. GENERAL SPECIFICATIONS OF WORKS

- 1.1 General
- 1.2 Standard of Materials
- 1.3 Workmanship
- 1.4 Procurement of Materials
- 1.5 Shop Drawings
- 1.6 Record Drawings
- 1.7 Regulations and Standards
- 1.8 Setting out Works

PART 2. GENERAL SPECIFICATIONS OF ELECTRICAL WORKS

- 2.1 Position of Electrical Plant and Apparatus
- 2.2 M.C.B Distribution Panels and Consumer Units
- 2.3 Fused Switchgear and Isolators
- 2.4 Conduits and Conduit Runs
- 2.5 Conduit Boxes and Accessories
- 2.6 Labels
- 2.7 Earthing
- 2.8 Cables and Flexible Cords
- 2.9 Armoured PVC Insulated and Sheathed Cables
- 2.10 Cable Supports; Markers and Tiles
- 2.11 PVC Insulated Cables
- 2.12 Heat Resisting Cables
- 2.13 Flexible Cords
- 2.14 Cable Ends and phase Colours
- 2.15 Cable Insulation Colours
- 2.16 Sub-circuit Wiring
- 2.17 Space Factor
- 2.18 Insulation

- 2.19 Lighting Switches
- 2.20 Sockets and Switched sockets
- 2.21 Fused Spur Boxes
- 2.22 Cooker Outlets
- 2.23 Connectors
- 2.24 Lamp holders
- 2.25 LED Lamps
- 2.26 lighting Fittings Street lighting Lanterns
- 2.27 Position of Points and Switches
- 2.28 Current Operated Earth leakage circuit breaker
- 2.29 MV Switchboard
- 2.30 Steel Conduits and Steel Trunking
- 2.31 Testing on Site

PART 1. GENERAL SPECIFICATIONS OF WORKS

1.1 GENERAL

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

1.2 STANDARD OF MATERIALS

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

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

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

1.3 WORKMANSHIP

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

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

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

1.4 PROCUREMENT OF MATERIALS

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

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

1.5 SHOP DRAWINGS

Before manufacture or Fabrication is commenced the sub-contractor shall submit Two copies of detailed drawings of all control pillars, meter cubicles, medium voltage switchboards including their components showing all pertinent information including sizes, capacities, construction details, etc, as may be required to determine the suitability of the equipment for the approval of the Engineer.

Approval of the detailed drawings shall not relieve the sub-contractor of the full responsibility of errors or the necessity of checking the drawings himself or of furnishing the materials and equipment and performing the work required by the plans and specifications.

1.6 RECORD DRAWINGS

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

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

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

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

1.7 REGULATIONS AND STANDARDS

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

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

1.8 SETTING OUT WORK

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

PART 2. GENERAL SPECIFICATIONS OF ELECTRICAL WORKS

2.1 POSITIONS OF ELECTRICAL PLANT AND APPARATUS

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

2.2 MCB DISTRIBUTION PANELS AND CONSUMER UNITS

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

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

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

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

A locking plate shall be provided for each size of breaker; A complete list of circuit details on typed cartridge paper glued to stiff cardboards and covered with a sheet of perspex, and held in position with four suitable fixings, shall be fitted to the inner face of the lids of each distribution panel. The

appropriate MCB ratings shall be stated on the circuit chart against each circuit in use: Ivorine labels shall be secured to the insulation barriers in such a manner as to indicate the number of the circuits shown on the circuit chart.

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

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

2.3 FUSED SWITCHGEAR AND ISOLATORS

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

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

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

Isolators shall be load breaking/fault making isolators.

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

2.4 CONDUITS AND CONDUIT RUNS

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

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

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

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

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

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

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

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

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

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

2.5 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 enamelled or galvanised finish according to location. They shall be of square or oblong shape location. They shall be of square or oblong shape complete with lids secured by four 2 BA brass roundhead screws; No adaptable box shall be less than 75mm x 75mm x 50mm or larger than 300mm x 300mm x 75mm

and shall be adequate in depth in relation to the size of conduit entering it. Conduits shall only enter boxes by means of conduit bushes.

2.6 LABELS

Labels fitted to switches and fuse boards; -

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

2.7 EARTHING

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

- (i) It shall be carried out in accordance with the appropriate sections of the current edition of the Regulations, for the Electrical Equipment of Buildings issued by Institute of Electrical Engineers of Great Britain.
- (ii) At all main distribution panels and main service positions a 25mm x 3mm minimum cross-sectional area Copper tape shall be provided and all equipment including the lead sheath and armouring of cables, distribution boards and metal frames shall be bonded thereto.
- (iii) The earth tape in Sub-clause (ii) shall be connected by means of a copper tape or cable of suitable cross-sectional area to an earth electrode which shall be a copper earth rod (see later sub-clause).
- (iv) All tapes to be soft high conductivity copper, untinned except where otherwise specified and where run underground on or through walls, floors, etc., it shall be served with corrosion resisting tape or coated with corrosion compound and braided
- (v) Where the earth electrode is located outside the building a removable test link shall be provided inside the building as near as possible to the point of entry to the tape, for isolating the earth electrode for testing purposes.
- (vi) Earthing of sub-main equipment shall be deemed to be satisfactory where the sub-main cables are M.I.C.S. or conduit with separate earth wire, and installation is carried out in accordance with the figures stated in the current edition of the I.E.E Regulations.
- (vii) Where an earth rod is specified (see Sub-clause (iii)) it shall be proprietary manufacture, solid hand drawn copper of 15mm diameter driven into the ground to a minimum depth of 3.6M. It shall be made up to 1.2m sections with internal screw and socket joints and fitted with hardened steel tip and driving cap.

- (viii) Earth plates will not be permitted
- (ix) Where an earth rod is used the earth resistance shall be tested in the manner described in the current edition of the IEE Regulations, by the Sub-Contractor in the presence of the Engineer and the Sub-Contractor shall be responsible for the supply of all test equipment.
- (x) Where copper tape is fixed to the building structure it shall be by means of purpose made non-ferrous saddles which space the conductor away from the structure a minimum distance of 20mm. Fixings, shall be made using purpose made plugs; No fixings requiring holes to be drilled through the tape will be accepted.
- (xi) Joints in copper tape shall be tinned before assembly riveted with a minimum of two copper rivets and seated solid.
- (xii) Where holes are drilled in the earth tape for connection to items of equipment the effective cross sectional area must not be less than required to comply with the IEE regulations.
- (xiii) Bolts, nuts and washers for any fixing to the earth tape must be of non-ferrous material.
- (xiv) Attention is drawn to the need for the earthing metal parts of lighting fittings and for bonding ball joint suspension in lighting fittings.

2.8 CABLES AND FLEXIBLE CORDS

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

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

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

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

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

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

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

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

2.10 CABLE SUPPORTS, MARKERS AND TILES

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

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

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

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

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

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

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

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

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

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

2.11 PVC INSULATED CABLES

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

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

2.12 HEAT RESISTING CABLES

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

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

2.13 FLEXIBLE CORDS

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

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

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

2.14 CABLE ENDS AND PHASE COLOURS

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

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

2.15 CABLE INSULATION COLOURS

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

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

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

2.16 SUB-CIRCUIT WIRING

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

Lighting circuits P.V.C. cable.

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

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

- (i) 2.5mm² for one, two or three 5Amp sockets wired in parallel.
- (ii) 2.5mm² for one 15Amp socket.
- (iii) 2.5mm² for maximum of ten switched 13 Amp sockets wired from 30 Amp MCB.

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

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

2.17 SPACE FACTOR

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

2.18 INSULATION

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

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

2.19 LIGHTING SWITCHES

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

2.20 SOCKETS AND SWITCHED SOCKETS

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

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

2.21 FUSED SPUR BOXES

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

2.22 COOKER OUTLETS

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

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

2.23 CONNECTORS

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

2.24 LAMPHOLDERS

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

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

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

2.25 LAMPS

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

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

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

2.26 LIGHTING FITTINGS AND STREET LIGHTING LANTERNS

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

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

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

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

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

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

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

2.27 POSITIONS OF POINTS AND SWITCHES

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

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

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

2.29 M.V. SWITCHBOARD AND SWITCHGEAR

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

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

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

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

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

Small wiring, which will be neatly arranged and cleated, shall be executed in accordance with B.S. 158 and the insulation of the wiring shall be coloured according to the phase or neutral connection. Switches and fuse switches, shall be in strict accordance with KS04-183:1978 Class 2 switches. Means of locking the switch in the "OFF" position shall be provided.

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

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

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

2.30 STEEL CONDUITS AND STEEL TRUNKING

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

2.31 TESTING ON SITE

The Sub-contractor shall conduct during and at the completion of the installation and, if required, again at the expiration of the maintenance period, tests in accordance with the relevant section of the

current edition of the Regulations for the electrical equipment of buildings issued by the I.E.E of Great Britain, the Government Electrical Specification and the Electric Supply Company's By-Laws.

- (a) Tests shall be carried out to prove that all single pole switches are installed in the 'live' conductor.
- (b) 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.
- (c) 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.
- (f) The Sub-contractor shall generally attend on other contractors employed on the project and carry out such electrical tests as may be necessary.
- (g) 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.
- (h) Where such equipment, etc., forms part of or is connected to a system whether primarily or of an electrical nature or otherwise (e.g. air conditioning system) the Sub-contractor shall attend on and assist in balancing, regulating testing and commissioning, or if primarily an electrical or other system forming part of works, shall balance, regulate, test and commission the system to the service engineer's approval.

APPENDIX TO GENERAL SPECIFICATIONS OF MATERIALS AND WORKS

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

1. Government Electrical Specifications No. 1 and No. 2.
2. All requirements of Kenya Power Company Limited

SECTION C
PARTICULAR SPECIFICATIONS
OF
MATERIALS AND WORKS

ITEM	CONTENTS
1.1	LOCATION OF SITE
1.2	EXTENT OF WORKS
1.3	REGULATION AND STANDARDS
1.4	ELECTRICAL REQUIREMENTS
1.5	MANDATORY REQUIREMENTS
1.6	PART A – ELECTRICAL INSTALLATION WORKS
1.7	PART B - STRUCTURED CABLING INSTALLATION WORKS

PARTICULAR AND TECHNICAL SPECIFICATIONS FOR ELECTRICAL, STRUCTURED CABLING, AND ACCESS SYSTEM.

PART A – ELECTRICAL INSTALLATION WORKS

1. Location of site

The site is located in **Alupe Isolation – Busia County**

SCOPE OF WORKS

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

a) Electrical Works

This shall include Cabling, trunking, fittings and accessories.

b) Structured cabling works

This shall include cabling, fittings and telephone/data outlet plates.

MATERIALS FOR THE WORKS

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

2. Extent of The Works

The works to be carried out include the supply, delivery, installation, testing, commissioning and leaving in servicing condition the Electrical and Structured Cabling systems in the proposed Site as herein described in this specification. The works shall include, but not limited to the supply and installation of the following:

- Structured Cabling
- Patch panels
- Switches
- Electrical fittings

3. Regulation and Standard

The works shall comply with the provisions of the following as necessary and relevant:

- ISO/IEC, CCK, ATM CENELEC 11801
- ANSI/EIA/TIA 56
- Latest Edition of IEE Regulation
- Kenya Bureau of Standards (KEBS)
- Institution of Electrical Engineers (IE.E) Wiring Regulations
- Current recommendation of CCITT and CC1R
- Electric Power Act and Rules made there under.

4. ELECTRICAL REQUIREMENTS

The equipment to be supplied shall be capable of being operated from 240V AC 50Hz power supply.

5. MANDATORY REQUIREMENTS

- A.** All equipment and materials used shall be standard components that are regularly manufactured and used in the manufacturer's system.
- B.** All systems and components shall have been thoroughly tested and proven in actual use.

- C. All systems and components shall be provided with the availability of a, 24-hour technical assistance program (TAP) from the manufacturer. The TAP shall allow for immediate technical assistance for either the dealer/installer or the end user at no charge.
- D. All systems and components shall be provided with a one-day turn around repair express and 24-hour parts replacement. The repair and parts express shall be guaranteed by the manufacturer on warranty and non-warranty items.
- E. The supplier shall be the manufacturer, or the manufacturer appointed agent (proof to be submitted).
- F. The Offered system has been installed and commissioned by the supplier in other locations.

PART A: PARTICULAR SPECIFICATIONS FOR ELECTRICAL INSTALLATION WORKS

MINIMUM TECHNICAL SPECIFICATIONS FOR LED LAMPS/ LIGHTING FITTINGS

LED TUBES, PANELS & BULBS LIGHT FITTING		
TECHNICAL SPECIFICATIONS		
IEC Compliant		
Item	Minimum Specifications	Proposed solution
Brand	State the brand, model and attach Technical Brochure (Mandatory)	
Operating	<ul style="list-style-type: none">➤ Voltage range: 130-300 V ac➤ Frequency range: 50-60Hz➤ Power factor ≥ 0.9 lagging➤ Total Harmonic Distortion (THD) <15%➤ Ambient temperature range -10 to +35 °Operating➤ Colour Consistency $\leq 5\text{SDCM}$	
Performance	<ul style="list-style-type: none">➤ System efficacy $\geq 100\text{lm/W}$➤ Lamp colour temperature: 4000K - 6500K➤ Colour Rendering Index ≥ 80➤ Median useful life $\geq 30000\text{ h}$	
Standards Compliance	CB/EMC/CE	
General	<ul style="list-style-type: none">➤ Driver/power unit/transformer - PSU-E➤ Optical cover/lens type - Polystyrene bowl/cover prismatic➤ Protection class IEC - Safety class II (II)	

PART B: PARTICULAR SPECIFICATIONS FOR STRUCTURED CABLING WORKS

1. 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 150 data/voice points.
- iv) Supply, install telephone cables to interconnect the data cabinets to the IP-PBX to be located in the Server Room. The works shall include inter-wiring, programming and activating all voice points.

2. 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, CCK, 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.

3. 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.

4. NETWORK CABINETS

DATA CABINET AND ACCESSORIES		
RACKS TECHNICAL SPECIFICATIONS		
Standards: Comply with ANSI/EIA-310-D, CEA 310E, IEC60297-3		
Item	Minimum Specifications	Proposed Solution
Brand	State the brand, model and attach Technical Brochure (Mandatory)	
Product type	Ventilated rack with fans where applicable	
Construction	<ul style="list-style-type: none"> Detachable composite structure Material: SPCC quality cold rolled steel Thickness: Square hole strips 2.0mm, others 1.2mm 	
Power	<ul style="list-style-type: none"> Pre-wired 240V AC conditioned grounded power circuit Supplied with Earth Bond Kit and Cage nuts 	
Warranty	Comprehensive Manufacturer's Warranty (<i>Attach Manufacturer's Warranty Statement</i>) Minimum 3 Years	

5. CABLES

i) HORIZONTAL CABLING & PATCH CORDS

	Category 6A STP 4-Pair Cable	
Item	Minimum specifications	Proposed Solution
Brand	State the brand, model and attach Technical Brochure (Mandatory)	
Construction	<ul style="list-style-type: none"> STP Solid (non-tinned) copper Centre Isolation Member 	
Jacket	8.5mm with Sequential meter markings	
Warranty	End-to-End Manufacturer's Warranty on Cabling System (<i>Attach Manufacturer's Warranty Statement</i>) Minimum 15 Years Warranty	

ii) CAT 6A PATCH PANELS		
Item	Minimum specifications	Proposed Solution
Brand	State the brand, model and attach Technical Brochure (Mandatory)	
Industry Compliance	STANDARDS COMPLIANCE <ul style="list-style-type: none"> • IEEE 802.3af (PoE) • IEEE 802.3at (PoE+) • ANSI/TIA-1096-A 	
Warranty	End-to-End Manufacturer's Warranty on Cabling System (<i>Attach Manufacturer's Warranty Statement</i>) Minimum 15Years	

iii) FACE PLATES - COMPLETE WITH TWIN SCREENED MAX MODULES

Item	Minimum Specifications	Proposed Solution
Brand	State the brand, model and attach Technical Brochure (Mandatory)	
Construction	Complete with Twin MAX RJ45 Modules <ul style="list-style-type: none"> • Double gang faceplates for each designated work area point. • UV resistant, high impact plastic 	
Wiring	T568A and T568B	
Face Plate Characteristics	<ul style="list-style-type: none"> • Twin • Label Covers- Faceplates include pressure-release designation label covers for quick, tool-less removal • With icon/label provision • With doors/shutters • White 	
Module Characteristics	<ul style="list-style-type: none"> • 1000/100/10Gbs • Backward compatible 	
Standards	<ul style="list-style-type: none"> • ISO/IEC 11801: 2002 2nd Edition (Category 6) • UL CMX • UL CMP and CSA FT6 	
Warranty	End-to-End Manufacturer's Warranty on Cabling System (<i>Attach Manufacturer's Warranty Statement</i>) Minimum 15 Years	

6. FIBRE

i) BACKBONE MULTIMODE FIBRE OPTIC CABLE

Item	Minimum Specifications	Proposed Solution
Brand	State the brand, model and attach Technical Brochure (Mandatory)	
Construction	Steel Tape armoured with Glass Yarn	
Armour	Corrugated Steel Tape Armour	
Cable characteristics	<ul style="list-style-type: none"> • Support for 10GBASE-T • Low Density Polyethylene Sheath • Gel Filled Loose Buffer Tube • Level 1 Rodent Protection • Crash(N) at least 2500 • Torsion (Turns/M) not more than 5 • Multimode 	
Warranty	End-to-End Manufacturer's Warranty on Cabling System (<i>Attach Manufacturer's Warranty Statement</i>) Minimum 15 Years	

ii) BACKBONE FIBRE CABLING INTERCONNECT

Rack Mount Interconnect Center (RIC)		
Item	Minimum Specifications	Proposed Solution
Brand	State the brand, model and attach Technical Brochure (Mandatory)	
Construction	<ul style="list-style-type: none"> • Spring loaded quick-release hinges 	
	<ul style="list-style-type: none"> • Include laser-printable labels, cable ties, rack mounting hardware and pre-installed fiber management clips 	
Industry Compliance	<ul style="list-style-type: none"> • IEEE802.3ae, EMC/EMI Specifications 	
Warranty	End-to-End Manufacturer's Warranty on Cabling System (<i>Attach Manufacturer's Warranty Statement</i>) Minimum 15 Years	

iii) BACKBONE FIBRE CONNECT PANELS

Fibre connect panels		
Item	Minimum Specifications	Proposed Solution
Brand	State the brand, model and attach Technical Brochure (Mandatory)	
Construction	<ul style="list-style-type: none"> • Lanced Tabs • Front Fiber Clips • Label Holder • Rear Fiber Clips • 	

Industry Compliance	Meets or exceeds IEEE802.3ae standard EMC/EMI Specifications	
Warranty	End-to-End Manufacturer's Warranty on Cabling System (<i>Attach Manufacturer's Warranty Statement</i>) Minimum 15 Years	

iv) BACKBONE DISTRIBUTION FIBRE PATCH CORDS

Item	Minimum Specifications	Proposed Solution
Brand	State the brand, model and attach Technical Brochure (Mandatory)	
Construction	Precision cable assembly	
Features	<ul style="list-style-type: none"> • Easy Identification- Connectors color coded per ANSI/TIA/EIA-568-B.3 • Dust Caps- Dust caps included to protect polished ferrule from dirt and damage • Polarity Connection- LC Duplexing clip for polarity correction 	
Warranty	End-to-End Manufacturer's Warranty on Cabling System (<i>Attach Manufacturer's Warranty Statement</i>) Minimum 15 Years	

7. ACTIVE DEVICES

i) SWITCH

Item	Minimum Specifications	Proposed solution
Brand	State the brand, model and attach Technical Brochure (Mandatory). Item supplied Must currently be supported by the manufacturer and must be on sale life for not less than 5 years from date of tender.	
Features	<ul style="list-style-type: none"> • 10/100/1000 Base-T port of full PoE+ capability • Uplink configuration: Modular uplink options (4 No. 10G SFP+) – 48/24/ Port switch (2 No. 10G SFP+) – 16/12/ 8 Port switch • Fans: FRU redundant • AES-128 MACsec encryption • Layer 3 capabilities, including OSPF, EIGRP, ISIS, RIP, and routed access • Advanced network monitoring using Full Flexible Net Flow 	

Specs	<ul style="list-style-type: none"> Virtual Networks: 4 Power input: 100 to 240VAC, 50 to 60Hz 8Port switch <ul style="list-style-type: none"> Switching capacity: 17.6 Gbps Forwarding rate: 13.1 Mpps MAC Address table size: 16K entries 16/12 Port switch <ul style="list-style-type: none"> Switching capacity: 12.8 Gbps Forwarding rate: 9.5 Mpps) MAC Address table size: 8K entries 	
RAM& accessories	<ul style="list-style-type: none"> SDRAM- 64MB Flash- 16MB 	
Support	Locally Available Technical Support Services (<i>Manufacturer's Letter of Authorization Mandatory</i>)	
Warranty	Manufacturer's Limited Lifetime Warranty	

8. ADDITIONAL NOTES

Tenderers should take note of the following

- The network should be capable of carrying data, voice and video. QOS should be considered as part of installation and configuration of the network.
- All active LAN equipment should be from the same manufacturer for seamless integration, management and maintenance.
- Each floor should have a telecommunication Closet to house the necessary structured cabling components and active equipment if necessary.

9. FIELD QUALITY CONTROL

Installation personnel shall meet manufacturer's training and education requirements for implementation of extended warranty program.

10. 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:

- Label each outlet with permanent self-adhesive label with minimum 3/16 in. high characters.
- Label each cable with permanent self-adhesive label with minimum, 1/8 in. high characters, in the following locations:
 - Inside receptacle box at the work area.
 - Behind the communication closet patch panel or punch block.
- 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.
- Use color-coded labels for each termination field that conforms to ANSI/TIA/EIA-606(A) standard color codes for termination blocks.
- Mount termination blocks on color-coded backboards.
- 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 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.

11. TESTING

- a. Testing shall conform to ANSI/TIA/EIA-568-B.1 standard. Testing shall be accomplished using level IIe or higher field testers.
- b. 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

- c. 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.
- 2) Cables shall be tested at 1310 and 1550 nm for single mode optical fibers.
- 3) Testing procedures shall utilize “Method B” – One jumper reference.

4) 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.

- i Submit printout for each cable tested.
- ii 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.

4. BROCHURES AND TECHNICAL LITERATURE

Tenderers **must** enclose together with their submitted bids brochures detailing technical Literature and specifications of all the 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.

SECTION D

SCHEDULE OF CONTRACT DRAWINGS

SCHEDULE OF CONTRACT DRAWINGS

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

NOTE:

Tenderers are advised to inspect the electrical drawings at the office of the **Chief Engineer (Electrical) – State Department for Public Works**, at Chief Engineer's (Electrical) Office, Hill Plaza Building, Community area, Nairobi along Ngong road, during normal working hours.

SECTION E

TECHNICAL SCHEDULE

TECHNICAL SCHEDULE

1. The technical schedule shall be submitted by tenderers to facilitate and enable the Project Manager to evaluate the tenders, especially where the tenderer intends to supply or has based his tender sum on equipment, which differs in manufacture, type or performance from the specifications indicated by the Project Manager.
2. This schedule shall form part of the technical evaluation criterion, and tenderers are therefore advised to complete the schedule as they shall be considered non-responsive.

NB. The tenderer must complete in full the technical schedule. Apart from the information required in the technical schedule, the tenderer **MUST SUBMIT LEGIBLE** comprehensive manufacturer's technical brochures and performance details for all items listed in this schedule and **CLEARLY HIGHLIGHT THE SPECIFIC REQUIRED ITEM ONLY**.

Technical Schedule

	DESCRIPTION	MAKE	MODEL NO
1.	MCBs and MCCBs		
2.	Socket outlets		
3.	Trunking		
4	SC copper cable		
5	Light Switches		
6.	Lighting fittings a) LED' Panels b) Bulkhead fittings		
7.	6 ways Consumer Units		
8.	12 port switch		
9.	12 port patch panel		
10.	Patch code.		
11.	Fibre cable		
12.	Data outlets		
13.	12U data cabinet		

SECTION F
SCHEDULE OF UNIT RATES

SCHEDULE OF UNIT RATES

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

SCHEDULE OF UNIT RATES

ITEM	DESCRIPTION	QTY/UNIT	RATE(KSHS)
1.	<u>Cables</u> PVC SWA PVC Cables:- a) 6 mm sq. 4 core b) 4.0 mm sq 4 core c) 10.0 mm sq 4 core	LM LM LM LM	
2.	100A 10-way TPN Distribution Board.	No.	
3.	Blanking Cover for Twin socket outlet points.	No.	
4.	Indoor Bullet Camera MPs	No.	
5.	Indoor Dome Camera MPs	No.	
6.	24 port edge switch POE capabilities	No.	
7.	9U Wall Mounted cabinet	No. No.	

SECTION G
BILLS OF QUANTITIES

BILLS OF QUANTITIES

A) PRICING OF PRELIMINARIES 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 No.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.

The Bills of Quantities are divided generally into three sections:-

a) Preliminaries – Bill 1

Sub-contractor's preliminaries are as per those described in section C – sub-contractor preliminaries and conditions of contract. The sub-contractor shall study the conditions and make provision to cover their cost in this Bill. The number of preliminary items to be priced by the Tenderer has been limited to tangible items such as site office, temporary works and others. However the Tenderer is free to include and price any other items he deems necessary taking into consideration conditions he is likely to encounter on site.

b) Installation Items and Other Bills

The brief description of the items in these Bills of Quantities should in no way modify or supersede the detailed descriptions in the contract Drawings, conditions of contract and specifications.

The unit of measurements and observations are as per those described in clause 1.05 of the section C.

c) Summary

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

This grand total tender sum shall be entered in the Form of Tender provided elsewhere in this document

B) NOTES FOR BILLS OF QUANTITIES

1. The Bills of Quantities form part of the contract documents and are to be read in conjunction with the contract drawings and general specifications of materials and works.
2. The prices quoted shall be deemed to include for all obligations under the sub-contract including but not limited to supply of materials, labour, delivery to site, storage on site, installation, testing, commissioning and all taxes (including **V.A.T and all taxes applicable at the time of tender.**
3. All prices omitted from any item, section or part of the Bills of Quantities shall be deemed to have been included to another item, section or part.
4. The brief 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 to. Otherwise alternative brands of **equal and approved** quality will be accepted.

Should the sub-contractor install any material not specified here in before receiving **approval** from the Project Manager, the sub-contractor shall remove the material in question and, **at his own cost**, install the proper material.
5. The grand total of prices in the price summary page must be carried forward to the **Form of Tender.**
6. Tenderers must enclose, together with their submitted tenders, **detailed manufacturer's Brochures** detailing Technical Literature and specifications on the items they intend to offer.

This shall be used in the tender evaluation to determine the first line aesthetics and quality of fittings offered.

BILL NO. 1 - ISOLATION WARD					
Item	Description	Qty	Unit	Rate (Ksh)	Amount (Ksh)
	Supply, install, test and commission the following ;-				
	LIGHTING POINTS				
1.01	Lighting points wired in 1.5 mm ² SC CU cables drawn in concealed 20mm diameter HG P.V.C				
	a) one way switching	71	No.		
	b) two way switching	26	No.		
	c) Unswitched	7	No.		
	SWITCHES				
1.02	10Amps, switch plate as CLIPSAL, or approved equivalent as				
	a) one gang one way	19	No.		
	b) two gang one way	4	No.		
	c) one gang two way	22	No.		
	LIGHTING FITTINGS				
1.03	Lighting fittings complete with bulbs or tubes as follows:-				
	a) 1200mm Single SmartBright LED Batten fitting complete with 18 watts Essential LED tube (TYPE A) as PHILIPS or approved equivalent	49	No.		
	b) 1x8Watts, Double sided EXIT emergency lighting luminaire as THORN or approved equivalent. (TYPE EXIT)	7	No.		
	c) 20 W circular Surface mounted Essential Smartbright Bulkhead as PHILIPS or approved equivalent, complete with LED bulb (Type 2D)	33	No.		
	d) 15W, circular Surface mounted LED luminaire with Aluminium die-cast housing, as Philip SmartBright LED Downlight or approved equivalent. (Type BH)	15	No.		
SUB TOTAL C/F TO THE NEXT PAGE					

BILL NO. 1 CONT'D - ISOLATION WARD					
Item	Description	Qty	Unit	Rate (Ksh)	Amount (Ksh)
	Supply, install, test and commission the following				
	Sub Total B/F From PREVIOUS PAGE				
	SOCKET OUTLETS AND OTHER POWER POINTS				
1.04	13 Amps. Socket outlet points wired ring comprising of 3x2.5 mm ² single core PVCI copper cables drawn in concealed 25mm HG PVC conduits including all accessories.	99	No.		
1.05	13 Amps Moulded plate switched socket outlet with neon indicator as BG or approved equivalent				
	a) twin.	63	No.		
1.06	Bedhead unit comprising of 1No. 18 Watts LED reading light, 1 No. 18 watts LED night light, 2 No. standard twin 13Amps 240V socket outlet and provision 1 No. Nurse call bed switch point and 3No. medical gas outlets (1No. Oxygen, 1No. vacuum and 1No. medical air terminals) of diameter 15mm as made by Nationwide Electricals or approved equivalent	36	No.		
1.07	AC Power point comprising wiring in 3x4 mm ² PVC-SC-CU cables in concealed PVC conduits	6	No.		
1.08	20 Amps double pole switches with neon indicator as CLIPSAL or approved equivalent for the AC above.	6	No.		
1.09	Instant shower Power point comprising wiring in 3x4 mm ² PVC-SC-CU cables in concealed PVC conduits	12	No.		
1.10	20 Amps double pole switches with neon indicator as CLIPSAL or approved equivalent for instant shower.	12	No.		
1.11	Cooker Control Unit point comprising wiring in 3x6 mm ² PVC-SC-CU cables in concealed PVC conduits	1	No.		
1.12	45 Amps Cooker Control Unit complete with 13 Amps socket outlet	1	No.		
1.13	45 A Cooker connection unit	1	No.		
	SUB TOTAL C/F TO THE NEXT PAGE				

BILL NO. 1 CONT'D - ISOLATION WARD					
Item	Description	Qty	Unit	Rate (Ksh)	Amount (Ksh)
	Supply, install, test and commission the following :-				
	Sub Total B/F From PREVIOUS PAGE TELEPHONE/DATA AND TV WORKS				
1.14	Telephone/Data outlet point comprising of concealed 20 mm dia. HG PVC conduits plus 1.5 mm ² single core draw wire.	17	No.		
1.15	TV outlet point complete with wiring in CO-AXIAL cable drawn in concealed HG PVC conduit including moulded plates	7	No.		
1.16	CCTV outlet point comprising of concealed 20 mm dia. HG PVC conduits plus 1.5 mm ² single core draw wire.	4	No.		
	DISTRIBUTION BOARDS				
1.17	4 ways TP&N, flush mounted distribution boards (A) complete with 100A integral isolator as HAGER or approved equivalent complete with all accessories but excluding MCBs.	1	No.		
1.18	MCBs for item above				
	(a) 32A, TP	1	No.		
	(b) 50A,TP	1	No.		
	(c) TP blanking plates	2	No.		
1.19	8 ways TP&N, flush mounted distribution boards (A) complete with 100A integral isolator as HAGER or approved equivalent complete with all accessories but excluding MCBs.	2	No.		
1.20	MCB's for items above				
	(a) 10A, SP	9	No.		
	(b) 20A, SP	18	No.		
	(c) 32A, SP	9	No.		
	(f) Blanking plates	6	No.		
	SUB-MAIN POWER DISTRIBUTION				
1.21	5x6 mm ² single core PVC CU cables drawn in cable duct from DB to DB A on ground floor	20	LM		
1.22	5x10 mm ² single core PVC CU cables drawn in cable duct from DB to DB B on ground floor	25	LM		
	SUB TOTAL C/F TO THE NEXT PAGE				

BILL NO. 1 CONT'D - ISOLATION WARD					
Item	Description	Qty	Unit	Rate (Ksh)	Amount (Ksh)
	Supply, install, test and commission the following :-				
	Sub Total B/F From PREVIOUS PAGE				
	<u>MAIN POWER DISTRIBUTION</u>				
1.23	5x25 mm ² single core PVC CU cables drawn in PVC HG conduit from CLB to main distribution board	5	LM		
1.24	16 SWG Standard Cable Loop-in box	1	No.		
1.25	The following for item above complete with all fixing materials and any other necessary accessories:- a) 80 Amps TPN MCCB as ABB or approved equivalent(to be installed in CLB and in LV Board)	2	No.		
1.26	25 mm ² 4 core PVC/SWA/PVC insulation cable Copper cables laid in cable trench from existing LV board to CLB at ward ,complete cable glands , lugs. Cable maker and any other necessary accessories .	75	LM		
1.27	Trenching to 600mm depth, tilling, laying and backfilling complete with "HATARI" tiles. For items above	70	LM		
1.28	200x50mm, two compartment heavy gauge cream powder coated steel metallic trunking complete with bends, fixing accessories for coupling and earthing for Power cable. Allow for colour change to Architect's detail. i Twin Outlet Plate ii Dual Data/Telephone Outlet iii Carry out Bonding throughout the entire Length of Trunking and connect to Earthing	105	LM		
1.29	EARTHING. Earthing of the CLB (item 1.22), comprising of the following:- a) 15 mm x 1800 mm earth rod as FURSE cat. No. RB 105. b) 15 mm dia. Driving stud as FURSE cat.No. ST100. c) Rod to tape clamp as FURSE. d) Concrete inspection pit as FURSE cat. No.PT005. (or a well made 320mm x e) 25x3mm copper tape	1 1 1 1 20	No. No. No. No. LM		
SUB TOTAL C/F TO THE NEXT PAGE					

BILL NO. 1 CONT'D - ISOLATION CENTER					
Item	Description	Qty	Unit	Rate (Ksh)	Amount (Ksh)
	Supply, install, test and commission the following :- Sub Total B/F From PREVIOUS PAGE FIRE ALARM SYSTEM.				
1.30	2 zone Flush mounted, addressable Fire alarm control panel complete with Battery and charger as MENVIER MF9304L or approved equivalent	1	No.		
1.31	Fire alarm power points wired in Heat resistant SC PVC copper cables drawn in concealed HG PVC conduits	34	No.		
1.32	Addressable low profile LED sounder beacon with flashing light as MENVIER MSB124SB	3	No.		
1.33	Smoke detectors as MENVIER or approved equivalent.	26	No.		
1.34	Fire break glass Manual call point unit as MENVIER or approved equivalent complete with a packet of 5 spare glasses, a packet of 5 spare test keys, a spare back box and a hinged cover.	5	No.		
	NURSE CALL SYSTEM				
1.35	Nurse call system points comprising of wiring in 6 core PVC insulated copper cable drawn in concealed 20mm dia. HG conduits.	96	No.		
1.36	Wall mounted over door lights for Nurse call system.	6	No.		
1.37	Nurse call system pull cord call switch on bedhead unit	36	No.		
1.38	Nurse call/reset switch on bedhead unit	36	No.		
1.39	Nurse call system ceiling pull cord call switch in toilet area	8	No.		
1.40	Nurse call/reset switch in toilet area	8	No.		
1.41	Nurse call system pull cord call switch in bath	2	No.		
1.42	250 VAC 50 HZ, flush mounted Nurse call control panel with a minimum of 36 No. patient stations, alarm sounder, lamp test facility for the dome lights and LEDs, continuous supervision of addressable devices to Engineer's approval.	1	No.		
	SUB TOTAL C/F TO MAIN SUMMARY PAGE				

BILL NO. 2 - STRUCTURED CABLING					
ITEM	DESCRIPTION	QTY	UNIT	RATE (Kshs)	AMOUNT (Kshs)
	Supply, Install, test and Commission the following				
	HORIZONTAL CABLING				
2.01	RJ45 Cat 6A STP Data and voice outlets as Siemons or approved equivalent	14	No.		
2.02	3m RJ45- RJ45 Cat 6A STP factory terminated patch cord as Siemons for use at workstation areas	8	No.		
2.03	1m, RJ45- RJ45 cat 6A STP factory terminated patch cord as Siemons to be used in cabinet.	14	No.		
2.04	1m, RJ45- RJ45 cat 6A STP factory terminated patch cord as Siemons to be used from the telephone to the computer	2	No.		
2.05	Cat 6A STP 4-pair cable as Siemons pulled between cabinet and work stations.	700	Lm.		
	CABINETS				
2.06	16U Wall Mounted cabinet with power outlet sockets, as described in particular specifications	1	No.		
2.07	24 port RJ45 Cat Data/Voice patch panel for STP termination as Siemon.	1	No.		
2.08	Cable Manager	3	No.		
2.09	1000VA Rack Mount,un-interrupted power supply unit (UPS) with USB and Serial Port as APC or equal and approved equivalent	1	No		
	ACTIVE COMPONENTS				
2.10	24 port full PoE+ Switch, modular uplink configuration, PWR-C5-600WAC power supply, FRU redundant fans, 128 Gbps switching capacity with Network Advantage software as described in	1	No		
2.11	Wall mounted wireless Access pointwith POE support, with dual-band radios support up to 450 Mbps per radio to maximize capacity and coverage, Robust security including WPA2, 802.1X with secure authentication, 10/100/1000 Ethernet, with support for 802.3af PoE as CISCO Wireless Access Point or equal and approved equivalent	3	No.		
	BACKBONE CABLING				
2.12	Screened Armoured 8 Core Multimode Fibre Optic Cable as SIEMON or Approved Equivalent from Server Room Switch to the Switch at Ward.	100	Lm		
SUB TOTAL C/F TO SUMMARY PAGE					

*Proposed construction of Medical plant
Electrical Installation Works- Alupe County Hospital*

BILL NO. 3- MEDICAL PLANT- ALUPE COUNTY HOSPITAL SCHEDULE NO. 3 : MEDICAL GASES PLANT					
Item	Description	Qty	Unit	Rate (Ksh)	Amount (Ksh)
	Supply, install, test and commission the following :-				
	LIGHTING POINTS				
3.01	Lighting points wired in 3x 1.5 mm ² SC CU cables drawn in concealed 20mm diameter HG P.V.C conduits for:- a) one way switching	21	No.		
	SWITCHES				
3.02	10Amps, switch plate as CLIPSAL, BG NEXUS or approved equivalent as a) one gang one way	9	No.		
	LIGHTING FITTINGS				
3.03	Lighting fittings complete with bulbs or tubes as follows:- a) 1200mm 20 Watts LED fitting with Polycarbonate linear Optical cover, 30,000hrs lifetime explosive proof, IP65, SmartBright LED with 20 watts Essential LED tube as PHILIPS BN012C or approved equivalent.(TYPE A1) i)) A round shape 20 Watts outdoor LED fitting with opal polycarbonate diffuser, IP65, as Philips or approved Equivalent complete with 15 Watts LED bulb (Type BH)	13	No.		
	SOCKET OUTLETS AND OTHER POWER POINTS				
3.04	13 Amps. Socket outlet points wired ring comprising of 3x2.5 mm sq. single core PVCI copper cables drawn in concealed 25mm HG PVC conduits including all accessories.	10	No.		
3.05	13 Amps. Moulded plate switched socket outlet with neon indicator as BG, CLIPSAL or approved equivalent a) twin.	10	No.		
SUB TOTAL C/F TO THE NEXT PAGE					

*Proposed construction of Medical plant
Electrical Installation Works- Alupe County Hospital*

BILL NO. 3- MEDICAL PLANT- ALUPE COUNTY HOSPITAL SCHEDULE NO. 3 : MEDICAL GASES PLANT					
Item	Description	Qty	Unit	Rate (Ksh)	Amount (Ksh)
	Supply, install, test and commission the following :-				
	Sub Total B/F From PREVIOUS PAGE				
3.06	Medical Vacuum Plant Power point comprising wiring in 5x2.5mm ² PVC-SC-CU cables in concealed PVC conduits	10	LM		
3.07	20 Amps TPN isolator switch as CLIPSAL or approved equivalent for the item above	1	No.		
3.08	AGSS Plant Power point comprising wiring in 5x6mm ² PVC-SC-CU cables in concealed PVC conduits	20	LM		
3.09	32 Amps TPN isolator switch as CLIPSAL or approved equivalent for the item above	2	No.		
3.10	Medical Air Plant Power point comprising wiring in 5x 16 mm ² PVC-SC-CU cables in concealed PVC conduits	16	LM		
3.11	63 Amps TPN isolator switch as CLIPSAL or approved equivalent for the item above	2	No.		
3.12	PSA Air compressor Power point comprising wiring in 5x35mm ² PVC-SC-CU cables in concealed PVC conduits	9	LM		
3.13	100 Amps TPN isolator switch as CLIPSAL or approved equivalent for the item above	1	No.		
3.14	PSA Air drier Power point comprising wiring in 5x4mm ² PVC-SC-CU cables in concealed PVC conduits	10	LM		
3.15	20 Amps TPN isolator switch as CLIPSAL or approved equivalent for the item above	1	No.		
3.16	Generator Power point comprising wiring in 5x2.5mm ² PVC-SC-CU cables in concealed PVC conduits	10	LM		
3.17	20 Amps TPN isolator switch as CLIPSAL or approved equivalent for the item above	1	No.		
	SUB TOTAL C/F TO THE NEXT PAGE				

*Proposed construction of Medical plant
Electrical Installation Works- Alupe County Hospital*

BILL NO. 3- MEDICAL PLANT- ALUPE COUNTY HOSPITAL SCHEDULE NO. 3 : MEDICAL GASES PLANT					
Item	Description	Qty	Unit	Rate (Ksh)	Amount (Ksh)
	Supply, install, test and commission the following :-				
	Sub Total B/F From PREVIOUS PAGE				
3.18	PSA high pressure compressor Power point comprising wiring in 5x4mm ² PVC-SC-CU cables in concealed PVC conduits	10	LM		
3.19	20 Amps TPN isolator switch as CLIPSAL or approved equivalent for the item above	1	No.		
	DISTRIBUTION BOARDS				
3.20	12 ways TP&N, flush mounted distribution board at Kitchen complete with 200A integral isolator as HAGER or approved equivalent complete with all accessories but excluding MCBs.	1	No.		
3.21	MCB's for item above				
	(a) 10A, 5P B Curve	1	No.		
	(c) 20A 5P B Curve	4	No.		
	(d) 20A TPN D Curve	7	No.		
	(e) 32A TPN D Curve	1	No.		
	(f) 63A TPN D Curve	1	No.		
	(g) 100 A TPN D Curve	1	No.		
	(h) TPN Spares	2	No.		
	(l) 200 A TPN to installed in the existing board	1	No.		
	SUB-MAIN POWER DISTRIBUTION				
3.22	4 x 95mm ² + 1 x 50 mm ² ECC Single core PVC insulated Copper cables from CLB to DB	10	LM		
3.23	16 SWG Standard Cable Loop-in box for the cable below	1	No.		
3.24	200A TPN MCCB as ABB or approved equivalent to be installed in the CLB	1	No.		
	SUB TOTAL C/F TO COLLECTION PAGE				

*Proposed construction of Medical plant
Electrical Installation Works- Alupe County Hospital*

BILL NO. 3- MEDICAL PLANT- ALUPE COUNTY HOSPITAL SCHEDULE NO. 3 : MEDICAL GASES PLANT					
Item	Description	Qty	Unit	Rate (Ksh)	Amount (Ksh)
	Supply, install, test and commission the following :-				
	Sub Total B/F From PREVIOUS PAGE				
	MAIN POWER DISTRIBUTION				
3.25	2X50 mm ² 4 core PVC SWA/PVC insulation cable Copper cables laid in cable trench from existing LV board to CLB at plant room ,complete cable glands , lugs. Cable maker and any other necessary accessories .	420	LM		
3.26	Trenching to 600mm depth, tilling, laying and backfilling complete with "HATARI" tiles. For items above	190	LM		
	EARTHING.				
3.27	Earthing of the Distribution board B above, comprising of the following:- a) 15 mm x 1800 mm earth rod as FURSE cat. No. RB 105.	1	No.		
	b) 15 mm dia. Driving stud as FURSE cat.No. ST100.	1	No.		
	c) Rod to tape clamp as FURSE.	1	No.		
	d) Concrete inspection pit as FURSE cat. No.PT005. (or a well made 320mm x 320mmx 210 mm depth pit.)	1	No.		
	e) 25x3mm copper tape	6	LM		
	POWER FACTOR CORRECTION				
3.28	25 KVAR,3phase, 415V automatic power factor correction capacitor bank switched in 6 steps. The bank to be made from low-Iss bio-degradable capacitive units, complete with appropriately rated breaker and earthed enclosure. All the contactors, controls and indicator lamps, including a digital read- out screen. to be included.	1	No.		
	SUB TOTAL C/F TO COLLECTION PAGE				

SUMMARY PAGE		
ITEM	DESCRIPTION	AMOUNT(KSHS)
A	Sub total B/F from SCHEDULE 1- ELECTRICAL INSTALLATION WORKS	
B	Sub total B/F from SCHEDULE 2 -STRUCTURED CABLING INSTALLATION WORKS	
C	Sub total B/F from SCHEDULE 3 -MEDICAL PLANT INSTALLATION WORKS	
TOTAL CARRIED FORWARD TO THE CONTRACT SUM		

Total Amount in Words Kenya Shillings.....

.....

Tenderer's Name and Stamp.....

.....

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

PIN No.....VAT Certificate No.....

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

Signature of witness..... Date.....

**SUPPLY, DELIVERY, INSTALLATION, TESTING AND COMMISSIONING OF INTERNAL
PLUMBING, INTERNAL DRAINAGE, SOLAR WATER HEATING, WATER STORAGE TANKS
AND FIRE PROTECTION WORKS**

SECTION I - EVALUATION AND QUALIFICATION CRITERIA

10 GENERAL PROVISIONS

- 11** 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 evaluating Tenders.
- 12** 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.

13 EVALUATION AND CONTRACT AWARD CRITERIA

The Procuring 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 THE EVALUATION WILL BE UNDERTAKEN IN 3 STAGES AS FOLLOWS:

1. Preliminary Evaluation;
2. Technical Evaluation and ;
3. Financial Evaluation.

STAGE 1: PRELIMINARY EXAMINATION FOR DETERMINATION OF RESPONSIVENESS

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.

PRELIMINARY EVALUATION CRITERIA

S/No	MANDATORY REQUIREMENTS(MR)
MR1	Valid Copy of certificate of incorporation/ Registration.
MR2	NCA registration certificate for NCA 7 and above in Plumbing and drainage installation works category
MR3	Copy of Annual Practicing License from NCA for the current year
MR4	Valid copy Current Tax Compliance Certificate from Bidding Company, and if Consortium, from each member of the consortium.
MR5	Submission of valid CR12/CR13 form showing the list of directors /shareholding issued within the last 12 months or National Identity Card(s) for Sole Proprietorship
MR6	Dully filled, Signed and Stamped Confidential Business Questionnaire
MR7	Valid Copy of Current Single Business permit
MR8	Dully filled, signed, dated and stamped form SD1 (Anti-debarment form) (Must be commissioned by a Commissioner for Oaths)
MR9	Dully filled, signed, dated and stamped form SD2 (Anti-corruption form) (Must be commissioned by a Commissioner for Oaths)
MR10	Dully filled, signed, dated and stamped form DEC 1 (Code of Ethics form)
MR11	Dully filled, signed, dated and stamped Tenderer Information Form ELI
MR12	Domestic sub-contractors must sign and stamp the summary page of their respective Specialist works on the tender document.
MR13	Duly filled, signed and stamped Statement of compliance.
MR14	Power of Attorney Authorized by a magistrate or commissioner of Oaths indicating the Authorized signatory for the Documents of the bidder if the signatory is not a director.

Note:

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

STAGE 2: TECHNICAL EVALUATION

The tender document shall be examined based on clause 17.0 of the Instruction to Tenderers. *In order to comply with provisions of clause 17.0 of Instruction to Tenderers, the tenderers shall be required;*

- a) *To fill the Standard Forms* provided in the bid document for the purposes of providing the required information. The tenderers may also attach the required information if they so desire;
- b) *To supply equipment's/items which comply with the technical specifications set out in the bid document.* In this regard, the 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 technical evaluation criteria shall be as shown below:

<u>PARAMETER</u>	ACTION
(i) Compliance with Technical Specifications.....	PASS/FAIL
(ii) Key Personnel.....	PASS/FAIL
(iii) Contract Completed in the last Five (5)	PASS/FAIL
(iv) Schedules of on-going projects	PASS/FAIL
(v) Schedules of contractors equipment	PASS/FAIL
(vi) Audited Financial Report for the last 3 years	PASS/FAIL
(vii) Evidence of Financial Resources	PASS/FAIL
(viii) Name, Address and Telephone of Bank (Contractor to provide)	PASS/FAIL
(ix) Litigation History	PASS/FAIL

The detailed Assessment for Eligibility shall be as shown in table 1 below:

TABLE 1: Technical Evaluation Criteria

Item	Description	Remarks
1	Compliance with Technical Specifications <i>(Note: Tender Evaluation Committee to carryout analysis showing how decision on this requirement has been arrived at. Attach analysis on this as an Appendix)</i>	PASS/FAIL
2	Tender Questionnaire Form <ul style="list-style-type: none"> Dully filled, signed and stamped form 	PASS/FAIL
3	Key Personnel (Attach evidence)	PASS/FAIL
	Director of the firm <ul style="list-style-type: none"> Holder of a diploma and above in relevant Engineering field 	PASS/FAIL
	At least 1No. degree/diploma holder of key personnel in relevant field <ul style="list-style-type: none"> With over 5 years relevant experience 	PASS/FAIL
	At least 1No certificate holder of key personnel in relevant field <ul style="list-style-type: none"> With over 10 years relevant experience 	PASS/FAIL
	At least 2No artisan (trade test certificate in relevant field) <ul style="list-style-type: none"> With over 10 years relevant experience 	PASS/FAIL
4	Contracts completed in the last five (5) -Provide Evidence of; <ul style="list-style-type: none"> 3 No. Projects of similar nature, complexity or magnitude or 5 No. Projects of similar nature but of lower value than the one in consideration 	PASS/FAIL

Item	Description	Remarks
5	On-going projects – Provide Evidence Maximum of three (3no.) ongoing projects	PASS/FAIL
6	Schedule of contractors equipment and transport (proof or evidence of ownership/Lease)	PASS/FAIL
	a) Relevant means of transport (pick-ups, lorries, trucks- at least two (2 no.)	
7	Financial report	PASS/FAIL
	a) Audited financial report (last three (3) years)-2020,2019 and 2018 <ul style="list-style-type: none"> • With an Average Annual Turn-over of 100% of the cost of the project Or • With an Average Annual Turn-over above 50% but below 100% of the cost of the project 	
	b) Evidence of Financial Resources (cash in hand, lines of credit, overdraft facility etc.) <ul style="list-style-type: none"> • Bank/Creditors/Letters of access to credit specific to the tender. 	
8	Name, Address and Telephone of Banks (Contractor to provide)	PASS/FAIL
9	Litigation History <ul style="list-style-type: none"> •Duly Filled, signed and stamped form signed and Stamped by an Attorney/ Commissioner for Oaths 	PASS/FAIL
	OVERALL REMARKS	PASS/FAIL

**Monthly Cash Flow =Tender Sum/Contract Period*

Note: Any bidder who FAILS in technical evaluation shall be not be considered for further evaluation.

STAGE 3 - FINANCIAL EVALUATION

Upon completion of the technical evaluation a detailed financial evaluation shall follow.

The evaluation shall be in **three parts**;

- a) Determination of Arithmetic errors
- b) Comparison of Rates; and
- c) Consistency of the Rates.

a) Determination of Arithmetic Errors

All arithmetic errors are to be noted and reported accordingly

NOTE:

Arithmetic Errors will be determined 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 tender figure in the Main summary of the Bills of Quantities, the amount as stated in the Form of Tender shall prevail.
- ii) 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;
- iii) Tenders with arithmetic errors shall be disqualified as per Clauses 74(2) and 75(1) of the Public Procurement and Asset Disposal Regulations 2020 which states:
Clause 74(2): "Subject to section 79(2)(b) of the Act any errors in the submitted tender arising from a miscalculation of unit price quantity subtotal and total bid price shall be considered as a major deviation that affects the substance of the tender and shall lead to disqualification of the tender as non-responsive."
Clause 75(1): "A procuring entity shall reject all tenders which are not in conformity to the requirements of section 79 of the Act and regulation 74 of these Regulations"

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 demonstrable 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.

RECOMMENDATION FOR AWARD

The successful bidder shall be the tenderer with the lowest evaluated tender price.

PART II - WORKS REQUIREMENTS

SECTION V - SPECIFICATIONS

Notes for preparing Specifications

1. Specifications must be drafted to present a clear and precise statement of the required standards of materials, and workmanship for tenderers to respond realistically and competitively to the requirements of the Procuring Entity and ensure responsiveness of tenders. The Specifications should require that all materials, plant, and other supplies to be permanently incorporated in the Works be new, unused, of the most recent or current models, and incorporating all recent improvements in design and materials unless provided otherwise in the Contract. Where the Contractor is responsible for the design of any part of the permanent Works, the extent of his obligations must be stated.
2. Specifications from previous similar projects are useful and may not be necessary to re-write specifications for every Works Contract.
3. There are considerable advantages in standardizing **General Specifications** for repetitive Works in recognized public sectors, such as high ways, urban housing, irrigation and water supply. The General Specifications should cover all classes of workmanship, materials and equipment commonly involved in constructions, although not necessarily to be used in a particular works contract. Deletions or addenda should then adapt the General Specifications to the particular Works.
4. Care must be taken in drafting Specifications to ensure they are not restrictive. In the Specifications of standards for materials, plant and workmanship, existing Kenya Standards should be used as much as possible, otherwise recognized international standards may also be used.
5. The Procuring Entity should decide whether technical solutions to specified parts of the Works are to be permitted. Alternatives are appropriate in cases where obvious (and potentially less costly) alternatives are possible to the technical solutions indicated in tender documents for certain elements of the Works, taking into consideration the comparative specialized advantage of potential tenderers.
6. The Procuring Entity should provide a description of the selected parts of the Works with appropriate reference to Drawings, Specifications, Bills of Quantities, and Design or Performance criteria, stating that the alternative solutions shall be at least structurally and functionally equivalent to the basic design parameters and Specifications.
7. Such alternative solutions shall be accompanied by all information necessary for a complete evaluation by the Procuring Entity, including drawings, design calculations, technical specifications, breakdown of prices, proposed construction methodology, and other relevant details. Technical alternatives permitted in this manner shall be considered by the Procuring Entity each on its own merits and independently of whether the tenderer has priced the item as described in the Procuring Entity's design included with the tender documents.

GENERAL MECHANICAL SPECIFICATONS

GENERAL MECHANICAL SPECIFICATION

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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.

2.08.5 shop drawings

Before manufacture or Fabrication is commenced the contractor shall submit Two copies of detailed drawings of all water tanks, fire hose reel pump, water booster pump and any other equipment 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 contractor of the full responsibility of errors or the necessity of checking the drawings himself or of furnishing the materials and equipment and performing the work required by the plans and specifications.

2.09 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 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.

GENERAL SPECIFICATIONS FOR PLUMBING AND DRAINAGE INSTALLATION WORK

PARTICULAR PLUMBING AND DRAINAGE SPECIFICATIONS

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GENERAL

SITE LOCATION

The site of the proposed works is at **Alupe Sub-County Hospital Compound – Busia County**

SCOPE OF WORKS

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

a) Plumbing and drainage installation works

BROCHURES FOR DEVICES

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

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 Pipework and Fittings

Pipework materials are to be used as follows:

a) Galvanized Steel Pipework

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.

b) Copper Tubing

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.

Cpvc piping

PVC (polyvinyl chloride) that has been chlorinated via a free radical chlorination reaction. CPVC is produced by adding chlorine to PVC in a water slurry or fluidized bed chlorination process. The chlorination reaction is initiated by ultraviolet light. The chlorinated PVC is compounded with ingredients necessary for the desired properties for further processing. The chlorine added to PVC gives CPVC higher temperature performance and improved fire and corrosion resistance.

Should conform to ASTM D2846 standard and ASTM F441 Standard for chlorinated poly vinyl chloride pipes. Short copper connection tubes between galvanized pipe work and sanitary fittings 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.

c) P.V.C. (Hard) Pressure Pipes and Fittings

All P.V.C. pipes and fittings shall be manufactured in accordance with B.S. 3505: 1968.

Jointing

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.

Testing

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.

d) 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, centers 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.

e) 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.

b) 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 Littlehampton, 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) Steel and Copper Pipes and Tubes

Pipe runs shall be secured by clips connected to pipeangers, 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 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. They shall be as described in the bill of quantities.

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.

1.1. **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 ten hours 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.

b) 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 crawlways, 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.

GENERAL SOLAR WATER HEATING SPECIFICATIONS

i

SOLAR WATER HEATING SYSTEM

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, no alternatives 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 Bosch solar thermo siphon system 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 weatherproof. 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 pipework and in accordance with B.S. 2871 or similar. All joints and connections between the riser and header tubings shall be leak proof and stand to hydraulic pressure tests. The collector to be pressure tested to withstand a pressure of 8 kg/cm². whichever is greater. In general, collectors shall be pressure tested at 15 times the rated operating gauge pressure of 8kg/cm², which ever is greater. 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/m³. 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°.

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°.

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 Thermosyphon

The solar cylinder shall maintain a minimum horizontal distance of 300mm above the highest point of the solar panel installation

b) For low Thermosyphon

The solar cylinder shall maintain a flow line up grade of 1:20 minimums where the low profile thermosyphon 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 weatherproof 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 weatherproofed. 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.

1.3.3.4 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.

1.3.3.5 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.

1.3.3.6 Inter connection of solar panels

Shall be done utilizing Neoprene tubing or Stainless Steel connector or equivalent, fitted with clamps

and able to withstand the working pressure.

1.3.3.7 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 with floor or wall pedestals shall be provided.

Screwed piping shall be installed with a sufficient number of unions to facilitate easy removal of valves and fittings, and to enable alterations of the pipework to be carried out without the need to cut the pipe.

Full allowance shall be made for the expansion and contraction of pipework, precautions 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 tubings specified as chased into walls shall have the wall face neatly cut and chased, the tubing wedged and fixed and plastered over.

All tubing specified as fixed to ceilings, roofs or roof structures shall be fixed with approved mild steel hangers cut and pinned to ceilings, roofs or roof structures.

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.

<u>Size</u> <u>Nominal Bores</u>	<u>Maximum support</u> <u>Spacing</u>
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:

- Malleable iron "school board" pattern brackets for building in or screwing to structure or
- Malleable pipe rings, with either back plate, plugs or girder clips or
- 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 brazed 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 :-

- Copper-alloy holderbats for building in, or screwing to structure.
- Or
- Strap clips of copper, copper-alloy or other suitable material.
- Or
- Gunmetal holderbats 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.

1.1.6.2 Valves, Cocks, Taps Etc

Gate Valves

All gate valves up to and including 65mm nominal bore and above, other than those required for fitting to 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.

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.

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

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.

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/m³. Premolded 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) o.c.

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 weatherproof 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. The engineer shall witness galvanising at the factory

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 types 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 whosoever 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.

Galvanised steel plates shall have a minimum of 25 years of warranty against rust, corrosion or anyother damage due to poor galavanization.

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. ($4 \frac{1}{2}$ 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 ($4 \frac{1}{2}$ 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°C to 105°C (50°F to 220°F).

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 builders 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/cm².

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 labeled 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.

SOLAR WATER HEATING SYSTEM 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 & m²).....

Gross Dimensions & Area (m & m²).....

Dimensions and Area absorbing surface (m & m²).....
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 °C.....

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 SPECIFICATION FOR PORTABLE FIRE EXTINGUISHER BOOSTED HOSE REEL SYSTEM, HOSE REEL, AND FIRE HYDRANT INSTALLATIONS

4.1 GENERAL

The particular specification details the requirements for the supply and installation and commissioning of the Portable Fire Extinguishers and Boosted Hose Reel System. 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.

4.2 SCOPE OF WORKS

The Sub-contractor shall supply, deliver, erect, test and commission all the portable fire extinguishers and Hose Reel which are called for in these Specifications and as shown on the Contract Drawings.

4.3 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.

4.4 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

4.5 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 its 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.

4.6 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 2³/₄ X 8TPI female thread.

Head cap: to be plastic moulding acetyl resin.

CO₂ 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.

4.7 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.

4.8 BOOSTED HOSE REEL SYSTEM

6.8.1 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.

6.8.2 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 5M³/hr 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.

6.8.3 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.

6.8.4 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 or 45 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-galvanised cabinet recessed on the wall.

The hose reels shall be installed at 1.5 metres centre above the finished floor level in locations shown in the contract drawings.

6.8.5 Pipe Work

The pipe work for the hose reel installation shall be galvanised wrought steel tubing heavy grade Class C 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.

6.8.6 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.

6.8.7 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.

6.8.8 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

6.8.9 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.

6.8.10 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.

6.8.11 Finish Painting

Upon completion of testing and commissioning the hose reel installation, the pipework shall be primed and finish painted with 2 No. coats of paints to the Engineer's requirements.

6.8.12 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.

6.8.13 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.

6.8.14 Signage-Fire Instruction /Fire Exit

4.8.14.1 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.

4.8.14.2 Fire Exit Sign

Print Fire Exit signs on the Perspex plate, 4mm thick, with white colour background as follows:-

1. Lettering IN RED COLOUR 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.

4.8.14.3 Hose Reel Label

Print Fire Exit signs on the Perspex plate, 4mm thick, with white colour background as follows:-

1. Lettering IN RED COLOUR 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.

5.0 The Dry Riser Installation

5.1 Definition

Dry riser installation is a system where a pipe is installed vertically through a building with an inlet breeching provided at a street level through which the fire brigade can pump water.

5.2 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.

5.3 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 2 No 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.

5.4 Fire Brigade Breeching Inlets

One of the Brigade Breeching inlets shall consist of four (4 No.) 64mm internal diameter instantaneous male coupling for connection to the fire brigade pumps and other two shall consist of two (2 No.) 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 remainder of the box is to be finished in fire red enamel paint.

5.5 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.**

5.6 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.

5.7 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.

5.8 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.

5.9 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 conform to B.S 5153:1974 with flanges to B.S 4504 PN 16. The valve shall be of Cast Iron Construction with Gunmetal seat to B.S 1400.

5.10 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.

5.11 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.

5.12 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.

5.13 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

5.14 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.

5.15 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

5.16 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.

5.17 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

6.0 Fire Hydrant

6.1 Fire Hydrant Details

6.1.1 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.

6.1.2 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.

6.1.3 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.

6.1.4 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.

6.1.5 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.

6.1.6 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.

6.1.7 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.

6.1.8 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.

6.1.9 Hydrant coating

The hydrant shall be coated in accordance to BS. 4164.

6.1.10 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

6.1.11 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 cast into the cover.

6.1.12 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

6.2 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

6.3 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.

6.4 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 Alupe Sub-County Hospital compound and if unable to locate it or its details apply to the Principal Secretary, Ministry of Health

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 galvanized 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 Galvanised steel plate Water Tanks

The tank shall be Galvanised steel plates 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 super 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 Low Level Tank for Hose Reel

It shall be constructed of 1000 x 1000mm galvanized steel plates, having a capacity of 2,000 litres

Preferred Dimensions

- (a) Length – 2.0m
- (b) Height – 1.0m
- (c) Width – 1.0m

5.2 High Level Tank for Supply

Tank Capacity: 4,000 litres. It shall be constructed of 1000 x 1000mm galvanized steel plates

5.2.1 Preferred Dimensions

- (a) Length – 2.0m
- (b) Width – 2.0m
- (c) Height – 1.0m

Height from ground level to the underside of the tank shall be 6 metres.

The tanks in clause 2 shall be complete with:

1. 50mm and 40mm diameter inflow connection (Council and Borehole Supply)
2. 50mm diameter outflow connection

3. 50mm diameter washout pipe
4. 50mm diameter overflow pipe
5. 1No. level regulator
6. 1No. Water level indicator
7. 1No. internal ladder
8. 1No. external ladder to 3m off-ground level with cage
9. 1No. perimeter walkway and handrail around the tank

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 Access Ladder

Internal ladders shall be supplied for the tank and shall be fixed adjacent at the manholes but easily removable for cleaning the inside of the tank (i.e hooked connection).

The tanks shall be provided with an external ladder from the platform leading to the manhole and complying to BS 4211. The stringers shall be parallel, minimum width 15 inches apart and of flat bar of minimum dimensions 1½" by 2/8 inches. The rugs shall be of round bars not less than ¾ inches diameter and the distance between centres shall be 9 – 10 inches. The external ladder shall be fitted with safety hoofs made to conform to BS 4211.

The tower external ladder shall be as above but have a half landing 8M above ground level complete with a 6mm thick checked base plate and an appropriate protection safety handrail.

8.0 Platform

The tower, in galvanized steel, shall have a periphery walkway at tank level having minimum width of 600mm clear between the edge of the tank and the inside of the protective safety handrail. The platform is to be provided with a steel chequered plate floor of similar approved and to be completely sealed so as not to allow anybody or items such as bolts and spanners to fall on persons on the ground.

There shall also be a ladder from the ground to the platform complete with a cage, all in steel. The ladder shall be firmly fixed to the tower.

All loading for the design of the platform are to be provided in the structural calculations.

9.0 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.

10.0 Erection

The sub-contractor shall erect the tank complete, on foundation prepared and designed by others and with all necessary pipes, ladders, tower etc. as listed herein and shown on the drawing.

The main contractor shall prepare the foundation to the sub-contractor's and Structural Engineers details. The main contractor shall also concrete or ground in the HD bolts to the sub-contractor's requirements.

11.0 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.

11.1 Guarantee

The sub-contractor shall guarantee the tanks against leaks, and the tower for a period of (12) months from the

SCHEDULE OF UNIT RATES

1. The tenderer shall insert unit rates against the items in the following schedules and may add such other items as he considers appropriate.
2. The unit rates shall include for supply, transport, insurance, delivery to site, storage as necessary, assembling, cleaning, installing, connecting, profit and maintenance in defects liability and any other obligation under this contract.
3. The unit rates will be used to assess the value of additions or omissions arising from authorized variations to the contract works.
4. Where trade names or manufacturer's catalogue numbers are mentioned in the specification, the reference is intended as a guide to the type of article or quality of material required. Alternative brands of **equal** and **approved** quality will be accepted

ITEM	DESCRIPTION	UNIT	RATE (Kshs)
1.	50mm CPVC pipe	LM	
2.	400mm CPVC pipe	LM	
3.	25mm –ditto	No.	
4.	Instantaneous shower heater	No.	
5.	Hand drier with HEPA filter	No.	
6.	Pedestal “Duravit” wash hand basin (Chrome pop up waste)	No.	
7.	Paper Towel disposal bin 20L (Foot pedal operated lid)	No.	
8.	Paper Towel dispensing unit (250 Sheets).	No.	
9	Manual Push Button Flush valve for water closet as “Sloan”	No.	
10	urinal flush valve with sensor.	No.	

**TECHNICAL SCHEDULE
OF
ITEMS TO BE SUPPLIED**

TECHNICAL SCHEDULE

1. The technical schedule shall be submitted by tenderers to facilitate and enable the Project Manager to evaluate the tenders, especially where the tenderer intends to supply or has based his tender sum on equipment which differs in manufacture, type or performance from the specifications indicated by the Project Manager/Engineer.
2. This schedule shall form part of the technical evaluation criterion, and tenderers are therefore advised to complete the schedule as they shall be considered non responsive.

NB. The tenderer must complete in full the technical schedule. Apart from the information required in the technical schedule, the tenderer **MUST SUBMIT LEGIBLE** comprehensive manufacturer's technical brochures and performance details for all items listed in this schedule and **CLEARLY HIGHLIGHT THE SPECIFIC REQUIRED ITEM ONLY.**

		MANUFACTURER	COUNTRY OF ORIGIN	REMARKS (Catalogue No. etc.)
A	DZR PEX Gate Valves			
B	Pipes PPR			
C	Water closet			
D	Wash hand basin			
E	Urinal bowl flush valve			
F	WC flush-valve			
G	Water Booster pump			
H	Galvanized Pressed steel plates			
I	Fire Hose reel and pump			
J	Automatic dry chemical extinguisher			
K	Fire Hydrant			
L	Solar hot water panel & cylinder			
M	Hand drier			
N	CPVC pipes			

Catalogue must be attached for all the items in the schedule of material above

ALUPE SUB-COUNTY REFERRAL HOSPITAL -PLUMBING ,DRAINAGE AND FIRE FIGHTING INSTALLATIONS					
Item	Description	Unit	Qty	Rate (Kshs)	Amount (Kshs)
	<u>SANITARY FITTINGS</u> Supply, deliver, install and fix the following sanitary fittings including all materials and jointing to supply, waste/soil and overflow pipes.Brand names for 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.Prices to be inclusive of VAT				
A	Wash Hand Basin Pedestal cat No.vw4910WH, Twyforde "SOLA 500" wash hand basin with 1no tap holes and chain stay hole cat. No. SA4211WH, total install bracket pack for 500 basin T1 1960XX complete with 1No.cobra CP pillar tap 1/2 with 6" long lever elbow action cat. no. 101.000.83, chrome grid waste 1 1/4" cat no. WF 4341 CP and white plastic bottle trap 1 1/4" P-trap cat. no.WF 8482 xx or approved equivalent.	No	10		
B	Medical Wash Hand Basin Pedestal cat No.vw4910WH, Twyforde "SOLA MEDICAL 500" wash hand basin 500X400 with 1no tap holes and chain stay hole cat. No. SA4255WH, total install bracket pack for 500 basin T1 1960XX complete with 1No.cobra CP pillar tap 1/2 with 6" long lever elbow action cat. no. 101.000.83, chrome grid waste 1 1/4" cat no. WF 4341 CP and white plastic bottle trap 1 1/4" P-trap cat. no.WF 8482 xx or approved equivalent.	No	10		
C	Water Closet Ambulant Disabled Water Closet suite Close-coupled WC suite with 'P'-trap in approved colour complete with horizontal outlet to BS 3402 with 6/4 litre valveless ceramic cistern and fittings including siphon, 15mm diameter side inlet ball valve, 20mm diameter side overflow, dual flush system, inlet connection,chrome-plated flush button and heavy plastic seat and cover with metal top fixed (chrome plated) hinges 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 Duravit D-Code (Horizontal outlet) CAT No. 2111090000 water closet or equal and approved.	No	2		
D	Wall mounted Hand paper towel dispenser as mediclinic ,with stainless steel matte finish	No	12		
	Total c/f to next page				

ALUPE HOSPITAL-PD

Item	Description	Unit	Qty	Rate (Kshs)	Amount (Kshs)
	Total b/d from previous page				
	Water Closet				
A	Close-coupled WC suite with 'P'-trap in approved colour complete with horizontal outlet to BS 3402 with valveless cistern set to 6/4litre, back to wall pan #MD1145WH, Cistern #MD2342WH, Seat Cover with soft closing mechanism #MD 7851WH and fittings including siphon, 15mm diameter side inlet ball valve, 20mm diameter side overflow, plastic flush bend, dual flush system, inlet connection, chrome-plated flush button and heavy plastic seat and cover with metal top fixed (stainless steel) hinges. All to be as Twyford Moda Rimfree water closet or equal and approved. For staff toilets.	No	6		
B	Squatting water closet suite in vitreous china comprising of water closet pan(WC3390WH) with top plate and integral foot threads, S-trap connector, 6 litres Cistern(CX7630WH), cistern brackets(SR1300XX), hand spray with 1/2" tap and flexible hose(SF7270CP), rubber inlet connector(CF4220XX) and plastic flush pipe and clip(cf6415wh)r, 15mm dia side inlet ball valve, 20mm dia side overflow. All to be as "Twyfords nile squatting wc" or approved equivalent.	No	6		
	Toilet Roll Dispenser				
C	Toilet Paper Dispensers of Ø275mm industrial paper roll, Polish, PR2787C, Stainless Steel as Mediclinic or approved equivalent	No	14		
D	Wall mounted toilet brush set as Duravit toilet accessories 96 x 126mm #009957 or approved equivalent.	No	14		
E	Double chrome robe hooks complete with fixing plates, wall flanges and screws as Jaguar, Kubix Prime or approved equivalent.	No	14		
	Soap Dispenser				
F	Touch-free wall-mounted liquid soap or hand sanitizer dispenser of 1.2 L capacity, manufactured in high impact ABS plastic. Liquid level display window located at the front part of the dispenser to help monitoring the liquid content. Provided with a safety lock with a special key to help prevent tampering and vandalism and to avoid soap robbery in public places, at the same time that hygiene is guaranteed. Operates on 4 AA LR6 alkaline batteries Screws and plastic plugs to mount on a brick wall and to be as Mediclinics or approved equivalent	No	5		
	Total c/f to next page				

ALUPE HOSPITAL-PD

Item	Description	Unit	Qty	Rate (Kshs)	Amount (Kshs)
	Total b/d from previous page				
A	Soap Dispenser Touch-free wall-mounted liquid soap or hand sanitizer dispenser of 1.2 L capacity, manufactured in high impact ABS plastic.Liquid level display window located at the front part of the dispenser to help monitoring the liquid content. Provided with a safety lock with a special key to help prevent tampering and vandalism and to avoid soap robbery in public places, at the same time that hygiene is guaranteed.Operates on 4 AA LR6 alkaline batteries Screws and plastic plugs to mount on a brick wall and to be as Mediclinics or approved equivalent	No	5		
B	Kitchen Sink Single Bowl, Single Drainer stainless steel kitchen sink. Size 1000 x 500mm as manufactured by ASL , bowl size 430 x 420 x 200mm deep complete with chrome plated 40mm waste fittings, plugs, chain stays, overflow,1No. chrome plated Sola 1/2" lever bib wall mounted tap with swivel nozzle(SF1099CP), and 40mm diameter heavy duty plastic bottle trap with 75mm deep seal and chain waste fitting.	No	1		
C	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 with 1No.cobra CP pillar tap 1/2 elbow action cat. no. 101.000.81, chrome plate chain and rubber stopper and heavy gauge 1 1/2" bottle trap and stainless steel legs. All as "Armitage Shanks Birch" or approved equivalent.	No	1		
D	Disinfection Sink Hospital sterilization sink in stainless steel, size 600 x 600mm x 450mm deep with two tap holes, stainless steel cantilever brackets(pair) , 2.3 litre undersink glass base dilution trap,front leg supports in stainless steel and unslotted chain waste fitting complete with lever action mixer tap for hot and cold water. All as Twyford's Hospital Sink or approved equivalent.	No	1		
E	2 Range urinal with 2No urinal bowls 500x350x330 (VC7003WH) and 2 No urinal divisions (VC8051WH) Exposed flush pipe and spreader (SS6072SS) with 9litre auto-cistern in vitreous china, outlet grating (CX8612WH) and bottle trap 1 1/2" chrome (WF8461CP) together with all necessary accessories for proper functioning.The unit to be Twyford Camden or approved equivalent.	No	2		
	Total c/f to next page				

ALUPE HOSPITAL-PD

Item	Description	Unit	Qty	Rate (Kshs)	Amount (Kshs)
	Total b/d from previous page				
A	Shower Fittings Hand shower and rail set with cumulus hand shower, hand shower rail and anti-kink shower hose, 100mm diameter rose with antilime nipples, 2m long hand shower hose, multi rail with sliding hand shower holder and exposed wall mounted shower mixer 'S' connection with 1/2" BSP male iron connection ends and wall flanges, and other necessary fittings and accessories. All to be as cobra or equal and approved.	12	No.		
B	Folding Shower Seat Folding shower seat (AV8800) with back support made of polyester coated aluminium frame with vinyl seat, white RAL 9016, luminous values 90 together with appropriate wall fixings. To be as Twyford or approved equivalent.	4	No.		
C	Bath towel rail 610 x 73mm and all fixing accessories to be as Duravit toilet accessory #009942 or approved equivalent	12	No.		
D	15mm diameter x 300mm long flexible connectors complete with integral chrome plated angle valve as Cobra or equal and approved.	No	36		
E	Mirror of size 610 x 610mm, plugged and screwed to wall with 6No. chrome plated dome capped screws. The mirror shall rest against a layer of 5mm thick foam.	No	10		
F	Sluice Room Combined Disposal Hopper Stainless Steel (1.5mm thick, type 304 to EN 1 4401) disposal hopper; sink and worktop, right hand drainer, left hand hopper measuring 1600 x 600mm, hopper 110mm diameter outlet, chrome plated extended bib tap 1/2" SF5204CP Chrome plated Lever action mixer tap flexible hose and handspray plastic flush pipe (CF6410WH) and flush pipe connectors, top inlet (PS8107SS), S-trap (WF8603XX), removable outlet grating (PS9017SS), pair of cantilever brackets (PS9018SS), pair of leg and bearer brackets, 6-litre high vitreous china cistern and cistern support brackets complete with valveless fittings and chain pull (CX7630WH) To be as Twyford or approved equivalent.	2	No.		
	Total for Sanitary Fittings c/f to Summary page				

ALUPE HOSPITAL-PD

PLUMBING PIPEWORKS					
Item	Description	Unit	Qty	Rate (Kshs)	Amount
	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.				
A	25mm diameter pipe	Lm	120		
B	32mm ditto	Lm	50		
C	40mm ditto	Lm	20		
D	50mm ditto	Lm	90		
	Bends				
E	25mm ditto	No	30		
F	32mm ditto	No	8		
G	40mm ditto	No	8		
H	50mm ditto	No	12		
	Tees				
I	40mm diameter equal tee	No	4		
J	32mm diameter equal tee	No	6		
K	25mm diameter equal tee	No	30		
	Reducers				
L	50 x 40mm diameter reducer	No	5		
M	40 x 32mm diameter reducer	No	7		
N	32 x 25mm diameter reducer	No	10		
	Male/Female Threaded Brass Adapters				
O	20mm threaded brass coupling	No	36		
	Unions				
P	25mm diameter union	No	30		
Q	32mm ditto	No	13		
R	40mm ditto	No	7		
S	50mm ditto	No	20		
Total Carried to Next Page					

ALUPE HOSPITAL-PD

Item	Description	Unit	Qty	Rate (Kshs)	Amount
	Total carried forward from previous page				
	Male/Female Threaded Brass Adapters				
	Gate Valves				
	25mm diameter screwed- in bonnet, full way non-rising stem, solid wedge disk, bronze gate valve to BS 5154 PN 20 for series 'B' ratings with wheel head and transition fitting for jointing to GMS pipework.	No	4		
A					
B	32mm ditto	No	2		
C	40mm ditto	No	2		
D	50mm ditto	No	2		
E	Allow for excavation for the pipework at tee and valve points to connect with existing pipework.	Lm	20		
	Indicator Plates				
F	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	1		
	High Level Water Tank				
G	Supply, deliver and Assemble a high level water tank, made of pressed galvanized steel sectional tank plates 6mm thick plates and of size 1000mm x 1000mm capacity of tank to be 4,000 litres (500Gallons) and of preferred dimensions 2000mm x 2000mm x 1000mm. 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. <i>Platform for tank erected by other's to SE's details</i> . The tank shall be complete with the following pipe connections:-				
	32 mm diameter inlet				
	50 mm diameter outlet				
	40 mm diameter over flow				
	50 mm diameter wash out	No.	1		
H	Water level indicator	No	1		
I	Internal ladder	No	1		
J	External ladder from tank platform	No	1		
K	Galvanized tower ladder and protection cage of approximately 6 metres high	No	1		
L	Galvanized platform with features described in the particular specifications.	No	1		
M	Galvanized steel tower 6 metres high with features as described in the particular specifications.	No	1		
N	25mm diameter medium pressure ball valve	No	1		
	Total for internal plumbing carried forward to Summary page				

ALUPE HOSPITAL-PD

Item	Description	Unit	Qty	Rate (Kshs)	Amount (Kshs)
	<u>INTERNAL FOUL WATER DRAINAGE</u> 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	150mm diameter heavy gauge golden brown UPVC pipe	Lm	150		
B	100mm diameter heavy gauge golden brown UPVC pipe	Lm	150		
C	100mm diameter heavy gauge grey mUPVC pipe	Lm	30		
D	50mm diameter waste pipe	Lm	70		
E	40mm diameter waste pipe	Lm	55		
F	32mm diameter waste pipe	Lm	25		
	Bends				
G	100mm diameter bend with access	No	20		
H	100mm diameter long radius bend	No	20		
I	100mm diameter sweep bend	No	18		
J	50mm diameter sweep bend	No	20		
K	40mm diameter sweep bend	No	12		
	Tees				
L	50mm diameter sweep tee	No	12		
M	40mm diameter sweep tee	No	14		
N	32mm diameter sweep tee	No	6		
	Access Caps				
O	50mm diameter access cap	No	4		
P	40mm diameter access cap	No	10		
Q	32mm diameter access cap	No	6		
R	100mm diameter WC connector	No	16		
	Vulcathene Pipes				
S	50mm diameter vulcathene pipe	Lm	25		
	Vulcathene Floor Traps				
T	100x50mm diameter acid resistant floor trap	No	1		
Total Carried to Next Page					

ALUPE HOSPITAL-PD

Item	Description	Unit	Qty	Rate (Kshs)	Amount
	Total carried forward from previous page				
	Traps				
A	50 x 100mm diameter floor drain and stainless steel grating	No	25		
B	Standard 300 x 300 x 450mm masonry gully trap complete with 125mm thick reinforced concrete cover.	No	17		
	Weathering Slates and Vent Cowls				
C	100mm diameter weathering slate and apron.	No	4		
D	100mm diameter vent cowl	No	4		
E	Man-hole or inspection chamber size 600 x 450 mm by approximately 750mm deep using 200mm thick base (concrete class N15) with 250mm thick benching including forming drain channels, and 200mm thick solid concrete block walling, including 15mm internal plaster and top slab/screed, including pit digging, backfilling, carting away surplus and making good.	No	18		
	<u>Sterilization of Internal Plumbing System</u>				
F	Allow for flushing out and sterilizing the whole system with chlorine to the satisfaction of the Project Engineer.	Item	1		
Total for internal drainage carried to Summary Page					

ALUPE HOSPITAL-PD

FIRE FIGHTING EQUIPMENT					
Item	Description	Unit	Qty	Rate (Kshs)	Amount (KShs)
	FIRE FIGHTING EQUIPMENT Supply, deliver and install the following fire fighting equipment in positions indicated on the contract drawings or as shall be instructed by the Engineer.				
A	Hose Reel 20mm diameter 36m long swimming type fire 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.	No.	2		
B	Hose Reel Pump Fully automatic package unit water pressure booster pumpset capable of delivering 2.3 litres/sec against a static pressure head of 27M. The pumpset shall comprise 2No. pumps (one duty, one standby), mountings, control gear, pressure switch and pneumatic vessel, all on a common frame. Control shall be effected via a pressure switch through a prewired control panel, which shall give automatic changeover from duty to standby after every cycle of operation. The controls shall also include motor under-voltage/over voltage protection devices and incorporate a float switch for protection against dry running. The pumpset shall be pre-assembled complete with pipework, and fittings(unions, water strainers, isolation valves, non-return valves, etc)ready for connection to water tank outlet and to the hose-reel supply pipework. The pumpset shall be as 'Pullen Firepak' as manufactured by pullen pumps ltd or equal and approved.	Set	1		
C	Control Panel Control panel for the above pumps with contactors, over voltage and under voltage protection relays, 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. <i>The pump and its controls to be mounted on concrete plinth inside a pump house erected by others to SE's details.</i>	1	No.		
Sub-total carried forward to next page					

ALUPE HOSPITAL-PD

Item	Description	Qty	Unit	Rate (Kshs)	Amount (Kshs)
	Sub-total carried down from previous page				
	GMS pipe				
A	50mm diameter gms pipe class "B"	45	Lm		
B	25mm diameter gms pipe class "B"	8	Lm		
C	20mm diameter gms pipe class "B"	5	Lm		
	EXTRA OVERS				
D	50mm Bends	6	No.		
E	25mm Bends	12	No.		
F	50mm equal tee	4	No.		
G	50mm x 25mm Reducer	4	No.		
H	25mm x 20mm Reducer	4	No.		
I	50mm gate valve sa peggler or approved equivalent	6	No.		
J	25mm -ditto-	4	No.		
K	50mm non-return valve	2	No.		
	Hose Reel Water Tank				
	Supply, deliver and Assemble a Low level water tanks, made of pressed galvanized steel sectional tank plates 6mm thick plates and of size 1000mm x 1000mm capacity of tank to be 2,000 litres (500Gallons) and of preferred dimensions 2000mm x 1000mm x 1000mm. 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. <i>Plantform for tank erected by other's to SE's details</i> . The tank shall be complete with the following pipe connections:-				
L	25 mm dimater inlet				
	50 mm diameter outlet				
	32 mm diameter over flow				
	50 mm diameter wash out	1	No		
M	Air Release Valve	2	No		
Sub-total carried forward to next page					

ALUPE HOSPITAL-PD

Item	Description	Qty	Unit	Rate (Kshs)	Amount (Kshs)
	Sub-total carried down from previous page				
	PORTABLE FIRE EXTINGUISHERS				
	Supply, deliver, install, test and commission the following portable fire extinguishers and conforming to BS EN 3 / BS 1449.				
	Water/Carbon Dioxide Gas Fire Extinguisher				
A	9 litres water/carbon dioxide gas portable fire extinguisher complete with pressure gauge, initial charge and mounting brackets.	2	No		
	Carbon Dioxide Gas Fire Extinguisher				
B	5kg carbon dioxide gas portable fire extinguisher complete with pressure gauge, initial charge and mounting brackets.	2	No		
	Dry Chemical Powder Fire Extinguisher				
C	9kg dry chemical powder portable fire extinguisher complete with pressure gauge, initial charge and mounting brackets.	2	No		
	Fire blanket.				
D	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 to BS 1721	1	No		
	Manual Alarm Bell				
E	9" (225mm) manual operated alarm bell (Gong)	2	No		
	Fire Notices				
F	Allow for fire signage for the hose reel system, fire exits and fire instructions as described in the particular specifications and to the Project Engineer's approval.	2	No		
	Total for Fire Fighting Carried Forward to Summary Page				

ALUPE HOSPITAL-PD

SOLAR WATER HEATING INSTALLATION					
Item	Description	Qty	Unit	Rate (Kshs)	Amount (Kshs)
	Supply, delivery, installation, test and commission of the following solar hot water system appliances complete with all the accessories including all connections to the services, jointing to water supply, overflows, supports and all plugging and screwing to walls and frames				
	Solar Panels and Hot Water Storage Cylinder				
A	Solar water heating system comprising of integral 1No. 180 litres capacity hot water cylinder with 3KW electric booster element, 1No. solar panels with selective (black chrome) 2m ² dielectric nett absorbing area and all other necessary interconnectors. The insulated cylinder shall be treated against corrosion by ceramic lining and shall be fitted with a correct colour coded anode as per the water condition . The system shall be an closed circuit type of the solar heating system with envelope collector technology as Solahart SP Series or equal and approved,complete with a pressure gauge,timer switch,temperature controller,thermostat,sight glass,isolating valves,automatic air eliminator, a safety valve and all other necessary accesories for proper operation.	6	Item		
	Wiring				
B	Allow for all wiring to booster heater from local isolator supplied by others within two meter to the solar heating systems.	6	Item		
	Supporting Frames				
C	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. The supports will be installed on the roof.	6	No.		
	Gate Valves				
D	32mm diameter screwed- in bonnet, full way non-rising stem, solid wedge disk, bronze gate valve to BS 5154 PN 20 for series 'B' ratings with wheel head and transition fitting for jointing to PPR pipework.	12	No.		
	Non- Return Valves				
E	32mm diameter screwed -in cap, lift type disc bronze non-return valve to BS 5154 PN 32 for series 'B' ratings.	6	No.		
F	Thermostatic Mixer	6	No		
Total Carried to Next Page					

ALUPE HOSPITAL-PD

Item	Description	Unit	Qty	Rate (Kshs)	Amount
	Total carried forward from previous page Oxystable PPR pipework and Fittings with aluminium lining from panels upto thermostatic mixer.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.				
A	32mm diameter pipework	80	Lm		
B	25mm diameter pipework	80	Lm		
	<u>Testing and commissioning</u> Test and commission the entire Plumbing,Drainage, Fire Fighting and Solar Water heating installation to the satisfaction of the engineer	1	Item		
	<u>As installed drawings</u> Allow for as installed drawings in hard copy plotted on A1 paper;3 copies and soft copy (CD-ROM and 8 Gb Flash disk), for the Plumbing & Drainage Installations	set	1		
	Total for Solar Water Heating Carried Forward to Summary Page				

ALUPE HOSPITAL-PD

SUMMARY PAGE		
Item	Description	Amount (Kshs)
1	Allow for Contract Preliminaries b/d from pageF-6	
2	Total for sanitary fittings carried forward from page 107	
3	Total for internal plumbing carried forward from page 109	
4	Total for internal drainage carried forward from page 111	
5	Total for Fire Fighting Equipment carried forward from page 114	
6	Total for Solar Water Heating carried forward from page 116	
TOTAL CARRIED FORWARD TO GRAND SUMMARY		

Amount in Words:

.....

Tenderer's Name and Stamp:

Sub contract period.Weeks

Signature..... Date:

PIN NO. VAT CERTIFICATE No.

(Provide copy)

Witness Address:

Signature..... Date:

|

**SUPPLY, DELIVERY, INSTALLATION, TESTING AND COMMISSIONING OF
MEDICAL GASES PLANTS AND PIPEWORK SYSTEM INSTALLATION WORKS**

SECTION I - EVALUATION AND QUALIFICATION CRITERIA

10 GENERAL PROVISIONS

- 11** 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 evaluating Tenders.
- 12** 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.

13 EVALUATION AND CONTRACT AWARD CRITERIA

The Procuring 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 THE EVALUATION WILL BE UNDERTAKEN IN 3 STAGES AS FOLLOWS:

1. Preliminary Evaluation;
2. Technical Evaluation and ;
3. Financial Evaluation.

STAGE 1: PRELIMINARY EXAMINATION FOR DETERMINATION OF RESPONSIVENESS

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.

PRELIMINARY EVALUATION CRITERIA

S/No	MANDATORY REQUIREMENTS(MR)
MR1	Valid Copy of certificate of incorporation/ Registration.
MR2	NCA registration certificate for NCA 3 and above in Plumbing and drainage installation works category
MR3	Copy of Annual Practicing License from NCA for the current year
MR4	Valid copy Current Tax Compliance Certificate from Bidding Company, and if Consortium, from each member of the consortium.
MR5	Submission of valid CR12/CR13 form showing the list of directors /shareholding issued within the last 12 months or National Identity Card(s) for Sole Proprietorship
MR6	Dully filled, Signed and Stamped Confidential Business Questionnaire
MR7	Valid Copy of Current Single Business permit
MR8	Dully filled, signed, dated and stamped form SD1 (Anti-debarment form) (Must be commissioned by a Commissioner for Oaths)
MR9	Dully filled, signed, dated and stamped form SD2 (Anti-corruption form) (Must be commissioned by a Commissioner for Oaths)
MR10	Dully filled, signed, dated and stamped form DEC 1 (Code of Ethics form)
MR11	Dully filled, signed, dated and stamped Tenderer Information Form ELI
MR12	Domestic sub-contractors must sign and stamp the summary page of their respective Specialist works on the tender document.
MR13	Duly filled, signed and stamped Statement of compliance.
MR14	Power of Attorney Authorized by a magistrate or commissioner of Oaths indicating the Authorized signatory for the Documents of the bidder if the signatory is not a director.

Note:

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

STAGE 2: TECHNICAL EVALUATION

The tender document shall be examined based on clause 17.0 of the Instruction to Tenderers. *In order to comply with provisions of clause 17.0 of Instruction to Tenderers, the tenderers shall be required;*

- a) *To fill the Standard Forms* provided in the bid document for the purposes of providing the required information. The tenderers may also attach the required information if they so desire;
- b) *To supply equipment 's/items which comply with the technical specifications set out in the bid document.* In this regard, the 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 technical evaluation criteria shall be as shown below:

<u>PARAMETER</u>	<u>ACTION</u>
(i) Compliance with Technical Specifications.....	PASS/FAIL
(ii) Key Personnel.....	PASS/FAIL
(iii) Contract Completed in the last Five (5)	PASS/FAIL
(iv) Schedules of on-going projects	PASS/FAIL
(v) Schedules of contractors equipment	PASS/FAIL
(vi) Audited Financial Report for the last 3 years	PASS/FAIL
(vii) Evidence of Financial Resources	PASS/FAIL
(viii) Name, Address and Telephone of Bank (Contractor to provide)	PASS/FAIL
(ix) Litigation History	PASS/FAIL

The detailed Assessment for Eligibility shall be as shown in table 1 below:

TABLE 1: Technical Evaluation Criteria

Item	Description	Remarks
1	Compliance with Technical Specifications <i>(Note: Tender Evaluation Committee to carryout analysis showing how decision on this requirement has been arrived at. Attach analysis on this as an Appendix)</i>	PASS/FAIL
2	Tender Questionnaire Form <ul style="list-style-type: none"> Dully filled, signed and stamped form 	PASS/FAIL
3	Key Personnel (Attach evidence)	PASS/FAIL
	Director of the firm <ul style="list-style-type: none"> Holder of a diploma and above in relevant Engineering field 	PASS/FAIL
	At least 1No. degree/diploma holder of key personnel in relevant field <ul style="list-style-type: none"> With over 5 years relevant experience 	PASS/FAIL
	At least 1No certificate holder of key personnel in relevant field <ul style="list-style-type: none"> With over 10 years relevant experience 	PASS/FAIL
	At least 2No artisan (trade test certificate in relevant field) <ul style="list-style-type: none"> With over 10 years relevant experience 	PASS/FAIL
4	Contracts completed in the last five (5) -Provide Evidence of; <ul style="list-style-type: none"> 3 No. Projects of similar nature, complexity or magnitude or 5 No. Projects of similar nature but of lower value than the one in consideration 	PASS/FAIL

Item	Description	Remarks
5	On-going projects – Provide Evidence Maximum of three (3no.) ongoing projects	PASS/FAIL
6	Schedule of contractors equipment and transport (proof or evidence of ownership/Lease)	PASS/FAIL
	a) Relevant means of transport (pick-ups, lorries, trucks- at least two (2 no.)	
7	Financial report	PASS/FAIL
	a) Audited financial report (last three (3) years)-2020,2019 and 2018 <ul style="list-style-type: none"> • With an Average Annual Turn-over of 100% of the cost of the project Or • With an Average Annual Turn-over above 50% but below 100% of the cost of the project 	
	b) Evidence of Financial Resources (cash in hand, lines of credit, overdraft facility etc.) <ul style="list-style-type: none"> • Bank/Creditors/Letters of access to credit specific to the tender. 	
8	Name, Address and Telephone of Banks (Contractor to provide)	PASS/FAIL
9	Litigation History <ul style="list-style-type: none"> •Duly Filled, signed and stamped form signed and Stamped by an Attorney/ Commissioner for Oaths 	PASS/FAIL
	OVERALL REMARKS	PASS/FAIL

**Monthly Cash Flow =Tender Sum/Contract Period*

Note: Any bidder who FAILS in technical evaluation shall be not be considered for further evaluation.

STAGE 3 - FINANCIAL EVALUATION

Upon completion of the technical evaluation a detailed financial evaluation shall follow.

The evaluation shall be in **three parts**;

- a) Determination of Arithmetic errors
- b) Comparison of Rates; and
- c) Consistency of the Rates.

a) Determination of Arithmetic Errors

All arithmetic errors are to be noted and reported accordingly

NOTE:

Arithmetic Errors will be determined 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 tender figure in the Main summary of the Bills of Quantities, the amount as stated in the Form of Tender shall prevail.
- ii) 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;
- iii) Tenders with arithmetic errors shall be disqualified as per Clauses 74(2) and 75(1) of the Public Procurement and Asset Disposal Regulations 2020 which states:
Clause 74(2): "Subject to section 79(2)(b) of the Act any errors in the submitted tender arising from a miscalculation of unit price quantity subtotal and total bid price shall be considered as a major deviation that affects the substance of the tender and shall lead to disqualification of the tender as non-responsive."
Clause 75(1): "A procuring entity shall reject all tenders which are not in conformity to the requirements of section 79 of the Act and regulation 74 of these Regulations"

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 demonstrable 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.

RECOMMENDATION FOR AWARD

The successful bidder shall be the tenderer with the lowest evaluated tender price.

PART II - WORKS REQUIREMENTS

SECTION II - SPECIFICATIONS

Notes for preparing Specifications

1. Specifications must be drafted to present a clear and precise statement of the required standards of materials, and workmanship for tenderers to respond realistically and competitively to the requirements of the Procuring Entity and ensure responsiveness of tenders. The Specifications should require that all materials, plant, and other supplies to be permanently incorporated in the Works be new, unused, of the most recent or current models, and incorporating all recent improvements in design and materials unless provided otherwise in the Contract. Where the Contractor is responsible for the design of any part of the permanent Works, the extent of his obligations must be stated.
2. Specifications from previous similar projects are useful and may not be necessary to re-write specifications for every Works Contract.
3. There are considerable advantages in standardizing **General Specifications** for repetitive Works in recognized public sectors, such as high ways, urban housing, irrigation and water supply. The General Specifications should cover all classes of workmanship, materials and equipment commonly involved in constructions, although not necessarily to be used in a particular works contract. Deletions or addenda should then adapt the General Specifications to the particular Works.
4. Care must be taken in drafting Specifications to ensure they are not restrictive. In the Specifications of standards for materials, plant and workmanship, existing Kenya Standards should be used as much as possible, otherwise recognized international standards may also be used.
5. The Procuring Entity should decide whether technical solutions to specified parts of the Works are to be permitted. Alternatives are appropriate in cases where obvious (and potentially less costly) alternatives are possible to the technical solutions indicated in tender documents for certain elements of the Works, taking into consideration the comparative specialized advantage of potential tenderers.
6. The Procuring Entity should provide a description of the selected parts of the Works with appropriate reference to Drawings, Specifications, Bills of Quantities, and Design or Performance criteria, stating that the alternative solutions shall be at least structurally and functionally equivalent to the basic design parameters and Specifications.
7. Such alternative solutions shall be accompanied by all information necessary for a complete evaluation by the Procuring Entity, including drawings, design calculations, technical specifications, breakdown of prices, proposed construction methodology, and other relevant details. Technical alternatives permitted in this manner shall be considered by the Procuring Entity each on its own merits and independently of whether the tenderer has priced the item as described in the Procuring Entity's design included with the tender documents.

GENERAL MECHANICAL SPECIFICATONS

GENERAL MECHANICAL SPECIFICATION

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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.

2.08.5 shop drawings

Before manufacture or Fabrication is commenced the contractor shall submit Two copies of detailed drawings of all water tanks, fire hose reel pump, water booster pump and any other equipment 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 contractor of the full responsibility of errors or the necessity of checking the drawings himself or of furnishing the materials and equipment and performing the work required by the plans and specifications.

2.09 **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 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.

GENERAL SPECIFICATIONS

FOR

**MEDICAL GASES PLANTS AND PIPELINE
SYSTEM (MGPS)**

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General Specifications for Medical Gas Pipeline Systems (MGPS)

1.0 General

1.1 Extent of Contract.

The work shall include supplying, installing, testing, commissioning, demonstrating and leaving in proper working order a piped centralized supply system for medical gases comprising (specify either : oxygen, Nitrogen Oxide/Oxygen mixture, carbon dioxide, compressed air and vacuum) as outlined in this specification. Tenders shall comply in all respects with the specification, but the contractor may offer alternatives provided that the differences and advantages are clearly detailed by him on the schedule of alternatives attached which shall be returned with the tender.

1.2 Specialist Contractors.

The work shall be tendered for by approved contractors only who are specialists in the installation of medical gas systems and who have permanently employed staff experienced in this type of work. At the time of tendering the contractor shall confirm in writing that he has suitable qualified personnel who would be employed on the project.

1.3 Contract Drawings

The contract drawings to be read together with this specification shall be issued during the project implementation by the Project Engineer.

Any discrepancies between the drawings and the specification shall be clarified by the Engineer before tendering.

1.4 As- Installed Drawings

During the course of construction the contractor shall correct one copy of the contract drawings daily as the work proceeds, indicating any change made from the arrangements shown in the contract drawings.

This amended drawing shall remain on site, readily available for inspection, and the amendments must ultimately be transferred to a reproducible copy of contract drawings.

2.0 Central Storage Cylinder Systems

2.1. Gases to be dispensed from cylinders

The supply system (s) for ((specify either: oxygen, Nitrogen Oxide/Oxygen mixture, carbon dioxide, compressed air and vacuum)) shall (each) comprise a centralized battery of cylinders, complete with support tacks, headers, automatic manifold distribution panel (s) and shall necessary controls, safety devices, alarms, pipework, valves and terminal units for distributing the gases to the required positions as listed on the schedule of terminal units.

Note: The following shall be supplied from plant installations as specified later.

- (a) Oxygen
- (b) Compressed Air.
- (c) Vacuum.

2.2 Location of cylinders

The cylinders shall be located in the medical gases manifold room as indicated on contract drawings. Back up manifolds and cylinders for oxygen, surgical air and nitrous oxide for theatres and any other critical areas may be sited adjacent to such areas in mini plant rooms.

2.3. Initial complement of cylinders

The Specialist Contractor shall be responsible for providing the full complement of cylinders for each gas as required and these will be used initially for purging and commissioning and handing over the systems in proper working order. All this will be done according to the specifications for testing and commissioning of medical gases.

2.4. Capacity of Systems

The capacities of central storage cylinders and the number of duty and stand-by bank cylinders shall be as described in Particular Specifications for the MGPS and contract drawings.

2.5. Cylinder Support Racks

The supporting steelwork for the cylinders shall hold them in an inclined position against the wall and shall consist of mild steel bulb angle section 178mm x 76mm 'rag' bolted to the floor and a separate mild steel angle section 102mm x 76 mm x 13mm thick 'rag' bolted to the wall.

The steel sections to be to BS.4. The angle section shall have neatly formed semi-circular cut-outs to space and support the cylinders in banks.

All securing bolts shall be provided by the specialist contractor who shall mark out the position of holes in floor and walls for drilling by the building contractor. Any grouting in shall be done by the specialist contractor, who shall also erect the steelwork.

2.6. Trolleys

Suitable trolleys conforming to BS 2718:1979 shall be used for transporting cylinders whenever they are moved. The appropriate size and type of trolleys shall be supplied by the Specialist Contractor.

2.7. Manifold Control System

The manifold control system shall conform to NHS Health Technical Memorandum No. 02-01 (HTM 02-01).

The manifold control system shall provide an uninterrupted supply of a specific medical 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 or 700 kPa.

The entire system shall be 'duplexed' such that any single functional component failure will not affect the integrity of the medical gas supply.

The manifold shall be supplied fully assembled and tested and a test certificate supplied.

2.7.1 Manifold Control System Design

There shall be two separate stages of regulation to enable high peak flow rates without a reduction in line pressure. Multistage regulators combined into a single unit are not acceptable.

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 be capable of supplying a flow of 1000 l/min to a 400 kPa distribution system and a flow of 2000 l/min to a 700 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 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.

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.

2.7.2 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.

2.7.3 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 utilising polymers or elastomers are not acceptable.

2.8 Modular Header Manifolds

Modular header manifolds shall provide connection points for flexible cupronickel tailpipes.

They shall be available in 'primary' and 'secondary' configurations, with either single or double cylinder connection points.

'Primary' headers shall connect directly to the manifold control system with extensions for additional cylinders being provided by the addition of 'secondary' headers.

Non-return valves shall be fitted to each tailpipe connection point to protect the system in the event of a tailpipe fracture.

Corner connectors shall be available to enable installation of manifold headers around corners of the manifold room. A custom length corner connector shall also be available to enable header manifolds to be installed in a 'U' configuration across 3 adjacent walls of a manifold room.

2.8.1 Non- Interchangeability of Cylinder Connections

The screwed connections of the tail pipes to the cylinder valves shall be designed such that cross connection of the pipe for any one gas cannot be made to any cylinders for the gases, the exception being oxygen and air which to BS. 341 part 1 are identical.

2.8.2 Testing of Headers

The manifold and tail pipe assembly shall be capable of withstanding a maximum working gauge pressure of 136 bar (1980 p.s.i.) and shall be tested to twice this pressure by the manufacturer at his work and a test certificate supplied.

2.8.3. De-greasing

The assembly shall be de-greased and delivered to site in a sealed polythene bag or cover and labelled to the effect that it is degreased and shall on no account be contaminated by dirt, oil or grease during erection or afterwards.

2.8.4 Pressure Gauges

The control panel shall incorporate three pressure gauges: one high pressure gauge to each cylinder bank and one common low pressure gauge on the outgoing supply to the distribution pipework.

The gauges shall conform to BS1780 and be graduated in bars and p.s.i.

Each gauge shall carry the name of the gas on the dial face with warning- "USE NO OIL OR GREASE" Gauge shall be degreased and maintained in this condition before and after installation.

The dials shall be marked with a blue line at the normal working pressure and a red line at the minimum allowable pressure.

2.8.5 Control Panel Identification

Each panel shall carry in large letters on the front the name of the gas being controlled the letters shall be embossed engraved or otherwise marked on so as to be indelible. Painting or adhesive lettering shall not be permitted.

2.8.6 Heated Manifold for Nitrous oxide and Entonox

On the Nitrous oxide and Nitrous Oxide/oxygen mixture manifolds, electric heating elements shall be incorporated.

2.8.7 Electricity Supply

The manifolds shall be suitable for operating from a 240 volts, single phase and neutral, 50 Hertz, A.C. supply.

Any internal wiring in the panel shall have a flame- retardant sheathe to comply with I.E.E regulation B. 16.

2.8.8. Precautions against Leakage

All parts of the control panel shall be constructed of materials, which will not deteriorate during service and lead to leakages. Diaphragm gaskets of pressure regulators shall not be of fibre but brass.

2.9. Service or Emergency Point

Each gas (or air) installation shall include a service or emergency point in the manifold room on the wall near to the control panel and on the outgoing distribution pipe into which a supply can be connected manually from a standby cylinder when the control panel is to be serviced or has failed.

The service point shall be in form of a terminal unit complete with check valve and isolating valve, into which a flexible pipe with probe can be inserted. See 6.11.8 for details.

The unit shall be capable of passing 275 litres/min. minimum at a nominal gauge pressure of 4.1 bar (60 p.s.i.) with a pressure loss not exceeding 0.55 bar (8 p.s.i.).

The unit shall be rigidly piped up to the distribution main and the height of the unit above floor level shall be such that the flexible pipe probe can be inserted easily by a person of average height standing on floor level.

The service point shall be identified indelibly with the name of the gas and by colour code to B.S. 1710 (1971).

2.9.1. Stand-by Cylinder Rack

The standby cylinder shall be complete with pressure reducing set with safety relief valve, high and low pressure gauges, on/off control valve, flexible pipe and probe.

The supply of the cylinder shall be the responsibility of the hospital authority but a supporting steel work rack on the lines of those for the main banks and reducing sets, gauges and valves shall be included in this contract.

Regulators should have a working capacity of 300 litres/min. and be set to operate at a gauge pressure of 4.1 bar (60 p.s.i) for oxygen, for nitrous oxide 4.1 bar (60 p.s.i.) and for compressed air 7.2 bar (105 p.s.i.) .

The probe and the connection of the pipe to the pressure regulator shall be non-interchangeable with other gases.

2.9.2. Main Stop Valve

A main stop valve shall be fitted on the distribution main before the service point is reached in order to allow the control panel to be isolated.

The valve shall be in readily accessible position so that it can also serve as an emergency valve and being located in the manifold room. It need not be housed in a valve box.

2.10 Safety Relief Valve

A self – closing safety relief valve shall be fitted on the distribution pipe-in between the control panel and the main stop valve. The valve shall have flow capacity and head equal to the maximum flow rate of the control panel and shall be set to operate at 25% above the distribution pressure.

The valve shall be of a type which can be locked or sealed and shall be non-ferrous material.

It shall be coupled to a copper vent pipe one size larger than the distribution pipe and vented to atmosphere at a suitable level and position outside the building. The end of the vent pipe shall terminate in an inverted “U” bend with wire mesh and a suitable shield to protect against harsh weather conditions. The discharge point shall be finally agreed on site by the Engineer and Contractor to ensure that there is no danger of fire, injury to personnel, contamination or interference with air intakes or windows. The safety valve and vent pipe shall be supplied and installed in a degreased condition. Weatherproof notices shall be fixed at each discharge point stating:-

2.11. Electrical Installation Work

All electrical equipment shall be supplied and installed by the specialist contractor.

The interconnecting wiring shall be carried out to separate specification by the contractor/others.

The specialist contractor shall in all cases supply duplicate wiring diagrams and instruction within three weeks of being awarded the contract.

3. Medical Compressed Air Systems

3.1 General Requirements

The Specialist Contractor shall supply and install at the position shown on the contract drawings a combined medical and surgical compressed air system complete with all necessary controls, safety devices, alarms, oil and moisture separators and air dryers.

3.2. Quality of Air

The quality of the compressed air shall be in accordance with HTM 02-01, Table 29. The medical air shall also comply with the appropriate sections of the current edition of Ph. Eur (See HTM 02-01, Table 30).

3.3. Distribution pressure

Medical quality air shall be delivered at a pressure of 700 kPa (7 bar) gauge for supply of the hospital surgical air. The pressure shall be reduced by regulator system to supply medical air-4 bar.

3.4 Maintenance

The plant shall be designed and arranged to facilitate easy and efficient inspection and maintenance to the satisfaction of the engineer.

3.5 Precautions against Vibration and Noise

Flexible pipe work connections and resilient mountings shall be provided where necessary to prevent the transmission of vibration and noise to the building and distribution pipe work. The specialist contractor shall be responsible for ensuring that rigid connections are not made either by themselves or others.

3.6 Builders Works

The specialist contractor shall supply and fix all holding down bolts, anti-vibration mountings and supply details of all foundations and hole positions for the building contractor to provide. The concrete foundation block shall be of adequate mass placed on suitable resilient foundations to damp out vibrations.

3.7 Siting

The plant shall have all-round access for maintenance purposes, and allowance shall be made for changing major components.

The siting of the plant shall allow for adequate flows of air for three different purposes:

- a. air intake to the compressors;
- b. cooling of the compressed air by the after-coolers;
- c. cooling of the compressors.

3.8 Air intake

The air intake for a compressor shall be located to minimise contamination from internal combustion engine exhausts and the discharge from vacuum systems, AGSS and ventilation systems or other sources of contaminants.

Air intakes shall be ducted where necessary to avoid contamination; a minimum height of 5 m above ground level shall ensure a reasonable quality of intake air.

Where this cannot be achieved, additional filtration and/or air treatment may be necessary.

If the siting of the compressor, regardless of the air intake location, is considered subject to a risk of aspirating toxic fumes and smoke as a result of a fire, an automatic shutdown system, linked to local smoke detectors, shall be installed. If such a system is planned, it is essential that an automatic emergency supply manifold system is sited well away from the fire-risk area and is arranged to come on-line automatically in the event of plant shutdown.

Care is needed when extending compressor air intakes. Manufacturers' data shall be consulted to ensure that intake flow, and hence compressor performance, are not adversely affected by excessive lengths of intake ducting.

Choice of intake material is also important. Often, intakes are constructed from solvent-welded PVC. In a fire, toxic materials from the burning intake could be drawn into the air compressor and distributed throughout the system. In addition, there is a risk that inadequate solvent drying time before use of the intake will result in toxic solvent fumes being drawn into the system.

Corrosion-resistant ducting (for example **stainless-steel** flue liner) is a suitable material.

Air-inlet filters shall be fitted immediately upstream of the compressor. In exceptional circumstances, additional screens, filters and silencers may be required.

The filters shall comply with BS ISO 5011:2000 and be either dry medium filters or grade CA paper element filters.

3.9. Compressor Types

There are different types of compressor currently available, the most common types being:

- a. reciprocating piston compressors;
- b. rotary vane compressors;
- c. rotary screw compressors.

The compressors may be of any type, provided they are suitable for continuous running on load and for high frequency start/stop operation.

When selecting compressors, the opportunity shall be taken to maximise energy efficiency. If reciprocating compressors are used, they may be either of the single- or of the two-stage type, although for a 400 kPa system a single-stage compressor is usually satisfactory. The compressors are air cooled, air end directly driven by a 380-420V, 3 phase, 50/60Hz TEFC electric motor coupled to an air blast after-cooler with auto drains.

3.10 Compressor Lubrication

Compressors may be oil-lubricated, provided that suitable arrangements are made to ensure that the air quality specification given in HTM 02-01, Table 29 is fulfilled.

Rotary compressors are sealed and cooled by oil or water. Oil control is therefore essential and is usually provided as an integral part of the compressor.

Reciprocating compressors may be oil lubricated, carbon ring, PTFE ring or diaphragm sealed type.

Oil-free compressors may be beneficial in reducing filtration requirements.

Water shall not be used as a sealant because of risk of microbial contamination and potential problems with water treatment.

There is a danger that PTFE rings and lubricating oils could decompose at high temperatures to form toxic products. This may be countered by fitting a temperature sensor to the cylinder head or output of the compressor with suitable controls to cut off the power supply to the compressors if excessive temperatures are sensed.

BS EN ISO 15001 specifies the requirements for selecting materials used in medical supply equipment.

Where oil-lubricated compressors are used, suitable means of separating oil from condensate shall be provided.

Once a compressor installation has been selected:

- a. the plant shall include at least two compressors, but additional compressors may be included provided that in all cases the total capacity will provide 100% of system design flow with one compressor not running;
- b. the individual compressors shall be arranged so that they will supply the system simultaneously if necessary;

- c. the control system for the compressor plant shall include an “hours-run” counter;
- d. the efficiency of plant, expressed as the volume of air delivered to the pipeline distribution system (after losses in the drying system and filtration system) per kilowatt-hour (kWh), shall be stated by the supplier of the system.

The testing procedure shall evaluate this efficiency by testing the power consumption over a suitable period of time at 100%, 10% and 0% of the system design flow.

A minimum efficiency of 5 m³/kWh at 100% and 10% is required. The power consumption at zero flow shall be less than 1% of that at 100% design flow.

3.11. After-coolers

After-coolers (and inter-coolers) usually form part of the compressor sub-assembly.

After-coolers shall be fitted to oil-lubricated medical air compressor systems. These will normally be air-cooled, and may need ducting with forced ventilation to ensure an adequate supply of cooling air.

3.12 Receivers

Air receivers shall comply with BS EN 286-1: 1998 for all vessels up to 10,000 bar litres, and shall be supplied with test certificates.

The minimum water capacity of the receivers shall be 50% of the compressor output in 1 minute, stated in terms of free air delivered at normal working pressure.

The receiver(s) shall be connected to the dryer unit in parallel incorporating lockable valves for safe inspection such that operation can continue during receiver isolation for periodic internal inspection.

Receivers shall also be fitted with an automatic drain. Electrically operated automatic drains have been found to be more reliable.

To facilitate the statutory inspection, there shall be either two suitably valved air receivers or a bypass arrangement (for use in manual operating mode only) in order to avoid interruption to the supply. Alternatively the tertiary supply manifold can be used.

For systems that have a design flow in excess of 500 L/min, two receivers shall be provided with valve arrangements to permit isolation of one or the other for inspection purposes.

3.13. Air Treatment and Filtration

3.13.1 General

Contaminants can enter the compressed air system from three sources: the atmosphere, the compressor and the pipeline distribution system.

Filtration equipment may include pre-filters, coalescing filters, adsorption equipment, carbon filters, particulate filters and any other additional filtration equipment necessary to ensure the quality of the product.

3.13.2. Solid contaminants

Particles in the environment cover a wide range of sizes, but approximately 80% are less than 0.2 µm and are therefore not removed by the intake filter to the compressor.

Although particles smaller than 40 µm are unlikely to cause mechanical damage, a 5 µm intake filter is preferred to avoid blockage of internal air/oil separators.

Filters shall be specified in terms of performance tests – a sodium flame test, a DOP (dispersed oil particulate) test etc.

3.13.3 Water

Water is always a contaminant in a compressed air system, regardless of the type and location of the compressor plant, since the air drawn into the compressor intake is never completely free of water vapour.

The amount can vary from 2.5 g/m³ to over 40 g/m³ depending on the climatic conditions. The after-cooler and receiver remove some of this, but about 20 g/m³ is likely to remain in the compressed air unless removed by dryers.

A water content not exceeding 67 vpm (volume parts per million – equivalent to dew-point –46°C at atmospheric pressure) shall be specified for medical air pipeline systems. Only desiccant dryers shall be used.

3.13.4 Oil

Oil levels in the air supply shall be controlled to 0.1 mg/m³ with means of monitoring on a routine basis.

3.13.5. Dryer controls

The dryer control system shall ensure that regeneration is operated in proportion to the compressed air usage.

The effectiveness of the control system will become apparent when the efficiency of the compressor system is tested at 10% and 0% of the system design flow.

Evidence of the reliability and performance of a dryer system shall be sought from manufacturers, since these items are critical to the overall performance of the compressor system.

The dryer control system shall include a dew-point hygrometer and display with a minimum accuracy of $\pm 3^{\circ}\text{C}$ in a range from -20°C to -60°C atmospheric dew-point, with a set point of -46°C .

It shall be arranged that in the event of open circuit, a “plant emergency” alarm be initiated.

3.13.6. Dust filters

There shall be a dust filter downstream of the dryers to remove particles down to $1\text{ }\mu\text{m}$, with a DOP penetration of less than 0.03%, when tested in accordance with BS EN ISO 3549:2002.

Each dryer and filter assembly shall be rated for continuous use at the system demand flow, with air at 100% relative humidity at 35°C .

3.13.7. Activated carbon filter

Duplex activated carbon filters shall be installed upstream of the final bacteria filter for odour removal.

3.13.8. Bacteria filters

Duplex bacteria filters shall be fitted upstream of the final pressure regulator with appropriate isolating valves.

The filters shall provide particle removal to 0.01 mg/m^3 and a DOP penetration of less than 0.0001%.

3.14 Pressure control

The pressure control shall maintain the nominal pipeline pressure within limits given in HTM 02-01, Part A, Chapter 4.

Duplex line pressure regulators shall be provided with suitable isolating valves.

The regulators shall be of the non-relieving type.

3.14.1. Safety valves

Safety valves shall be provided in accordance with the requirements given in (a)–(c) below. All safety valves shall conform to BS EN ISO 4126-1:2004.

A safety valve of the certified discharge capacity stated shall be fitted in each of the following positions:

- a. on the delivery pipe of each compressor and upstream of any isolating valve, non-return valve or after-cooler, capable of discharging the total throughput of the compressor;
- b. on each air receiver and dryer tower, capable of discharging the sum of the throughput of all the compressors. It is not necessary to provide safety valves on the dryer columns where the system is already protected by a safety valve on the receiver and the downstream equipment, that is, if the dryer column is already sufficiently protected;
- c. immediately downstream of each pressure regulator, capable of discharging the system demand flow.

All safety valves shall be of the closed-bonnet type and connected to suitably sized pipework to allow safe discharge, not necessarily to the outside.

3.15. Traps, Valves and Non-return Valves

3.15.1. Automatic drainage traps

Electrically- or mechanically-operated automatic drainage traps shall be provided on the after- coolers, receiver, separators and coalescing filters.

The discharge from these drainage traps shall be piped to a suitable gully via an oil separator.

Co-ordination with building work shall be required for this provision.

Electrically-operated automatic drains have been found to be more reliable.

Drainage and tundishes shall be provided under the building contract. Separators shall be provided under the air compressor contract.

Provision of interceptor tanks may be made under either the building contract or the air compressor contract, as appropriate.

Non-return valves are required to prevent backflow of the air supply in certain situations. These valves shall be located as follows:

- a. between the compressor and the receiver, but downstream of any flexible connector;

- b. downstream of the dust filter on the dryer;
- c. upstream of the emergency cylinder reserve connection in the pipeline connecting the plant to the pipeline distribution system, to prevent back-feeding this plant;
- d. upstream of any inlet point that may be used to feed the system in an emergency;
- e. downstream of the emergency cylinder manifold regulators.

3.15.2. Isolating valves

Isolating valves shall be provided downstream of non-return valves and upstream of, for example, the connection of the emergency reserve manifold.

Isolating valves shall be provided in order to facilitate maintenance or replacement of plant items.

Manually-operated ball isolation valves shall be located in appropriate positions to allow isolation of components such as receivers, dryers, automatic drains, pressure regulators and filters.

There shall also be a valve on the compressed air plant, downstream of the plant non-return valve and the connection of the cylinder manifold supply.

3.16. Pressure indicators

Pressure indicators shall comply with BS EN 837-1:1998 or have an equivalent performance if electronic indicators are used.

Calibration shall be in bar or kPa.

All gauges shall have a minimum scale length of 90 mm, and the working range shall not exceed 65% of the full-scale range except on differential pressure gauges.

Pressure indicators shall be connected by means of gauge cocks.

Pressure indicators shall be located:

- a. on the plant control unit indicating receiver pressure;
- b. on each receiver;
- c. downstream of each pressure regulator;

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- d. on each dryer tower;
- e. on the plant pipework, upstream of the plant isolating valve.

Differential pressure indicators should be located on:

- a. each coalescing filter;
 - b. each dust filter;
 - c. each bacteria filter;
- or any combination, as appropriate.

Except for pressure gauges, all control and measuring devices shall be connected directly to the pipework via a minimum leak device (to allow removal for servicing) and not isolated by valves.

3.17. Operating and Indicating System

The operating and indicating system shall perform the following functions:

- a. overall plant control and indication;
- b. individual compressor starting;
- c. control of dryers;
- d. plant status monitoring.

Provided that the individual compressor starters are housed in a separate compartment, these functions may be carried out by separate units or may be installed in a common panel and located on the plant or on the plant room wall.

Control panels containing pneumatic components shall have vents to permit release of pressure in the event of component failure.

All indicators shall be appropriately identified and shall have a design life of at least five years.

The operating system shall be capable of automatically restarting after reinstatement of the power supply.

All components of the medical air supply system shall be connected to the essential electrical supply.

The control system shall ensure that compressors restart in sequence to avoid overloading the power supply.

3.17.1. Plant Control Unit

The plant control unit shall have a separate power supply for each compressor, controlled by a separate sub-circuit. The unit shall allow either manual selection of duty/stand-by for each of the compressors or have an automatic sequence selection with a means for manual override.

The unit shall ensure that two or more compressors do not start simultaneously when power is applied. A warning notice that complies with BS 5499-5:2002 shall be affixed which indicates the presence of low voltage.

3.17.2. Plant Control Indication

There shall be indicators for each compressor as follows:

- a. green “mains supply on”;
- b. green “compressor called for”, which indicates that the compressor motor is electrically energised;
- c. an indicator of the pressure produced by the compressor.

3.17.3. Compressor Starter Units

There shall be individual starter units for each compressor which operate a single designated compressor.

The starters shall be provided with safety interlocks, as specified by the compressor manufacturers, which shall inhibit plant operation until manually reset by means of a button.

The starters shall allow automatic restart after an interruption to the power supply.

Each starter unit shall contain the following:

- a. an isolator interlocked with the covers;
- b. either HRC (high rupturing capacity) fuses to BS 88 or suitable circuit breakers to BS EN60947-2:2003 and/or BS EN 60898-1:2003;
- c. an industrial grade ammeter to BS EN 60051-1:1999, IEC 60051-1:1997 (digital ammeters of similar accuracy to those compliant with BS EN 60051-1:1999, IEC 60051-1:1997 may be used);

- d. a “total hours” counter if not included in the plant control unit;
- e. a green “mains supply on” indicator if mounted separately from the plant control unit.

3.17.4. Dryer Control Unit

The dryer control unit may be mounted on the dryers or may be located with the plant control unit. There shall be separate power supplies for the duty and stand-by dryer assemblies taken from the same phase. The dryer control unit shall contain the following:

- a. a duty dryer selector switch;
- b. a service function – to enable selection of continuous/normal running;
- c. individually fused, separate cycling systems for each dryer;
- d. a system to control regeneration of the dryers in relation to pipeline demand;
- e. a hygrometer and display with a minimum accuracy of $\pm 3^{\circ}\text{C}$ in a range from -20°C to -60°C (set to -46°C atmospheric dew-point) and a pressure sensor;
- f. an automatic changeover to the stand-by dryer system in the event of failure of the duty unit by either dryness or pressure.

This requires:

- (i) electrical and pneumatic isolation of the duty sub-assembly so that it is taken off-stream;
- (ii) electrical and pneumatic energisation of the stand-by sub-assembly so that it is brought on-stream;
- (iii) activation of the appropriate fault indicator and associated volt-free contacts;
- (iv) the sub-assembly to remain in this mode of operation until the fault has been rectified;

Note

In the event of power supply failure, all drain and vent valves should fail “closed”, and all inlet and outlet valves should fail “open”.

g. green function indicators for each dryer subassembly to indicate:

- (i) dryer 1 selected;
- (ii) dryer 2 selected;
- (iii) selected dryer – “normal”;
- (iv) selected dryer – “failed” (this fault indicator should remain until manually reset by means of a reset button);
- h. a fail-safe system which on failure of the power supply causes the following:
 - (i) closure of the exhaust and purge valves;
 - (ii) opening of the inlet and outlet valves.

3.17.5. Plant Status Monitoring

A monitoring system shall be provided to detect the following faults in the air compressor system:

- a. plant faults (for each compressor):
 - (i) control circuit failed;
 - (ii) motor tripped;
 - (iii) after-cooler temperature high;
 - (iv) compressor temperature high;
 - (v) compressor failed to go on load;

(vi) activation of other safety devices supplied by the manufacturers;

b. plant faults (for each dryer unit): (i)

dryer failure;

(ii) pressure fault;

c. plant emergency:

(i) receiver pressure 0.5 bar below the standby cut-in pressure; (ii)

receiver pressure 0.5 bar above cut-out pressure;

(iii) dryness above -46°C at atmospheric pressure

d. pressure fault (cylinder reserve):

(i) pressure in duty bank below 50% (of normal cylinder pressure);

e. pressure fault (pipeline): (i)

low pipeline pressure;

(ii) high pipeline pressure.

3.17.6 Plant Status Indicator Unit

In addition to the plant control indication, there shall be a plant status indicator panel that may be mounted on the plant room wall or adjacent to either the compressor starter unit or the plant control unit.

It shall have a warning notice that complies with BS 5499-5:2002 to indicate the presence of low voltage.

There shall be indicators for each compressor to show the following conditions:

a. green “mains supply on”;

b. yellow “control circuit failed”;

c. yellow “overload tripped”;

d. yellow “after-cooler temperature high”;

e. yellow “compressor temperature high”;

f. yellow for each individual safety device provided by the manufacturers;

g. yellow “compressor failure”.

There shall be indicators for each dryer system to show the following:

a. green “mains supply on”;

b. yellow “dryness fault”;

c. yellow “pressure fault”.

3.17.7. Alarm Signal Status Unit

An alarm signal status unit shall be provided as part of the control system. It shall display the following conditions:

a. green “normal” (normal);

b. yellow “plant fault” conditions ((b)–(g) in paragraph 7.71);

c. yellow “plant emergency” (low reservoir pressure/high moisture: that is, condition (b) in paragraph 7.71);

d. yellow “reserve low” (emergency/reserve banks low ($<50\%$));

e. red “pipeline pressure fault” (pressure fault).

Conditions (b) to (e) shall be transmitted to the central alarm system.

Where relays are used, they shall be normally energised relays that de-energise under fault conditions, with contacts having a minimum rating of 50 V dc and 50 mA.

Volt-free, normally closed contacts rated at 50 V dc and 50 mA shall be provided for transmission of conditions (b) to

(e) to the alarm system.

The panel can be incorporated into the plant indicator unit or be a separate unit within the plant room. If mounted separately, the cabling shall be monitored for open/short circuit.

In the event of such a cabling fault, a red “system fault” lamp shall be illuminated on the alarm signal status unit together with the appropriate alarm condition.

The alarm signal status unit shall be supplied from all individual plant control units or from a separate common supply.

3.18. Standby Air Cylinder Manifold

3.18.1. Location

The specialist contractor shall supply and install in the plant room as shown in Contract Drawing a Standby Medical Quality Air Cylinder Manifold which shall come into operation automatically should the compressed air plant fail.

For combined air system, there shall be separate stand-by manifold systems with automatic changeover from duty to stand-by cylinder banks for both medical air- 4 bar and surgical –air-7 bar.

The ordering of the initial full complement of cylinders and any future replacement cylinders shall be the responsibility of the Hospital Authority.

3.18.2. Capacity

A standby supply of one day is recommended.

One bank shall be on duty while the other is on standby

3.18.3. Standby Operation

The standby manifold shall come into operation for any of the following reasons: -

Compressors faulty – not maintaining pressure- air temperature too high.

Dryer faulty- dew point high.

Line pressure 15% below normal.

3.18.4. Manifold Assembly

The requirements of the Standby Manifold shall be as described for medical gas manifolds covering:-

- Manifold headers
- Non-interchangeability of cylinder connectors
- Testing of headers
- Degreasing

Control Panel with:-

- both automatic operation for “changeover” or manual operation for “changeover”
- pressure gauges
- identification

3.18.5. Electricity Supply

The standby manifold shall be suitable for operating from 240 volts, single phase and neutral, 50 hertz, A.C. supply.

3.18.6. Connection Point into Distribution System

The air, which will be of the correct quality and dryness, will not require further filtering or drying and the standby supply shall be permanently connected into the distribution main in the plant room at a point beyond the pressure gauge and safety valve at the plant room wall.

A non-return valve shall be fitted prior to the above gauge and relief valve to prevent back pressure to the dryers, etc. from the cylinder supply.

A stop valve shall be provided to allow the standby connection to be isolated.

3.18.7. Electrical Installation Work

All electrical equipment shall be supplied and installed by the Specialist Contractor.

The interconnecting wiring shall be carried out to separate specification by the Specialist Contractors.

The specialist Contractor shall in all cases supply duplicate wiring diagrams and instructions within 3 weeks of being awarded the contract.

4.0 Medical Vacuum Plant

4.1 General Requirements

The Specialist Contractor shall supply and install at the position shown on the Contract Drawing a Medical Vacuum Plant complete with all necessary controls, drainage traps and bacterial filters. Discharge into an aerobics septic chamber is not permissible due to potential health hazards.

4.2 Degree of Vacuum

The overall design of the system shall be such that the degree of vacuum in the distribution pipework at the back of the remotest terminal unit is not less than 400mm Hg below a standard atmospheric pressure of 760 mm Hg (360 mm Hg absolute).

4.3 Maintenance

The plant shall be designed and arranged to facilitate easy and efficient inspection and maintenance, to the satisfaction of the engineer.

4.4 Precautions against Vibrations and Noise

Flexible pipework connections and resilient mountings shall be provided where necessary to prevent the transmission of vibration and the noise to the building and distribution pipe work.

The specialist contractor shall be responsible for ensuring that rigid connections are not made either by themselves or others.

4.5 Builder's Work

The specialist contractor shall supply and fix all holding down bolts, anti-vibration mountings and supply details of foundations and hole positions for the building contractor to provide. The concrete foundation block shall be of adequate mass placed on suitable resilient foundations to damp out vibrations.

4.6 Vacuum Pump Unit

4.7.1 Definition

Each vacuum plant unit shall comprise a vacuum pump driven by an electric motor mounted together on a common base plate having anti vibration mountings.

4.7.2 Duty

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 one pump in standby.

The two vacuum pumps shall be arranged so that one pump is on duty while the other is on standby and each shall be capable of dealing with 75% of the total design flow and running continuously at this load.

4.7 Lubricated Type Pumps- Air Cooled

The vacuum pumps shall be of the air cooled type, oil flooded rotary vane type driven by electric motor, having oil lubricated cylinders which shall be designed so that the lubricating oil consumption is kept to a minimum.

4.8 Vacuum Pump Exhaust System

4.9.1 Silencers

The discharge from the vacuum pumps shall pass through silencers in order to keep the noise level down to a minimum. (See also 4.10.5)

4.9.2 Location of discharge pipes

The discharge pipes shall terminate outdoors at high level at the position shown on the

Contract Drawing but if considered necessary the position may be modified after a final inspection of the site and agreement between the Medical Officer, the Engineer and the Contractor in order to ensure that the discharge cannot constitute a health hazard.

4.9.3 Weather protection

The discharge of pipes shall be adequately protected by cowls or other means from the ingress of rain, snow, ice and wind pressure and sited away from windows and air intakes.

4.10.4 Back Pressure

The exhaust system shall be designed so that the back pressure does not exceed 50 mm Hg (1.0 p.s.i) at the peak demand and this figure shall be taken into account when sizing the pumps.

4.10.5 Permissible Noise Levels

The overall effect of silencers, anti-vibration mountings and pumps (both running) shall not produce sound pressure greater than I.S.O rating of 75dB, measured 1.8 m (6 feet) away from sides above the plant.

The Contractor shall state the sound pressure levels of the plant being tendered and this shall be checked and proved on completion of the installation to the satisfaction of the Engineer.

4.9 Vacuum Pump Electric Motor

Each electric motor shall be continuously rated for the maximum duty to be performed and shall be of T.E.F.C type for 415 volts, 3 phase, 50-hertz a.c. supply and conform to B.S 2613 and B.S 3979 (metric dimensions) with class E insulation.

The motor shall drive the pump either by Vee belts or flexible coupling, which in either case shall be efficiently guarded to satisfy the requirements of the Factories Act.

4.10 Motor Starters

Each motor shall have a starter which shall be rated for frequency in accordance with B.S. 587 and have a thermal overload protection.

The starters shall be of the automatic type so that once switched on the motor will be capable of re-starting automatically should the supply have been interrupted. This feature shall be indicated by a suitable warning notice displayed on or near the motors.

A time delay shall be incorporated to ensure that the two pumps do not start together. 3 phase motors shall have single phasing preventers. Each star delta starter shall be electrically and mechanically interlocked to prevent simultaneous star and delta connection.

4.11 Ammeter

An industrial grade ammeter to B.S 89 shall be connected in the yellow phase connection to each motor, the dial to be 75mm diameter.

4.12 Vacuum Pump Controls

4.13.1 Duty Selection Switch

The two pumps shall be run alternately so that one is on duty while the other is on standby and a change-over duty switch shall be provided so that manual selection can be made.

4.13.2 Hour Counter

An hour counter shall be provided on each pump to record its total running time and assist in even running of the pumps.

4.13.3 Switches

Each pump shall have a "hand/manual-off-auto" switch to allow choice of either automatic or hand/manual control.

4.13.4 Pressure Switches

The pumps shall be controlled by two pressure switches connected to and sensing the vacuum in the reservoir.

The "high" pressure switch shall be set to operate the duty motor starter when the reservoir gauge pressure falls to 400mm Hg and to stop the motor when the gauge pressure rises to 500mm Hg.

The "low" pressure switch shall be set to operate the standby motor starter when the reservoir gauge pressure falls to 400mm Hg and to stop the motor when the gauge pressure rises to 500mm Hg.

When the pumps are on hand control and cut-off the motor when maximum working vacuum is reached.

4.13.5 Audible and Visual Alarm

Provide audible and visual local alarm (complete with indicating lights and individual sets of auxiliary contacts wired to the terminal strip for remote alarm indication) for the following: vacuum pump thermal malfunction and reserve vacuum pump in use.

Provide manual reset for thermal malfunction shut-down. All control and alarm functions shall remain energized while any vacuum pump in the system remains electrically on-line. The lag vacuum pump shall be able to start automatically if the lead vacuum pump fails to operate.

4.13 Control Cabinet

4.14.1 Compartment Arrangement

The vacuum plant controls shall be arranged together in one metal cabinet with three separate fireproof compartments. The centre compartment shall contain the duty selector switch, wiring and accessories common to both pumps, while the other compartments each contain the controls for one pump and its associated equipment.

A drawing of the panel shall be submitted to the Engineer before commencing manufacture.

4.14.2 Isolating Switch

The cabinet shall house a load breaking isolating switch interlocked with the cover and the circuits and apparatus shall be protected by H.R.C fuses.

5.14.3 Regulations

Warning notices shall be incorporated from each compartment to warn the presence of medium voltage, to conform to I.E.E regulations A.17 and A.19.

5.14.5 Manufacture

The cabinet shall be manufactured from iron sheet, rust proofed (zintec) or electro-coated rust inhibited and not less than 2.0 mm (14 S.W.G) thick and adequately braced.

The cabinet shall have an external finish of semi-gloss stoved or cellulose enamel to B.S standard, untreated parts shall have a rust inhibitor coat and an undercoat applied before manufacture.

The internal finish shall be white.

4.15. Vacuum Reservoir Vessel

4.15.1 Type Design

Each Vacuum Reservoir Vessel shall be of the horizontal type and be designed to conform to B.S 487, Part 1, Class III D (Fusion Welded Steel Air Receivers).

4.15.2 Capacity

The capacity of the vessel shall be 785 litres “water capacity”.

The capacity is intended to be such that the number of start/ stop cycles of the pump on duty does not exceed 30 times per hour.

4.15.3 Safety Requirements

Where inadvertent reversal of the pump motor could occur on 3 phase supply, a pressure switch on the inlet pipe between reservoir and pump shall switch off the motor on sensing a positive pressure. A non-return valve shall also be fitted as a further safeguard.

4.15.4 Inspection, Cleaning, Draining

The reservoir(s) shall have an inspection cover, a cleaning outlet and a manual drain valve which shall discharge via copper tundish piped to a suitable gully.

4.15.5 Vacuum Gauge

A vacuum gauge to B.S 1780 shall be fitted on each reservoir, the dial to be 150 mm (6") diameter, calibrated 0-760 mm HG and reading Zero (0) at atmospheric pressure.

The gauge shall be complete with isolating valve or cock. The dial shall be marked with a blue line at the normal working vacuum and a red line at the minimum allowable vacuum.

4.15.6 Pressure Switch Connections

Provision shall be made on the reservoirs for tapings to suit the pressure switch connections for vacuum pump control.

4.15.7 Tests Certificates

The reservoir(s) shall have been pressure tested at the manufacturer's works in accordance with BS 487 Part I to 10.3

bar (150 p.s.i.) gauge.

4.16. Drainage Traps

4.16.1 Duty

The intake to the vacuum vessel from the distribution pipeline shall first pass through a drainage trap, installed in duplicate, each trap being sized to deal with the total maximum flow.

4.16.2 Sterilizing

The bowls of the traps shall be sterilizable by the following methods:-

- a) By means of moist steam at 2.2 bar gauge (32 p.s.i.) and 138°C (280°F) in a porous load sterilizer to B.S 3970.
- b) By means of dry heat at 160°C (320°F) for atleast 60 minutes.

The trap bowls shall either be transparent or have transparent windows.

4.16.3 Spare Trap Bowls

Two sets of spare trap bowls shall be included initially to cater for frequency of sterilizing required and to ensure that a sterilized set is available always for change-over purposes.

4.17. Bacterial Filters

4.17.1 Duty

A bacterial filter shall be fitted between each drainage trap and vessel, each filter being capable of dealing with the total maximum flow.

The filter housing shall be distinctly marked with the words "BIO-HAZARD".

4.17.2 Efficiency

The penetration of the filters when tested by the sodium flame test in accordance with B.S 3928 shall not exceed 0.05% at the design flow.

4.18. Operations of Traps and Filters

The traps and filters shall be operated on a duty and standby basis and manually operated valves shall be provided so that either of the sets can be selected and to allow for isolation for maintenance and changing of trap bowls and filters.

4.19. Standby Vacuum Facilities

Standby Emergency Vacuum Facilities are not covered under this contract. An emergency service from portable electric suction apparatus to BS 4199 should be arranged by the Hospital Authority.

4.20. Electrical Installation

360-450V three phase supply should be provided to each pump starter panel, connect the electrical power supply from the wall mounted isolator to the terminal blocks provided on the pump starter panel. Connect multicores to BMS or central area alarms if required.

All electrical equipment shall be supplied and installed by the Specialist Contractor. The interconnecting wiring shall be carried out to separate specification by the Specialist contractor.

The specialist contractor shall in all cases supply duplicate wiring diagrams and instructions, within 3 weeks of being awarded the contract.

5. Anaesthetic Gas Scavenging System

5.1 General

The Anaesthetic Gas Scavenging (AGS) System shall comply with HTM 02-01 and BS 6834:1987 or BSEN 737-2:1998. 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 **130 l/min** with a 1 kPa resistance to flow, and a minimum of **80 l/min** with a

4 kPa 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 simplex or duplex configuration.

The AGS pump assemblies shall be skid mounted and included on the skid shall be the simplex or duplex pump(s), motor control unit(s) with starter/isolator, moisture drain flask and flexible connector(s) to connect the plant to the pipeline.

Each pump shall include an electric motor and directly coupled impeller assembly. Impeller bearings in the pump(s) shall not require lubrication.

The pump(s) shall be air cooled and rated for continuous operation.

5.2 Vacuum/Flow Regulating Valve

A vacuum/flow regulating valve shall be provided, comprised of a spring-loaded plate valve and inlet silencer. The plate shall control air ingress into the pipeline system, thereby controlling the vacuum level within.

The number and installed position of the regulating valves fitted to the system shall be determined by the Project Engineer.

The vacuum/flow regulating valve shall ensure a maximum vacuum of 200mb below atmospheric pressure is not exceeded.

5.3 Control System

Each motor control panel shall incorporate an emergency panel isolation switch facility, which controls all electrical power to the exhaustor 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.

Simplex installations shall use remote start switches that include a red 'PLANT EMERGENCY' indicator. This indicator 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, or if the overload trips.

Duplex installations 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.

Where a duplex system is installed each pump shall be controlled by a separate motor control panel to enable servicing of either pump or control gear whilst maintaining system operation.

Volt free relay kits for replicating alarm conditions to BMS shall be available as an optional extra. To be either installed either at factory or as a retro-fit kit for onsite installation.

5.4 Terminal Units

Terminal units shall be provided with adjustable orifices 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.

1. Warning and Alarm System

6.1 General

A warning and alarm system shall be provided to monitor the safe and efficient operation of an MGPS. There are three reasons for this monitoring:

- a. to indicate normal function of the pipeline system by means of visual indicators;
- b. to warn by visual and audible indication that routine replacement of cylinders or other engineering action is required;
- c. to inform the user by visual and audible emergency alarms that abnormal conditions have occurred which may require urgent action by the user.

This alarm condition will require a rapid response by the various departmental staff.

6.2. Dedicated systems

Warning and alarm systems shall be provided for all medical gas and vacuum systems.

A simplified system shall be provided for surgical air systems and for the AGSS, with the warning/indication panel located in the operating room.

Warning and alarm systems shall comprise pressure sensors, a central system providing information on all monitored functions, with repeater panels located where information is required to ensure the necessary action is taken.

Area alarms shall be provided to give warning to users downstream of the designated departmental AVSU (area valve service unit).
Pressure sensors shall be connected to the pipeline by means of minimum leak devices.

All MGPS warning and alarm indicating panels shall comply with the requirements of Health Technical Memorandum No. 02 -01 (HTM 02-01), including all operating room panels.

6.3 Panel Location

6.3.1. Central Indicator Panel

Warning and alarm conditions for all medical gas supply systems shall be displayed on a central panel located in a position where there is continuous 24-hour occupation, such as the telephone switchboard room.

6.3.2. Repeater Indicator Panel Location

Repeater panels shall be provided in other locations to display all or some of the information on the central alarm so that appropriate action can be taken to ensure the continuing operation of the system.

Some warning system information may be appropriate for display in specific departments, for example cylinder manifold status information in a porters' room, and oxygen concentration in the pharmacy department when a PSA plant supplies the hospital pipeline installation.

6.3.3. Area Warning and Alarm Panel Location

Local panels to display "high" and "low" gas pressure shall be installed in the locations given in HTM 02-01, Part A, Chapter 3.

The sensors for these panels shall be located downstream of the designated AVSUs, normally the departmental AVSUs. It shall not be possible to isolate the sensor with a separate shut-off valve and they shall be connected to the pipeline by means of a minimum leak device.

6.4. System Components

Warning and alarm systems include the following functional elements:

a. interfaces/transmitters that convert the signal from the plant or manifold volt-free alarm contacts into a form which can be transmitted via multiplexed cable (for example using pulse width modulation). The transmitter may be a separate unit or may be incorporated:

(i) in plant or into a manifold control panel;

(ii) into an indicator panel.

Cases (i) and (ii) shall include line-fault monitoring devices;

b. indicator panels which display the transmitted signals;

a. interconnecting multiplex wiring which connects all interfaces/transmitters to all indicator panels.

6.5 System Layout

6.5.1. Central System

The layout of area warning and alarm system shall comply with HTM 02-01 with initiating devices at remote locations such as the VIE compound, medical air and vacuum plant rooms, nitrous oxide manifold room and emergency/reserve manifold rooms.

The transmitters shall be located close to the initiating devices.

Indicator panels shall be located at the telephone exchange, the porter's room and the engineer's office to provide information requiring action by engineering and other support staff.

6.5.2. Area Warning and Alarm Systems

The layout of area warning and alarm system shall comply with HTM 02-01.

For each gas service there shall be local pressure switches for low pressure; high pressure switches shall also be provided when oxygen, nitrous oxide and medical air are installed together.

These conditions shall be indicated on a locally-mounted indicator panel, with facility to provide a common alarm condition for connection to other alarm panels.

Area panels shall carry no indication of the warnings for cylinder replacement and plant functions that are given on central indicator panels.

6.6. General requirements

6.6.1. Labelling

All visual signal panels shall be permanently labelled according to their function, including clear identification of the areas, rooms or departments served.

6.6.2. Visual signals

Flashing visual signals shall have alternate “on” and “off” periods, each of equal duration between 0.25 and 0.50 seconds.

There shall be two separately energised light sources for each signal, arranged so that the failure of one source does not affect the other.

The light sources shall have a design life of at least five years of continuous operation.

6.6.3. Audible signals

All audible signal tones shall be modulated equally at a rate of 4 Hz $\pm 10\%$ between two tones of 440 Hz $\pm 10\%$ and 880 Hz $\pm 10\%$.

6.6.4. Automatic resetting

When a warning or alarm signal occurs and the system condition subsequently reverts to normal, the corresponding visual and audible signals shall automatically reset to normal.

6.6.5. Temporary Muting

Means shall be provided on each panel for the user to mute the audible signal.

The signal shall resound after a nominal 15-minute period if the fault condition still exists.

The process of muting and reinstatement of the signal shall be repeated until the fault condition has been

rectified. Operation of the mute on the central panel shall be accompanied by change from flashing to

steady illumination of the

corresponding visual indicator on the central and any repeater panels.

Operation of the mute on area alarm or repeater panels shall not be accompanied by a change from flashing to steady illumination.

6.6.6. Continuous Muting

An internally-mounted switch shall be provided to allow continuous muting during periods of maintenance.

When the system condition returns to normal, the continuous muting shall automatically reset to normal

operation. When the continuous muting is in operation on any alarm condition, it shall not prevent the

operation of the audible

signal on other alarm conditions when a fault condition arises.

6.6.7. Electrical Wiring

All electrical wiring shall be in accordance with IEE regulations.

6.6.8. System Integrity

If extra low voltage (ELV), maximum 50 V, is superimposed on the signal or communication circuit (for example by cross-connection), the system design shall ensure that any damage to the system is limited to replaceable panel components and that such damage is indicated as a system fault.

The performance of the system shall not be compromised by the use of multi-core cabling that carries ELV and communication signals in adjacent cores.

The system shall be designed to reject spurious radio frequency (RF) or mains noise typically arising in hospitals, examples being diathermy equipment and current spikes caused by plant start-up etc.

6.6.9. Relay Conditions

If relays are used to transmit alarm signals, the relays shall be energised in their normal closed condition.

6.6.10. Mains Power Supply

The mains electricity supply shall be derived from the essential power supply (that is, must be on the emergency system).

6.6.11. Safety Extra Low Voltage/Functional Extra Low Voltage Power Supply

The panel power may be designed either as a safety extra low voltage (SELV) system or as a functional extra low voltage (FELV) system, as defined in Part 4 of the IEE Wiring Regulations.

The ELV power supply may be housed either in the alarm panels or in a separate metal enclosure.

The power supply shall be rated for the full load of the panel, with visual and auditory signals on all normal and alarm conditions.

6.6.12. Test Facility

Each panel shall be provided with a means to test all visual and audible signals

on that panel. The power supply shall be capable of sustaining all indicators and

audible signals.

6.7. Warning and Alarm System Faults

6.7.1 General

A flashing red visual indicator and an audible signal shall operate on all panels when any of the following conditions occur:

- a. line fault from the initiating device;
- b. communication fault or other wiring fault;
- c. mains power failure.

6.7.2. Line Fault

The system shall monitor the integrity of the lines between the initiating devices and the panel or transmitter units.

The “alarm system fault” condition shall be indicated on loss of integrity, for example open or short circuits, together with the visual alarm indicator(s) associated with the faulty wiring.

6.7.3. Communication/Wiring Fault

The system shall indicate an alarm system fault in the event of loss of data transmission between panels and transmitters.

6.7.4. Mains Power Failure

Failure of mains power shall be shown by a flashing red indicator and an audible signal, which shall be powered from an internal battery.

The audible signal may be muted and not automatically reinstate as required under normal power supply, but the visual indicator shall continue to flash until either the fault has been rectified or the battery has discharged.

6.7.5. Stand-by Battery

A battery shall be provided with sufficient capacity to power the visual and audible “alarm system fault” signal for a minimum period of four hours. The battery shall be sealed and exchangeable, and shall automatically recharge within 72 hours.

6.7.6. Legend

The legend on this indicator shall be “alarm system fault”.

6.8. Indicator Panel Requirements for All Systems

6.8.1 Indicators

Panels shall be provided with all indicators for the gas services in local use.

The visual indicators shall be arranged vertically in priority order, with the normal

indicators at the top. The sequence of gas services shall be, from left to right:

- a. medical oxygen (cryogenic and cylinders/pressure swing adsorber (PSA) systems);
- b. nitrous oxide;
- c. nitrous oxide/oxygen mixture;
- d. medical air 400 kPa (compressor plant, cylinders and synthetic air);
- e. surgical air 700 kPa;
- f. medical vacuum (pumps);
- g. helium/oxygen mixture.

In addition to the gas service signal indicators, each panel shall include:

- a. a green “power on” indicator without an audible signal;
- b. a red “alarm system fault” indicator with an audible signal.

6.8.2. Labelling

Panels shall be labelled as follows:

- a. medical gas alarm;
- b. with the identification of the medical gas services indicated, and the areas and departments served.

6.8.3. Construction

The fascia panel shall be removable to allow access to the rear of the fascia or to the panel for maintenance purposes. Access to the interior of the panel shall be tamper-proof.

It shall be possible to replace the source of illumination without removing the legend.

Panels shall have electrical sections with protection at least equal to BS EN 60529:1992.

Panels and their housings shall be of adequate strength for their purposes and be manufactured from corrosion-resistant materials.

If gas services are brought into the panel, they shall be housed in separate, enclosed compartments, which are vented to the outside.

There shall be gas-tight seals where electrical services pass through any gas compartment.

6.8.4. Remote Audible Sounder

All panels shall have provision for connection to a remote audible sounder.

6.9. Central Indicator Panel Requirements

6.9.1. Displays

The central panel shall display all signals for all MGPS which are generated by the warning and alarm system, as described below.

Normal

The normal condition for all piped MGPS shall be displayed as a steady green visual signal. The “normal” indicator shall extinguish in warning and alarm conditions.

Warnings

Warning conditions appropriate to each MGPS shall be displayed as a flashing yellow visual signal that may be accompanied by a mutable audible signal.

Emergency Alarms

Emergency alarms are generated by loss of pipeline pressure or vacuum and are indicated by flashing red visual signals accompanied by mutable audible signals.

Alarm System Fault

The “alarm system fault” condition shall be displayed as a flashing red visual signal accompanied by a mutable audible signal.

6.9.2. Mute Functions

The temporary mute shall cancel the audible signal for about 15 minutes and change the visual indicators from flashing to continuous on all central and repeater panels.

Operation of the continuous mute shall inhibit the 15-minute reinstatement of the audible alarm.

Operation of the mute shall not inhibit the visual or audible indication of any subsequent alarm conditions.

6.9.3 Panel Legend and Display

Panel legend and display shall be in accordance with HTM 02-01, Table 24.

6.10. Repeater Indicator Panel Requirements

6.10.1. Displays

The repeater indicator panel shall always display “normal”, “emergency alarm” and “alarm system fault” conditions as given above.

The repeater panel shall display some or all of the warning conditions that are displayed on the central indicator panel. The extent of the display of warnings shall be varied to suit local clinical requirements.

6.10.2. Mute Functions

The temporary mute shall cancel the audible signal for about 15 minutes whilst the visual indicator continues to flash.

Operation of the temporary mute (on the central panel) shall change the visual indicator to continuous illumination on the central and any repeater panels.

Operation of the continuous mute shall inhibit the 15-minute reinstatement of the audible alarm.

Operation of the mute shall not inhibit the visual or audible indication of any subsequent alarm conditions.

6.10.3. Panel Legend and Display

The panel legend and display shall be in accordance with HTM 02-01, Part A, Table 24.

6.11 Area Warning and Alarm Panel

6.11.1. Panel Displays and Legend

Area panels shall display the conditions listed in HTM 02-01, Part A, Table 25.

6.11.2. Mute Functions

The temporary mute shall cancel the audible signal for about 15 minutes whilst the visual indicator continues to flash. Operation of the mute shall not inhibit the visual or audible indication of any subsequent alarm conditions.

7. Distribution Pipework System

7.1. Extent of Pipework

The Specialist contractor shall supply, install, connect up and test all the pipework and valves required from the supply source to the distribution terminals for each gas, air and vacuum.

The pipe sizes and valve positions shall be as given on the Contract Drawings and test procedure as described in testing and commissioning of medical gases document.

7.2. Spare Pipeline

The Specialist Contractor shall include for one spare pipeline with valves from the supply source to selected departments (to be determined during project implementation).

The pipeline will be used in the future for other medical gases not considered and the pipe sizes and valve position will be as directed by the project engineer and medical officers.

The pipeline shall be tested as specified later and left ready in a capped condition for future connection in the manifold room, the terminal end as to be specified later.

7.3. Pipe Installation

7.3.1 Fixing

All pipework shall be fixed without any springing or forcing. A clearance of 150mm (6") shall be maintained between the pipework and other services. Where pipework crosses other services a clearance of 25mm (1") minimum shall be maintained.

7.3.2 Gradients

Gradients will be as specified in the contract drawings.

7.3.3 Drainage

A full way drain lock is to be provided at the bottom of each main vertical run on the air and vacuum pipework. Branches on horizontal air pipe work shall be taken from the top side of mains to avoid pockets of moisture.

7.3.4 Diversion Sets

The use of fittings for the diversion sets shall not be permitted and the sets shall be formed from a long length in one piece and cold drawn or hot drawn in a neat manner without bucking or thinning.

7.3.5 Routing to avoid Fire Risk Areas

The routes of the pipework shall avoid fire risk areas including laundries, boiler houses, generator rooms, incinerator rooms, storage rooms for combustible materials (unless the pipes are to be cased), lift shafts and kitchens.

7.3.6 Pipework Supports

Pipework shall be supported at not greater than the intervals shown in the table below:

SPACING OF SUPPORTS FOR COPPER PIPES

Nominal Pipe outside diameter mm BS 2871 Part 1 Table X	Maximum Intervals For Vertical Runs	Maximum Intervals For Horizontal Runs
	(m)	(m)
10	1.2	-
12	1.2	1
15	1.8	1.2
18	2	1.5
22	2.4	1.8
28	2.4	1.8
35	3	2.4
42	3	2.4
54	3	2.7
76	3.6	3

Where valves are fitted the pipe shall be supported at both sides of the valve to facilitate valve operation without valve movement.

Fixing brackets or supports shall be of a suitable non-ferrous material or suitably treated to minimize corrosion and prevent electrolytic action.

The specialist contractor shall drill and plug walls and ceilings as required to fasten the supports. Where roof decking is encountered the specialist contractor shall provide cavity fixing devices to fasten the supports.

7.3.7 Pipework in Floors, Walls, Ceilings

Pipework in rooms and corridors shall be concealed either behind ceiling panels, or in walls, ducts or trucking. Removable covers or panels shall be provided to allow access to pipework.

Pipework shall not be buried solidly in floors, walls or ceiling except with the approval of the Engineer. Approval will normally be given only for tail pipes in one piece from Terminal unit to service duct or ceiling void and for unjointed pipes from control valve to void. The route of the buried pipe should be clearly and continuously marked by chalk, coloured adhesive tape or otherwise, during construction, to discourage the driving of nails into or near the pipe.

Where pipes are to be installed in partition walls the tail pipes of terminal unit shall be in one piece (without joint) from the terminal unit to the service duct ceiling void.

Service ducts or voids shall have adequate ventilation to prevent gas concentration in the event of a leak. Where pipes pass through floors, walls or partitions, copper sleeves pipes, one size larger shall be used and shall project between 1.5 and 3mm (1/16" and 1/18") beyond finished surfaces and plates shall be fitted. All joints shall be accessible and no joint shall be made so that it's inside the pipe sleeve.

Where pipework is to be concealed it shall not be covered over until it has satisfactorily passed all pressure tests. Pipework in service ducts, or voids or in rooms or in corridors where the pipework is not required to be concealed shall be surface run.

7.3.8 Special Precautions against Corrosion.

Where pipework is supported by or is liable to come into contact with timber that has been treated with compounds likely to cause corrosion of copper, the pipe shall be protected locally by impermeable materials such as p.v.c. tape or spacers.

5.3.9 Cleanliness during installation

Great care shall be taken during installation to ensure that no extraneous materials are allowed to enter the pipework. Where any section of the pipework is left incomplete during erection the open end of the pipe shall be sealed immediately with plastic cap.

7.3.10 Bonding and Earthing

Wherever possible, pipeline shall be physically separated from the metal sheath and armour of electric cables and from metal conduits, trunking and bare earth continuity conductors associated with any cables which operate at low voltage or above.

Where physical separation is impossible or when pipeline are in metal trunking and bed head units the pipeline shall be bonded to the I.E.E Regulations B. 53 and D.10

The above work shall be carried out by specialist contractor.

7.4 Pipework Material and Size

Material

Pipework material for gases, air and vacuum shall be phosphorous de-oxidized non-arsenical copper to B.S 1172

Sizes

Pipework sizes shall be to metric outside diameters in accordance with B.S. 2871, Part 1, Table X.

7.5 Fittings and Joints

7.5.1. Capillary Fittings

All fittings shall be “high Duty” Capillary Type suitable for a “steam” working pressure of 17bar (250p.s.i.) gauge.

The fittings shall have integral rings of silver brazing alloy complying with composition to B.S 1845 (1966) Table 2, Type

AG.11 Brazing by the end-feed method shall not be permitted.

The fitting shall be non-ferrous and capable of withstanding corrosion and dezincification.

7.5.2. Flux

Because of the high temperatures required for their effective use borax or borax based fluxes shall NOT be used. The flux shall be provided by the Fitting Manufacture to suit the work. Fluxes shall be free from grease and agents which promote corrosion or deposits of chlorides.

Care shall be taken to avoid any excess of flux which might enter the pipe bore and when the joint is cool excess flux shall be washed and wire brushed off. A visual inspection of each brazed joint shall be made to confirm that the hardened flux has not formed a temporary seal which holds test pressure.

7.5.3 Fittings

Fittings on moisture eliminators and trap sets for vacuum and compressed air shall be brass competition type fittings, or flanged fittings as appropriate.

7.5.4 Valve Joints - Screwed

Joining of valves to the pipelines shall preferably be made with a capillary joint similar to 5.5.1 but the end feed method may have to be used in this case. If however, the valve connection is screwed a capillary to screwed adaptor shall be used but in this case the joint shall be made by tinning the male thread with soft solder. Litharge and Glycerine or an approved oxygen luting or scaling compound are also acceptable. See also 7.7.1.

The screwed joint shall be factory made using silver alloy as specified for capillary fittings and the adaptor screwed up while the “tinning” is molten. This shall be done with valves dismantled to avoid damage to internal parts and the same care shall be taken when making the capillary to the damage diaphragms, seating e.t.c.

The parts of the valves shall be maintained in a degreased condition. Screw threads shall tampered either to B.S. 3643 or

BS. 21. Parallel threads shall not be used.

7.6 Degreasing of Pipes and Fittings

7.6.1 Extended Protection Labelling

All pipework and fittings for medical Gas, air and vacuum shall be degreased at the manufacturer’s works, the pipes to be individually fitted with purpose made tightly fitting plastic caps or plugs to protect the bores before dispatch to site. Pipes shall be delivered in bundles in protective wrappings and fittings in

sealed polythene bags, no capping required. The bundles and bags shall be securely and clearly labelled: - "Degreased Materials".

For use on Medical Gas Installations. Do not allow to come into contact with oil or grease".
The specialist Contractor shall take great care in storing these materials and any materials contaminated while on site shall be returned to the manufacturer for degreasing, all at the expense of the Specialist Contractor.

7.6.2 Degreasing Processes

The pipes shall be degreased internally by steam, then dried, shot blasted and blown through with medical quality bottled

air. After a visual inspection each pipe shall be capped individually at both ends.

If steam cleaning is not economical, pipes above 54mm outside diameter may be alternatively cleaned using an approved solvent such as such as methyl chloride, which will leave no poisonous or explosive residues and the fittings shall be dried out, inspected and capped or sealed as specified in 7.6.1.

While the degreasing process is primarily concerned with the bore of pipes care shall be taken to avoid oil or grease on the outside, as being a possible source for bore contamination to occur from.
Degreasing of valves is dealt with under 7.7.4.

7.7. Valves on Distribution Pipework

The Specialist Contractor shall supply and fit valves at the positions shown on the Contract Drawings and any deviations from these positions shall be agreed in writing by the Engineer.

The height of valves is to be stated under "Valve Boxes", (7.8.3.) but in plant or manifold rooms valves may be arranged differently provided they are easily accessible for emergency or maintenance use.

7.7.1 Valve Materials and Types

All valves shall be of non-ferrous material and of the non-lubricated type, to the following details. If screwed, threads shall be tampered either to BS.3643 or BS.21 (see 6.5.4.) Parallel threads shall not be allowed.

a) Medical Gas Valves

Type – medical ball line valves (lever operated)

Bores – full bores equal to pipe sizes

End Connections – separate flanges bored out to provide socket capillary ends for silver brazing.

b) Compressed Air valves

Type: as specified in contract drawings Bores: as specified in contract drawings End Connections: as per medical gases valves

c) Vacuum Valves

Type: Diaphragm type

Bores: as specified in contract drawings

End connections: as specified in contract drawings

7.7.2 Direction of Valve Closure

Wheel screw valves shall close in a clockwise direction. Lever Ball Valves shall have the direction of closing indelibly cast or engraved on the wheel by means of an arrow and the word "CLOSE".

Lever ball valves shall have "ON" / "OFF" cast or engraved on to show when the valve is open or closed.

7.7.3. Maker's Identification

Each valve shall carry the manufacturer's serial numbers or identification and valve size.

7.7.4. Pressure Testing and Degreasing

All valves shall be pneumatically tested by the manufacturers to twice the working pressure and afterwards de-greased for medical gas services using a suitable method as given as at 5.6.2 before being individually sealed in polythene bags, capping not required.

The valves shall be securely and clearly labelled:-

“Degreased Valve. For use on Medical Gas installations. Do not allow to come into contact with oil or grease”.

7.7.5. Certificates

A certificate shall be supplied by the manufacturer for each valve or batch stating that pressure tests and degreasing has been carried out and that any solvents have been completely removed.

7.7.6 Valves for System Testing Purposes

The Specialist Contractor shall Supply and fit at the position(s) shown on the Contract Drawings (s), a three-valve arrangement to facilitate providing and testing of the installation(s).

The Principle of the method is shown on schedule No.6 and the procedure laid down under Testing and Commissioning Requirements. The valves shall be of non-ferrous material, de-greased and comply with relevant requirements, as previously specified and to be to following details:-

Type: as specified in contract drawings

Bores: as specified in contract drawings

End Connections: as specified in contract drawings

The valves shall be suitably labelled as described under 7.10

7.7.7. Extended, Phased, Modified, Installations

New work during installation shall be physically separated from the existing system and final joining up left to the last after completing all required tests.

7.8. Valve Boxes

7.8.1. Location

The Specialist Contractor shall supply and install lockable valve boxes for all the medical gas, air and vacuum valves located outside manifold and plant rooms and not contained in ducts or cupboards e.t.c.

7.8.2. Purpose

The boxes shall render the valves tamper proof and shall have a transparent breakable panel to facilitate emergency operation of the valve.

7.8.3. Mounting Height

The valves shall serve for the both emergency and maintenance purposes and because of the former requirement the box and valve shall be mounted at the centre height of 1.22metres (4 feet) above floor level in a position not obstructed in a anyway by other equipment.

Boxes for the different gases grouped together may be fixed one above another in which case the mean height is to be 1.22m.

7.8.4. Mounting Depth

The boxes shall be set into the wall with any projection being kept to a minimum and surface mounted boxes shall be avoided if at all possible.

The Specialist Contractor shall ascertain from the Architect or Site the nature of the wall into which the boxes will fit.

7.8.5. Standardised Type Boxes

The design of box offered shall be of a standardized pattern throughout the installation and have the following features:

- a) Ease of access for fitting valve and maintenance
- b) Designed so that the pipework can be fitted easily, either by having a split box or other suitable means
- c) Ventilation to obviate a possible buildup of gas in case of a leak,
- d) Non-interchangeable keys so that a maintained permit – to – work system can be operated
- e) Keys in duplicate
- f) Keys and locks with numbers engraved on
- g) Breakable transparent panel
- h) Non-interchangeability box covers if this could wrongly identify – covers to be hinged on.
- i) Boxes shall accommodate one valve only, ganging not permitted.

7.8.6. Box Material

The boxes shall not be of wooden construction but of robust plastic or metallic material and capable of withstanding hazards from blows, abrasions and fire.

The finished appearance of the boxes shall be such that they match the décor of the rooms and are not unsightly.

7.9. Valves in Ducts or Cupboards

The valves shown on the contract drawings in ducts or cupboards are intended for maintenance purpose only and are

not required to be in valve boxes, providing the valves are lockable in the open and closed position. Suitable locking arrangements and duplicate non-interchangeable keys shall be provided so that such valves can be included in any permit to work scheme. (See 7.8.5.d.).

Care shall be taken not to install valves in cupboards or ducts which are poorly ventilated or in cupboards used for other materials which could be affected by leakages. Any pipe runs so situated shall be drawn to the attention of the Engineer before proceeding on site.

7.10 Identification of Valves

An engraved label of white “Traffolyte” or similar material shall be permanently fixed adjacent to each valve box to indicate the service and give the following information:

- | | | |
|----|---|--|
| a) | <u>In Red letter</u>
1. Service
2. Area Served
3. Emergency Instruction | <u>Engraving Required</u>
e.g. “OXYGEN”
e.g. “WARD 1”
e.g. “IN EMERGENCY BREAK
PANEL AND CLOSE VALVE” |
| b) | <u>In Black letters:</u>

1. Valve number |

e.g. “VALVE 6” |

This number is for maintenance purpose and is to be agreed later on site.

Valves in ducts or cupboards shall be similarly identified except for emergency instructions.

The titles of areas served shall be finally agreed on site and the labels shall be installed before the systems are tested and commissioned in order to prove their correctness.

7.11 Terminal Units

7.11.1 Extent of Works

The Specialist Contractor shall supply, install and connect to the distribution pipework all the terminal units required at the positions shown approximately on the Contract Drawings and as listed on the Schedule of Terminal Units.

7.11.2 Definition

A terminal unit shall be defined as a single outlet point for a specific gas.

7.11.3. Fascia Plate

Terminal Units for different gases at one location may be house under a common fascia plate but it shall not be possible to mount the fascia plate incorrectly and reverse or alter the identification of the services.

The Units should be mounted on a common back plate to ensure accurate centering of the units and allow precise fitting of the fascia plate so that the probes enter freely.

7.11.4. Mounting Order

The Terminal Unit when viewed facing the units shall be mounted in the following order horizontally from left to right:-

Oxygen, Nitrous Oxide, Entonox, Medical air-4bar, surgical air-7bar, Medical vacuum, AGSS and Heliox.

7.11.5. Type

The terminal units shall be of the flush mounted type set into the wall unless in some areas where the terminal units shall be of the raised surface mounted type with probe connection made vertically underneath as directed by the Project Engineer.

7.11.6. Mounting Height

The mounting height of the terminal units above floor level shall be as follows:-

a)	for Flush Mounted Units	1.3m (4'- 4") to centre of Unit
b)	For Raised Surface Mounted Units	1.6M (5'- 2") to centre of unit
c)	For "Rail" Systems areas	1.5m(5'-0") to centre of unit.

7.11.7. Exact Positioning of Terminal Unit

The exact position of the terminal units relative to the beds, operating tables, etc. shall be finally agreed between the Medical Officers and Architect/Engineer, and the Architect/Engineer shall provide the Specialist contractor with suitable drawings.

Due regard shall be given to ensure that nursing staff can couple up equipment easily, that short routes for flexible pipes to apparatus can be achieved without obstructing movement of staff or equipment round the patient and that access to the units for maintenance is easy without disruption to patients or other services.

7.11.8. Essential Design Features of Units

Terminal Units shall be designed to incorporate the following features:-

- a. The ability to accept, retain and release the inserted probe by means of a quick release mechanism designed for single handed operation.
- b. A secondary locking mechanism to prevent accidental ejection of the probe which is to be finally removed by hand.
- c. Two Valves:-
 - i. A valve on the inlet to the unit which can be closed to isolate the unit only, without the need to isolate a complete section when maintenance is carried out.

- ii. A self-sealing check valve which is opened by the probe and or withdrawal closes before secondary lock engages.
- d. Non-swivel type terminal socket to probe connection so that secondary equipment such as a flow meter is not tilted during use.
- e. The terminal socket and check valve shall only accept the correct probe for the specified “gas” and not allow Inter-changeability with or partial operation by probes for any other service.
- f. It shall not be possible to interchange the parts of a unit for one gas with those for a different gas and so enable a probe to be connected to the wrong position.
- g. Fascia plates which is such that inter-changeability of fascia plates between the different gas terminal units is impossible.
- h. The front face around the terminal socket to be exposed and to carry “gas” name and colour identification, unless incorporated as in 7.11.8(i).
- i. Identification by shape incorporated on the problem is not an essential feature but if adopted by a manufacturer the following shapes shall be used:-

<u>Service</u>	<u>Shape</u>
Hexagonal Nitrous Oxide	Oxygen
Nitrous Oxide /Oxygen Mixture	Round
opposing flats Carbon Dioxide	Round with two
Triangular with radiuses corners Medical Air	
Round with one flat	
Medical Vacuum	Square

7.11.9. Identification Colours and Wording on Units

The following names and colours shall apply:

<u>Service</u>	<u>Colour</u>	<u>Wording</u>
Oxygen	White	Oxygen
Nitrous Oxide	French Blue	Nitrous Oxide Entonox
French Blue and white quarters	N ₂ O+O ₂ (50/50) Carbon dioxide	French Grey
Carbon dioxide Medical Air	White and Black quarters	Medical Air
Medical Vacuum	Prim Rose	Vacuum

The name and colour shall be permanent and it shall not be possible to transfer either to a different terminal. Painting on of colour or wording is not permissible.

7.11.10. Pressure Loss across Terminal Units

The pressure loss across terminal units shall be in accordance with HTM 02-01, Part A.

8. Special Fittings for Operating Theatres

8.1. Design of fittings

8.1.1. Boom Assembly, Open Type A

The boom shall be designed to carry flexible pipes connected into standard type flush fitting terminal units mounted at a height of 1.8M (5'-11") above floor level.

8.1.2. Boom Assembly, Enclosed Type B

The boom shall be designed to carry concealed pipes of nylon connected to the distribution pipework in a suitable wall unit.

The length of the boom shall be 3m and the height shall fit in the room height as given later.

8.1.3. Ceiling Pendant, Multipoint, Type C.

The pendant shall comprise a heavily chromed or stainless steel removable ceiling rose through which flexible hoses with terminal end connections are suspended.

The connections to the distribution pipework shall be within the ceiling rose space and the design shall be such that all strain is taken off the hose connections

The hose to distribution pipe connections shall not be interchangeable between the different services.

8.1.4. Ceiling Pendant, Single Point, Type D

The Pedant shall comprise a heavily chromed or stainless steel removable ceiling rose through which a flexible hose with terminal end connection is suspended.

The connection to the distribution pipe shall be within the ceiling rose space and the design shall be such be that all strain is taken off the hose connection.

8.1.5. Ceiling Columns, Type E, F and G Rigid or Telescopic

The fittings shall comprise a ceiling mounted column, either rigid or telescopic pattern; carrying concealed pipes connected to the distributions shall not be interchangeable between the different services.

The column shall be supported on an overhead track running above the operating table.

8.1.6. Terminal Connections

The terminal connection on all fittings shall only accept standard type probes and shall incorporate all the necessary features of the wall mounted terminal units as regards non-inter-changeability, self sealing check valves, isolating valves, identification, etc.

8.1.7. Valves

Where the design of the terminal connection on the fitting or hose does not include an isolating valve, this shall be provided elsewhere whether within or near to the fittings on the incoming distribution pipe work, in any easily assessable position for maintenance purposes.

8.1.8. Special Precautions

The design of all special fittings and hoses shall ensure that during use and movement of the fitting the pipework or hose cannot be twisted, kinked, uncoupled at either end, overstrained or otherwise damaged.

8.1.9 Anti-static Precautions

All fittings and hoses shall be of anti-static construction.

8.1.10 Cleanliness

All fittings shall be designed to present minimum lodgment of dirt, dust, etc. and be easy to keep clean. The materials of construction shall have complete freedom from rusting, scaling or deterioration and may be enamelled finish, stainless steel, or heavily chromed finish.

8.1.11 Order of Arrangement of Terminal Connections

On multi-point fittings the order arrangement of the terminal connections shall be as follows:-

Oxygen, Nitrous oxide, Entonox, Medical air-4bar, Surgical air-7bar, Medical Vacuum, AGSS and Heliox.

For pendants and columns the above order clockwise nearest to the hinge.

8.1.12 Headroom Clearance

All fittings shall provide a minimum clearance of 1.8m (5'-11") above floor level and on telescopic fittings when in the retracted position.

8.1.13 Dimensions of Fittings

The terminal outlet connections of fittings shall not be more than 1.9m (6'-3") above floor level on booms, pendant hoses and columns.

The depth of fittings and pendant hose length shall suit the height of the room(s) which

is/are as follows:- These dimensions shall be verified on site by the specialist Contractor.

8.1.14 Structural Requirements for fittings

The specialist contractor shall state in his tender the requirements for structural strength of walls or ceilings to which the special fittings are to be fastened.

8.1.15 Positioning of Special Fittings

The exact positioning of special fittings shall be agreed between the Medical Officers and Architect, and the Architect shall provide layout drawings for the Specialist Contractor.

8.1.16 Electrical Services in Fittings

The fitting shall carry electrical services which shall be in solid drawn rust-proof conduit separate from the medical service pipes.

The electrical fittings shall be arranged in a neat manner to fit in with the medical terminal outlets and shall afford easy access for coupling up equipment.

Any associated switching need not be of spark-proof type. The electric supply to the fitting will be 240 volts, 50Hz of electricity supply and the fittings shall be wired up by the Specialist Contractor from a suitable distribution point supplied by others.

8.2 Identification of Pipelines

8.2.1. Permanent Identification

The Specialist Contract shall carry out identification of the installations(s) by colour coding in accordance with Data

Sheet EE 10.11/12 and B.S. 1710 (1971).

The identification shall comprise:-

- a) Colour banding applied at valves, junctions; either side of walls, floors and at intervals of about 2m (6 feet) on short runs up to 4m (13 feet) on long straight runs.
- b) The name of the service printed on the colour band in a contrasting colour.

- c) An arrow at each colour band showing direction of flow.

Letters to be a minimum of 6mm (1/4") high.

Self-adhesive plastic labels or tapes of approved manufacture may be used as an alternative to painting. Where valves are in a valve boxes and identified by "Traffolyte" labels, colour handing is not required.

8.2.2. Temporary identification

During installation of piping, individual pipes, valves junctions and ends shall be identified as the work progresses. This identification shall be at intervals similar to final identification requirements and may be made with removable labels. These temporary identification labels must be subsequently replaced by the permanent ones at an appropriate stage.

PARTICULAR SPECIFICATIONS
FOR
MEDICAL GAS PIPELINE SYSTEM

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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)** at **Alupe Sub- County Hospital - Busia County**.

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 Pressure Swing Absorber Plant

2.1.1 General Description

The complete plants include a feed air compressor, feed air dryer, filter arrangements, Air Receiver and an oxygen generator (PSA) together with a high-pressure oxygen compressor and cylinder filling racks with capacity for filling 10 cylinders per day.

2.1.1 Compressor

The compressors shall be oil lubricated, rotary screw type suitable for both continuous and frequent stop/start operation at a nominal outlet pressure of 1000kPa (10 bar) 1300kPa (13 bar) compressors are available on request. The compressors are air cooled, air end directly driven by a 415V, 3 phase, 50/60Hz TEFC electric motor coupled to an air blast after-cooler with auto drains. Multistage oil separators capable of limiting oil carry over to a maximum of 2 ppm are fitted to minimize contamination and maintenance. The compressors are provided with intake valves to enable compressors to be run unloaded. A temperature switch is fitted to give indication if the temperature after the after-cooler exceeds 115°C. A pressure switch is included to provide indication that the compressor is delivering air after it has been called for.

2.1.2 Refrigerant Dryer

To be of F-Series refrigerant dryers and provide a consistently high performance with optimum efficiency. They are carefully selected depending on working conditions with continuous dew point monitoring enabling reliable operation with the lowest possible pressure losses and running costs.

Dryer to have aluminum heat exchanger featuring an air-to-air section, an air-to-refrigerant section, a highly efficient stainless steel demister separator and a moisture collection chamber, the new range provides air quality. To be equipped with digital controller featuring dew point level indication, free voltage alarm contact, maintenance reminder and integral timed drain control. When equipped with the Energy Save feature, which is optionally available from model F026S, the dryers will save additional energy at partial load by cycling the fridge compressor activity while cooling the inlet air using the cold reserve stored in the heat exchanger mass.

2.1.3 Vertical Air Receiver

The vertical air receiver shall be vertically mounted and constructed to BS EN 286-1 and is manufactured from heavy gauge fusion weld steel. The vertical air receiver shall be internally galvanized, double coat primer and epoxy coated white RAL 9010, fitted with automatic and manual drain valves and be protected by a pressure relief valve, fusible plug and include a pressure gauge.

2.1.4 PSA Control Panel

The oxygen generator control panel offers a digital touchscreen display and sensors for the purity of the oxygen produced, for carbon monoxide and carbon dioxide levels. The control panel is also equipped with a flow meter to give a visual representation of the flow.

2.1.5 Vertical Oxygen Receiver

The vertical Oxygen receiver shall be vertically mounted. The vertical oxygen receiver shall be internally galvanized, double coat primer and epoxy coated white RAL 9010, fitted with automatic and manual drain valves and be protected by a pressure relief valve, fusible plug and include a pressure gauge.

2.1.6 Oxygen Filling Stations

The oxygen filling station is effectively an oxygen generator with the addition of a high pressure oxygen compressor and a high pressure cylinder filling manifold. This allows the end user to fill cylinders with oxygen at high pressure for use in the facility.

2.1.7 High Pressure Oxygen Compressor

The oxygen compressor delivers oxygen at up to 15,169kPa or 151.6barg to a high pressure manifold capable of filling up to 10 cylinders at a time.

2.1.8 High Pressure Cylinder filling Ramp

High pressure cylinder filling ramp or filling manifold are used for filling cylinders with gases at pressures up to 250bar gauge and shall be supplied complete with test certificate. Ramp to be equipped with all necessary and approved safety devices, pressure gauges, filling hoses. These Oxygen generators and cylinder refilling plants operate automatically and generate oxygen that meets the United States and European Pharmacopoeia Oxygen 93 Percent (93% \pm 3%) Monograph.

2.2 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.

2.2.1 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 be capable of supplying a flow of 500 *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 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.

2.2.2 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.

2.2.3 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 utilising polymers or elastomers are not acceptable.

2.2.4 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.

2.2.5 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.

2.3 J-Size Oxygen Cylinders

The Secondary and Third supplies of oxygen shall have 4 x 4J-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 N₂O Cylinders = 2

No. of stand-by bank G- Size N₂O Cylinders = 2

Total No. of G- Size N₂O 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 2 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 duplex compressor configuration.

Each compressor shall be capable of supplying half flow (500 *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 maximise 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 filters, 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 ₂ O	67 ppm v/v
Dry particulates	Free from visible particulates in a 75 litre sample
Oil (droplet or mist)	0.1 mg/m ³
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 900 *litres*.

5.7 Dew Point Monitoring

The dryer shall incorporate a ceramic dew point hygrometer with an accuracy of $\pm 1^{\circ}\text{C}$ 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 MA-1800-D** with 1 No. receivers of capacity 900 *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 2000 *l/min* to a 400 kPa distribution system and a flow of 2,500 *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 1350 *l/min* flow.

6.1.6 Receivers

The plant shall have one receivers with total volume of 1350 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 **Precision UK MV- 1350-D** 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 4000 or 2000 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 80 l/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 (BS 6834) 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 pumps, 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 exhaustor 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 1050 *l/min* flow and suitable for 415 V, 3 Phase, 50 Hz power supply. The active disposal system shall be as **Beacon Medaes AGS-1050 D/3** or approved equivalent.

8.0 Heliox (79%He/21%O₂) 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.

<u>Sample</u>	<u>Species</u>	<u>Reduction</u>
Gas ID Ring	E coli	≥ 99.50%
Gas ID Ring	MRSA	≥ 99.52%
Plaster Box	E coli	≥ 99.94%
Plaster Box	MRSA	≥ 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 BeaconMedæx 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 electric sockets/devices.

Medical gas/vacuum services shall incorporate BeaconMedaes Gem 10 terminal units and the anaesthetic gas scavenging disposal system shall incorporate a BeaconMedaes 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/m² (0.002mg/cm²) 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/m² (0.002 mg/cm²) 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/m² (0.01mg/cm²) 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 joints shall 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 units.

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

12.7 Installation

Where pipeline pass through walls they shall be provided with copper sleeves and filled with suitable intumescent 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 Viton[®] 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, Teflon[®] ball seals, stem packing seal, 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 be made from extruded aluminium with die-cast aluminium 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 BeaconMedas 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 units, 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 BeaconMedas 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 BeaconMedæa Medizone Area Service Modules or **approved equivalent**.

16.0 Monitoring Equipment

16.1 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° 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 BeaconMedas 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° 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.

Alarm provider is responsible for programming the panel after the electrician has completed the wiring.

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 1/4" BSPP threaded 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 BeaconMedæ 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/cm²) 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 cosφ=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/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.

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 its 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 2³/₄ X 8TPI female thread. **Head cap:** to be plastic moulding acetyl resin.

CO₂ 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 carcass 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 for systems 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 flashing 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 conditions 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 NO₂)

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 pressure	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.

COMMISSIONING FORMS

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 systems)

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.....SignDate

Name

Project Engineer

DesignationSignDate

. 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:

[illegible]

No cross-connections between these systems were found.

Contractor's Representative

Designation Sign Date

Name

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 ofkPa 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

StatusSignDate

Name

Project Engineer

DesignationSignDate

Name

Witnessed on behalf of

By

Designation

SignDate

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 waskPa (max 10 kPa).

Contractor's Representative

Designation Sign Date

Name

Project Engineer

Designation Sign.....

Date

Name

Witnessed on behalf of

By

Designation

SignDate

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:

[illegible]

Contractor's Representative

Designation.....SignDate

Name

Project Engineer

Designation.....SignDate

Name

Witnessed on behalf of

By

Designation.....SignDate

Functional Tests of Terminal Units

(in accordance with the contract specification and HTM 02-01, Part A, paragraphs 15.77–15.78)

System

Specified 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 Identification	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

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 PASS/FAIL

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

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 ₂ O	N ₂ O/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 ₂ O				
N ₂ O/O ₂				
MA-4				
SA-7				
MVAC				
AGS				
He/O ₂				

Witnessed on behalf of

By

Designation Sign Date

Purging and Filling

This is to certify that medical gas systems have been purged and filled with **medical air/O₂ 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 ₂ O	N ₂ O/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 Pipeline 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/m ³	≤67 vpm (≤0.05 mg/l, atmospheric dew point of -46°C)	≤5 mg/m ³ ≤5 ppm v/v	≤300 ppm v/v	≤2 ppm v/v	≤1 ppm v/v	No discoloration	None	
N ₂ O	Free from visible particles in a 75 l sample	-	≤67 vpm (≤0.05 mg/l, atmospheric dew point of -46°C)	-	-	-	-	No discoloration	SAFETY Not performed	
N ₂ O/O ₂	Free from visible particles in a 75 l sample	-	≤67 vpm (≤0.05 mg/l, atmospheric dew point of -46°C)	-	-	-	-	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/m ³	≤67 vpm (≤0.05 mg/l, atmospheric dew point of -46°C)	≤5 mg/m ³ ≤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/m ³	≤1020 vpm (≤0.78 mg/l, atmospheric dew point of -20°C)	≤5 mg/m ³ ≤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 -46°C)	-	-	-	-	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 -46°C)	-	-	-	-	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 -46°C)	-	-	-	-	No discoloration	None	

Contractor's Representative

Name Designation Sign Date

Project Engineer

Name Designation Sign Date

Witnessed on behalf of

By

Designation Sign Date

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 ₂ O				
N ₂ O/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

Certificate of Completion

Hospital:

Medical Gas Installations – Location

.....
.....

This is to confirm that the following tests have been performed:

1. Mechanical functions tests
2. Quality and gas identity tests in accordance with Health Technical Memorandum 02-01 Part A, Chapter 15, and that the results are satisfactory.

Sign..... Quality Controller (MGPS)

Sign

Contractor's Representative (MGPS)

Signed Client Representative

WitnessedDesignation:.....

Date.....

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.....
...

SCHEDULE OF UNIT RATES

1. The tenderer shall insert unit rates against the items in the following schedules and may add such other items as he considers appropriate.
2. The unit rates shall include for supply, transport, insurance, delivery to site, storage as necessary, assembling, cleaning, installing, connecting, profit and maintenance in defects liability and any other obligation under this contract.
3. The unit rates will be used to assess the value of additions or omissions arising from authorized variations to the contract works.
4. Where trade names or manufacturer's catalogue numbers are mentioned in the specification, the reference is intended as a guide to the type of article or quality of material required. Alternative brands of **equal** and **approved** quality will be accepted

Item	Description	Unit	Rate (KShs)
A	Combined Triplex Compressed air system- 4/7 bar; 2200 l/min	No.	
B	Modular Triplex Vacuum plant 2000 l/min	No.	
C	AGSS capable of 1500 l/min	No.	
D	Split AC with indoor/outdoor unit of 7 KW	No.	
E	35mm diameter valve	No.	
F	12mm OD degreased copper pipe	No.	

**TECHNICAL SCHEDULE
OF
ITEMS TO BE SUPPLIED**

TECHNICAL SCHEDULE

1. The technical schedule shall be submitted by tenderers to facilitate and enable the Project Manager to evaluate the tenders, especially where the tenderer intends to supply or has based his tender sum on equipment which differs in manufacture, type or performance from the specifications indicated by the Project Manager/Engineer.
2. This schedule shall form part of the technical evaluation criterion, and tenderers are therefore advised to complete the schedule as they shall be considered non responsive.

NB. The tenderer must complete in full the technical schedule. Apart from the information required in the technical schedule, the tenderer **MUST SUBMIT LEGIBLE** comprehensive manufacturer's technical brochures and performance details for all items listed in this schedule and **CLEARLY HIGHLIGHT THE SPECIFIC REQUIRED ITEM ONLY.**

Technical Schedule

ITEM No.	Description	Manufacturer	Country of origin	Particulars (Catalogue No. etc)
A	Automatic manifold control system			
B	Manual manifold system			
C	Combined Medical air Plant			
D	Medical Vacuum System			
E	Anaesthetic Gas Disposal Plant			
F	Flexible Ceiling Pendant			
G	Alarms			
H	Retractable Pendants			
I	Terminal Units			
J	Copper Pipework			
K	Valves			
L	PSA Plant			
M	Cylinders			

Catalogue must be attached for all the items in the schedule of material above

ALUPE SUB-COUNTY HOSPITAL MEDICAL GASES PLANTS AND PIPEWORKS INSTALLATION WORKS					
MALE AND FEMALE ISOLATION WARD					
Item	Description	Qty	Unit	Rate (Kshs)	Amount (Kshs)
	Supply, deliver, install, test and commission the following <u>Terminal Units</u> (First,Second Fixes and all accessories) Medical gas terminal units shall conform to BS EN ISO 91701:2008 and accept probes to BS 5682:1998. Terminal units shall be capable of single-handed insertion and removal of medical gas probe. The AGSS terminal unit shall conform to BS 6834:1987. These to be installed on the bed head units provided elsewhere				
A	Oxygen terminal units	37	No		
B	Medical vacuum terminal units	37	No		
C	Medical air- 4bar terminal units	37	No		
	<u>Medical Gas Accessories complying with HTM 02-01</u>				
D	Medical oxygen versatile flow meter (0-15 lpm) with BS MK 1V PROBES & Humidifier	36	No		
E	Medical Vacuum regulator Unit (0-760mmHg) With BS MK1V Direct PROBES ,complete with disposable hydrophobic filter that acts as a safety overflow valve, an On/Off switch and vacuum adjustment knob, 2.0 litre Autoclavable Polysulphone collection jar (complete with wall bottle slide bracket)	36	No		
F	Oxygen probes (BS MK 1V)	36	No		
G	Medical air 4 bar probes(BS MK 1V)	36	No		
	<u>MONITORING EQUIPMENT</u>				
H	Area alarm complete with cabling. The area alarm shall be as <u>BeaconMedæ Medipoint 26 Medical Gas Area Alarms</u> or approved equivalent. These to be installed in patient care areas.	3	No.		
I	Central/Master alarm complete with cabling	2	No.		
	Sub-Total C/F to the next page				

Item	Description	Qty	Unit	Rate (Kshs)	Amount (Kshs)
	Sub-Total B/F from the previous page				
	<u>DISTRIBUTION SYSTEM</u>				
	<i>Copper pipes manufactured from phosphorous de-oxidised non-arsenical copper to BS EN 1412:1996 grade CW024A (Cu-DHP) conforming to HTM 02-01. Dimensions mentioned are Outside Diameters. Pipework rates to include necessary accessories for proper coupling and branching off.</i>				
A	15 mm diameter	400	LM		
B	Dito but for 22mm diameter	342	LM		
C	Ditto but for 28mm diameter	40	LM		
	Pipe Brackets and sandles				
D	15 mm Hospital brackets/sandles	300	No		
E	Dito but for 22mm diameter	200	No		
F	Ditto but for 28mm diameter	20	No		
	<u>Adaptors/Connectors</u>				
G	22 x 15mm adaptors/connectors	15	No		
H	28 x 22mm adaptors/connectors	15	No		
	<u>Coupling /sockets</u>				
I	15mm degreased socket/coupling	145	No		
J	22mm –degrease sockets/coupling	128	No		
K	28mm degreased socket/coupling	16	No		
	<u>Equal Tees</u>				
L	15mm diameter tee	70	No		
M	22mm diameter tee	35	No		
N	28mm diameter tee	8	No		
	<u>Bends/Elbows</u>				
O	15 mm diameter bend/elbow	64	No		
P	22 mm diameter bend/elbow	32	No		
Q	28mm diameter bend/elbow	8	No		
	<u>Area Valve Service unit</u>				
R	28mm diameter line ball valves fitted with copper stub pipes such as Medaes or approved equivalent. The valve to be complete with box and a laser grooved Safe Break window, Removable door for quick easy access with reversible door hinges, Sealed shut off NIST valves, flow meter and identification marks.	3	No		
S	Dito but for 22mm diameter	3	No		
	<u>Lockable Line Valves</u>				
T	28mm diameter line ball valves fitted with tamper proof locking device, Pressure tested, Tested for tightness copper stub pipes such as Medaes or approved equivalent.	3	No		
U	Dito but for 22mm diameter	9	No		
V	Dito but for 15mm diameter	12	No		
	Total for Terminal Units and Pipeworks c/f to summary page				

PLANTS AND COMMON ITEMS					
Item	Description	Qty	Unit	Rate (Kshs)	Amount (Kshs)
	<u>CENTRAL MEDICAL VACUUM SYSTEM</u>				
	<u>Primary/Secondary Supplies</u>				
A	Packaged Duplex Vacuum Plant pump module comprising of 2 number vacuum pumps ,duplex bacterial filter module, associated control panels and all associated accessories for proper functioning for System to conform to HTM 02-01 .Plant to be capable of 1050 l/min and suitable for 415V, 50 Hz,3 Phase power supply ,motor 4.0kw,. One number receiver vessels of volume shall be 1050 litres as MV-1050-D or approved equivalent.	1	No		
	<u>ANAESTHETIC GAS SCAVENGING SYSTEM</u>				
B	Anaesthetic gas disposal plant conforming to HTM 02-01 and either EN ISO 7396-2 or BS 6834 capable of 1050 l/min flow, and suitable for 415V, 3 Phase, 50 Hz power supply as.Also to include AGSS Remote Control Indicator, and condensate drain flask for exhaust pipe.	1	No		
C	AGSS Receiving system including 5 m disposal hose and 2.4 m transfer hose complete with pressure relief valve.	3	No		
	<u>COMBINED MEDICAL AIR PLANT</u>				
D	Duplex medical air plant to conform to EN ISO 7396-1 and HTM 02-01 and to deliver medical quality air at pressures 4 bar,7 bar or 10 bar gauge for supply to the hospital medical or surgical air systems.Plant to be as MA-1100-D and have 1 no. receiver vessel of volume 580litres,duplex filter dryer,compressor starter panels and starter units together with plant control panel and all other neccessary accessorie for proper operation.	1	No		
E	Medical air pressure reducing station - 7 bar to 4 bar complete with pressure gauges & control valves.	1	No		
	Sub-Total C/F to the next page				

Item	Description	Qty	Unit	Rate (Kshs)	Amount (Kshs)
	Sub-Total B/F from the previous page				
	<u>OXYGEN SYSTEM</u>				
A	Fully AUTOMATIC medical oxygen cylinder manifold, complete with with pre-set regulators and pressure sensors, automatic changeover manifold Panel,alarm panel, manifold header bar (size - 6 x 2 = 12 cylinder , 2 Bank manifolds ,Each bank 6 cylinders) & cylinder support racks	2	No		
	MEDICAL AIR 4 BAR MANIFOLD				
B	Fully automatic manifold control system conforming to HTM 02-01 complete with control panel and modular header manifolds to provide connection points for flexible cupronickel tailpipes.The manifold control system shall be as Beacon Medaes MCS2 or approved equivalent.(size - 6x 2 = 12 cylinder , 2 Bank manifolds ,Each bank 6 cylinders)	2	No.		
	SURGICAL AIR 7 BAR MANIFOLD				
C	Fully automatic manifold control system conforming to HTM 02-01 complete with control panel and modular header manifolds to provide connection points for flexible cupronickel tailpipes.The manifold control system shall be as Beacon Medaes MCS2 or approved equivalent.(size - 3x 2 = 6 cylinder , 2 Bank manifolds ,Each bank 3cylinders)	2	No.		
	MEDICAL VACUUM SYSTEM				
D	High vacuum suction unit as SAM 35 Portable Medical Vacuum plant,50 l/min,2x2.0 litres jars	4	No.		
	INITIAL GAS CHARGE				
E	Fully charging medical air/surgical air cylinder of nominal capacity 6,800 litres.	18	No.		
F	Fully charging nitrous oxide G-size cylinder.	4	No.		
	Allow for buying (in consultation with the hospital) of below listed medical gas cylinders from reputable dealers like BOC, Noble Gases etc to be used by the hospital to connect to the gas manifolds.				
G	J-Size medical air cylinders	18	No		
H	J-Size surgical air cylinders	4	No		
I	G-Size nitrous oxide cylinders	4	No		
	<u>Cylinder Trolleys</u>				
	Trolleys conforming to BS 2718:1979 suitable for transporting the following :				
J	1 x 40-50 litre J- Size BOC cylinders	2	No		
K	1 x 33 litre G-Size BOC cylinders	2	No		
	Sub-Total C/F to the next page				

Item	Description	Qty	Unit	Rate (Kshs)	Amount (Kshs)
	Sub-Total B/F from the previous page				
	PORTABLE FIRE EXTINGUISHERS				
	Supply, deliver, install, test and commission the following portable fire extinguishers and conforming to BS EN 3 / BS 1449.				
	Carbon Dioxide Gas Fire Extinguisher				
A	9 litres foam portable fire extinguisher complete with pressure gauge, initial charge and mounting brackets.	2	No		
	Carbon Dioxide Gas Fire Extinguisher				
B	5kg carbon dioxide gas portable fire extinguisher complete with pressure gauge, initial charge and mounting brackets.	2	No		
	Dry Chemical Powder Fire Extinguisher				
C	9kg dry chemical powder portable fire extinguisher complete with pressure gauge, initial charge and mounting brackets.	2	No		
	Automatic Dry Chemical Powder Fire Extinguisher				
D	10kg automatic dry chemical powder fire extinguisher complete with pressure gauge, initial charge, glass bulb, sprinkler head and mounting base. The operating temperature of the bulb shall be 68°C. The unit shall be mounted on the concrete slab ceiling using purpose-made screws and to be as Germania, model GD 25 or equal and approved.	4	No		
	Fire Notices				
E	Allow for fire signage and fire instructions as described in the particular specifications and to the Project Engineer's approval.	1	No		
	Sub-Total C/F to the next page				

Item	Description	Qty	Unit	Rate (Kshs)	Amount (Kshs)
	Sub-Total B/F from the previous page				
	<u>Training of Maintenance Staff and Operators</u>				
A	Allow for training of Five (5 No.) personnel, Two (2 No.) from SDPW and Three (3 No.) from MOH, on MGPS in accordance with HTM 02-01.	1	Item		
B	Allow for copper sleeves for all pipes passing in floors, walls and partitions.	1	Item		
	<u>Identification of Pipelines</u>				
C	Allow for permanent and temporary identification of pipelines, valves and ends in accordance to particular specifications described.	1	Item		
	<u>Painting and Marking</u>				
D	Allow for painting and marking of all pipes and fittings in accordance to particular specifications described.	1	Item		
E	Allow for flushing the whole system with the medical gases in accordance with HTM 02-01 and to the satisfaction of the Engineer.	1	Item		
	<u>Testing and Commissioning</u>				
F	Allow for testing and commissioning of the entire medical gas pipeline system in accordance with the Particular Specifications (Form E-1 to E-17) and to the satisfaction of the Project Engineer.	1	Item		
G	Working Drawings Allow for preparation of working drawings as detailed in the tender document	1	Item		
H	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 8GB flash disk.	1	Item		
	Total for Medical Gases Plant and Common items C/F to summary page				

	SUMMARY PAGE	
Item	Description	Total
1	Sub-Total for Terminal units, pipeworks and accessories b/d from page167	
2	Sub-Total for Medical gases Plants and Common items b/d from page171	
	TOTAL CARRIED FORWARD TO GRAND SUMMARY	

Amount in Words:

.....
Tenderer's Name and Stamp:

Contract period.Weeks

Signature Date:

PIN NO. VAT CERTIFICATE No.
(Provide copy) (Provide copy)

Witness Address:

Signature Date:

PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL, BUSIA.

ITEM	DESCRIPTION				KSHS.	CTS
A	<u>PROVISIONAL SUMS</u>					
	Provide a Provisional sum of Kshs. Seven Million Five Hundred Thousand for contingencies to be omitted or expended in whole or part at the discretion of the Project Manager in consultation with the client.				7,500,000.00	
	<u>TOTAL TO GRAND SUMMARY</u>			KSHS.		

PROPOSED CONSTRUCTION OF ISOLATION WARD AT ALUPE SUB-COUNTY HOSPITAL, BUSIA.

W.P. ITEM NO. D108/WE/BSA/2021 JOB NO 10819E

GRAND SUMMARY

ITEM	DESCRIPTION		OFFICIAL USE (KSHS)	FOR CONTRACTOR'S USE
1	PARTICULAR PRELIMINARIES	PP/8		
2	GENERAL PRELIMINARIES	GP/15		
3	BUILDERS WORKS	BW/S		
4	ELECTRICAL ENGINEERING WORKS	G/9		
5	INTERNAL PLUMBING AND DRAINAGE	P/117		
6	MEDICAL PIPE WORK	M/172		
7	PROVISIONAL SUMS	PS/1		
	TOTAL CARRIED TO FORM OF TENDER (VAT INCL.) KSHS.			

Amount in words: Kenya Shilings.....

.....

Tenderer's signature and stamp.....

Address.....

Date.....

Witness: Name and signature.....

Address.....

Date.....