KENYA MEDICAL SUPPLIES AUTHORITY YOUR PARTNER IN HEALTHCARE

TENDER NO.: GF-KEMSA/CONST 01/ONT1/2021/2022

TENDER FOR SUPPLY, INSTALLATION, TESTING AND COMMISSIONING OF BUILDING MANAGEMENT SYSTEM (BMS) AT KEMSA NEW WAREHOUSE

SPECIFICATIONS AND BILLS OF QUANTITIES

CLOSING DATE: 13th June, 2022

Contents Page

SECTION I

INVITATION FOR TENDER (IFT)

Open National Tender (ONT)

FUNDING: THE GOVERNMENT OF KENYA, THE GLOBAL FUND AND THE KENYA MEDICAL SUPPLIES AUTHORITY

IFT NO.: GF-KEMSA/CONST 01/ONT1/2021/2022

TENDER FOR SUPPLY, INSTALLATION, TESTING AND COMMISSIONING OF BUILDING MANAGEMENT SYSTEM (BMS) AT KEMSA NEW WAREHOUSE
Date: 17th May, 2022

1. The Government of The Republic of Kenya (GoK) and The Global Fund (GF) through The Kenya Medical Supplies Authority (KEMSA) has set aside funds for construction of a Modern Warehouse and Office Block on LR No. 9042/176 at Embakasi, Nairobi Kenya.
2. KEMSA, on behalf of GOK and GF now invite sealed tender (s) for the under listed categories of works.

Tender Reference	Tender Description	NCA Registration Category	Tender Security Amount
GF-KEMSA/CONST 01/ONT1/2021/2022	BMS INSTALLATIONS	NCA 8 and above	Kshs.400,000.00

3. Bidding will be conducted through the **Open National Tender (ONT)** procedures specified in the Government of Kenya Public Procurement and Asset Disposals Act, 2015.
4. Interested eligible bidders may obtain further information from KEMSA offices and inspect the bidding documents at the Procurement office situated at:

   Kenya Medical Supplies Authority
   13, Commercial Street, Industrial Area
   P.O B Box 47715-00100
   Telephone No.: +254 20 3922000/+254 719033000/+254 733606600
   Fax No.: +254203922400
   Email: procure@kemsa.co.ke

   On normal working days on Monday to Friday **09.00hrs and 16.00hrs except on Public Holidays or download at the IFMIS Supplier's Portal: http://supplier.treasury.go.ke/** KEMSA's website https://www.kemsa.co.ke Documents downloaded are free of charge and bidders are advised to register at the Procurement Office or via email at procure@kemsa.co.ke (***Refer to registration form in the tender document***).

5. Complete serialized/paginated Bid Documents; **One original** and **a copy** in plain sealed envelopes clearly marked on top with the Tender Reference and Description and accompanied by a Bid Security of an amount as indicated in the respective Tender Documents in a freely convertible currency from Commercial Banks or Insurance Companies (Approved by The GOK Public Procurement Regulatory Authority) and should be addressed to:

   The Chief Executive Officer
   Kenya Medical Supplies Authority
   13, Commercial Street, Industrial Area
   P.O B Box 47715-00100
   Nairobi, Kenya.

   And must be deposited in Tender Box 2 Marked **Global Fund Tenders** at the reception on the Ground floor of KEMSA's Commercial Street Office in Nairobi on or **before 13th June, 2022 at 10.00 a.m**. Bids will be opened immediately thereafter in the presence of Bidders' and or representatives who choose to attend.

6. Bulky tenders can be handed over to KEMSA **Procurement Director's** office for registration and safe keeping till the tender opening date.

7. Late bids shall **NOT** be accepted.

8. There will be a mandatory Site visit for all prospective bidders on **26th May, 2022 from 9.00am** at KEMSA warehouse in Embakasi, Nairobi. Thereafter there will be a pre-bid meeting for those who wish to attend.

Yours sincerely,

CHIEF EXECUTIVE OFFICER,
KENYA MEDICAL SUPPLIES AUTHORITY

REGISTRATION FORM FOR ONLINE TENDERERS/BIDDERS/SUPPLIERS

Tender No.: GF-KEMSA/CONST 01/ONT1/2021/2022 – TENDER FOR SUPPLY, INSTALLATION, TESTING AND COMMISSIONING OF BUILDING MANAGEMENT SYSTEM (BMS)

NOTE: Please provide your details below for purposes of communication in case you download this tender document from IFMIS or KEMSA website.

Name of the firm:……..

Postal Address:……..

Telephone Contacts:……...……

Company email address:……..

Contact Person:……

Once completed please submit this form to the email below;

procure@kemsa.co.ke

SPECIAL NOTES

1. The Contractor is required to check the numbers of the pages of these Bills of Quantities against the contents stated on the Table of Contents and should he find missing, in duplicate or indistinct, he must inform the Procuring entity as described in this document 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 Procuring entity in order that the correct meaning may be decided before the date of submission of tenders.

3. No liability will be accepted nor any claim allowed in respect of errors in the Contractor's tender due to mistakes in these Bills of Quantities which should have been rectified in the manner described above.

4. The Tenderer shall not alter or otherwise qualify the text of this Tender Document. Any alteration or qualification made without any authority will be ignored and the text printed will be adhered to.

5. In case of Discrepancy between Tender Data Sheet and other sections of these Tender Documents, information in the Tender Data Sheet shall apply.

6. The bids shall be evaluated in accordance with evaluation criteria as detailed in the bid document.

7. Only Tenderers who score 70 points and above in the Technical Evaluation Stage shall qualify for further evaluation.

PRE-BID SITE VISIT CERTIFICATE

KENYA MEDICAL SUPPLIES AUTHORITY

TENDER REFERENCE NO.: GF-KEMSA/CONST 01/ONT1/2021/2022

SUPPLY, INSTALLATION, TESTING AND COMMISSIONING OF BUILDING MANAGEMENT SYSTEM (BMS) AT KEMSA NEW WAREHOUSE

We confirm that M/s. ……..... was duly represented by ……. during the **Site Visit/ Pre-bid Briefing** on **26th May, 2022** from **9.00A.M to 2.00 P.M** at KEMSA Warehouse Embakasi Nairobi.

Signed: ……..……
CHIEF EXECUTIVE OFFICER
KENYA MEDICAL SUPPLIES AUTHORITY

SECTION II
INSTRUCTIONS TO TENDERERS

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

1.1 This Invitation for Tenders is open to all eligible tenderers for Works Contract as described in the tender documents. The successful tenderer will be expected to complete the Works by the Intended Completion Date specified in the tender documents.

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

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

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

Tender documents shall be accompanied by the following **Mandatory requirements** for preliminary evaluation:-

Mandatory Requirements

a) Certificate of Registration/Incorporation (*Applicable to all Bidders)*

b) Valid & Current Registration with **National Construction Authority (NCA 8 and above) –** *ICT Installations*

c) Manuals and Materials Certificates as described in the Tables attached and Bills of Quantities - *(Applicable to all Bidders)*

d) Valid Tax Compliance Certificate **-** *(Applicable to all Bidders)*

e) Valid Tender Security of 150 days **-** *(Applicable to all Bidders)*

f) Duly Signed Anti-Corruption declaration form **-** *(Applicable to all Bidders)*

g) Duly signed non-Debarment declaration form. **-** *(Applicable to all Bidders)*

h) Pagination / Serialization of Tender Document**-** *(Applicable to all Bidders)*

i) Duly signed form of Tender **-** *(Applicable to all Bidders)*

j) Certificate of Site visit duly Signed and stamped by the procuring entity **-** *(Applicable to all Bidders)*

k) Compliance with Technical Specifications - ***Note: Tender Evaluation Committee to carry out analysis showing how decision on this requirement has been arrived at and attach analysis on this as an Appendix. (Applicable to all Bidders)***

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).

A tenderer who fails to meet the mandatory requirements shall be disqualified from further evaluation.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

1.7 To qualify for award of the Contract, tenderers shall meet the following minimum qualifying criteria;

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

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

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

(d) a Contract Manager with at least ten years' experience in works of an

equivalent nature and volume, including no less than three years as Manager; and

(e) Liquid assets and/or credit facilities, net of other contractual commitments and exclusive of any advance payments which may be made under the Contract, of no less than 2 months of the estimated payment flow under this Contract.

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

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

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

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

1.12 The Kenya Medical Supplies Authority employees, committee members, board members and their relative (spouse and children) are not eligible to participate in the tender.

1.13 The Kenya Medical Supplies Authority shall allow the tenderer to review the tender document free of charge before purchase.

2 Tender Documents

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

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

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

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

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

2.5 To give prospective tenderers reasonable time in which to consider an addendum in preparing their tenders, Kenya Medical Supplies Authority shall extend, as necessary, the deadline for submission of tenders, in accordance with Clause 4.2 here below.

3 Preparation of Tenders

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

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

(a) These Instructions to Tenderers, Form of Tender, Conditions of Contract, Appendix to Conditions of Contract and Specifications;

(b) Tender Security;

(c) Priced Bill of Quantities;

(d) Qualification Information Form and Documents;

(e) Alternative offers where invited; and

(f) Any other materials required to be completed and submitted by the tenderers.

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

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

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

3.6 Tenders shall remain valid for a period of one hundred and Twenty (120) days from the date of submission. However, in exceptional circumstances, the Kenya Medical Supplies Authority may request that the tenderers extend the period of validity for a specified additional period. The request and the tenderers' responses shall be made in writing. A tenderer may refuse the request without forfeiting the Tender Security. A tenderer agreeing to the request will not be required or permitted to otherwise modify the tender, but will be required to extend the validity of Tender Security for the period of the extension, and in compliance with Clause 3.7 - 3.11 in all respects.

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

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

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

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

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

3.12 The Tender Security may be forfeited

(a) if the tenderer withdraws the tender after tender opening during the period of tender validity;

(b) if the tenderer does not accept the correction of the tender price, pursuant to Clause 5.7;

(c) in the case of a successful tenderer, if the tenderer fails within the specified time limit to

(i) sign the Agreement, or

(ii) furnish the required Performance Security.

3.13 Tenderers shall submit offers that comply with the requirements of the tendering documents, including the basic technical design as indicated in the Drawings and Specifications. Alternatives will not be considered, unless specifically allowed in the invitation to tender. If so allowed, tenderers wishing to offer technical alternatives to the requirements of the tendering documents must also submit a tender that complies with the requirements of the tendering documents, including the basic technical design as indicated in the Drawings and Specifications. In addition to submitting the basic tender, the tenderer shall provide all information necessary for a complete evaluation of the alternative, including design calculations, technical specifications, breakdown of prices, proposed construction methods and other relevant details. Only the technical alternatives, if any, of the lowest evaluated tender conforming to the basic technical requirements shall be considered.

3.14 The tenderer shall prepare one original of the documents comprising the tender documents as described in Clause 3.2 of these Instructions to Tenderers, bound with the volume containing the Form of Tender, and clearly marked **"ORIGINAL".** In addition, the tenderer shall submit copies of the tender, in the number specified in the invitation to tender, and clearly marked as **"COPIES".** In the event of discrepancy between them, the original shall prevail.

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

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

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

3.18 The tender security shall be in the amount of 0.5 – 2 per cent of the tender price.

4 Submission of Tenders

4.1 The tenderer shall seal the original and all copy of the tender in two inner envelopes and one outer envelope, duly marking the inner envelopes as "**ORIGINAL**" and "**COPY**" as appropriate. The inner and outer envelopes shall:

(a) be addressed to the Kenya Medical Supplies Authority at the address provided in the invitation to tender;

(b) bear the name and identification number of the Contract as defined in the invitation to tender; and

(c) provide a warning not to open before the specified time and date for tender opening.

4.2 Tenders shall be delivered to Kenya Medical Supplies Authority at the address specified above not later than the time and date specified in the invitation to tender. However, Kenya Medical Supplies Authority may extend the deadline for submission of tenders by issuing an amendment in accordance with Sub-Clause 2.5 in which case all rights and obligations of the Employer and the tenderers previously subject to the original deadline will then be subject to the new deadline.

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

4.4 Tenderers may modify or withdraw their tenders by giving notice in writing before the deadline prescribed in clause 4.2. Each tenderer's modification or withdrawal notice shall be prepared, sealed, marked, and delivered in accordance with clause 3.13 and 4.1, with the outer and inner envelopes additionally marked "**MODIFICATION"** and "**WITHDRAWAL**", as appropriate. No tender may be modified after the deadline for submission of tenders.

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

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

5 Tender Opening and Evaluation

5.1 The tenders will be opened by Kenya Medical Supplies Authority, including modifications made pursuant to Clause 4.4, in the presence of the tenderers' representatives who choose to attend at the time and in the place specified in the invitation to tender. Envelopes marked "**WITHDRAWAL**" shall be opened and read out first. Tenderers and Employer's representatives who are present during the opening shall sign a register evidencing their attendance.

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

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

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

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

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

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

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

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

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

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

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

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

5.8 Kenya Medical Supplies Authority will evaluate and compare only the tenders determined to be substantially responsive in accordance with Clause 5.5.

5.9 In evaluating the tenders, Kenya Medical Supplies Authority will determine for each tender the evaluated tender price by adjusting the tender price as follows:

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

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

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

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

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

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

5.12 Firms incorporated in Kenya where indigenous Kenyans own 51% or more of the share capital shall be allowed a 10% preferential bias provided that they do not sub-contract work valued at more than 50% of the Contract Price excluding Provisional Sums to non-indigenous sub-contractor.

6 Award of Contract

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

6.2 Notwithstanding clause 6.1 above, Kenya Medical Supplies Authority reserves the

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

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

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

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

6.5 Within **21 days after receipt** of the Letter of Acceptance, the successful tenderer shall deliver to the Kenya Medical Supplies Authority a Performance Security in the amount stipulated in the Appendix to Conditions of Contract and in the form stipulated in the Tender documents. The Performance Security shall be in the amount and specified form.

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

6.7 Upon the furnishing by the successful tenderer of the Performance Security, Kenya Medical Supplies Authority Ltd. will promptly notify the other tenderers that their tenders have been unsuccessful.

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

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

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

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

6.12 Where contract price variation is allowed, the variation shall not exceed 20% of the original contract price.

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

6.14 Kenya Medical Supplies Authority may at any time terminate procurement proceedings before contract award and shall not be liable to any person for the termination.

6.15 Kenya Medical Supplies Authority shall give prompt notice of the termination to the tenderers and on request give its reasons for termination within 14 days of receiving the request from any tenderer.

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

7 Corrupt and Fraudulent practices

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

APPENDIX TO INSTRUCTIONS TO TENDERERS

APPENDIX TO INSTRUCTIONS TO TENDERERS

The following information for procurement of services shall complement or amend the provisions of the instructions to tenderers. Wherever there is a conflict between the provisions of the instructions to tenderers and the provisions of the Appendix, the provisions of the Appendix herein shall prevail over those of the instructions to tenderers.

SECTION III

TENDER EVALUATION CRITERIA

(a) Tender Evaluation Criteria

The following criteria will be used in the evaluation of all bids. The submission of the required documents will be used in the determination of the Completeness and Suitability of the Bid. Bids that do not contain all the information required will be declared non responsive and shall not be evaluated further.

1.1 Stage I – Mandatory Requirements

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.

a) Certificate of Registration/Incorporation *(Applicable to all Bidders)*

b) Valid & Current Registration with **National Construction Authority (NCA 8 and above) –** *ICT Works*

c) Manuals and Materials Certificates as described in the Tables attached and Bills of Quantities - *(Applicable to all Bidders)*

d) Valid Tax Compliance Certificate - *(Applicable to all Bidders)*

e) Valid Tender Security of 150 days - *(Applicable to all Bidders)*

f) Duly Signed Anti-Corruption declaration form - *(Applicable to all Bidders)*

g) Duly signed non-Debarment declaration form - *(Applicable to all Bidders)*

h) Pagination / Serialization of Tender Document - *(Applicable to all Bidders)*

i) Duly signed form of Tender - *(Applicable to all Bidders)*

j) Certificate of Site visit duly Signed and stamped by the procuring entity - *(Applicable to all Bidders)*

k) Compliance with Technical Specifications - ***Note: Tender Evaluation Committee to carry out analysis showing how decision on this requirement has been arrived at and attach analysis on this as an Appendix.*** *(Applicable to all Bidders)*

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:

(vi) Standards of manufacture;

(vii) Performance ratings/characteristics;

(viii) Material of manufacture;

(ix) Electrical power ratings; and

(x) Any other necessary requirements (Specify).

A tenderer who fails to meet the mandatory requirements shall be disqualified from further evaluation.

STAGE 2: TECHNICAL EVALUATION

The tender document shall be examined based on clause 2.2 of the Instruction to Tenderers which states as follows:

In accordance with clause 2.2 of Instruction to Tenderers, the tenderers will be required to provide evidence for eligibility of the award of the tender by satisfying the employer of their eligibility under sub clause 2.1 of Instructions to Tenderers and their capability and adequacy of resources to effectively carry out the subject contract.
In order to comply with provisions of clause 2.2 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:
   (xi) Standards of manufacture;
   (xii) Performance ratings/characteristics;
   (xiii) Material of manufacture;
   (xiv) Electrical power ratings; and
   (xv) 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's they propose to supply.

1.2 Stage II -Technical Evaluation

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

	PARAMETER	MAXIMUM POINTS
(i)	Presentation of Bid document	2
(ii)	Key personnel	27
(iii)	Contract Completed in the last Five (5) years	12
(iv)	Schedules of contractor's equipment	23
(v)	Audited Financial Report for the last 3 years	15
(vi)	Evidence of Financial Resources	15
(vii)	Litigation History	1
(viii)	Work Program	5
	TOTAL	100

A bidder scoring less than 75% shall not be considered Technically responsive and therefore shall not be considered for financial evaluation.

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

The detailed scoring plan shall be as shown in table 1 below: -

stage II : Technical Evaluation

Item	**Description**	**Raw Points Scored**	**Max. Point**
1	Presentation and response (This include binding the documents, neat presentation, separation and arrangement of requested information and general response to all requirements)		**2**
2	**Key Personnel (Attach evidence)**		
	Director of the firm ***(one Director Only)*** • Holder of degree in relevant field ----------***4 Mks*** • Holder of diploma in relevant field ----------***3Mks*** • Holder of certificate in relevant Engineering field---- ***2Mks*** • Others)---------- ----------***1Mks***		**4**
	2No. degree/diploma holders of key personnel in relevant field		**6**

	• With over 10 years relevant experience ----***3Mks each*** • With over 5 years relevant experience------***2Mks each*** • With under 5 years relevant experience ----***1Mks each***			**27**
	3 No certificate holder of key personnel in relevant field • With over 10 years relevant experience---***3 Mks each*** • With over 5 years relevant experience ----***2 Mks each*** • With under 5 years relevant experience ---***1 Mks each***		**9**	
	4 No artisan (trade test certificate in relevant field) • Artisan with over 10 years relevant experience -- ***2Mks each*** • Artisan with under 10 years relevant experience --***1Mks each***		**8**	
3	**Contract completed in the last Ten (10) years <u>Provide Evidence</u>** 2 projects of similar nature / complexity and magnitude (a) Above Kshs.20. Million ---------- ***6 Mks for each project*** (b) Kshs 10 million – 19 million---------- ***4 Mks for each project*** (c) Kshs 5 million – 9 million ---------- ***2 Mks for each project***		**12**	
4	Schedule of contractor's equipment and transport (proof or evidence of ownership/Lease) a) Relevant Transport • 2No. Trucks ----------***4Mks for each*** • 2No. Pickups ----------***4Mks for each*** b) Equipment's/tools • PPE Equipment's----------***2mks*** • Manufactures Recommended Tools (Evidence to be provided) ----------***5mks***		**23**	
5	Financial report			
	a) Audited financial report (last three (3) years) • Provide Audited Accounts for 2019, 2020, 2021 ----------***3Mks*** • Average Annual Turn-over equal to or greater than the annual Expected Turnover of the project ---------- ***12mks*** • Average Annual Turn-over above 50% but below 100% of the cost of the project ----------***6Mks*** • Average Annual Turn-over below 50% of the cost of the project --- ---------- ***3Mks***	15	**30**	
	b) Evidence of Financial Resources (cash in hand, lines of credit, over draft facility, etc.) • Has financial resources to finance the projected **monthly cash flow*** for three months ----------***15Mks*** • Has financial resources equal to the projected **monthly cash flow***-- ----------***10Mks*** • Has financial resources less the projected **monthly cash flow***--------- ----------***5Mks*** Has not indicated sources of financial resources ----------***0Mks***	15		

vii	**Litigation History** • Duly Filled ---------- ***1Mks*** • Not filled ----------***0Mks***		1
xi	**Work Program** c) Provide Detailed Work program from site possession to completion of works***---------- 5Mks*** ***The Program must be accompanied with supporting document such as manufacturing timeline from the manufacturer, Work methodology etc. otherwise it will be left at the discretion of the tender evaluators***		5
	TOTAL		100

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

A bidder must score at least 75% total marks to qualify for further evaluation. (Score 75/100). The Technical Score will be weighted to 70.

A) Assessment of deviations

Pursuant to section 64 of the act, a tender is deemed responsive if it conforms to all the mandatory requirements and it **does not contain major** deviations. Section 23.2 of the instruction to tenderers, defines major deviations as

a) One that affects in a substantial way the scope, quality, completion timing, administration of works to be undertaken by the tenderer under the contract, inconsistent with the tender document; or
b) Which limits in any substantial way the rights of the employer or the tenderers obligations; or
c) Whose rectification would affect unfairly the competitive position of other tenderers presenting substantially responsive tenders.

Where the deviations are minor in the view of the tender committee, with the concurrence of the procuring entity representative, the evaluation committee shall quantify such deviations pursuant to section 64 (3) of the act which requires that a minor deviation shall:

a) Be quantified to the extent possible; and
b) Be taken into account in the evaluation and comparison of tenders.

Where the deviation in the view of the tender committee with the concurrence of the procuring entity representative is major, the tender shall be deemed **non-responsive and will not be evaluated further**

STAGE 3 - FINANCIAL EVALUATION

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

The evaluation shall be in **three stages**

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

A) Determination of Arithmetic Errors

Arithmetic Errors will be corrected by the Procuring Entity as follows:

i) In the event of a discrepancy between the tender amount as stated in the form of Tender and the corrected tender figure in the Main summary of the Bills of Quantities, the amount as stated in the Form of Tender shall prevail. Pursuant to Section 82 of the Public Procurement and Asset Disposal Act 2015, the tender sum as submitted and read out during the tender opening shall be absolute and final and shall not be the subject of correction, adjustment or amendment in any way by any person or entity;

ii) Error correction factor shall be computed by expressing the difference between the amount and the corrected tender sum as a percentage of the corrected contract works (i.e. corrected tender sum less P.C; and Provisional Sums);

iii) The Error correction factor shall be applied to all contract works (as a rebate or addition as the case may be) for the purposes of valuations for Interim Certificates and valuation of variations.

B) Comparison of rates

Items that are underpriced 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.

FINANCIAL EVALUATION

The Tenderers who qualify under Technical Evaluation will have their Financial Bid evaluated and the lowest responsive bid submitted after analysis shall have their tender considered for award.

SECTION IV

CONDITIONS OF MAIN CONTRACT

GENERAL CONDITIONS OF CONTRACT

1 Definitions

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

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

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

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

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

"The Contractor" refers to the person or corporate body whose tender to carry out the Works has been accepted by Kenya Medical Supplies Authority

"The Contractor's Tender" is the completed tendering document submitted by the Contractor to Kenya Medical Supplies Authority

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

2 Interpretation

2.1 In interpreting these Conditions of Contract, singular also means plural, male also means female or neuter, and the other way around. Headings have no significance. Words have their normal meaning in English Language unless specifically defined. The Project Manager will provide instructions clarifying queries about these Conditions of Contract.

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

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

a) Agreement,
b) Letter of Acceptance,
c) Contractor's Tender,
d) Appendix to Conditions of Contract,
e) Conditions of Contract,
f) Specifications,
g) Drawings,
h) Bill of Quantities,

i) Any other documents listed in the Appendix to Conditions of Contract as forming part of the Contract.

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

3 Language and Law

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

4 Project Manager's Decisions

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

5 Delegation

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

6 Communications

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

7 Subcontracting

7.1 The Contractor may subcontract with the approval of the Project Manager, but may not assign the Contract without the approval of Kenya Medical Supplies Authority in writing. Subcontracting shall not alter the Contractor's obligations.

8 Other Contractors

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

9 Personnel

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

10 Works

10.1 The Contractor shall construct and install the Works in accordance with the Specifications and Drawings. The Works may commence on the Start Date and shall be carried out in accordance with the Program submitted by the Contractor, as updated with the approval of the Project Manager, and complete them by the Intended Completion Date.

11 Safety and Temporary Works

11.1 The Contractor shall be responsible for the design of temporary works. However before erecting the same, he shall submit his designs including specifications and

drawings to the Project Manager and to any other relevant third parties for their approval. No erection of temporary works shall be done until such approvals are obtained.

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

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

12 Discoveries

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

13 Work Program

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

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

14 Possession of Site

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

15 Access to Site

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

16. Instructions

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

16.2 If within seven days after receipt of a written notice from the Project Manager requiring compliance with Project Manager's instructions the Contractor does not comply therewith, the Kenya Medical Supplies Authority may employ and pay other persons to execute any work whatsoever which may be necessary to give effect to such instructions and all costs incurred in connection therewith shall be recoverable from the Contractor by the Employer as a debt or may be deducted by the Project Manager from any moneys due or to become due to the Contractor under this Contract

17 Extension or Acceleration of Completion Date

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

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

18 Management Meetings

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

19 Early Warning

19.1 The Contractor shall warn the Project Manager at the earliest opportunity of specific likely future events or circumstances that may adversely affect the quality of the Work, increase the Contract Price or delay the execution of the Works. The Project Manager may require the Contractor to provide an estimate of the expected effect of the future event or circumstance on the Contract Price and Completion Date. The estimate shall be provided by the Contractor as soon as reasonably possible.

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

20 Defects

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

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

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

21 Bills of Quantities

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

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

adjust the rate to allow for the change.

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

22 Variations

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

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

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

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

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

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

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

23 Payment Certificates, Currency of Payments and Advance Payments

23.1 The Contractor shall submit to the Project Manager monthly applications for payment giving sufficient details of the Work done and materials on Site and the amounts which the Contractor considers himself to be entitled to. The Project Manager shall check the monthly application and certify the amount to be paid to the Contractor within 14 days. The value of Work executed and payable shall be determined by the Project Manager.

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

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

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

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

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

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

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

b) No advance payment may be made before the Contractor has submitted proof of the establishment of deposit or a directly liable guarantee satisfactory to Kenya Medical Supplies Authority in the amount of the advance payment. The guarantee shall be in the same currency as the advance.

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

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

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

Where:

R =the amount to be reimbursed

A =the amount of the advance which has been granted

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

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

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

24 Compensation Events

24.1 The following issues shall constitute Compensation Events:

(a) Kenya Medical Supplies Authority does not give access to a part of the Site by the Site Possession Date stated in the Appendix to Conditions of Contract.

(b) Kenya Medical Supplies Authority modifies the List of Other Contractors, etc., in a way that affects the Work of the Contractor under the Contract.

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

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

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

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

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

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

(i) The effects on the Contractor of any of Kenya Medical Supplies Authority risks.

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

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

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

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

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

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

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

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

25 Price Adjustment

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

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

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

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

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

(iii) No adjustment shall be made in respect of changes in the rates of wages and other emoluments and expenses which occur after the date of Completion except during such other period as may be granted as an extension of time under clause 17.0 of these Conditions.

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

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

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

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

26 Retention

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

27 Liquidated Damages

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

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

28 Securities

28.1 The Performance Security shall be provided to Kenya Medical Supplies Authority no later than the date specified in the Letter of Acceptance and shall be issued in an amount and form and by a reputable bank acceptable to Kenya Medical Supplies Authority, and denominated in Kenya Shillings. The Performance Security shall be valid until a date 30 days beyond the date of issue of the Certificate of Completion.

29 Dayworks

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

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

29.3 The Contractor shall be paid for Dayworks subject to obtaining signed Dayworks forms.

30 Liability and Insurance

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

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

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

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

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

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

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

(b) an event occurring before the Completion Date, which was not itself the Kenya Medical Supplies Authority's risk

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

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

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

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

(b) loss of or damage to Equipment;

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

(d) personal injury or death.

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

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

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

31 Completion and Taking Over

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

32 Final Account

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

33 Termination

33.1 Kenya Medical Supplies Authority or the Contractor may terminate the Contract if the other party causes a fundamental breach of the Contract. These fundamental breaches of Contract shall include, but shall not be limited to, the following;

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

(b) the Project Manager instructs the Contractor to delay the progress of the

Works, and the instruction is not withdrawn within 30 days;

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

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

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

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

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

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

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

34 Payment Upon Termination

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

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

34.3 Kenya Medical Supplies Authority may employ and pay other persons to carry out and complete the Works and to rectify any defects and may enter upon the Works and use all materials on the Site, plant, equipment and temporary works.

34.4 The Contractor shall, during the execution or after the completion of the Works under this clause remove from the Site as and when required, within such

reasonable time as the Project Manager may in writing specify, any temporary buildings, plant, machinery, appliances, goods or materials belonging to or hired by him, and in default Kenya Medical Supplies Authority may (without being responsible for any loss or damage) remove and sell any such property of the Contractor, holding the proceeds less all costs incurred to the credit of the Contractor.

Until after completion of the Works under this clause Kenya Medical Supplies Authority shall not be bound by any other provision of this Contract to make any payment to the Contractor, but upon such completion as aforesaid and the verification within a reasonable time of the accounts therefore the Project Manager shall certify the amount of expenses properly incurred by Kenya Medical Supplies Authority and, if such amount added to the money paid to the Contractor before such determination exceeds the total amount which would have been payable on due completion in accordance with this Contract the difference shall be a debt payable to the Employer by the Contractor; and if the said amount added to the said money be less than the said total amount, the difference shall be a debt payable by Kenya Medical Supplies Authority to the Contractor.

35 Release from Performance

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

36 Corrupt Gifts and Payments of Commission

36.1 The Contractor shall not;

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

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

Any breach of this Condition by the Contractor or by anyone employed by him or acting on his behalf (whether with or without the knowledge of the Contractor) shall be an offence under the provisions of the Public Procurement Regulations

issued under The Exchequer and Audit Act Cap 412 of the Laws of Kenya.

37 Settlement Of Disputes

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

(i) Architectural Association of Kenya

(ii) Institute of Quantity Surveyors of Kenya

(iii) Association of Consulting Engineers of Kenya

(iv) Chartered Institute of Arbitrators (Kenya Branch)

(v) Institution of Engineers of Kenya

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

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

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

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

37.5 Notwithstanding anything stated herein the following matters may be referred to arbitration before the practical completion of the Works or abandonment of the

Works or termination of the Contract by either party:

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

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

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

(d) Any dispute or difference arising in respect of war risks or war damage.

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

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

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

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

SPECIAL CONDITIONS OF CONTRACT

Special conditions of contract shall supplement the general conditions of contract, wherever there is a conflict between the GCC and the SCC, the provisions of the SCC herein shall prevail over those in the GCC.

Special conditions of contracts with reference to the general conditions of contract.

SECTION V

APPENDIX TO CONDITIONS OF CONTRACT (SUBCONTRACT WORKS)

1.00 **APPENDIX TO CONDITIONS OF CONTRACT**

THE EMPLOYER IS:-

Name: KENYA MEDICAL SUPPLIES AUTHORITY.

Address: P. O. BOX 47715 - 00100, NAIROBI

Name of Authorized Representative: THE CHIEF EXECUTIVE OFFICER, KENYA MEDICAL SUPPLIES AUTHORITY

Telephone: ……

Facsimile: …….

THE PROJECT MANAGER IS:

Name: WORKS SECRETARY, MINISTRY OF TRANSPORT, INFRASTRUCTURE, HOUSING AND URBAN DEVELOPMENT, STATE DEPARTMENT OF PUBLIC WORKS

Address: P. O. BOX 30743 – 00100, NAIROBI

Telephone: +254 20272 3101

Facsimile: +254 202724504

Email: info@publicworks.go.ke

The name (and identification number) of the Contract is PROPOSED CONSTRUCTION OF KEMSA MODERN WAREHOUSE AND OFFICE BLOCK AT EMBAKASI, NAIROBI - **Tender Ref. No GF-KEMSA-CONST -5/OIT6/2017-2018**

The works in this contract comprise the construction of :
Modern warehouse - 14,680 M^2
Office block with 1No. basement and 6No. floors – 15,758 M^2
Flammable goods store – 307 M^2
Associated Civil and External Works
Associated Mechanical and Electrical Services Installations.

The Start Date shall be As agreed with the Employers.

The Intended Completion Period is **130 Weeks** for the whole works from the start date.

The Contractor shall submit a revised program for the Works within Seven days of delivery of the Letter of Acceptance.
The Site Possession Date shall be 14 days from the date of acceptance letter

The Site is located in Embakasi, KEMSA Land LR No. 9042/176 Embakasi.

	The Defects Liability Period is 180 days AFTER DATE OF PRACTICAL COMPLETION.
	Other Contractors, utilities, etc., to be engaged by the Employer on the Site include those for the execution of: 1. None 2. " ' 3. " ' 4. " ' The minimum insurance covers shall be; 1. The minimum cover for insurance of the Works and of plant and Materials in respect of the Contractor's faulty design is:10% CONTRACT SUM 2. The minimum cover for loss or damage to Equipment is:10% CONTRACT SUM 3. The minimum for insurance of other property is:10% CONTRACT SUM 4. The minimum cover for personal injury or death insurance 5. For the Contractor's employees: AS PER WORKMAN'S COMPENSATION 6. And for other people is:5% CONTRACT SUM The following events shall also be Compensation Events: AS STATED IN THE CONDITIONS OF CONTRACT The period between Program updates is 30 days. The amount to be withheld for late submission of an updated Program is Full Certificate The proportion of payments retained is TEN PER CENT (10%) OF CERTIFIED AMOUNT The Limit of retention is FIVE PER CENT (5%) OF CONTRACT SUM The Minimum monthly certificate shall be in the amount of 2% (minimum) of Contract Price / Contract Sum The Price Adjustment Clause SHALL NOT APPLY. THIS IS A FIXED PRICE CONTRACT The liquidated damages for the whole of the Subcontract Works are KENYA SHILLINGS FIVE HUNDRED THOUSAND (KSHS.100,000.00) PER WEEK OR PART THEREOF The Performance Security shall be for the following minimum amounts equivalent as a percentage of the Contract Price **FIVE PERCENT (5%).** The Completion Period for the Works is **130 Weeks** Bidders are allowed to bid in any freely convertible currency. The rate of exchange for comparison purpose shall be the CBK rate on the tender opening date. The schedule of basic rates used in pricing by the Contractor is as attached *[Contractor to attach]*. Clause 25.3 (KABCEC clauses) shall not apply. The bidder shall instead quote for prices from material from reputed manufacturers or suppliers for material listed. Advance Payment **SHALL NOT** be granted. Clause 23.7 is not applicable Special preference shall be given to the construction of the warehouse, flammable goods store, External Works and Civil works. The office block will commence upon satisfactory progression

	and / or on completion of the warehouse, flammable goods store, External Works and Civil works on Instruction from the Project Manager in consultation with the client. However, the Contractor will not be entitled to claims for loss of profit and other related costs / expenses in relation to delay of commencement office block

SECTION VI

STANDARD FORMS

NOTES ON THE SAMPLE FORMS

1 *Form of Invitation to Tender* - form to be completed by the Kenya Medical Supplies Authority

2 *Form of Tender* - The form of tender must be completed by the tenderer and submitted with the tender documents. It must also be duly signed by duly authorized representatives of the tenderer.

3 *Letter of Acceptance* this form letter will be used to communicate the award to the successful tenderer

4 *Form of Agreement* - The Form of Agreement shall not be completed by the tenderer at the time of submitting the tender. The Contract Form shall be completed after contract award and should incorporate the accepted contract price.

5 *Form*-of *Tender Security* - When required by the tender documents the tender shall provide the tender security either in the form included herein or in another format acceptable to the Kenya Medical Supplies Authority.

6 *Performance Security Form*- The performance security form should not be completed by the tenderers at the time of tender preparation. Only the successful tenderer will be required to provide performance security in the form provided herein or in another form acceptable to the Kenya Medical Supplies Authority.

7 *Bank Guarantee for Advance Payment Form* - When Advance payment is requested for by the successful bidder and agreed by the Kenya Medical Supplies Authority, this form must be completed fully and duly signed by the authorized officials of the bank.

8 *Qualification Information* - this form must be completed fully and duly signed by the bidder.

9 *Tender Questionnaire* - this form must be completed fully and duly signed by the bidder.

10 *Confidential Business Questionnaire Form* - This form must be completed by the tenderer and submitted with the tender documents.

11. *Statement of Foreign Currency Requirement* – this form is not applicable to this tender.

12. *Details of Sub-Contractors* - This form must be completed by the tenderer and submitted with the tender documents.

13. *Request for Review Form* This form shall only be used after tender evaluation if a bidder disagrees with the decisions of the Procuring Entity.

14. *Declaration of Undertaking* (Integrity Statement)

15. *Non - Debarment Declaration* - This form must be completed by the tenderer and submitted with the tender documents.

16. *Site Visit Declaration Form* – This form is for information only. A pre-bid site visit certificate has been issued elsewhere in this document and shall only be filled during the pre-bid site visit in the manner prescribed therein.

FORM OF INVITATION FOR TENDERS

_____*[date]*

To: TENDERER'S NAME_____

P. O. BOX _____

_____

_____

Dear Sirs:

RE: _____

You have been prequalified to tender for the above project.

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

A complete set of tender documents may be purchased by you from _____

Upon payment of a non-refundable fee of _____

All tenders must be accompanied by ONE (1) copy of both Technical and Financial Proposals and a security in the form and amount specified in the tendering documents, and must be delivered to _____, or be addressed to _____ _____. Tenders will be opened immediately thereafter, in the presence of tenderers' representatives who choose to attend.

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

Yours faithfully,

_____ Authorized Signature

_____ Name and Title

QUALIFICATION INFORMATION

1. **Individual Tenderers or Individual Members of Joint Ventures**

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

Place of registration: _____

Principal place of business _____

Power of attorney of signatory of tender _____

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

Year	Volume	
	Currency	Value

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

Project Name	Name of Client and Contact Person	Type of Work Performed and Year of Completion	Value of Contract

1.4 Major items of Contractor's Equipment proposed for carrying out the Works. List all information requested below. Refer also to Clause 1.7(c) of the Instructions to Tenderers

Item of Equipment	**Description, Make and age (years)**	**Condition (new, good, poor) and number available**	**Owned, leased (from whom?), or to be purchased (from whom?)**

1.5 Qualifications and experience of key personnel proposed for administration and execution of the Contract. Attach biographical data. Refer also to clause 1.5(e) of the Instructions to Tenderers and Clause 9.1 of the Conditions of Contract

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

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

_____
_____
_____
_____

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

_____
_____
_____

1.8 Name, address and telephone, telex and facsimile numbers of banks that may provide reference if contacted by Kenya Medical Supplies Authority

_____
_____
_____

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

_____
_____
_____

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

3.0 **Joint Ventures**

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

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

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

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

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

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

Bidder's Signature: ----------Official Stamp ----------

Date: **----------**

TENDER QUESTIONNAIRE

Please fill in block letters.

1. Full names of tenderer

   _____

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

   _____

3. Telephone number (s) of tenderer

   _____

4. Facsimile number of tenderer

   _____

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

   _____

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

   _____

   _____

   _____

_____

Signature of Tenderer

CONFIDENTIAL BUSINESS QUESTIONNAIRE FORM

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

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

Part 1 – General

1.1 Business Name
……

1.2 Location of Business Premises. ……

1.3 Plot No…… Street/Road ……

Postal Address ……..……..……..

Tel No. ……..…. Fax …….. E mail ……...…….

1.4 Nature of Business ,……..……

1.5 Registration Certificate No.……

1.6 Maximum Value of Business which you can handle at any one time – Kshs.……

1.7 Name of your Bankers ……Branch ……..

Part 2 (a) – Sole Proprietor

2a.1 Your Name in Full ……..…….. Age ……

2a.2 Nationality …… Country of Origin ……

- Citizenship Details ……..

Part 2 (b) Partnership

2b.1 Given details of Partners as follows:

2b.2

Name	Nationality	Citizenship Details	Shares
1……			
2……			
3……			
4……			

Part 2 (c) – Registered Company

2c.1 Private or Public ……..

2c.2 State the Nominal and Issued Capital of Company-

Nominal Kshs. ……

Issued Kshs. ……

2c.3 Given details of all Directors as follows

Name	Nationality	Citizenship Details	Shares
1……			
2……			
3……			

4……

5……

Part 3 – Eligibility Status

3.1 Are you related to an Employee, Committee Member or Board Member of Kenya Medical Supplies Authority ? Yes _____ No_____

3.2 If answer in '3.1' is **YES** give the relationship.
……
……
……
……

3.3 Does an Employee, Committee Member, Board Member of Kenya Medical Supplies Authority sit in the Board of Directors or Management of your Organization, Subsidiaries or Joint Ventures? Yes_____ No_____

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

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

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

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

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

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

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

……

……

……

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

Date …….. Signature of Candidate

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

DECLARATION OF UNDERTAKING (INTEGRITY STATEMENT)

Anti – Corruption Policy in the Procurement Process

Undertaking By Bidder On Anti – Corruption Policy / Code of Conduct And Compliance Program

The governments of Kenya is committed to fighting corruption in all its forms and in all its institutions to ensure that all the government earned revenues are utilized prudently and for the purpose intended with a view to promoting economic development as the country work towards actualizing Vision 2030.

Here at KEMSA and also being one of the government entities mandated under the government Legal Notice number 466 of 2004 to procure, warehouse and distribute Essential Medicines and Medical Supplies to all the public health facilities in Kenya, on behalf of the government, we are highly committed to fighting any form of corruption in our organization to ensure that all the monies that the government entrust with us, is optimally and prudently utilized for the benefits of all the people we serve.

The following is a requirement that every Bidder wishing to do business with KEMSA must comply with:

(1) Each bidder must submit a statement, as part of the tender documents, in the format given and which must be signed personally by the Chief Executive Officer or other appropriate senior corporate officer of the bidding company and, where relevant, of its subsidiary in Kenya. If a tender is submitted by a subsidiary, a statement to this effect will also be required of the parent company, signed by its Chief Executive Officer or other appropriate senior corporate officer.

(2) Bidders will also be required to submit similar No-bribery commitments from their subcontractors and consortium partners; the bidder may cover the subcontractors and consortium partners in its own statement, provided the bidder assumes full responsibility.

(3) a) Payment to agents and other third parties shall be limited to appropriate compensation for legitimate services.

b) Each bidder will make full disclosure in the tender documentation of the beneficiaries and amounts of all payments made, or intended to be made, to agents or other third parties (including political parties or electoral candidates) relating to the tender and, if successful, the implementation of the contract.

c) The successful bidder will also make full disclosure [quarterly or semi- annually] of all payments to agents and other third parties during the execution of the contract.

d) Within six months of the completion of the performance of the contract, the successful bidder will formally certify that no bribes or other illicit commissions have been paid. The final accounting shall include brief details of the goods and services provided that are sufficient to establish the legitimacy of the payments made.

e) Statements required according to subparagraphs (b) and (d) of this paragraph will have to be certified by the company's Chief Executive Officer, or other appropriate senior corporate officer.

(4) Tenders which do not conform to these requirements shall not be considered.

(5) If the successful bidder fails to comply with its No-bribery commitment, significant sanctions will apply. The sanctions may include all or any of the following:

a) Cancellation of the contract;

b) Liability for damages to the public authority and/or the unsuccessful competitors in the bidding possibly in the form of a lump sum representing a pre-set percentage of the contract value (liquidated).

(6) Bidders shall make available, as part of their tender, copies of their anti-Bribery Policy/Code of Conduct, if any, and of their-general or project - specific - Compliance Program.

(7) The Government of Kenya through Kenya Anti-Corruption Commission has made special arrangements for adequate oversight of the procurement process and the execution of the contract. Those charged with the oversight responsibility will have full access if need be to all documentation submitted by Bidders for this contract, and to which in turn all Bidders and other parties involved or affected by the project shall have full access (provided, however, that no proprietary information concerning a bidder may be disclosed to another bidder or to the public).

1. MEMORANDUM (FORMAT)

(Clause 41, 62 and 66 of Kenya Public Procurement and Asset Disposal Act 2015)

This company _____*(name of company)* has issued, for the purposes of this tender, a Compliance Program copy attached -which includes all reasonable steps necessary to assure that the No-bribery commitment given in this statement will be complied with by its managers and employees, as well as by all third parties working with this company on the public sector projects or contract including agents, consultants, consortium partners, subcontractors and suppliers')"

Authorized Signature:_____

Name and Title of Signatory: _____

NON - DEBARMENT DECLARATION

We **(*insert the name of the company / supplier*)** ----------declares and guarantees that no director, sub-contractor or any person who has any controlling interest in our organization has been debarred from participating in a procurement proceeding.

Name ……Signature……..Date ……

Company Seal / Business Stamp

SITE VISIT DECLARATION FORM

PROPOSED CONSTRUCTION OF KEMSA WAREHOUSE AND OFFICE BLOCK

I/We……of…….. do hereby declare that I/We have visited the site in the company of the below mentioned consultant and fully understand the scope and sequence of works.

COMPANY REPRESENTATIVE

NAME: …….

DESIGNATION: …….

Date …….

OFFICIAL STAMP

KEMSA REPRESENTATIVE

NAME:…….

SIGNATURE:……..

DATE:……..

OFFICIAL STAMP

Signed …….

Date …….

TENDER SECURITY FORM

(Amend accordingly if provided by Insurance Company)

Whereas ……..[name of the tenderer]

(hereinafter called "the tenderer")has submitted its tender dated……..[date of submission of tender] for the provision of ……..

[name and/or description of the services]

(hereinafter called "the Tenderer")……

KNOW ALL PEOPLE by these presents that WE……

of……having registered office at

[name of Procuring Entity](hereinafter called "the Bank")are bound unto……..

[name of Procuring Entity](hereinafter called "the Procuring Entity") in the sum of …….

for which payment well and truly to be made to the said Procuring Entity, the Bank binds itself, its successors, and assigns by these presents. Sealed with the Common Seal of the said Bank this_____ day of 20_____.

THE CONDITIONS of this obligation are:
1. If the tenderer withdraws its Tender during the period of tender validity specified by the tenderer on the Tender Form; or
2. If the tenderer, having been notified of the acceptance of its Tender by the PROCURING ENTITY during the period of tender validity:

(a) fails or refuses to execute the Contract Form, if required; or
(b) fails or refuses to furnish the performance security, in accordance with the instructions to tenderers;

we undertake to pay to the Procuring Entity up to the above amount upon receipt of its first written demand, without the Procuring Entity having to substantiate its demand, provided that in its demand the Procuring Entity will note that the arnount claimed by it is due to it, owing to the occurrence of one or both of the two conditions, specifying the occurred condition or conditions.
This guarantee will remain in force up to and including thirty (30) days after the period of tender validity, and any demand in respect thereof should reach the Bank not later than the

above date.

[signature of the bank]

DETAILS OF SUB-CONTRACTORS

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

Failure to comply with this requirement may invalidate the tender.

(1) Portion of Works to be sublet: ……..…

(i) Full name of Sub-contractor
and address of head office: ……

……

……

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

……

……

(2) Portion of Works to sublet:
……

(i) Full name of Sub-contractor
and address of head office: ……

……

……

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

……..……

……..

_____ _____
[Signature of Tenderer] Date

BANK GUARANTEE FOR ADVANCE PAYMENT FORM

To **……..**

Gentlemen and/or Ladies:

In accordance with the payment provision included in the special conditions of contract, which amends the general conditions of contract to provide for advance payment,
……

[name and address of tenderer][hereinafter called "the tenderer"] shall deposit with the Procuring entity a bank guarantee to guarantee its proper and faithful performance under the said clause of the contract in an amount of …… …… *[amount of guarantee in figures and words]*.

We, the…… *[bank or financial institution],* as instructed by the tenderer, agree unconditionally and irrevocably to guarantee as primary obligator and not as surety merely, the payment to the Procuring entity on its first demand without whatsoever right of objection on our part and without its first claim to the tenderer, in the amount not exceeding…… ……...*[amount of guarantee in figures and words]*.

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

This guarantee shall remain valid and in full effect from the date of the advance payment received by the tenderer under the Contract until *[date]*.

Yours truly,

Signature and seal of the Guarantors _____

[name of bank or financial institution]

_____

[address]

_____

[date]

PERFORMANCE SECURITY FORM

To: ……

WHEREAS……
…….[name of tenderer]

(hereinafter called "the tenderer") has undertaken, in pursuance of Contract No._____[reference number of the contract] dated _____20_____ to supply……..

[Description services](Hereinafter called "the contract")

AND WHEREAS it bas been stipulated by you in the said Contract that the tenderer shall furnish you with *a* bank guarantee by a reputable bank for the sum specified therein as security for compliance with the Tenderer's performance obligations in accordance with the Contract.

AND WHEREAS we have agreed to give the tenderer a guarantee:

THEREFORE WE hereby affirm that we are Guarantors and responsible to you, on behalf of the tenderer, up to a total of ……
……. *[amount of the guarantee in words and figures],*
and we undertake to pay you, upon your first written demand declaring the tenderer to be in default under the Contract and without cavil or argument, any sum or sums within the limits of ……
……*[amount of guarantee]* as aforesaid, without your needing to prove or to show grounds or reasons for your demand or the sum specified therein.

This guarantee is valid until the _____ day of 20_____

_____

Signature and seal of the Guarantors

_____

[name of bank or financial institution]

_____

[address]

_____ [date]

METHOD STATEMENT

The Tenderer is required to give a brief description herebelow of how the tenderer plans to execute the works (The tenderer may add more pages if required).

STATEMENT OF FOREIGN CURRENCY REQUIREMENTS

(See Clause 23] of the Conditions of Contract)

In the event of our Tender for the execution of_____
_____(*name of Contract*) being accepted, we would require in accordance with Clause 21 of the Conditions of Contract, which is attached hereto, the following percentage:

(Figures)…… (Words)……

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

Currency in which foreign exchange element is required:

……

Date: The …… Day of …….. 20…….

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

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

_____
(Signature of Tenderer)

LETTER OF NOTIFICATION OF AWARD

To:_____

_____

_____

RE: Tender No._____

Tender Name_____

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

_____

_____

1. Please acknowledge receipt of this Letter of Notification signifying your Acceptance.

2. The Contract/contracts shall be signed by the parties within 30 days of the date of this letter but not earlier than 14 days from the date of the letter.

3. You may contact the officer whose particulars appear below on the subject matter of this Letter of Notification of Award.

…….
The Chief Executive Officer
Kenya Medical Supplies Authority
P. O. Box 47715 – 00100
NAIROBI.

FOR: **…….**

LETTER OF ACCEPTANCE
[letterhead paper of the Employer]

_____*[date]*

TO: _____(Contractor)

P. O. BOX: _____

_____

Dear Sir,

This is to notify you that your Tender dated _____

for the execution of _____

[Name of the Contract and identification number, as given in the Tender documents] for the Contract Price of Kshs._____ *[amount in figures]* [Kenya Shillings _____
_____*(amount in words)*
in accordance with the Instructions to Tenderers is hereby accepted.

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

Authorized Signature: ……

Name and Title of Signatory: ……

FORM OF AGREEMENT

THIS AGREEMENT, made the _____ day of _____ 20 _____ between **KENYA MEDICAL SUPPLIES AUTHORITY** of [or whose registered office is situated at] **……..** (hereinafter called "the Procurement Entity") of the one part AND

_____of[or whose registered office is situated at]_____

(hereinafter called "the Contractor") of the other part.

WHEREAS THE Procurement Entity is desirous that the Contractor executes

_____

(name and identification number of Contract) (hereinafter called "the Works") located at_____*[Place/location of the Works*]and the Procurement Entity has accepted the tender submitted by the Contractor for the execution and completion of such Works and the remedying of any defects therein for the Contract Price of

Kenya Shillings_____*Amount in figures*],

Kenya Shillings_____ [*Amount in words]*.

NOW THIS AGREEMENT WITNESSETH as follows:

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

2. The following documents shall be deemed to form and shall be read and construed as part of this Agreement i.e.
   (i) Letter of Acceptance
   (ii) Form of Tender
   (iii) Conditions of Contract Part I
   (iv) Conditions of Contract Part II and Appendix to Conditions of Contract
   (v) Specifications

(vi) Drawings

(vii) Priced Bills of Quantities

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

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

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

The common Seal of _____

Was hereunto affixed in the presence of _____

Signed Sealed, and Delivered by the said _____

Binding Signature of the Procurement Entity

_____

Binding Signature of Contractor _____

In the presence of (i) Name_____

Address_____

Signature_____

(ii) Name _____

Address_____

Signature_____

CONTRACT FORM

THIS AGREEMENT made the ___day of _____20____between…… [name of Procuring Entity] of …….[country of Procuring Entity] (hereinafter called "the Procuring entity") of the one part and ……[name of tenderer] of …….[city and country of tenderer] (hereinafter called "the tenderer") of the other part.

WHEREAS the procuring entity invited tenders for certain materials and spares. viz……..[brief description of materials and spares] and has accepted a tender by the tenderer for the supply of those materials and spares in the spares in the sum of ……[contract price in words and figures].

NOW THIS AGREEMENT WITNESSETH AS FOLLOWS:

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

2. The following documents shall be deemed to form and be read and construed as part of this Agreement, viz.:

   (a) the Tender Form and the Price Schedule submitted by the tenderer;

   (b) the Schedule of Requirements;

   (c) the Technical Specifications;

   (d) the General Conditions of Contract;

   (e) the Special Conditions of Contract; and

   (f) the Procuring entity's Notification of Award.

3. In consideration of the payments to be made by the Procuring entity to the tenderer as hereinafter mentioned, the tenderer hereby covenants with the Procuring entity to provide the materials and spares and to remedy defects therein in conformity in all respects with the provisions of the Contract

4. The Procuring entity hereby covenants to pay the tenderer in consideration of the provision of the materials and spares and the remedying of defects therein, the Contract Price or such other sum as may become payable under the provisions of the contract at the times and in the manner prescribed by the contract.

IN WITNESS whereof the parties hereto have caused this Agreement to be executed in accordance with their respective laws the day and year first above written.

Signed, sealed, delivered by _____the _____(for the Procuring entity)

Signed, sealed, delivered by _____the _____(for the tenderer)

in the presence of_____

FORM RB 1

REPUBLIC OF KENYA

PUBLIC PROCUREMENT ADMINISTRATIVE REVIEW BOARD

APPLICATION NO…….OF…….….20……...

BETWEEN

…….APPLICANT

AND

……RESPONDENT *(Procuring Entity*)

Request for review of the decision of the…… (*Name of the Procuring Entity)* of ……dated the…day of ……..20…….in the matter of Tender No……..…of ……..20……

REQUEST FOR REVIEW

I/We……,the above named Applicant(s), of address: Physical address…….Fax No……Tel. No……..Email ……., hereby request the Public Procurement Administrative Review Board to review the whole/part of the above mentioned decision on the following grounds , namely:-

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

1.

2.

etc

SIGNED …….(Applicant)

Dated on…….day of ……/…20…..

FOR OFFICIAL USE ONLY

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

SIGNED

Board Secretary

SECTION B

CONDITIONS OF

SUB-CONTRACT AGREEMENT

CONDITIONS OF CONTRACT

SUB-CONTRACT AGREEMENT (KABCEC)

AGREEMENT AND CONDITIONS OF SUB-CONTRACT FOR BUILDING WORKS

Published by:
The Kenya Association of Building and Civil Engineering Contractors
with the sanction of:
The Joint Building Council, Kenya
and
The Architectural Association of Kenya

June 2002 Edition

CONTENTS

ORIGINAL
embossed stamp

COUNTERPART
embossed stamp

1.0 AGREEMENT

1.1 This agreement is made on ……

between …….

of (or whose registered office is situated at) ……

……

(hereinafter called "the Contractor") of the one part ……

and …….

of (or whole registered office is situated at) ……

……...
(hereinafter called "the Sub-Contractor") of the other part:

1.2 SUPPLEMENTAL to an agreement(hereinafter referred to as the "the main contract")

made on …….

Between ……

……
(hereinafter called "the Employer") of the one part and the Contractor of the other part based on the Agreement and Conditions of Contract for Building Works, published by the Joint Building Council, Kenya ……..
…….. edition.

1.3 WHEREAS the contractor is desirous of sub-letting to the Sub-Contractor

……..

…….

……

hereinafter called "the sub-contractor works" at……...

on Land Reference No……...being part of the main contract works.

1.4 And whereas the Sub-contractor has supplied the Contractor with a priced copy of the bills of quantities (hereinafter referred to as "the sub-contractor bills"), where applicable, which together with the drawings numbered……

……...
(hereinafter referred to as "the sub-contract drawings), the specifications and the conditions of sub-contract have been signed by or on behalf of the parties thereto.

And whereas the Sub-Contractor has had reasonable opportunity of inspecting the main contract or a copy thereof except the detailed prices of the Contractor included in the bills of quantities or schedule of rates.

1.5 And whereas the Architect, with the approval of the Employer, has nominated the Sub-Contractor to carry out the works described at clause 1.3 herein:

NOW IT IS HEREBY AGREED AS FOLLOWS:

1.6 For the consideration herein stated, the Sub-Contractor shall upon and subject to the conditions annexed hereto carry out and complete the sub-contract works shown upon the sub-contract drawings and described by or referred to in the sub-contract bills, specifications and in the said conditions.

1.7 The Contractor shall pay the Sub-Contractor the sum of the Kshs (in words)……

……

……Kshs……..……)
(hereinafter referred to as "the sub-contractor price") or such sum as shall become payable hereinafter at the times and in manner specified in the said conditions.

1.8 The term 'Architect', 'Quantity Surveyor' and 'Engineer', where applicable, shall refer to the persons appointed by the Employer to administer the sub-contract in accordance with the main contract agreement. Where applicable reference to the Project Manager shall be deemed to include reference to the Engineer.

1.9 In the event of the need to appoint a replacement Architect, Quantity Surveyor, Engineer or other specialist (whether named in this agreement or not) the Employer shall make such appointment as soon as practicable after the need for such appointment arises and shall communicate the appointment to the Sub-Contract through the Contractor.

1.10 Where the sub-contract does not incorporate bills of quantities, the term "sub-contract bills" and "bills of quantities" wherever appearing shall be deemed deleted and replaced with the term "schedule of rates" as applicable.

1.11 The terms defined in the main contract shall have the same meaning in this sub-contract as that assigned to them therein.

1.12 AS WITNESS the hands of the said parties;

Signed by the said

……..(Contractor)

In the presence of

Name ……..

Address ……..

Signed by the said

…….(Sub-Contractor)

In the presence of

Name ……

Address ……

CONDITIONS OF SUB-CONTRACT

2.0 GENERAL OBLIGATIONS OF THE CONTRACTOR

The Contractor shall:

2.1 Timeously obtain from the Project Manager on behalf of the Sub-Contractor all drawings, necessary details, instructions and other information required by the Sub-Contractor for the proper carrying out of the sub-contract works.

2.2 Provide all such facilities and attend upon the Sub-Contractor as required and as provided in the specifications, bills of quantities and these conditions to the extent compatible with the provisions of the main contract

2.3 Observe, perform and comply with all the provisions of the main contract and of this sub-contract on the part of the Contractor to be observed, performed and complied with to ensure satisfactory completion of the sub-contract works.

3.0 GENERAL OBLIGATIONS OF THE SUB-CONTRACTOR

3.1 The Sub-Contractor shall be deemed to have notice of all the provisions of the main contract except the detailed prices of the Contractor included in the bills of quantities or in the schedule of rates.

3.2 The Sub-Contractor shall carry out and complete the sub-contract works in accordance with this sub-contract and in all respects to the reasonable satisfaction of the Contractor and of the Project Manager and in conformity with all reasonable directions and requirements of the Contractor regulating the due carrying out of the contract works.

3.3 The Sub-Contractor shall observe, perform and comply with all the provisions of the main contract on the part of the Sub-Contractor to be observed, performed and complied with so far as they relate and apply to the sub-contract works or any portion thereof and are not inconsistent with the expressions of this sub-contract as if all the same were set out herein.

3.4 Without prejudice to the generality of the foregoing requirements, the Sub-Contractor shall especially observe perform and comply with the provisions in the main contract as they apply to the sub-contract works

4.0 SUB-CONTRACT DOCUMENTS

4.1 The sub-contract documents for use in the carrying out of the sub-contract works shall be:-

4.1.1 The agreement and these conditions

4.1.2 The sub-contract drawings as listed in the agreement

4.1.3 The sub-contract bill of quantities or schedule of rates as applicable

4.1.4 The specifications as separately supplied or as contained in the sub-contract bills.

4.2 Upon the execution of the sub-contract, the Contractor shall register the agreement with the relevant statutory authority and pay all fees, charges, taxes, duties and all costs arising therefrom.

4.3 The manner of supplying contract documents, their custody, display on site and their interpretation in the event of discrepancies shall be as provided in the main contract in respect of the main contract documents with the necessary amendments made to refer to the sub-contract.

5.0 GENERAL LIABILITY OF THE SUB-CONTRACTOR

5.1 The Sub-Contractor shall be liable for and shall indemnify the Contractor against and from:

5.1.1 Any breach, non-observance or non-performance by the Sub-Contractor, his servants or agents of any of the said provisions of the main contract and of this sub-contract.

5.1.2 Any act or omission of the Sub-Contractor, his servants or agents which involve the Contractor in any liability to the Employer under the main contract

5.1.3 Any claim, damage, loss or expense due to or resulting from any negligence or breach of duty on the part of the Sub-Contractor, his servants or agents.

5.1.4 Any loss or damage resulting from any claim under any statute or common law by an employee of the Sub-Contractor in respect of personal injury or death arising out of or in the course of his employment.

5.2 Provided that nothing contained in this sub-contract shall impose any liability on the Sub-Contractor in respect of any negligence or breach of duty on the part of the Employer, the Contractor, other sub-contractors or their respective servants or agents nor create any privity of contract between the Sub-Contractor and the Employer or any other sub-contractor.

6.0 INSURANCE AGAINST INJURY TO PERSONS AND PROPERTY

6.1 Without prejudice to his liability to indemnify the Contractor under clause 5.0 above, the Sub-Contractor shall maintain:-

6.1.1 Such insurances as are necessary to cover the liability of the Sub-Contractor in respect of injury or damage to property including damage to the works arising out of or in the course of or by reason of the carrying out of the sub-contract works except for liability against the contingencies specified at clause 6.3 herein.

6.1.2 The insurances required under sub clause 6.1.1 above shall be placed with insurers approved by the Contractor and the Architect.

6.2 Notwithstanding the provisions of clause 23.0 of these conditions, the Contractor shall not be obliged to make payments to the Sub-Contractor before the said policies have been provided.

6.3 Where clause 30 of the main contract applies, the sub-contract works, including materials and goods of the sub-Contractor delivered to the works, shall as regards loss or damage by the contingencies stated at clause 30 therein, namely, fire, earthquake, fire following earthquake, lightning, explosion, storm, tempest, flood, bursting or overflowing of water tanks, apparatus or pipes, aircraft and other aerial devices or articles dropped therefrom, riot and civil commotion, be at the sole risk of the contractor. The Contractor shall cover his liability for the works by procuring insurances as required in the said clause.

6.4 Where clause 30 or the main contract applies, the sub-contract works, including materials and goods of the Sub-Contractor delivered to the works shall, as regards loss or damage by the contingencies stated therein be at the sole risk of the Employer. The Employer shall cover his liability for the works by procuring insurances as required in the said clause.

6.5 The Sub-Contractor shall observe and comply with the conditions contained in the policy or policies of insurance of the Contractor or of the Employer, as the case may be, as regards loss or damage which may be caused by the stated contingencies. For this purpose, the Contractor or the Employer as the case may be, shall avail the said policies to the Sub-Contractor for his perusal.

6.6 If any loss or damage affecting the sub-contract works or any part thereof or any unfixed goods or materials is occasioned by any one or more of the said contingencies, then,

6.6.1 The occurrence of such loss or damage shall be disregarded in computing any amounts payable to the Sub-Contractor under the sub-contract, and

6.6.2 The Sub-Contractor shall, with due diligence, restore the work damaged, replace or repair any unfixed materials or goods which have been destroyed or damaged, remove and dispose of any debris and proceed with the carrying out and completion of the sub-contract works.

6.6.3 The restoration of work damaged the replacement and repair of unfixed materials and goods and the removal of debris shall be deemed to be a variation required by the Architect. Such work shall be paid for in accordance with clause 30.0 of the main contract.

7.0 PERFORMANCE BOND

Before commencing the works, the Sub-Contractor shall provide one surety who must be an established bank or insurance company to the approval of the Contractor and who will be bound to the Contractor in the sum equivalent to five per cent (5%) of the sub-contract price for the due performance of the sub-contract until the certified date of practical completion. Notwithstanding the provisions of clause 23.0 of these conditions, no payments shall made to the Sub-Contractor before the said bond is provided.

8.0 POSSESSION OF SITE AND COMMENCEMENT OF WORKS

8.1 Within the period stated in the appendix to these conditions, the Contractor shall give possession of the site works to the Sub-Contractor and such access as may be necessary to enable the Sub-Contractor to commence and proceed with the sub-contract works in accordance with the sub-contract.

8.2 On or before the date for commencement of works stated in the appendix to these conditions, the Sub-Contractor shall commence the carrying out of the sub-contract works and shall proceed regularly and diligently with the same in accordance with the sub-contract program, the main contract program and or with the progress of the main contract works and complete on or before the date stated in the appendix to these conditions as the date for practical completion or within any extended time granted under clause 25.0 of these conditions.

9.0 PROJECT MANAGERS INSTRUCTIONS

9.1 The Sub-Contractor shall forthwith comply with all the instructions issued to him by the Project manager, either directly or through the Contractor, in regard to any matter in respect of which the Project Manager is expressly empowered by the main contract conditions to issue instructions.

9.2 The manner of complying with or querying the validity of Project manager's instruction shall be as provided in clause 16.0 of the main contract. The Project manager shall not be obliged to carry our instructions not issued in the manner provided therein.

10.0 VARIATIONS

10.1 The term "variation" shall have the meaning assigned to it at clause 22.0 of the main contract.

10.2 The valuation of variations shall be made by the Quantity Surveyor in accordance with sub-clause 22.0 of the main contract.

10.3 Effect shall be given to the measurement and valuation of variations in interim certificates and by the adjustment of the sub-contract price.

11.0 LIABILITY FOR OWN EQUIPMENT

The construction equipment and other property belonging to or provided by the Sub-Contractor and brought onto the site for carrying out the works shall be at the sole risk of the Sub-Contractor. Any loss or damage to the same or caused by the same shall, except for any loss or damage due to any negligence, omission or default of the Contractor, be at the sole risk of the Sub-Contractor who shall indemnify the Contractor against loss, damage or claims in respect thereof. Insurance against any such loss, damage or claims shall be the sole responsibility of the Sub-Contractor.

12.0 PROVISION OF FACILITIES BY THE CONTRACTOR

12.1 Where provided in the main contract, the Contractor shall supply at his own cost all necessary water, lighting, electric power, telephones and security required for the sub-contract works. Where not so provided, the Sub-Contractor shall provide the said services at his own cost.

12.2 Except as otherwise provided in the main contract, the Sub-Contractor shall construct at his own expense all necessary workshops, stores, offices, workers' accommodation and other temporary buildings required for the carrying out of the works at such places on site as the Contractor shall identify. The Contractor undertakes to give the sub-Contractor the required space and all reasonable facilities for such construction. Upon practical completion of the works, the Sub-contractor shall remove the said facilities and reinstate disturbed surface to the satisfaction of the Contractor.

12.3 The Contractor shall provide, without charge, general attendance to the Sub-Contractor to facilitate the carrying out of the works which attendance shall include facilities for access to and movement within the site and sections or parts of the building or buildings where the sub-contract works are being carried out, the use of temporary roads, paths and access ways, sanitary and welfare facilities.

12.4 The Contractor shall permit the Sub-Contractor to use, without charge, at all reasonable times, any scaffolding and hoisting equipment belonging to or provided by the Contractor while it remains so erected upon the site. The use by the Sub-Contractor of any other equipment, facilities or services provided by the Contractor for the works shall be subject to private arrangements between the parties hereto and shall not be regulated by these conditions.

12.5 Provided that such use of the scaffolding and hoisting equipment shall be on the express condition that no warranty or other liability on the part of the Contractor shall be created or implied in regard to fitness, condition or suitability for the intended purpose except that the Sub-Contractor shall be liable for any damage caused thereto or thereby.

12.6 Where required, the Contractor shall provide the facilities, equipment and the like and carry out any necessary builder' works within a reasonable time of the request by the Sub-Contractor to enable timely performance of the sub-contract.

13.0 LIABILITY FOR OWN WORK

13.1 The Contractor and the Sub-Contractor shall be liable for the due carrying out of their respective works in accordance with their respective contracts without causing damage or injury to the works of the other sub-contractors, and in particular:

13.2 Should the carrying out of the sub-contract works cause injury or damage to the main contract works, or to the work of the other sub-contractors, the Sub-contractor shall rectify the damage so caused at his own cost.

13.3 Should the carrying out of the main contract works cause damage or injury to the sub-contract works, the Contractor shall rectify the damage at his own cost.

13.4 If in the course of carrying out the sub-contract works, the Sub-Contractor is required to carry out work not included in his sub-contract by reason of any materials of workmanship not being in accordance with the main contract or with other sub-contracts, the Contractor shall reimburse the Sub-Contractor the expenses incurred therein.

14.0 CO-OPERATION IN USE OF FACILITIES

14.1 The Contractor and the Sub-Contractor undertake to co-operate with each other and co-ordinate work arrangements and procedures required in carrying preventing interference, disruption or disturbance to the progress of the works or to the activities of other sub-contractors.

14.2 The Contractor and the Sub-Contractor undertake not to wrongfully use or interfere with equipment, scaffolding, appliances, ways, temporary works, temporary buildings and other property belonging to or provided by the other part or by other sub-contractors.

14.3 Provided that nothing contained in this clause shall prejudice or limit the rights of the Contractor or of the sub-Contractor in carrying out their respective statutory and or contractual duties under this sub-contract or under the main contract.

15.0 ASSIGNMENT AND SUBLETTING

15.1 Neither the Contractor nor the Sub-Contractor shall, without the written consent of the other and the Employer, assign this sub-contract.

15.2 The Sub-Contractor shall not sub-let the whole of the works without the written consent of the Contractor and the Project manager.

15.3 Provided that any assignment and any sub-contracts as well as this sub-contract shall terminate immediately upon (for whatever reason) of the main contract.

16.0 WORK PRIOR TO APPOINTMENT OF CONTRACTOR

16.1 Where the Sub-Contractor is appointed before the Contractor is appointed, any work done by the Sub-Contractor prior to the said appointment shall be treated as a separate contract between the Employer and the Sub-Contractor and shall be valued by the Quantity Surveyor and paid for directly by the Employer without the involvement of the Contractor.

16.2 Where the Sub-Contractor is appointed before the Contractor is appointed, the Sub-Contractor shall be permitted, when the identity of the Contractor is known and within 30 days thereof, to raise objections (on reasonable grounds) against entering into a sub-contract with the Contractor

16.3 Where work which is outside the sub-contract is ordered directly by Employer or the Architect, that work shall be treated as a separate contract between the Sub-Contractor and the Employer and shall be valued and paid for directly to the Sub-Contractor in accordance with sub-clause 16.1 herein without the involvement of the Contractor. The cost of equipment, facilities and the like provided by the Contractor to the Sub-contractor and any builder's work carried out by the Contractor with regard to such work shall be paid directly by the Sub-Contractor to the Contractor.

17.0 SUB-CONTRACTOR DESIGN

Where the sub-contract includes a design component by the Sub-Contractor, the design shall be to the approval of the Project Manager and the Employer. Notwithstanding and approvals, the Sub-Contractor shall be liable directly to the Employer for any consequences of failure of the design to comply with the requirements of the Employer or to be fit or suitable for the purposes for which the sub-contract works or the relevant part thereof were intended.

18.0 SPECIFICATION OF GOODS, MATERIALS AND WORKMANSHIP

18.1 All materials, goods and workmanship shall so far as procurable, be of the respective kinds and standards described in the sub-contract bills, specifications and drawings.

18.2 The provisions in the main contract regulating the procurement, specification and quality assurance of materials, processes and workmanship and the requirements of clause dealing with the provision of samples and the carrying out of specified tests shall apply to the sub-contract in the same manner as they apply to the main contract.

19.0 COMPLIANCE WITH STATUTORY AND OTHER REGULATIONS

The Sub-Contract shall comply with all statutory and other regulations of competent authorities regulating the carrying out of the works in accordance with the provisions in the main contract, as applicable.

20.0 ROYALTIES AND PATENT RIGHTS

20.1 All royalties or other sums payable in respect of the supply and use of any patented articles, processes or inventions in carrying out the works as described by or referred to in the sub-contract bills, specifications or drawings shall be deemed to have been included in the sub-contract price.

20.2 The provision of clause in of the main contract dealing with the same shall apply to the sub-contract in the same manner as they apply to the main contract.

21.0 ANTIQUITIES AND OTHER OBJECTS OF VALUE

All fossils, antiquities and other objects of interest or value which may be found on the site or in excavating the same during the progress of the sub-contract shall be dealt with in accordance with the provisions of the main contract.

22.0 SUSPENSION OF WORKS

22.1 An instruction by the Project Manager to postpone or suspend the works under clause 28.0 of the main contract shall have the same effect on the sub-contract works as it has on the main contract works.

22.2 If the suspension arises due to default by the contractor and the sub-contract works are adversely effected by the suspension, the sub-contractor shall be entitled to reimbursement by the contractor of all expenses arising therefrom.

22.3 If the suspension arises due to default by the sub-contractor, the sub-contractor shall be liable to the contractor for all expenses arising therefrom.

22.4 A notice by the contractor to suspend the works under clause 29.0 of the main contract shall have the same effect on the sub-contract works as it has on the main contract works.

22.5 Should the sub-contract works be adversely affected by suspension under clause in the main contract, the sub-contractor shall be entitled to the remedies provided for at clauses 25.0 and 26.0 of this sub-contract.

23.0 PAYMENTS

23.1 Procedures for originating and processing applications for payments and payment certificates as regards the sub-contract works shall be the same as those prescribed for the Contractor in the main contract at clause 34.0. references therein to the contractor shall be deemed to include references to the Sub-contractor.

23.2 Before submitting an application for payment to the Quantity Surveyor in accordance with clause 34.1 of the main contract, the Contractor shall give the Sub-Contractor a notice of not less than 7 days to submit the details of the amounts, which the Sub-Contractor considers himself entitled to for the relevant period. Such details, when received, shall be annexed to the said Contractor's application.

23.3 Where it is necessary to measure the sub-contract works for purpose of interim valuation or for the preparation of the final account, the Quantity Surveyor shall give the Sub-Contractor a reasonable opportunity to be present at the time of the measurements and to take notes and measurements as he may require.

23.4 Neither the Quantity Surveyor nor the Project Manager shall be bound to issue a valuation or a payment certificate in respect of the sub-contract works, as the case may be, whose value is less than the amount stated in the appendix to these conditions as the minimum amount of a payment certificate before the issue of the certificate of practical completion of the main contract or of the sub-contract, as applicable.

23.5 Provided that where the minimum amount of a certificate inserted in the appendix to these conditions has been achieved but the corresponding minimum inserted in the appendix to the main contract in respect of the Contractor's work has not been achieved, or the Contractor has not applied for payment within the stated period, the Project Manager may with the consent of the Contractor, issue a payment certificate directly to the Sub-Contractor for payment by the Employer.

23.6 Within 7 days of receipt by the Contractor of payment by the Employer, the Contractor shall notify and pay to the Sub-Contractor the total value certified therein in respect of the sub-contract works less the portion of the retention money attributable to the sub-contract works and less amounts previously paid to the Sub-Contractor.

23.7 Where certificates are not paid by the Employer within the prescribed period, the Sub-Contractor shall be entitled to be paid by the Contractor, upon receipt of payment from the Employer, the interest certified for the delay in accordance with sub-clause 34.6 of the main contract in respect of the portion of the sub-contract works included in the certificate.

23.8 a) Payment will be made through certificates direct to the subcontractor. All the subcontractors valuations claim must done through the main contractor and subsequently forwarded to the consultants . All payments will be less retention as specified in the Main Contract. No payment will become due until materials are delivered to site.

b) In case, the Contractor has received payment from the Employer but has not released the appropriate amount to the Sub-Contractor within the stated period, the Contractor shall pay to the Sub-Contractor in addition to the amount not paid, simple interest on the unpaid amount for the period it remains unpaid at the commercial bank lending rate in force during the period of default.

23.9 If, upon application by the Sub-Contractor and Project Manager agree, or if the Contractor fails to make payment to the Sub-Contractor in accordance with sub-clause 23.6 herein and continues such default for 14 days thereafter, the Project Manager may issue a payment certificate directly to the Sub-Contractor for payment by the Employer, where applicable, and deduct the amount from subsequent payment to the Contractor.

23.10 Upon the issue of the certificate of practical completion and the release of one half of the total amount of the retention of money to the Contractor, the Contractor shall pay the portion attributable to the sub-contract to the Sub-Contractor within 7 days of receipt of the payment.

23.11 Upon the issue of the certificate of rectification of defects and receipt of the balance of the retention money by the Contractor, the Contractor shall pay the balance of the portion of the retention money attributable to the sub-contract to the Sub-Contractor within 7 days of receipt of the payment.

23.12 The sub-contract final account shall be agreed between the Sub-Contractor, the Contractor, the Quantity Surveyor and the Project Manager and shall be annexed to the Contractor's final accounts which shall be agreed as provided for in the main contract. For purpose of finalizing the accounts, the Quantity Surveyor may request the Sub-Contractor to submit further documents as he may deem necessary.

23.13 The final certificate issued under sub-clause 34.21 of the main contract shall be final and binding on the Sub-Contractor in the same manner it is binding on the Contractor.

23.14 If the Project Manager desires to secure final payment to the Sub-Contractor before final payment is due to the Contractor, the provisions of sub-clause 32.1 of the main contract shall apply.

23.15 The Contractor shall be entitled to deduct from or set off against any money due from him to the Sub-Contractor in interim certificates any sum or sums which the Sub-Contractor is liable to pay to the Contractor arising under or in connection with the sub-contract.

24.0 PRACTICAL COMPLETION AND DEFECTS LIABILITY

24.1 The Sub-Contractor shall proceed with the works regularly and diligently and complete the same within the period stated in the appendix to this sub-contract or within such extended period as may be granted under clause 25.0 of this sub-contract.

24.2 Where the sub-contract works are to be completed in sections or where the sub-contract works are to be completed in advance of the main contract works, the provisions of clauses in the main contract shall apply, as appropriate, to the sub-contractor in the same manner as they apply to the main contract.

24.3 The procedures for certifying practical completion and for dealing with defects in the sub-contract works as well as the main contract works are as prescribed in the main contract. Upon the issue of the certificate of practical completion of the whole of the works or of the sub-contract works, as applicable, the Sub-contractor shall be entitled to release of one half of the retention money attributable to the sub-contract works within 7 days after the Contractor has received payment.

24.4 The balance of the retention money shall be released to the Sub-Contractor after the defects appearing in the works have been rectified in accordance with the main contract condition of contract and after the Contractor has received the said payment as provided for in the main contract.

25.0 EXTENSION OF TIME

25.1 Upon it becoming reasonably apparent that the progress of the sub-contract works is or will be delayed, the Sub-Contractor shall forthwith give written notice of the cause of the delay to the Contractor and to the Project Manager with supporting details showing the extent of delay caused or likely to be caused. Thereafter, the Project Manager shall evaluate the information supplied by the Sub-Contractor and if in his opinion, the completion of the works is likely to be or has been delayed beyond the date for practical

completion stated in the appendix to these conditions or beyond any extended time previously fixed under this clause, by any of the reasons entitling the Contractor to extension of time under sub-clause 36.1 of the main contract, then the Project Manager shall, so soon as he is able estimate the length of the delay beyond the date or time aforesaid, recommend to the Contractor a fair and reasonable extension of time to be granted for the completion of the sub-contract works.

25.2 Thereupon, the Contractor shall grant in writing to the Sub-Contractor the recommended time. Provided that the Contractor shall not grant any extension of time to the Sub-Contractor without the written recommendation of the Project Manager. And provided that the Sub-Contractor shall constantly use his best endeavors to prevent delay and shall do all that may be reasonably required to proceed with the works.

25.3 The procedures for dealing with requests for extension of time and the observance of time limits prescribed in the main contract shall apply to the sub-contract in the same manner as they apply to the main contract.

26.0 LOSS AND EXPENSE CAUSED BY DISTURBANCE OF REGULAR PROGRESS

26.1 If upon written application being made by the Sub-Contractor to the Contractor and to the Project Manager, the project manager is of the opinion that the Sub-Contractor has been involved in direct loss and or expense, for which he would not be reimbursed by a payment made under any other provision in this sub-contract, by reasons of the regular progress of the sub-contract works or any part thereof having been materially affected by any of the reasons which would entitle the Contractor to reimbursement under the main contract, the Quantity Surveyor shall assess the amount of such loss and or expense.

26.2 Any amount so assessed shall be added to the sub-contract price and if an interim certificate is issued after the date of assessment, any such amount shall be added to the amount, which would otherwise be stated as due in such certificate as regards the Sub-Contractor's entitlement.

26.3 The procedures for dealing with loss and or expense claims prescribed in the main contract shall apply to the sub-contract in the same manner as they apply to the main contract, as appropriate.

27.0 DAMAGES FOR DELAY IN COMPLETION

27.1 If the Sub-Contractor fails to complete the sub-contract works by the date for practical completion stated in the appendix to these conditions or within any extended time fixed under clause 25.0 herein, and the Engineer certifies in writing that in his opinion the same ought reasonably so to have been completed, then the Sub-Contractor shall pay or allow to the Contractor a sum calculated at the rate stated in the said appendix as liquidated damages for the period during which the works shall so remain or have remained incomplete.

27.2 The Contractor may deduct such sum from any money due or to become due to the Sub-Contractor under the sub-contract or recover the same from the Sub-Contractor as a debt. Provided that the Contractor shall not be entitled to recover any liquidated damages from the Sub-Contractor without first obtaining the Architect's certificate of delay prescribed herein.

28.0 FLUCTATIONS

28.1 Unless otherwise stated in the sub-contract bills or specifications, the sub-contract price shall be deemed to have been calculated to include all duties and taxes imposed by statutory and other competent authorities in the country where the works are being carried out, and

28.2 The sub-contract price shall be deemed to be based on currency exchange rates current at the date of tender as regards materials or goods to be specifically imported for permanent incorporation in the works.

28.3 Should duties, taxes and exchange rates vary during the period of the contract, compensation thereof shall be calculated in accordance with sub-clause 24.5 of the main contract.

28.4 Compensation for change in prices of goods and materials incorporated in the works and in the rates of wages provided for in the main contract shall not apply to the sub-contract unless specifically provided for in the bill of quantities or specifications.

29.0 TERMINATION OF MAIN CONTRACT

29.1 If, for any reason, the contractor's employment is terminated either under clause 33.0 of the main contract, this sub-contract shall thereupon also terminate.

29.2 Upon termination, the sub-contractor shall ceases all work and vacate the site. He shall not remove any equipment or any materials brought onto the site for the carrying out of the works without the written approval of the contractor and the project manager

29.3 Where the termination of the main contract occurs without the default of the sub-contractor, the sub-contractor shall be paid by the contractor for work done in the like manner as the Contractor is paid at clause 33.0 of the main contract.

29.4 Where the termination of main contract arises from the default by the sub-contractor, the adjustment of the sub-contract accounts shall be performed in the like manner as is provided at sub-clause 33.0 of the main contract regarding the main contract accounts.

30.0 TRMINATION OF SUB-CONTRACT.

30.1 Without prejudice to any other rights and remedies which the contractor may possess, if the sub-contractor shall make default in any one or more of the respects which would entitle the employer to terminate the main contract under clause 38.0 therein, the contractor shall give the sub-contractor a notice, with a copy to the Project Manager and to the employer by registered post of recorded delivery specifying the default. Should the sub-contractor continue the default for 14 days after receipt of such notice or at any time thereafter repeat such default and should the Project Manager certify that the sub-contractor is in default, the contractor may terminate the Sub-contract forthwith after the expiry of the notice provided that the notice is not given unreasonably or vexatiously. The termination letter shall be copied to the Project Manager and to the Employer.

30.2 Where the sub-contract is terminated due to the default of the sub-contractor as in sub-clause 30.1 herein, the adjustment of sub-contract accounts shall be performed in the like manner as is provided at sub-clause 33.0 of the main contract regarding the main contract accounts.

30.3 Without prejudice to any other rights and remedies which the Sub-Contractor may possess, if the Contractor shall make default in one or more of the respects which, if committed by the Employer, would entitle the contractor to terminate the main contract under clause 39.0 therein, the Sub-Contractor shall give the Contractor a notice, with a copy to the Project Manager and to the Employer, by registered post or recorded delivery specifying the default. Should the contractor continue the default for 14 days after receipt of such notice or at any time thereafter repeat such default, and should the Project Manager certify that the contractor is in default, the Sub-Contractor may terminate the sub-contract forthwith after expiry of the notice, provided that the notice is not given unreasonably or vexatiously. The termination letter shall be copied to the Project Manager and to the Employer.

30.4 If the Sub-Contract is terminated due to the default of the Contractor as in sub- clause 30.3 herein, the Contractor shall pay the sub-contractor for work done in the like manner as the Contractor would be paid at sub-clause 33 of the main contract where the termination is done by the Contractor.

30.5 Where the sub-contract is terminated due to the default of the Contractor, all expenses arising from the termination shall be done wholly by the Contractor and the termination shall not create any liability on the Employer.

30.6 Where the sub-contract is terminated due to the default of the Sub-Contractor, the sub-contractor shall be liable to the contractor for all expenses arising therefrom.

31.0 SETTLEMENT OF DISPUTES

31.1 In case any dispute or difference shall arise between the Contractor and Sub-Contractor, either during the progress or after the completion or abandonment of the sub-contract works, such dispute shall be notified in writing by either party to the other with a request to submit it to arbitration and to concur in the appointment of an Arbitrator within 30 days of the notice.

31.2 The dispute shall be referred to the arbitration and final decision of a person to be agreed by the parties. Failing agreement to concur in the appointment of an Arbitrator, the Arbitrator shall be appointment by the Chairman or Vice Chairman of the Architectural Association of Kenya or the Chairman or Vice Chairman of The Chartered Institute of Arbitrators, Kenya Branch, at the request of the applying party.

31.3 The arbitration may be on the construction of this sub-contract or on any matter or thing of whatsoever nature arising thereunder or in connection therewith including the rights and liabilities of the parties during the currency of the sub-contract and subsequent to the termination of the sub-contract.

31.4 Where the sub-contractor is aggrieved by the manner in which the Project Manager has exercised or failed to exercise his powers stipulated in the main contract, or in the sub-contact or by any action or inaction of the Employer, and in particular, if he is aggrieved by:

31.4.1 The failure or refusal of the Project Manager to recommend to the contractor an extension of sub-contract time, or

31.4.2 The extend of the recommended time,
or
31.4.3. The amount certified to the sub-contractor either in an interim in a final Certificate,
or
31.4.4 The issue of an instruction which the sub-contractor contends is not authorized by the main contract or the sub-contract,
or
31.4.5. Any other matter left to the discretion of the Project Manager in the main contract or in the sub-contract, then.

31.5 Subject to the Sub-Contractor giving the Contractor such indemnity and security as the Contractor may reasonably require, the Contractor shall allow the Sub-Contractor to use the contractor's name and, if necessary, shall join the Sub-Contractor in arbitration proceeding against the employer to decide the matters in dispute or in difference.

31.6 Provided that no arbitration proceedings shall be commenced on any dispute or difference where notice of a dispute or difference where notice of a dispute or difference has not been given by the applying party within 90 days of the occurrence or discovery of the matter or issue giving rise to the dispute or difference.

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

31.8 In any event, no arbitration shall commence earlier than 90 days after the service of the notice of a dispute or difference, except as provided for at sub-clause 31.9 herein.

31.9 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 sub-contract without having to comply with sub clause 31.8 herein.

31.9.1 Whether or not the issue of an instruction by the Project Manager is authorized by the main contract or these conditions, and

31.9.2 Whether or not a payment certificate has been improperly withheld or is not in accordance with the main contract or these conditions or though issued, it has not been honoured.

31.10 All other matters in dispute shall only be referred to arbitration after the practical completion or alleged practical completion of the works or abandonment of the works or termination or alleged termination of the sub-contract, unless the project manager the contractor and the sub-contractor agree otherwise in writing.

31.11 The Arbitrator shall, without prejudice to the generality of his powers, have power 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 or included in any payment certificate.

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

31.13 Provided that any decision of the Project Manager which is final and binding on the contractor under the main contract shall be final and binding between the contractor and the sub-contractor.

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

SUB CONTRACTOR'S PERFORMANCE BOND

BY THIS AGREEMENT we .....(SURETY)

of .....

are bound to .....(CONTRACTOR)

in the sum of Kenya shillings .....

.....(Kshs. .....)

to be paid by us to the said .....(CONTRACTOR)

WHEREAS by an agreement in writing dated .....

.....(SUB-CONTRACTOR)

entered into a sub-contract with .....(CONTRACTOR)

to carry out and complete the works therein stated in the manner and by the time therein specified all in accordance with the provisions of the said sub-contract, namely:
(description of works)
.....

NOW the condition of the above written bond is such that if the said sub-contractor, his executors, administrator, successors or assigns shall duly perform his obligations under the sub-contract, of if on default by the sub-contractor the surety shall satisfy and discharge the damages sustained by the contractor thereby up to the amount of the above written bond, then this obligation shall be void, otherwise it shall remain in full force and effect. Upon default, and without prejudice to his other rights under the sub-contract, the contractor shall be entitled to demand forfeiture of the bond and we undertake to honour the demand in the amount stated above.

PROVIDED always and it is hereby agreed and declared that no alteration in the terms of the said sub-contract or in the extend or nature of the works to be carried out and no extension of time by the contractor under the sub-contract shall in any way release the surety from any liability under the above written bond.

IN WITNESS whereof we have set out hand this..... day of .....

....

Surety Witness

Authrorised by Power of Attorney No.....

APPENDIX	**Clause**
Name of sub-contractor's insurers	6.0.....
Name of sub-contractor's surety	7.0.....
Amount of surety	7.0.....
Period of possession of site	8.1.....
Date of commencement of works	8.2.....
Date for practical completion	8.2.....
Interval for application of payment certificates	23.1.....
Minimum amount of payment certificate	23.4.....
Percentage of certified value retained	23.6.....
Limit of retention fund, if any	23.6.....
Name of the sub-contractor's bank for Purposes of interest calculation.	23.7, 23.8.....
Defects liability period	23.11.....
Period of final measurement and valuation	23.12.....
Damages of delay in completion	27.1 at the rate of Kshs. 100,000 /wk ..

Signed by the said:

....

CONTRACTOR **SUB-CONTRACTOR**

APPENDIX TO AGREEMENT AND CONDITIONS OF SUB-CONTRACT FOR BUILDING WORKS

Modify Clause 28.4
This is a fixed price contract.

SECTION C

SUB-CONTRACT PRELIMINARIES

AND

GENERAL CONDITIONS

CONTRACT PRELIMINARIES AND GENERAL CONDITIONS

SECTION C

SUB-CONTRACT PRELIMINARIES AND GENERAL CONDITIONS

1.01 Examination of Tender Documents

The tenderer is required to check the number of pages of this document and should he find any missing or indistinct, he must inform the Engineer at once and have the same rectified.

All tenderers shall be deemed to have carefully examined the following:

a) Work detailed in the Specification and in the Contract Drawings.
b) The Republic of Kenya Document "General Conditions of Contract for Electrical and Mechanical Works".
c) Other documents to which reference is made.

He shall also be deemed to have included for any expenditure which may be incurred in conforming to the above items (a), (b), (c) and observe this expense as being attached to the contract placed for the whole or any part of the work.

The tenderer shall ensure that all ambiguities, doubts or obscure points of detail, are clarified with the Engineer before submission of his tender, as no claims for alleged deficiencies in the information given shall be considered after this date.

1.02 Discrepancies

The Sub-contractor shall include all work either shown on the Contract Drawings or detailed in the specification. No claim or extra cost shall be considered for works which has been shown on the drawings or in the specification alone.

Should the drawing and the specification appear to conflict, the Sub-contractor shall query the points at the time of tendering and satisfy himself that he has included for the work intended, as no claim for extra payment on this account shall be considered after the contract is awarded.

1.03 Conditions of Sub-Contract Agreement

The Sub-contractor shall be required to enter into a Sub-contract with the Main Contractor.

The Conditions of the Contract between the Main Contractor and the Sub-contractor as hereinafter defined shall be the latest edition of the Agreement and Schedule of Conditions of Kenya Association of Building and Civil Engineering Contractors as particularly modified and amended hereinafter.

For the purpose of this contract the Agreement and Schedule of Conditions and any such modifications and amendments shall read and construed together. In any event of discrepancy the modifications and amendments shall prevail.

1.04 Payment

Payment will be made through certificates direct to the subcontractor. All the subcontractors valuations claim must done through the main contractor and subsequently forwarded to the consultants . All payments will be less retention as specified in the Main Contract. No payment will become due until materials are delivered to site.

1.05 **Definition of Terms**

Throughout these contract documents units of measurements, terms and expressions are abbreviated and wherever used hereinafter and in all other documents they shall be interpreted as follows:

i. The term **"Employer"** shall mean **Kenya Medical Supplies Authority**

ii. The Term **"Project Manager "** Shall Mean **Works secretary, State Department of Public Works, Ministry of Transport, Infrastructure, Housing and Urban Development**

iii. The term **"Architect: "** shall mean **Maestro Architects Ltd**

iv. The term **"Quantity Surveyor"** shall mean **M & M Construction Consultants.**

v. The term **"Civil/Structural Engineers "** shall mean **Kiri Consult Ltd**

vi. **Engineer:** The term **"Engineer"** shall mean **Norkun Intakes Ltd**

vii. **Main Contractor:** The term **"Main Contractor"** shall mean the firm or company appointed to carry out the Building Works and shall include his or their heir, executors, assigns, administrators, successors, and duly appointed representatives.

vii) **Sub-contractor:** The term **"Sub-contractor"** shall mean the persons or person, firm or Company whose tender for this work has been accepted, and who has entered into a contract agreement with the Contractor for the execution of the Sub-contract Works, and shall include his or their heirs, executors, administrators, assigns, successors and duly appointed representatives.

viii) **Sub-contract Works:** The term **"Sub-contract Works"** shall mean all or any portion of the work, materials and articles, whether the same are being manufactured or prepared, which are to be used in the execution of this Sub-contract and whether the same may be on site or not.

ix) **Contract Drawings:** The term **"Contract Drawings"** shall mean those drawings required or referred to herein and forming part of the Bills of Quantities.

x) **Working Drawings:** The term **"Working Drawings"** shall mean those drawings required to be prepared by the Sub-contractor as hereinafter described.

xi) **Record Drawings:** The term **"Record Drawings"** shall mean those drawings required to be prepared by the Sub-contractor showing "as installed" and other records for the Sub-contract Works.

xii) **Abbreviations:**

CM shall mean **Cubic Metre**

SM shall mean **Square Metre**

LM shall mean **Linear Metre**

M shall mean **Metre**

LS shall mean **Lump Sum**

mm shall mean **Millimetres**

No. shall mean **Number**

Kg. shall mean **Kilogramme**

KEBS shall mean **Kenya Bureau of Standards**

BS shall mean. **Current standard British Standard Specification published by the British Standard Institution, 2 Park Street, London W1, England**

"Ditto" shall mean the whole of the preceding description in which it occurs.

Where it occurs in description of succeeding item it shall mean the same as in the first description of the series in which it occurs except as qualified in the description concerned.

Where it occurs in brackets it shall mean the whole of the preceding description which is contained within the appropriate brackets.

1.06 **Site Location**

The site of the Sub-contract Works is situated **at Embakasi Nairobi**

The tenderer is recommended to visit the site and shall be deemed to have satisfied himself with regard to access, possible conditions, the risk of injury or damage to property on/or adjacent to the site, and the conditions under which the sub-contract Works shall have to be carried out and no claims for extras will be considered on account of lack of knowledge in this respect.

1.07 **Duration of Sub-Contract**

The Sub-Contractor shall be required to phase his work in accordance with the Main contractor's program (or its revision). The program is to be agreed with the Main contractor.

1.08 **Scope of Sub-Contract Works**

The sub-contractor shall supply, deliver, unload, hoist, fix, test, commission and hand-over in satisfactory working order the complete installations specified hereinafter and/or as shown on the Contract Drawings attached hereto, including the provision of labour, transport and plant for unloading material and storage, and handling into position and fixing, also the supply of ladders, scaffolding the other mechanical devices to plant, installation, painting, testing, setting to work, the removal from site from time to time of all superfluous material and rubbish caused by the works.

The sub-contractor shall supply all accessories, whether of items or equipment supplied by the Main Contractor but to be fixed and commissioned under this Sub-contract.

1.09 **Extent of the Sub-contractor's Duties**

At the commencement of the works, the Sub-contractor shall investigate and report to the Engineer if all materials and equipment to be used in the work and not specified as supplied by the others are available locally. If these materials and equipment are not available locally, the Sub-contractor shall at this stage place orders for the materials in question and copy the orders to the Engineer. Failure to do so shall in no way relieve the Sub-contractor from supplying the specified materials and equipment in time.

Materials supplied by others for installation and/or connection by the Subcontractor shall be carefully examined in the presence of the supplier before installation and connection. Any defects noted shall immediately be reported to the Engineer.

The Sub-contractor shall be responsible for verifying all dimensions relative to his work by actual measurements taken on site.

The Sub-contractor shall mark accurately on one set of drawings and indicate all alterations and/or modifications carried out to the designed system during the construction period. This information must be made available on site for inspection by the Engineer.

1.10 Execution of the Works

The works shall be carried out strictly in accordance with:

a) All relevant Kenya Bureau of Standards Specifications.
b) All relevant British Standard Specifications and Codes of Practice (hereinafter referred to as B.S. and C.P. respectively).
c) This Specification.
d) The Contract Drawings.
e) The Bye-laws of the Local Authority.
f) The Architect's and/or Engineer's Instructions.

The Contract Drawings and Specifications to be read and construed together.

1.11 Validity of Tender

The tender shall remain valid for acceptance within 120 days from the final date of submission of the tender, and this has to be confirmed by signing the Tender Bond. The tenderer shall be exempted from this Bond if the tender was previously withdrawn in writing to the Employer before the official opening.

1.12 Firm – Price Sub-contract

Unless specifically stated in the documents or the invitation to tender, this is a firm-price Contract and the Sub-contractor must allow in his tender for the increase in the cost of labour and/or materials during the duration of the contract. No claims will be allowed for increased costs arising from the fluctuations in duties and/or day to day currency fluctuations. The Sub-contractor will be deemed to have allowed in his tender for any increase in the cost of materials which may arise as a result of currency fluctuation during the contract period.

1.13 Variation

No alteration to the Sub-contract Works shall be carried out until receipt by the Sub-contractor of written instructions from the Project Manager.

Any variation from the contract price in respect of any extra work, alteration or omission requested or sanctioned by the Project Manager or Engineer shall be agreed and confirmed in writing at the same time such variations are decided and shall not affect the validity of the Contract. Schedule of Unit Rates shall be used to assess the value of such variations. No allowance shall be made for loss of profit on omitted works.

Where the Project Manager requires additional work to be performed, the Sub-contractor, if he considers it necessary, will give notice within seven (7) days to the Main Contractor of the length of time he (the Sub-contractor) requires over and above that allotted for completion of the Sub-contract.

If the Sub-contractor fails to give such notice he will be deemed responsible for the claims arising from the delay occasioned by reason of such extension of time.

1.14 Prime Cost and Provisional Sums

A specialist Sub-contractor may be nominated by the Project Manager to supply and/or install any equipment covered by the Prime Cost or Provisional Sums contained within the Sub-contract documents.

The work covered by Prime Cost and Provisional Sums may or may not be carried out at the discretion of the Architect.

The whole or any part of these sums utilized by the Sub-contractor shall be deducted from the value of the Sub-contract price when calculating the final account.

1.15 **Bond**

The tenderer must submit with his tender the name of one Surety who must be an established Bank only who will be willing to be bound to the Main Contractor for an amount equal to 5 % of the Sub-contract amount as per the Main Contract condition of contract.

1.16 **Government Legislation and Regulations**

The Sub-contractor's attention is called to the provision of the Factory Act 1972 and subsequent amendments and revisions, and allowance must be made in his tender for compliance therewith, in so far as they are applicable.

The Sub-contractor must also make himself acquainted with current legislation and any Government regulations regarding the movement, housing, security and control of labour, labour camps, passes for transport, etc.

The Sub-contractor shall allow for providing holidays and transport for work people, and for complying with Legislation, Regulations and Union Agreements.

1.17 **Import Duty and Value Added Tax**

The Sub-contractor will be required to pay full Import Duty and Value Added Tax on all items of equipment, fittings and plant, whether imported or locally manufactured. The tenderer shall make full allowance in his tender for all such taxes

1.18 **Insurance Company Fees**

Attention is drawn to the tenderers to allow for all necessary fees, where known, that may be payable in respect of any fees imposed by Insurance Companies or statutory authorities for testing or inspection.

No allowance shall be made to the Sub-contractor with respect to fees should these have been omitted by the tenderer due to his negligence in this respect.

1.19 **Provision of Services by the Main Contractor**

In accordance with Clause 1.08 of this Specification the Main Contractor shall make the following facilities available to the Sub-contractor:

a) Attendance on the Sub-contractor and the carrying out of all work affecting the structure of the building which may be necessary, including all chasing, cutting away and making good brickwork, etc., except that all plugging for fixing, fittings, machinery, fan ducting, etc., and all drilling and tapping of steel work shall be the responsibility of the Sub-contractor. Any purpose made fixing brackets shall not constitute Builder's Work and shall be provided and installed by the Sub-contractor unless stated hereinafter otherwise.

b) The provision of temporary water, lighting and power: All these services utilized shall be paid for by the Main Contractor. The Sub-contractor shall, however, allow for additional connections/extensions required for his purposes.

c) Fixing of anchorage and pipe supports in the shuttering, except that all anchorage shall be Supplied by the Sub-contractor who shall also supply the Main Contractor with fully dimensioned drawings detailing the exact locations.

d) i) Provision of scaffolding, cranes, etc. but only in so far as it is required for the Main Contract Works. It shall be the Sub-contractor's responsibility to liaise with the Main Contractor to ensure that there is maximum co-operation with other Sub-contractors in the use of scaffolding, cranes, etc.

ii) Any specialist scaffolding, cranes, etc. by the Sub-contractor for his own exclusive use shall be paid for by the Sub-contractor.

1.20 **Suppliers**

The Sub-contractor shall submit names of any supplier for the materials to be incorporated, to the Engineer for approval. The information regarding the names of the suppliers may be submitted at different times, as may be convenient, but no sources of supply will be changed without prior approval.

Each supplier must be willing to admit the Engineer or his representative to his premises during working hours for the purpose of examining or obtaining samples of the materials in question.

1.21 **Samples and Materials Generally**

The Sub-contractor shall, when required, provide for approval at no extra cost, samples of all materials to be incorporated in the works. Such samples, when approved, shall be retained by the Engineer and shall form the standard for all such materials incorporated.

1.22 **Administrative Procedure and Contractual Responsibility**

Wherever within the Specification it is mentioned or implied that the Sub-contractor shall deal direct with the Employer or Engineer, it shall mean "through the Contractor" who is responsible to the Employer for the whole of the works including the Sub-contract Works.

1.23 **Bills of Quantities**

The Bills of Quantities have been prepared in accordance with the standard method of measurement of Building Works for East Africa, first Edition, Metric, 1970. All the Quantities are based on the Contract Drawings and are provisional and they shall not be held to gauge or to limit the amount or description of the work to be executed by the Sub-contractor but the value thereof shall be deducted from the Sub-contract Sum and the value of the work ordered by the Engineer and executed there under shall be measured and valued by the Engineer in accordance with the conditions of the Sub-contract.

All work liable to adjustment under this Sub-contract shall be left uncovered for a reasonable time to allow measurements needed for such adjustment to be taken by the Quantity Surveyor or Engineer. Immediately the work is ready for measuring the Sub-contractor shall give notice to the Quantity Surveyor or Engineer to carry out measurements before covering up. If the Sub-contractor shall make default in these respects he shall, if the Project Manager so directs, uncover the work to enable the necessary measurements to be taken and afterwards reinstate at his own expense.

1.24 **Sub-contractor's Office in Kenya**

The Sub-contractor shall maintain (after first establishing if necessary) in Kenya an office staffed with competent Engineer Manager and such supporting technical and clerical staff as necessary to control and coordinate the execution and completion of the Sub-contract Works.

The Engineer Manager and his staff shall be empowered by the Sub-contractor to represent him at meetings and in discussions with the Main Contractor, the Engineer and other parties who may be concerned and any liaison with the Sub-contractor's Head Office on matters relating to the design, execution and completion of the Sub-contract Works shall be effected through his office in Kenya.

It shall be the Sub-contractor's responsibility to procure work permits, entry permits, licenses, registration, etc., in respect of all expatriate staff.

The Sub-contractor shall prepare a substantial proportion of his Working Drawings at his office in Kenya. No reasons for delays in the preparation or submission for approval or otherwise of such drawings or proposals will be accepted on the grounds that the Sub-contractor's Head Office is remote from his office in Nairobi or the site of the Sub-contract Works or otherwise.

1.25 **Builder's Work**

All chasing, cutting away and making good will be done by the Main Contractor but the Sub-contractor shall mark out in advance and shall be responsible for accuracy of the size and position of all holes and chases required.

The Sub-contractor shall drill and plug holes in floors, walls, ceiling and roof for securing services and equipment requiring screw or bolt fixings.

Any purpose made fixing brackets shall not constitute builder's work and shall be provided and installed by the Sub-contractor unless stated hereinafter to the contrary.

1.26 **Structural Provision for the Works**

Preliminary major structural provision has been made for the Sub-contract Works based on outline information ascertained during the preparation of the Specification.

The preliminary major structural provision made will be deemed as adequate unless the Sub-contractor stated otherwise when submitting his tender.

Any major structural provision or alteration to major structural provisions required by the Sub-contractor shall be shown on Working Drawings to be submitted to the Engineer within 30 days of being appointed.

No requests for alterations to preliminary major structural provisions will be approved except where they are considered unavoidable by the Engineer. In no case will they be approved if building work is so far advanced as to cause additional costs or delays in the work of the Main Contractor.

1.27 Position of Services, Plant, Equipment, Fittings and Apparatus

The Contract Drawings give a general indication of the intended layout. The position of the equipment and apparatus, and also the exact routes of the ducts, main and distribution pipework shall be confirmed before installation is commenced. The exact siting of appliances, pipework, etc., may vary from that indicated.

The routes of services and positions of apparatus shall be determined by the approved dimensions detailed in the Working Drawings or on site by the Engineer in consultation with the Sub-contractor or the Main Contractor.

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

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

1.28 **Checking of Work**

The Sub-contractor shall satisfy himself to the correctness of the connections he makes to all items of equipment supplied under the Sub-contract agreement and equipment supplied under other contracts before it is put into operation. Details of operation, working pressures, temperatures, voltages, phases, power rating, etc., shall be confirmed to others and confirmation received before the system is first operated.

1.29 **Setting to Work and Regulating System**

The Sub-contractor shall carry out such tests of the Sub-contract Works as required by British Standard Specifications or equal and approved codes as specified hereinafter and as customary.

No testing or commissioning shall be undertaken except in the presence of and to the satisfaction of the Engineer unless otherwise stated by him (Sub-contractor's own preliminary and proving tests excepted).

It will be deemed that the Sub-contractor has included in the Sub-contract Sum for the costs of all fuel, power, water and the like, for testing and commissioning as required as part of the Sub-contract Works. He shall submit for approval to the Engineer a suitable programme for testing and commissioning. The Engineer and Employer shall be given ample warning in writing, as to the date on which testing and commissioning will take place.

The Sub-contractor shall commission the Sub-contract Works and provide attendance during the commissioning of all services, plant and apparatus connected under the Sub-contract Agreement or other Sub-contract Agreements, related to the project.

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

The proving of any system of plant or equipment as to compliance with the Specification shall not be approved by the Engineer, except at his discretion, until tests have been carried out under operating conditions pertaining to the most onerous conditions specified except where the time taken to obtain such conditions is unreasonable or exceeds 12 months after practical completion of the Sub-contract Works.

1.30 **Identification of Plant Components**

The Sub-contractor shall supply and fix identification labels to all plant, starters, switches and items of control equipment including valves, with white traffolyte or equal labels engraved in red lettering denoting its name, function and section controlled. The labels shall be mounted on equipment and in the most convenient positions. Care shall be taken to ensure the labels can be read without difficulty. This requirement shall apply also to major components of items of control equipment.

Details of the lettering of the labels and the method of mounting or supporting shall be forwarded to the Engineer for approval prior to manufacture.

1.31 **Contract Drawings**

The Contract Drawings when read in conjunction with the text of the Specification, have been completed in such detail as was considered necessary to enable competitive tenders to be obtained for the execution and completion of the Sub-contract works.

The Contract Drawings are not intended to be Working Drawings and shall not be used unless exceptionally they are released for this purpose.

1.32 **Working Drawings**

The Sub-contractor shall prepare such Working Drawings as may be necessary. The Working Drawings shall be complete in such detail not only that the Sub-contract Works can be executed on site but also that the Engineer can approve the Sub-contractor's proposals, detailed designs and intentions in the execution of the Sub-contract Works.

If the Sub-contractor requires any further instructions, details, Contract Drawings or information drawings to enable him to prepare his Working Drawings or proposals, the Sub-contractor shall accept at his own cost, the risk that any work, commenced or which he intends to commence at site may be rejected.

The Engineer, in giving his approval to the Working Drawings, will presume that any necessary action has been, or shall be taken by the Sub-contractor to ensure that the installations shown on the Working Drawings have been cleared with the Main Contractor and any other Sub-contractors whose installations and works might be affected.

If the Sub-contractor submits his Working Drawings to the Engineer without first liaising and obtaining clearance for his installations from the Main Contractor and other Sub-contractors whose installations and works might be affected, then he shall be liable to pay for any alterations or modification to his own, the Main Contractor's or other Sub-contractor's installations and works, which are incurred, notwithstanding any technical or other approval received from the Engineer.

Working Drawings to be prepared by the Sub-contractor shall include but not be restricted to the following:

a) Any drawings required by the Main Contractor, or Engineer to enable structural provisions to be made including Builder's Working Drawings or Schedules and those for the detailing of holes, fixings, foundations, cables and paperwork ducting below or above ground or in or outside or below buildings.

b) General Arrangement Drawings of all plant, control boards, fittings and apparatus or any part thereof and of installation layout arrangement of such plant and apparatus.

c) Schematic Layout Drawings of services and of control equipment.

d) Layout Drawings of all embedded and non-embedded paperwork, ducts and electrical conduits.

e) Complete circuit drawings of the equipment, together with associated circuit description.

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

Three copies of all Working Drawings shall be submitted to the Engineer for approval. One copy of the Working Drawings submitted to the Engineer for approval shall be returned to the Sub-contractor indicating approval or amendment therein.

Six copies of the approved Working Drawings shall be given to the Main Contractor by the Sub-contractor for information and distribution to other Sub-contractors carrying out work associated with or in close proximity to or which might be affected by the Sub-contract Works.

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

Approval by the Engineer of Working Drawings shall neither relieve the Sub-contractor of any of his obligations under the Sub-contract nor relieve him from correcting any errors found subsequently in the Approved Working Drawings or other Working Drawings and in the Sub-contract Works on site or elsewhere associated therewith.

The Sub-contractor shall ensure that the Working Drawings are submitted to the Project Manager for approval at a time not unreasonably close to the date when such approval is required. Late submission of his Working Drawings will not relieve the Sub-contractor of his obligation to complete the Sub-contract Works within the agreed Contract Period and in a manner that would receive the approval of the Architect.

1.33 **Record Drawings (As Installed) and Instructions**

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

Record Drawings, may, subject to the approval of the Engineer, include approved Working Drawings adjusted as necessary and certified by the Sub-contractor as a correct record of the installation of the Sub-contract Works.

They shall include but not restricted to the following drawings or information:

a) Working Drawings amended as necessary but titled "Record Drawings" and certified as a true record of the "As Installed" Sub-contract Works. Subject to the approval of the Engineer such Working Drawings as may be inappropriate may be omitted.
b) Fully dimensioned drawings of all plant and apparatus.
c) General arrangement drawings of equipment, other areas containing plant forming part of the Sub-contract Works and the like, indicating the accurate size and location of the plant and apparatus suitability cross-referenced to the drawings mentioned in (b) above and hereinafter.
d) Routes, types, sizes and arrangement of all pipework and ductwork including dates of installation of underground pipework.
e) Relay adjustment charts and manuals.
f) Routes, types, sizes and arrangement of all electric cables, conduits, ducts and wiring including the dates of installation of buried works.
g) System schematic and trunking diagrams showing all salient information relating to control and instrumentation.
h) Grading Charts.
i) Valve schedules and locations suitability cross-referenced.
j) Wiring and piping diagrams of plant and apparatus.
k) Schematic diagrams of individual plant, apparatus and switch and control boards. These diagrams to include those peculiar to individual plant or apparatus and also those applicable to system operation as a whole.
l) Operating Instruction

Schematic and wiring diagrams shall not be manufacturer's multipurpose general issue drawings. They shall be prepared specially for the Sub-contract Works and shall contain no spurious or irrelevant information.

Marked-up drawings of the installation of the Sub-contract Works shall be kept to date and completed by the date of practical or section completion. Two copies of the Record Drawings of Sub-contract Works and two sets of the relay adjustment and grading charts and schematic diagrams on stiff backing shall be provided not later than one month later.

The Sub-contractor shall supply for fixing in sub-stations, switch-rooms, boiler houses, plant rooms, pump houses, the office of the Maintenance Engineer and other places, suitable valve and instructions charts, schematic diagrams of instrumentation and of the electrical reticulation as may be requested by the Engineer providing that the charts, diagrams, etc., relate to installations forming part of the Sub-contract Works. All such charts and diagrams shall be of suitable plastic material on a stiff backing and must be approved by the Engineer before final printing.

Notwithstanding the Sub-contractor's obligations referred to above, if the Sub-contractor fails to produce to the Engineer's approval, either:-

a) The Marked-up Drawings during the execution of the Sub-contract Works or
b) The Record Drawings, etc., within one month of the Section or Practical Completion

The Engineer shall have these drawings produced by others. The cost of obtaining the necessary information and preparing such drawings, etc., will be recovered from the Sub-contractor.

1.34 **Maintenance Manual**

Upon Practical Completion of the Sub-contract Works, the Sub-contractor shall furnish the Engineer four copies of a Maintenance Manual relating to the installation forming part of all of the Sub-contract Works.

The manual shall be loose-leaf type, International A4 size with stiff covers and cloth bound. It may be in several volumes and shall be sub-divided into sections, each section covering one Engineering service system. It shall have a ready means of reference and a detailed index.

There shall be a separate volume dealing with Air Conditioning and Mechanical Ventilation installation where such installations are included in the Sub-contract Works.

The manual shall contain full operating and maintenance instructions for each item of equipment, plant and apparatus set out in a form dealing systematically with each system. It shall include as may be applicable to the Sub-contract Works the following and any other items listed in the text of the Specifications:

a) System Description.
b) Plant
c) Valve Operation
d) Switch Operation
e) Procedure of Fault Finding
f) Emergency Procedures
g) Lubrication Requirements
h) Maintenance and Servicing Periods and Procedures
i) Colour Coding Legend for all Services
j) Schematic and Writing Diagrams of Plant and Apparatus
k) Record Drawings, true to scale, folded to International A4 size
l) Lists of Primary and Secondary Spares.

The manual is to be specially prepared for the Sub-contract Works and manufacturer's standard descriptive literature and plant operating instruction cards will not be accepted for inclusion unless exceptionally approved by the Engineer. The Sub-contractor shall, however, affix such cards, if suitable, adjacent to plant and apparatus. One spare set of all such cards shall be furnished to the Engineer.

1.35 **Hand-over**

The Sub-contract Works shall be considered complete and the Maintenance and Defects Liability Period shall commence only when the Sub-contract Works and supporting services have been tested, commissioned and operated to the satisfaction of the Engineer and officially approved and accepted by the Employer, provided always that the handing over of the Sub-contract Works shall be coincident with the handing over of the Main Contract Works.

The procedure to be followed will be as follows:

a) On the completion of the Sub-contract Works to the satisfaction of the Engineer and the Employer, the Sub-contractor shall request the Engineer, at site to arrange for handing over.
b) The Engineer shall arrange a Hand-over Meeting or a series thereof, at site.

c) The Sub-contractor shall arrange with the Engineer and Employer for a complete demonstration of each and every service to be carried out and for instruction to be given to the relevant operation staff and other representatives of the Employer.

d) In the presence of the Employer and the Engineer, Hand-over will take place, subject to Agreement of the Hand-over Certificates and associated check lists.

1.36 **Painting**

It will be deemed that the Sub-contractor allowed for all protective and finish painting in the Sub-contract Sum for the Sub-contract Works, including colour coding of service pipework to the approval of the Engineer. Any special requirements are described in the text of the Specifications.

1.37 **Spares**

The Sub-contractor shall supply and deliver such spares suitably protected and boxed to the Engineer's approval as are called for in the Specifications or in the Price Schedules.

1.38 **Testing and Inspection – Manufactured Plant**

The Engineer reserves the right to inspect and test or witness of all manufactured plant equipment and materials.

The right of the Engineer relating to the inspection, examination and testing of plant during manufacture shall be applicable to Insurance companies and inspection authorities so nominated by the Engineer.

The Sub-contractor shall give two week's notice to the Engineer of his intention to carry out any inspection or tests and the Engineer or his representative shall be entitled to witness such tests and inspections

Six copies of all test certificates and performance curves shall be submitted as soon as possible after the completion of such tests, to the Engineer for his approval.

Plant or 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 certificate not be approved new tests may be ordered by the Engineer at the Sub-contractor's expense.

The foregoing provisions relate to tests at manufacturer's works and as appropriate to those carried out at site.

1.39 **Testing and Inspection -Installation**

Allow for testing each section of the Sub-contract Works installation as described hereinafter to the satisfaction of the Engineer.

1.40 **Labour Camps**

The Sub-contractor shall provide the necessary temporary workshop and mess-room in position to be approved by the Architect.

The work people employed by the Sub-contractor shall occupy or be about only that part of the site necessary for the performance of the work and the Sub-contractor shall instruct his employees accordingly.

If practicable, W.C. accommodation shall be allocated for the sole use of the Sub-contractor's workmen and the Sub-contractor will be required to keep the same clean and disinfected, to make good any damage thereto and leave in good condition.

1.41 **Storage of Materials**

Space for storage will be provided by the Main contractor but the sub-contractor will be responsible for provision of any lock-up sheds or stores required.

Nominated Sub-contractors are to be made liable for the cost of any storage accommodation provided specially for their use. No materials shall be stored or stacked on suspended slabs without the prior approval of the Project manager.

1.42 **Initial Maintenance**

The sub-contractor shall make routine maintenance once a month during the liability for the Defects Period and shall carry out all necessary adjustments and repairs, cleaning and oiling of moving parts. A monthly report of the inspection and any works done upon the installation shall be supplied to the Engineer.

The sub-contractor shall also provide a 24 -hour break-down service to attend to faults on or malfunctioning of the installation between the routine visits of inspection.

The sub-contractor shall allow in the sub-contract Sum of the initial maintenance, inspection and break-down 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 as oils, greases, sandpaper, etc., or parts which are periodically renewed such as brake linings etc., or parts which are faulty for any reason whatsoever excepting always Acts of God such as storm, tempest, flood, earthquake and civil revolt, acts of war and vandalism.

1.43 **Maintenance and Servicing After Completion of the Initial Maintenance**

The sub-contractor shall, if required, enter into a maintenance and service agreement with the employer for the installation for a period of up to five years from the day following the last day of the liability for Defects Period which offers the same facilities as specified in Clause 1.42 (Initial Maintenance).

The terms of any such agreement shall not be less beneficial to the employer than the terms of Agreements for either similar installation.

The sub-contractor shall submit with his tender for the works, where called upon a firm quotation for the maintenance and service of the installation as specified herein, which shall be based upon the present day costs and may be varied only to take into account increases in material and labour unit rate costs between the time of tendering and the signing of the formal maintenance and service agreement and which shall remain valid and open for acceptance by the Employer to and including the last day of the fifth complete calendar month following the end of the liability for Defects Period.

1.44 **Trade Names**

Where trade names of manufacturer's catalogue numbers are mentioned in the Specification or the Bills of Quantities, the reference is intended as a guide to the type of article or quality of material required. Alternate brands of equal and approved quality will be acceptable.

1.45 **Water and Electricity for the Works**

These will be made available by the Main Contractor. The Sub-contractor shall be liable for the cost of any water or electric current used and for any installation provided especially for their own use by the Main Contractor.

1.46 **Protection**

The sub-contractor shall adequately cover up and protect his own work to prevent injury and also to cover up and protect from damage all parts of the building or premises where work is performed by him under the Contract.

1.47 **Defects After Completion**

The defects liability period will be 6 months from the date of completion of the Main Contract as certified by the Engineer.

1.48 **Damages for Delay**

Liquidated and Ascertained damages as stated in the Main Contract Agreement will be claimed against the Main Contract for any unauthorised delay in completion. The Sub-contractor shall be held liable for the whole or a portion of these damages should he cause delay in completion.

1.49 **Clear Away on Completion**

The sub-contractor shall, upon completion of the works, at his own expense, remove and clear away all plant, equipment, rubbish and unused materials, and shall leave the whole of the works in a clean and tidy state, to the satisfaction of the Engineer. On completion, the whole of the works shall be delivered up clean, complete and perfect in every respect to the satisfaction of the Engineer.

1.50 **Final Account**

On completion of the works the sub-contractor shall agree with the Engineer the value of any variations outstanding and as soon as possible thereafter submit to the Engineer his final statement of account showing the total sum claimed sub-divided as follows:

Statement A - detailing the tender amounts less the Prime Cost and Provisional Sums, included therein.

Statement B - detailing all the variation orders issued on the contract.

Statement C - Summarizing statement A and B giving the net grand total due to the Contractor for the execution of the Contract.

1.51 **Fair Wages**

The sub-contractor shall in respect of all persons employed anywhere by him in the execution of the sub-contract, in every factory, workshop or place occupied or used by him for execution of the Contract, observe and fulfill the following conditions:

a) The sub-contractor shall pay rates of the wages and observe hours and conditions of labour not less favourable than those established for the trade or industry in the district where work is carried out.

b) In the absence of any rates of wages, hours or conditions of labour so established the sub-contractor shall pay rates and observe hours and conditions of labour are not less favourable than the general level of wages, hours and conditions observed by other employers whose general circumstances in the trade or industry in which the Contractor is engaged are similar.

1.52 Supervision

During the progress of the works, the Sub-contractor shall provide and keep constantly available for consultation on site an experienced English - speaking Supervisor and shall provide reasonable office facilities, attendance, etc., for the Supervisor.

In addition, during the whole of the time the works are under construction, the sub-contractor shall maintain on site one experienced foreman or charge-hand and an adequate number of fitters, etc., for the work covered by the Specification. The number of this staff shall not be reduced without the prior written approval of the Project manager or Engineer.

Any instructions given to the Supervisor on site shall be deemed to have been given to the sub-contractor.

One copy of this Specification and one copy of each of the Contract Drawings (latest issue) must be retained on site at all times, and available for reference by the Engineer or sub-contractor.

1.53 Test Certificates

The Sub-contractor shall provide the Engineer with three copies of all test reports or certificates that are or may be required by this Specification.

1.54 Labour

The Sub-contractor shall provide skilled and unskilled labour as may be necessary for completion of the contract.

1.55 Discount to the Main Contractor

No discount to the Main Contractor will be included in the tender for this installation.

1.56 Guarantee

The whole of the work will be guaranteed for a period of six months from the date of the Engineer's certification of completion and under such guarantee the Sub-contractor shall remedy at his expense all defects in materials and apparatus due to faulty design, construction or workmanship which may develop in that period.

1.57 Direct Contracts

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 instance, profit relative to the P.C Sum in the priced Bills of Quantities will be adjusted as deserved for P.C Sum allowed.

1.58 Attendance Upon the Tradesmen etc

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 the use of ordinary scaffolding. The contractor however, shall not be required to erect any special scaffolding for them.

1.59 Trade Unions

The contractor shall recognize the freedom of his work people to be members of trade unions.

1.60 Local and other Authorities notices and fees

The contractor shall comply with and give all notices required by any Regulations, Act or by Law of any Local Authority or of any Public Service, Company or Authority who have any jurisdiction with regard to the works or with those systems the same are or will be connected and he shall pay and indemnify the Government against any fees or charges legally demandable under any regulation or by-law in respect of the works; provided that the said fees and charges if not expressly included in the contract sum or stated by way of provisional sum shall be added to the contract sum.

The contractor before making any variation from the contract drawings or specification necessitated by such compliance shall give the Project Manager written notice specifying and giving the reason for such variation and applying for instructions in reference thereto.

If the contractor within seven days of having applied for the same does not receive such instructions, he shall proceed with the works in conforming to the provision regulation or by-law in question and any variation thereby necessitated shall be deemed to be a variation in accordance to the conditions of contract.

1.61 Assignment or subletting

The contractor shall not without the written consent of the Project Manager assign this contract or sublet any portion of the works, provided that such consent shall not be unreasonably withheld to the prejudice of the contractor.

1.62 Partial Completion

If the Government shall take over any part or parts works, apparatus, equipment etc. then within seven days from the date on which the Government shall have taken possession of the relevant part, the Project Manager shall issue a Certificate stating his estimate of the approximate total value of the works which shall be the total value of that part and practical completion of the relevant part shall be deemed to have occurred, and the Defects Liability Period in respect of the relevant part be deemed to have commenced on the date Government shall have taken possession thereof.

The contractor shall make good any defects or other faults in the relevant part that had been deemed complete.

The contractor shall reduce the value of insurance by the full value of the relevant part

The contractor shall be paid for the part of works taken possession by the Government

1.63 Temporary Works

Where temporal works shall be deemed necessary, such as Temporary lighting, the contractor shall take precaution to prevent damage to such works.

The contractor shall include for the cost of and make necessary arrangements with the Project Manager for such temporary works. For temporary lighting, electricity shall be metered and paid for by the contract

1.64 Patent Rights

The contractor shall fully indemnify the Government of Kenya; against any action, claim or proceeding relating to infringement of any patent or design rights, and pay any royalties which may be payable in respect of any article or any part thereof, which shall have been supplied by the contractor to the Project Manager. In like manner the Government of Kenya shall fully indemnify the contractor against any such action, claim or proceedings for infringement under the works, the design thereof of which shall have been supplied by the Project Manager to the contractor, but this indemnify shall apply to the works only, and any permission or request to manufacture to the order of the Project Manager shall not relieve the contractor from liability should he manufacture for supply to other buyers.

1.65 Mobilization and Demobilization

The contractor shall mobilize labour plant and equipment to site according to his programme and schedule of work. He shall ensure optimum presence and utilization of labour, plant and equipment. He should not pay and maintain unnecessary labour force or maintain and service idle plant and equipment. Where necessary he shall demobilize and mobilize the labour, plant and equipment, as he deems fit to ensure optimum progress of the works and this shall be considered to be a continuous process as works progress. He shall make provision for this item in his tender. No claim will be entertained where the contractor has not made any provision for mobilization and demobilization of labour, plant and equipment in the preliminary bills of quantities or elsewhere in this tender.

1.66 Extended Preliminaries

Where it shall be necessary to extend the contract period by the Project manager the contractor shall still ensure availability on site, optimum labour, materials, plant and equipment. The contractor shall make provision for extended preliminaries, should the contract period be extended and this shall be in a form of a percentage of the total Contractor works. Where called upon in the Appendix to these Preliminaries the Contractor shall insert his percentage per month for extended preliminaries that shall form basis for compensation.

Lack of inserting the percentage shall mean that the sub-contractor has provided for this requirement elsewhere in the Bills of Quantities.

1.67 Supervision by Engineer and Site Meetings

A competent Project Engineer appointed by the Engineer as his representative shall supervise the Contract works. The Project Engineer shall be responsible for issuing all the site instructions in any variations to the works and these shall be delivered through the Contractor with the authority of the Project Manager. Any instructions given verbal shall be confirmed in writing.

The project engineer and (or) the Engineer shall attend management meetings arranged by the Project Manager and for which the Contractor or his representative shall also attend. For the purpose of supervising the project, provisional sums are provided to cover for transport and allowances. The Contractor shall in his tender allow for the provision of management meetings and site inspections, as instructed by the Engineer, and also profit and attendance on these funds. The funds shall be expended according to Project Manager's instructions to the contractor.

1.68 Amendment to Scope of Contract Works

No amendment to scope of sub-contract works is expected and in case of amendment or modification to scope of work, these shall be communicated to all tenderers in sufficient time before the deadline of the tender submission. However during the contract period and as the works progress the Project Manager may vary the works as per conditions of contract by issuing site instructions.
No claims shall be entertained on account of variation to scope of works either to increase the works (pre-financing) or reduction of works (loss of profit-see clause 1.70)

1.69 Contractor Obligation and Employers Obligation

The sub-contractor will finance all activities as part of his obligation to this contract. The employer shall pay interim payment for materials and work completed on site as his obligation in this contract, as the works progresses. No claims will be entertained for pre-financing of the project by the sub-contractor, or for loss of profit (expectation loss) in case of premature termination, reduction or increase of works as the sub-contractor shall be deemed to have taken adequate measures in programming his works and expenditure and taken necessary financial precaution while executing the works. No interest shall be payable to the Contractor, except as relates to late payment as in the conditions of contract clause 23.3. The contractor shall where called upon, insert his price to compensate for any of the occurrence stated here (premature termination, reduction or increase of works), as a percentage of the contract sum in the Appendix to this section.

1.70 APPENDIX TO SUB-CONTRACT PRELIMINARIES AND GENERAL CONDITIONS

1. ADD TO CLAUSE 1.17

Prices quoted shall include **16% VAT**

In accordance with current Government policy, the **3% Withholding Tax** and **6% advance V,A.T** shall be deducted from all payments made to the sub-contractor, and the same shall subsequently be forwarded to the Kenya Revenue Authority (KRA). The applicable taxes shall be varied according to the Act and Regulations in force.

BMS

INSTALLATIONS

PARTICULAR

SPECIFICATIONS

BMS PARTICULAR SPECIFICATIONS

SPECIFIC NOTES TO TENDERERS

EXTENT OF INSALLATION

The Contractor shall carry out all the necessary works for successful installation of the services mentioned as described and set out in the technical specifications, Bills of Quantities and accompanying drawings to the satisfaction of the consulting engineers.

This will include the supply & delivery of equipment, fix, install, connect, test, label, commissioning & the associated labour to a clean and neat working system that meets every detail as described in the specification

WARRANTIES

- All equipment supplied under the scope, including all associated installations shall be warranted by the manufacturer against electronic failure for the duration specified in the specifications and if possible, a lifetime warranted against Electronic & Programming failure. ("Lifetime" means that if the electronics & programming should fail at any time it will always be replaced).
- The **bidder to specify the recommended lifespan (if any)** of the system by which date replacement of the entire system is recommended.

==========

SYSTEM SPECIFICATIONS

The items described in the schedules to be priced are to meet the under listed minimum specifications and of the stated model or equal and approved.

STANDARDS

The system should follow the following standards:

- All EU standards applicable to the product
- Any other as listed in the Sections that follow

GLOSSARY OF TERMS

Terms used within the Specification Text:

- **Advanced Application Controller (AAC):**

A fully programmable control module. This control module may be capable of some of the advanced features found in Building Controllers (storing trends, initiating read and write requests, etc.) but it does not serve as a master controller. Advanced Application Controllers may reside on either the Ethernet/IP backbone or on a subnet.

- **Application Specific Controller (ASC):**

A pre-programmed control module which is intended for use in a specific application. ASCs may be configurable, in that the user can choose between various pre-programmed options, but it does not support full custom programming. ASCs are often used on terminal equipment such as VAV boxes or fan coil units. In many vendors' architectures ASCs do not store trends or schedules but instead rely upon a Building Controller to provide those functions.

- **BACnet/IP:**

An approved BACnet network type which uses an Ethernet carrier and IP addressing.

- **BACnet MS/TP:**

  An approved BACnet network type which uses a Master-Slave Token Passing configuration. MS/TP networks are unique to BACnet and utilize EIA485 twisted pair topology running at 9600 to 76,800 bps.

- **BACnet over ARCNET:**

  An approved BACnet network type which uses an ARCNET (attached resource computer network) carrier. ARCNET is an industry standard that can utilize several speeds and wiring standards. The most common configuration used by BACnet controllers is an EIA485 twisted pair topology running at 156,000 bps.

- **Building Controller (BC):**

  A fully programmable control module which is capable of storing trends and schedules, serving as a router to devices on a subnet, and initiating read and write requests to other controllers. Typically this controller is located on the Ethernet/IP backbone of the BAS. In many vendors' architectures a Building Controller will serve as a master controller, storing schedules and trends for controllers on a subnet underneath the Building Controller.

- **Direct Digital Control (DDC):**

  A control system in which a digital computer or microprocessor is directly connected to the valves, dampers, and other actuators which control the system, as opposed to indirectly controlling a system by resetting setpoints on an analog pneumatic or electronic controller.

- **PICS - Protocol Implementation Conformance Statement:**

  A written document, created by the manufacturer of a device, which identifies the particular options specified by BACnet that are implemented in the device.

- **Smart Actuator (SA):**

  An actuator which is controlled by a network connection rather than a binary or analog signal. (0-10v, 4-20mA, relay, etc.)

- **Smart Sensor (SS):**

  A sensor which provides information to the BAS via network connection rather than a binary or analog signal. (0-10000 ohm, 4-20mA, dry contact, etc.)

- **Web services:**

  Web services are a standard method of exchanging data between computer systems using the XML (extensible markup language) and SOAP (simple object access protocol) standards. Web services can be used at any level within a Building Automation System (BAS), but most commonly they are used to transfer data between BAS using different protocols or between a BAS and a non-BAS system such as a tenant billing system or a utility management system.

Terms used within the Sequences of Operation:

- **adj.**
  Adjustable by the end user, through the supplied user interface.

- **AI, AO, etc. (Column Headings on Points List)**

  AI = Analog Input. A physical input to the control module.
  AO = Analog Output. A physical output from the control module.
  AV = Analog Value. An intermediate (software) point that may be editable or read-only. Editable AVs are typically used to allow the user to set a fixed control parameter, such as a setpoint. Read Only AVs are typically used to display the status of a control operation.
  BI = Binary Input. A physical input to the control module.
  BO = Binary Output. A physical output from the control module.
  BV = Binary Value. An intermediate (software) point that may be editable or read-only. Editable BVs are typically used to allow the user to set a fixed control parameter, such as a setpoint. Read Only BVs are typically used to display the status of a control operation.
  Loop = A control loop. Most commonly a PID control loop. Typically a control loop will include a setpoint, an input which is compared to the setpoint, and an output which controls some action based upon the difference between the input and the setpoint. A PID control loop will also include gains for the proportional, integral, and derivative response as well as an interval which controls how frequently the control loop updates its output. These gains may be adjustable by the end user for control loop "tuning," but in self-tuning control loops or loops which have been optimized for a specific application the gains

may not be adjustable.
Sched = Schedule. The control algorithm for this equipment shall include a user editable schedule.
Trend. The control system shall be configured to collect and display a trend log of this object. The trending interval shall be no less than one sample every 5 minutes. (Change of Value trending, where a sample is taken every time the value changes by more than a user-defined minimum, is an acceptable alternative.)
Alarm. The control system shall be configured to generate an alarm when this object exceeds user definable limits, as described in the Sequence of Controls.

Note: If the specifications require use of the BACnet protocol, all of the above shall be provided as BACnet objects.

- **KW Demand Limiting: ***

  An energy management strategy that reduces energy consumption when a system's electric power meter exceeds an operator-defined threshold.

  When power consumption exceeds defined levels, the system automatically adjust setpoints, de-energizes low priority equipment, and takes other pre-programmed actions to avoid peak demand charges. As the demand drops, the system restores loads in a predetermined manner.

- **Occupant Override Switch, or Timed Local Override:**

  A control option that allows building occupants to override the programmed HVAC schedule for a limited period of time.

  When the override time expires, the zone returns to its unoccupied state.

- **Occupant Setpoint Adjustment:**

  A control option that allows building occupants to adjust - within limits set by the HVAC control system - the heating and cooling setpoints of selected zones. Typically the user interface for this function is built into the zone sensor.

- **Optimal Start-Up: ***

  A control strategy that automatically starts an HVAC system at the latest possible time yet ensures comfort conditions by the time the building becomes occupied.

  In a typical implementation, a controller measures the temperature of the zone and the outside air. Then, using design heating or cooling capacity at the design outside air temperature, the system computes how long a unit must run at maximum capacity to bring the zone temperature to its occupied setpoint.

  The optimal start algorithm often includes a self-learning feature to adjust for variations from design capacity.

A distributed system must use Run on Request with Optimal Start. (See below.)

- **Requested, or Run on Request: ***

  A control strategy that optimizes the runtime of a source piece of equipment that supplies one or more receiving units - such as an air handler unit supplying zone terminal units with heating, cooling, ventilation, or similar service. Source equipment runs only when needed, not on a fixed schedule.

  The source equipment runs when one or more receiving units request its services. An operator determines how many requests are required to start the source equipment.

  For example, if all the zones in a building are unoccupied and the zone terminal units do not need heating or cooling, the AHU will shut down. However, if a zone becomes occupied or needs cooling, the terminal unit will send a run request to the AHU to initiate the start-up sequence. If this AHU depends on a central chiller, it can send a run request to the chiller.

  The run on request algorithm also allows an operator to schedule occupancy for individual zones based on the needs of the occupants without having to adjust the schedules of related AHUs and chillers.

- **Trim and Respond, or Setpoint Optimization: ***

  A control strategy that optimizes the setpoint of a source piece of equipment that supplies one or more receiving units - such as an air handler unit supplying zone terminal units with heating, cooling, ventilation, or similar service.

  The source unit communicates with receiving units to determine heating, cooling, and other requirements, and then adjusts its setpoint.

  For example, if all zones are comfortable and do not request cooling, the AHU will gradually increase (trim) its supply air setpoint. When a zone requests cooling, the AHU responds by dropping its setpoint. The more zones that request cooling, the more it drops the setpoint. The AHU repeats this process throughout the day to keep zones cool, but with a supply air setpoint that is no cooler than necessary.

Contracting Terms:

- **Furnished or Provided:**

  The act of supplying a device or piece of equipment as required meeting the scope of work specified and making that device or equipment operational. All costs required to furnish the specified device or equipment and make it operational are borne by the division specified to be responsible for providing the device or equipment.

- **Install or Installed:**

  The physical act of mounting, piping or wiring a device or piece of equipment in accordance with the manufacturer's instructions and the scope of work as specified. All costs required to complete the

installation are borne by the division specified to include labor and any ancillary materials.

- **Interface:**

  The physical device required to provide integration capabilities from an equipment vendor's product to the control system. The equipment vendor most normally furnishes the interface device. An example of an interface is the chilled water temperature reset interface card provided by the chiller manufacturer in order to allow the control system to integrate the chilled water temperature reset function into the control system.

- **Integrate:**

  The physical connections from a control system to all specified equipment through an interface as required to allow the specified control and monitoring functions of the equipment to be performed via the control system.

ABBREVIATIONS

The following abbreviations may be used in graphics, schematics, point names, and other UI applications where space is at a premium.

AC - Air Conditioning
ACU - Air Conditioning Unit
AHU - Air Handling Unit
AI - Analog Input
AO - Analog Output
AUTO - Automatic
AUX - Auxiliary
BI -Binary Input
BO -Binary Output
C -Common
CHW - Chilled Water
CHWP - Chilled Water Pump
CHWR - Chilled Water Return
CHWS - Chilled Water Supply
COND - Condenser
CW - Condenser Water
CWP - Condenser Water Pump
CWR - Condenser Water Return
CWS - Condenser Water Supply
DA - Discharge Air
EA - Exhaust Air
EF - Exhaust Fan
EVAP - Evaporators
FCU - Fan Coil Unit
HOA - Hand / Off / Auto
HP - Heat Pump
HRU - Heat Recovery Unit
HTEX - Heat Exchanger
HW - Hot Water
HWP - Hot Water Pump
HWR - Hot Water Return
HWS - Hot Water Supply
MAX - Maximum
MIN - Minimum
MISC - Miscellaneous
NC - Normally Closed
NO - Normally Open
OA - Outdoor Air
PIU - Powered Induction Unit
RA - Return Air
RF - Return Fan
RH - Relative Humidity
RTU - Roof-top Unit
SA - Supply Air
SF - Supply Fan
SP - Static Pressure
TEMP - Temperature
UH - Unit Heater
UV - Unit Ventilator
VAV - Variable Air Volume
VVTU - Variable Volume Terminal Unit
W/ - with
W/O - without
WSHP - Water Source Heat Pump

GENERAL

Section Includes

- **Products Furnished but Not Installed under This Section**
- **Products Installed but Not Furnished under This Section**
- **Products Not Furnished or Installed under but Integrated with the Work of This Section**
- **Related Sections**
- **Description**
- **Approved Control System Manufacturers**
- **Quality Assurance**
- **Codes and Standards**
- **System Performance**
- **Submittals**
- **Warranty**
- **Ownership of Proprietary Material**
- **Definitions**

- **Products Furnished but Not Installed under This Section**
- None
- **Products Installed but Not Furnished under This Section**
- None
- **Products Not Furnished or Installed under but Integrated with the Work of This Section**
- Section 26 29 00 - Low-Voltage Controllers
- Variable frequency drives
- Section 23 36 00 - Air Terminal Units
- VAV boxes
- Section 23 60 00 - Central Cooling Equipment
- VRV controls
- Section 23 70 00 - Central HVAC Equipment
- Packaged AHU or evaporative cooler controls
- Section 23 80 00 - Decentralized HVAC Equipment
- Unit ventilators, unit heaters, fan coils, etc.
- Section - Safety
- Smoke Detectors/Fire Stats
- Section - Security
- Access Control
- CCTV
- Section - Power Monitoring
- UPS
- Standby Generator
- Telecommunication Cabinets
- Section - Lighting
- Indoor Lighting

- **Related Sections**

- The General Conditions of the Contract, Supplementary Conditions, and General Requirements are part of this specification and shall be used in conjunction with this section as part of the contract documents.
- The following sections constitute related work:
- Section 01 30 00 - Administrative Requirements
- Section 01 60 00 - Product Requirements
- Section 01 80 00 - Performance Requirements
- Section 01 90 00 - Life Cycle Activities
- Section 23 05 00 - Common Work Results for HVAC
- Section 23 20 00 - HVAC Piping and Pumps
- Section 23 30 00 - HVAC Air Distribution
- Section 23 40 00 - HVAC Air Cleaning Devices
- Section 23 60 00 - Central Cooling Equipment
- Section 23 70 00 - Central HVAC Equipment
- Section 23 80 00 - Decentralized HVAC Equipment
- Section 26 05 00 - Common Work Results for Electrical
- Section 26 06 00 - Schedules for Electrical
- Section 26 09 00 - Instrumentation and Control for Electrical Systems
- Section 26 20 00 - Low Voltage Electrical Transmission
- Section 26 29 00 - Low-Voltage Controllers (Motor Controllers and VFD Drives)
- Section 26 30 00 - Facility Electrical Power Generating and Storing Equipment (UPS, Backup Generators)
- Section 26 50 00 - Lighting
- Section 28 00 00 - Electronic Safety and Security (includes Fire and Smoke)

- **Description**

- General: The control system shall consist of a high-speed, peer-to-peer network of DDC controllers, a control system server, and a web-based operator interface.
- System software shall be based on a server/thin client architecture, designed around the open standards of web technology. The control system server shall be accessed using a Web browser over the control system network, the owner's local area network, and (at the owner's discretion) over the Internet.
  The intent of the thin-client architecture is to provide operators complete access to the control system via a Web browser. No special software other than a web browser shall be required to access graphics, point displays, and trends, configure trends, configure points and controllers, or to download programming into the controllers.
- System shall use the BACnet protocol for communication to the operator workstation or web server and for communication between control modules. I/O points, schedules, setpoints, trends and

alarms specified in 23 09 93 – "Sequence of Operations for HVAC Controls" shall be BACnet objects.

- **Approved Control system Manufacturers**

- The following are approved control system suppliers, manufacturers, and product lines:

Supplier	Manufacturer	Product Line

The above list does not indicate order of preference. Inclusion on this list does not guarantee acceptance of products or installation. Control systems shall comply with the terms of this specification.

- The Contractor shall use only operator workstation software, controller software, custom application programming language, and controllers from the corresponding manufacturer and product line unless Owner approves use of multiple manufacturers.
- Other products specified herein (such as sensors, valves, dampers, and actuators) need not be manufactured by the above manufacturers.

- **Quality Assurance**

- Installer and Manufacturer Qualifications
- Installer shall have an established working relationship with Control System Manufacturer.
- Installer shall have successfully completed Control System Manufacturer's control system training. Upon request, Installer shall present record of completed training including course outlines.

- **Codes and Standards**

- Work, materials, and equipment shall comply with the most restrictive of local, state, and federal authorities' codes and ordinances or these plans and specifications. As a minimum, the installation shall comply with the current editions in effect 30 days prior to the receipt of bids of the following codes:
- National Electric Code (NEC)
- International Building Code (IBC)
- Section 719 Ducts and Air Transfer Openings
- Section 907 Fire Alarm and Detection Systems
- Section 909 Smoke Control Systems
- Chapter 28 Mechanical
- International Mechanical Code (IMC)
- ANSI/ASHRAE Standard 135, BACnet - A Data Communication Protocol for Building Automation and Control Systems

- **System Performance**

- Performance Standards. System shall conform to the following minimum standards over network connections. Systems shall be tested using manufacturer's recommended hardware and software for operator workstation (server and browser for web-based systems).
- Graphic Display. A graphic with 20 dynamic points shall display with current data within 10 sec.
- Graphic Refresh. A graphic with 20 dynamic points shall update with current data within 8 sec.and shall automatically refresh every 15 sec.
- Configuration and Tuning Screens. Screens used for configuring, calibrating, or tuning points, PID loops, and similar control logic shall automatically refresh within 6 sec.
- Object Command. Devices shall react to command of a binary object within 2 sec. Devices shall begin reacting to command of an analog object within 2 sec.
- Alarm Response Time. An object that goes into alarm shall be annunciated at the workstation within 45 sec.
- Program Execution Frequency. Custom and standard applications shall be capable of running as often as once every 5 sec. Select execution times consistent with the mechanical process under control.
- Performance. Programmable controllers shall be able to completely execute DDC PID control loops at a frequency adjustable down to once per sec. Select execution times consistent with the mechanical process under control.
- Multiple Alarm Annunciation. Each workstation on the network shall receive alarms within 5 sec of other workstations.
- Reporting Accuracy. System shall report values with minimum end-to-end accuracy listed in Table 1.
- Control Stability and Accuracy. Control loops shall maintain measured variable at set point within tolerances listed in Table 2.

Table-1
Reporting Accuracy

Measured Variable	**Reported Accuracy**
Space Temperature	±0.5ºC (±1ºF)
Ducted Air	±0.5ºC (±1ºF)
Outside Air	±1.0ºC (±2ºF)
Dew Point	±1.5ºC (±3ºF)
Water Temperature	±0.5ºC (±1ºF)
Delta-T	±0.15º (±0.25ºF)
Relative Humidity	±5% RH
Water Flow	±2% of full scale
Airflow (terminal)	±10% of full scale (see Note 1)
Airflow (measuring stations)	±5% of full scale
Airflow (pressurized spaces)	±3% of full scale
Air Pressure (ducts)	±25 Pa (±0.1 in. w.g.)
Air Pressure (space)	±3 Pa (±0.01 in. w.g.)
Water Pressure	±2% of full scale (see Note 2)
Electrical	±1% of reading (see Note 3)

Carbon Monoxide (CO)	±5% of reading
Carbon Dioxide (CO2)	±50 ppm

Note 1: Accuracy applies to 10%–100% of scale
Note 2: For both absolute and differential pressure
Note 3: Not including utility-supplied meters

Table 2
Control Stability and Accuracy

Controlled Variable	Control Accuracy	Range of Medium
Air Pressure	±50 Pa (±0.2 in. w.g.) ±3 Pa (±0.01 in. w.g.)	0–1.5 kPa (0–6 in. w.g.) -25 to 25 Pa (-0.1 to 0.1 in. w.g.)
Airflow	±10% of full scale	
Space Temperature	±1.0ºC (±2.0ºF)	
Duct Temperature	±1.5ºC (±3ºF)	
Humidity	±5% RH	
Fluid Pressure	±10 kPa (±1.5 psi) ±250 Pa (±1.0 in. w.g.)	MPa (1–150 psi) 0–12.5 kPa (0–50 in. w.g.) differential

- **Submittals**

- Product Data and Shop Drawings: Meet requirements of Section 01 30 00 on Shop Drawings, Product Data, and Samples. In addition, the contractor shall provide shop drawings or other submittals on hardware, software, and equipment to be installed or provided. No work may begin on any segment of this project until submittals have been approved for conformity with design intent. Provide drawings as AutoCAD 2006 (or newer) compatible files on magnetic or optical disk (file format: .DWG, .DXF, .VSD, or comparable) and three 11" x 17" prints of each drawing. When manufacturer's cutsheets apply to a product series rather than a specific product, the data specifically applicable to the project shall be highlighted or clearly indicated by other means. Each submitted piece of literature and drawing shall clearly reference the specification and/or drawing that the submittal is to cover. General catalogs shall not be accepted as cutsheets to fulfill submittal requirements. Select and show submittal quantities appropriate to scope of work. Submittal approval does not relieve Contractor of responsibility to supply sufficient quantities to complete work. Submittals shall be provided within 12 weeks of contract award. Submittals shall include:
- DDC System Hardware
- A complete bill of materials to be used indicating quantity, manufacturer, model number, and relevant technical data of equipment to be used.
- Manufacturer's description and technical data such as performance curves, product specifications, and installation and maintenance instructions for items listed below and for relevant items not listed below:
- Direct digital controllers (controller panels)
- Transducers and transmitters
- Sensors (including accuracy data)
- Actuators

- Valves
- Relays and switches
- Control panels
- Power supplies
- Batteries
- Operator interface equipment
- Wiring
- Wiring diagrams and layouts for each control panel. Show termination numbers.
- Schematic diagrams for all field sensors and controllers. Provide floor plans of all sensor locations and control hardware. Riser diagrams showing control network layout, communication protocol, and wire types.

- Central System Hardware and Software
- A complete bill of material of equipment used indicating quantity, manufacturer, model number, and relevant technical.
- Manufacturer's description and technical data such as product specifications and installation and maintenance instructions for items listed below and for relevant items furnished under this contract not listed below:
- Central Processing Unit (CPU) or web server
- Monitors
- Keyboards
- Power supplies
- Battery backups
- Interface equipment between CPU or server and control panels
- Operating System software
- Operator interface software
- Color graphic software
- Third-party software
- Schematic diagrams for all control, communication, and power wiring. Provide a schematic drawing of the central system installation. Label all cables and ports with computer manufacturers' model numbers and functions. Show interface wiring to control system.
- Network riser diagrams of wiring between central control unit and control panels.
- Controlled Systems
- Riser diagrams showing control network layout, communication protocol, and wire types.
- A schematic diagram of each controlled system. The schematics shall have all control points labeled with point names shown or listed. The schematics shall graphically show the location of all control elements in the system.
- A schematic wiring diagram of each controlled system. Label control elements and terminals. Where a control element is also shown on control system schematic, use the same name.

- An instrumentation list (Bill of Materials) for each controlled system. List each control system element in a table. Show element name, type of device, manufacturer, model number, and product data sheet number.
- A mounting, wiring, and routing plan-view drawing. The design shall take into account HVAC, electrical, and other systems' design and elevation requirements. The drawing shall show the specific location of all concrete pads and bases and any special wall bracing for panels to accommodate this work.
- A complete description of the operation of the control system, including sequences of operation. The description shall include and reference a schematic diagram of the controlled system.
- A point list for each control system. List I/O points and software points specified in Section 23 09 93. Indicate alarmed and trended points.
- Quantities of items submitted shall be reviewed but are the responsibility of the Contractor.
- Description of process, report formats, and checklists to be used in Section 23 09 23 Article 3.17 (Control System Demonstration and Acceptance).
- BACnet Protocol Implementation Conformance Statement (PICS) for each submitted type of controller and operator interface.
- Schedules
- Within one month of contract award, provide a schedule of the work indicating the following:
- Intended sequence of work items
- Start date of each work item
- Duration of each work item
- Planned delivery dates for ordered material and equipment and expected lead times
- Milestones indicating possible restraints on work by other trades or situations
- Monthly written status reports indicating work completed and revisions to expected delivery dates. Include updated schedule of work.
- Project Record Documents. Upon completion of installation, submit three copies of record (as-built) documents of the documents shall be submitted for approval prior to final completion and shall include:
- Project Record Drawings. As-built versions of submittal shop drawings provided as AutoCAD 2006 (or newer) compatible files on magnetic or optical media (file format: .DWG, .DXF, .VSD, or comparable) and as 11" x 17" prints.
- Testing and Commissioning Reports and Checklists. Completed versions of reports, checklists, and trend logs used to meet requirements of Section 23 09 23 Article 3.17 (Control System Demonstration and Acceptance).
- Operation and Maintenance (O&M) Manual.
- As-built versions of submittal product data.
- Names, addresses, and telephone numbers of installing contractors and service representatives for equipment and control systems.
- Operator's manual with procedures for operating control systems: logging on and off, handling alarms, producing point reports, trending data, overriding computer control, and changing setpoints and variables.

- Programming manual or set of manuals with description of programming language and syntax, of statements for algorithms and calculations used, of point database creation and modification, of program creation and modification, and of editor use.
- Engineering, installation, and maintenance manual or set of manuals that explains how to design and install new points, panels, and other hardware; how to perform preventive maintenance and calibration; how to debug hardware problems; and how to repair or replace hardware.
- Documentation of programs created using custom programming language including setpoints, tuning parameters, and object database. Electronic copies of programs shall meet this requirement if control logic, setpoints, tuning parameters, and objects can be viewed using furnished programming tools.
- Graphic files, programs, and database on magnetic or optical media.
- List of recommended spare parts with part numbers and suppliers.
- Complete original-issue documentation, installation, and maintenance information for furnished third-party hardware including computer equipment and sensors.
- Complete original-issue copies of furnished software, including operating systems, custom programming language, operator workstation or web server software, and graphics software.
- Licenses, guarantees, and warranty documents for equipment and systems.
- Recommended preventive maintenance procedures for system components, including schedule of tasks such as inspection, cleaning, and calibration; time between tasks; and task descriptions.
- Training Materials: Provide course outline and materials for each class at least six weeks before first class. Training shall be furnished via instructor-led sessions, computer-based training, or web-based training. Engineer will modify course outlines and materials if necessary to meet Owner's needs. Engineer will review and approve course outlines and materials at least three weeks before first class.

- **Warranty**

- Warrant work as follows:
- Warrant labor and materials for specified control system free from defects for a period of 12 months after final acceptance. Control system failures during warranty period shall be adjusted, repaired, or replaced at no additional cost or reduction in service to Owner. Respond during normal business hours within 24 hours of Owner's warranty service request.
- Work shall have a single warranty date, even if Owner receives beneficial use due to early system start-up. If specified work is split into multiple contracts or a multi-phase contract, each contract or phase shall have a separate warranty start date and period.
- If the engineer determines that equipment and systems operate satisfactorily at the end of final start-up, testing, and commissioning phase, the engineer will certify in writing that control system operation has been tested and accepted in accordance with the terms of this specification. Date of acceptance shall begin warranty period.
- Provide updates to operator workstation or web server software, project-specific software, graphic software, database software, and firmware that resolve the contractor-identified software deficiencies at no charge during warranty period. If available, Owner can purchase in-warranty

service agreement to receive upgrades for functional enhancements associated with above-mentioned items. Do not install updates or upgrades without Owner's written authorization.

- Exception: Contractor shall not be required to warrant reused devices except those that have been rebuilt or repaired. Installation labor and materials shall be warranted. Demonstrate operable condition of reused devices at time of Engineer's acceptance.

- **Ownership of Proprietary Material**

- Project-specific software and documentation shall become Owner's property. This includes, but is not limited to:
- Graphics
- Record drawings
- Database
- Application programming code
- Documentation

- **Definitions**

Term	Definition
BACnet Interoperability Building Blocks (BIBB)	A BIBB defines a small portion of BACnet functionality that is needed to perform a particular task. BIBBS are combined to build the BACnet functional requirements for a device in a specification.
BACnet/BACnet Standard	BACnet communication requirements as defined by the latest version of ASHRAE/ANSI 135 and approved addenda.
Control Systems Server	A computer(s) that maintain(s) the systems configuration and programming database.
Controller	Intelligent stand-alone control device. Controller is a generic reference to building controllers, custom application controllers, and application specific controllers.
Direct Digital Control	Microprocessor-based control including Analog/Digital conversion and program logic.
Gateway	Bi-directional protocol translator connecting control systems that use different communication protocols.
Local Area Network	Computer or control system communications network limited to local building or campus.
Master-Slave/Token Passing	Data link protocol as defined by the BACnet standard.
Point-to-Point	Serial communication as defined in the BACnet standard.
Primary Controlling LAN	High speed, peer-to-peer controller LAN connecting BCs and optionally AACs and ASCs. Refer to System Architecture below.
Protocol Implementation Conformance Statement	A written document that identifies the particular options specified by BACnet that are implemented in a device.
Router	A device that connects two or more networks at the network layer.
Wiring	Raceway, fittings, wire, boxes and related items.

PRODUCTS

Section Includes

- **Materials**
- **Communication**
- **Operator Interface**
- **Controller Software**
- **Controllers**
- **Input and Output Interfaces**
- **Power Supplies and Line Filtering**
- **Auxiliary Control Devices**
- **Wiring and Raceways**
- **Fiber Optic Cable System**
- **Compressed Air Supply - Pneumatic**

- **Materials**

- Use new products the manufacturer is currently manufacturing and selling for use in new installations. Do not use this installation as a product test site unless explicitly approved in writing by Owner. Spare parts shall be available for at least five years after completion of this contract.

- **Communication**

- Control products, communication media, connectors, repeaters, hubs, and routers shall comprise a BACnet internetwork. Controller and operator interface communication shall conform to ANSI/ASHRAE Standard 135, BACnet.
- Install new wiring and network devices as required to provide a complete and workable control network.
- Use existing Ethernet backbone for network segments marked "existing" on project drawings.
- Each controller shall have a communication port for temporary connection to a laptop computer or other operator interface. Connection shall support memory downloads and other commissioning and troubleshooting operations.
- Internetwork operator interface and value passing shall be transparent to internetwork architecture.
- An operator interface connected to a controller shall allow the operator to interface with each internetwork controller as if directly connected. Controller information such as data, status, and control algorithms shall be viewable and editable from each internetwork controller.
- Inputs, outputs, and control variables used to integrate control strategies across multiple controllers shall be readable by each controller on the internetwork. Program and test all cross-controller links required to execute control strategies specified in Section 23 09 93. An authorized operator shall be able to edit cross-controller links by typing a standard object address or by using a point-and-click interface.
- Workstations, Building Control Panels, and Controllers with real-time clocks shall use the BACnet Time Synchronization service. System shall automatically synchronize system clocks daily from an operator-designated device via the internetwork. The system shall automatically adjust for daylight saving and standard time as applicable.
- System shall be expandable to at least twice the required input and output objects with additional controllers, associated devices, and wiring.

- **Operator Interface**

- The Operator Workstation or server shall conform to the BACnet Operator Workstation (B-OWS) or BACnet Advanced Workstation (B-AWS) device profile as specified in ASHRAE/ANSI 135 BACnet Annex L.
- Operator Interface. Web server shall reside on high-speed network with building controllers. Each standard browser connected to server shall be able to access all system information.
- Communication. Web server or workstation and controllers shall communicate using BACnet protocol. Web server or workstation and control network backbone shall communicate using ISO 8802-3 (Ethernet) Data Link/Physical layer protocol and BACnet/IP addressing as specified in ANSI/ASHRAE 135, BACnet Annex J.
- Hardware. Each workstation or web server shall consist of the following:
- Computer. Industry-standard hardware shall meet or exceed DDC system manufacturer's recommended specifications and shall meet response times specified elsewhere in this document. The following hardware requirements also apply:
- The hard disk shall have sufficient memory to store:
- All required operator workstation software.
- A DDC database at least twice the size of the delivered system database.
- One year of trend data based on the points specified to be trended at their specified trend intervals.
- Provide additional hardware (communication ports, video drivers, network interface cards, cabling, etc.) to facilitate all control functions and software requirements specified for the DDC system.
- Minimum hardware configuration shall include the following:
- Dual or Quad Core Processor
- 6 GB RAM
- 500 GB hard disk providing data at 3.0 Gb/sec
- 16x DVD-RW drive
- Serial, parallel, and network communication ports and cables as required for proper DDC system operation
- System Software.
- Operating System. Web server or workstation shall have an industry-standard professional-grade operating system. Operating system shall meet or exceed the DDC System manufacturers minimum requirements for their software. Typically acceptable systems include Microsoft Windows7,Microsoft Vista, Microsoft Windows XP Pro, Windows Server 2003 or 2008, Red Hat Enterprise Linux, or Ubuntu Desktop 10.04.
- System Graphics. The operator interface software shall be graphically based and shall include at least one graphic per piece of equipment or occupied zone, graphics for each chilled water and hot water system, and graphics that summarize conditions on each floor of each building included in this contract. Indicate thermal comfort on floor plan summary graphics using dynamic colors to represent zone temperature relative to zone setpoint.

- Functionality. Graphics shall allow operator to monitor system status, to view a summary of the most important data for each controlled zone or piece of equipment, to use point-and-click navigation between zones or equipment, and to edit setpoints and other specified parameters.
- Animation. Graphics shall be able to animate by displaying different image files for changed object status.
- Alarm Indication. Indicate areas or equipment in an alarm condition using color or other visual indicator.
- Format. Graphics shall be saved in an industry-standard format such as BMP, JPEG, PNG, or GIF. Web-based system graphics shall be viewable on browsers compatible with World Wide Web Consortium browser standards. Web graphic format shall require no plug-in (such as HTML and JavaScript) or shall only require widely available no-cost plug-ins (such as Active-X and Adobe Flash).
- Custom Graphics. Custom graphic files shall be created with the use of a graphics generation package furnished with the system. The graphics generation package shall be a graphically based system that uses the mouse to create and modify graphics that are saved in the same formats as are used for system graphics.
- Graphics Library. Furnish a complete library of standard HVAC equipment graphics such as chillers, boilers, air handlers, terminals, fan coils, and unit ventilators. This library also shall include standard symbols for other equipment including fans, pumps, coils, valves, piping, dampers, and ductwork. The library shall be furnished in a file format compatible with the graphics generation package program.
- System Applications. System shall provide the following functionality to authorized operators as an integral part of the operator interface or as stand-alone software programs. If furnished as part of the interface, the tool shall be available from each workstation or web browser interface. If furnished as a stand-alone program, software shall be installable on standard IBM-compatible PCs with no limit on the number of copies that can be installed under the system license.
- Automatic System Database Configuration. Each workstation or web server shall store on its hard disk a copy of the current system database, including controller firmware and software. Stored database shall be automatically updated with each system configuration or controller firmware or software change.
- Manual Controller Memory Download. Operators shall be able to download memory from the system database to each controller.
- System Configuration. The workstation software shall provide a method of configuring the system. This shall allow for future system changes or additions by users under proper password protection. Operators shall be able to configure the system.
- On-Line Help. Provide a context-sensitive, on-line help system to assist the operator in operating and editing the system. On-line help shall be available for all applications and shall provide the relevant data for that particular screen. Additional help information shall be available through the use of hypertext.
- Security. Each operator shall be required to log on to the system with user name and password in order to view, edit, add, or delete data.

- Operator Access. The user name and password combination shall define accessible viewing, editing, adding, and deleting privileges for that operator. Users with system administrator rights shall be able to create new users and edit the privileges of all existing users.
- Automatic Log Out. Automatically log out each operator if no keyboard or mouse activity is detected. This auto logoff time shall be user adjustable.
- Encrypted Security Data. Store system security data including operator passwords in an encrypted format. System shall not display operator passwords.
- System Diagnostics. The system shall automatically monitor the operation of all building management panels and controllers. The failure of any device shall be annunciated to the operator.
- Alarm Processing. System input and status objects shall be configurable to alarm on departing from and on returning to normal state. Operator shall be able to enable or disable each alarm and to configure alarm limits, alarm limit differentials, alarm states, and alarm reactions for each system object. Configure and enable alarm points as specified in Section 23 09 93 (Sequences of Operation). Alarms shall be BACnet alarm objects and shall use BACnet alarm services.
- Alarm Messages. Alarm messages shall use the English language descriptor for the object in alarm in such a way that the operator will be able to recognize the source, location, and nature of the alarm without relying on acronyms.
- Alarm Reactions. Operator shall be able to configure (by object) what, if any actions are to be taken during an alarm. As a minimum, the workstation or web server shall be able to log, print, start programs, display messages, send e-mail, send page, and audibly annunciate.
- Alarm and Event log. Operators shall be able to view all system alarms and changes of state from any location in the system. Events shall be listed chronologically. An operator with the proper security level may acknowledge and delete alarms, and archive closed alarms to the workstation or web server hard disk.
- Trend Logs. The operator shall be able to configure trend sample or change of value (COV) interval, start time, and stop time for each system data object and shall be able to retrieve data for use in spreadsheets and standard database programs. Controller shall sample and store trend data and shall be able to archive data to the hard disk. Configure trends as specified in Section 23 09 93 (Sequences of Operation). Trends shall be BACnet trend objects.
- Object and Property Status and Control. Provide a method for the operator to view, and edit if applicable, the status of any object or property in the system. The status shall be available by menu, on graphics, or through custom programs.
- Reports and Logs. Operator shall be able to select, to modify, to create, and to print reports and logs. Operator shall be able to store report data in a format accessible by standard spreadsheet and word processing programs.
- Standard Reports. Furnish the following standard system reports:
- Objects. System objects and current values filtered by object type, by status (in alarm, locked, normal), by equipment, by geographic location, or by combination of filter criteria.
- Alarm Summary. Current alarms and closed alarms. System shall retain closed alarms for an adjustable period.

- Logs. System shall log the following to a database or text file and shall retain data for an adjustable period:
- Alarm History.
- Trend Data. Operator shall be able to select trends to be logged.
- Operator Activity. At a minimum, system shall log operator log in and log out, control parameter changes, schedule changes, and alarm acknowledgment and deletion. System shall date and time stamp logged activity.
- Workstation Application Editors. Each PC or browser workstation shall support editing of all system applications. The applications shall be downloaded and executed at one or more of the controller panels.
- Controller. Provide a full-screen editor for each type of application that shall allow the operator to view and change the configuration, name, control parameters, and set points for all controllers.
- Scheduling. An editor for the scheduling application shall be provided at each workstation. Provide a method of selecting the desired schedule and schedule type. Exception schedules and holidays shall be shown clearly on the calendar. The start and stop times for each object shall be adjustable from this interface.
- Custom Application Programming. Provide the tools to create, edit, debug, and download custom programs. System shall be fully operable while custom programs are edited, compiled, and downloaded. Programming language shall have the following features:
- Language. Language shall be graphically based or English language oriented. If graphically based, language shall use function blocks arranged in a logic diagram that clearly shows control logic flow. Function blocks shall directly provide functions listed below, and operators shall be able to create custom or compound function blocks. If English language oriented, language shall be based on the syntax of BASIC, FORTRAN, C, or PASCAL, and shall allow for free-form programming that is not column-oriented or "fill-in-the-blanks."
- A full-screen character editor programming environment shall be provided. The editor shall be cursor/mouse-driven and allow the user to insert, add, modify, and delete custom programming code. It also shall incorporate features such as cut/ paste and find.
- The programming language shall allow independently executing program modules to be developed. Each module shall be able to independently enable and disable other modules.
- The editor/programming environment shall have a debugging/simulation capability that allows the user to step through the program and observe any intermediate values and/or results.
- The programming language shall support conditional statements (IF/THEN/ELSE/ ELSE-IF) using compound Boolean (AND, OR, and NOT) and/or relations (EQUAL, LESS THAN, GREATER THAN, NOT EQUAL) comparisons.
- The programming language shall support floating-point arithmetic using the following operators: +, , ÷, ×, and square root. The following mathematical functions also shall be provided: absolute value and minimum/maximum value.
- The programming language shall have predefined variables that represent time of day, day of the week, month of the year, and the date. Other predefined variables shall provide elapsed time in seconds, minutes, hours, and days. These elapsed time variables shall be able to be reset by the

language so that interval-timing functions can be stopped and started within a program. Values from all of the above variables shall be readable by the language so that they can be used in a program for such purposes as IF/ THEN comparisons, calculations, etc.

- The language shall be able to read the values of the variables and use them in programming statement logic, comparisons, and calculations.
- The programming language shall have predefined variables representing the status and results of the system software and shall be able to enable, disable, and change the setpoints of the system software described below.
- Portable Operator's Terminal. Provide all necessary software to configure an IBM-compatible laptop computer for use as a Portable Operator's Terminal. Operator shall be able to connect configured Terminal to the system network or directly to each controller for programming, setting up, and troubleshooting.

- **Controller Software**

- Furnish the following applications for building and energy management. All software application shall reside and operate in the system controllers. Applications shall be editable through operator workstation, web browser interface, or engineering workstation.
- System Security. See Paragraph 2.3.E.5 (Security) and Paragraph 2.3.E.14.c.iii (Operator Activity).
- Scheduling. Provide the capability to execute control functions according to a user created or edited schedule. Each schedule shall provide the following schedule options as a minimum:
- Weekly Schedule. Provide separate schedules for each day of the week. Each schedule shall be able to include up to 5 occupied periods (5 start-stop pairs or 10 events).
- Exception Schedules. Provide the ability for the operator to designate any day of the year as an exception schedule. Exception schedules may be defined up to a year in advance. Once an exception schedule has executed, the system shall discard and replace the exception schedule with the standard schedule for that day of the week.
- Holiday Schedules. Provide the capability for the operator to define up to 24 special or holiday schedules. These schedules will be repeated each year. The operator shall be able to define the length of each holiday period.
- System Coordination. Operator shall be able to group related equipment based on function and location and to use these groups for scheduling and other applications.
- Binary Alarms. Each binary object shall have the capability to be configured to alarm based on the operator-specified state. Provide the capability to automatically and manually disable alarming.
- Analog Alarms. Each analog object shall have both high and low alarm limits. The operator shall be able to enable or disable these alarms.
- Alarm Reporting. The operator shall be able to determine the action to be taken in the event of an alarm. An alarm shall be able to start programs, print, be logged in the event log, generate custom messages, and display on graphics.
- Remote Communication. System shall automatically contact operator workstation or server on receipt of critical alarms. If no network connection is available, system shall use a modem connection.

- Demand Limiting.
- The demand-limiting program shall monitor building power consumption from a building power meter (provided by others) which generates pulse signals or a BACnet communications interface. An acceptable alternative is for the system to monitor a watt transducer or current transformer attached to the building feeder lines.
- When power consumption exceeds adjustable levels, system shall automatically adjust setpoints, de-energize low-priority equipment, and take other programmatic actions to reduce demand as specified in Section 23 09 93 (Sequences of Operation). When demand drops below adjustable levels, system shall restore loads as specified.
- Maintenance Management. The system shall be capable of generating maintenance alarms when equipment exceeds adjustable runtime, equipment starts, or performance limits. Configure and enable maintenance alarms as specified in 23 09 93 (Sequences of Operation).
- Sequencing. Application software shall sequence chillers, boilers, and pumps as specified in Section 23 09 93 (Sequences of Operation).
- PID Control. System shall provide direct- and reverse-acting PID (proportional-integral-derivative) algorithms. Each algorithm shall have anti-windup and selectable controlled variable, setpoint, and PID gains. Each algorithm shall calculate a time-varying analog value that can be used to position an output or to stage a series of outputs. The calculation interval, PID gains, and other tuning parameters shall be adjustable by a user with the correct security level.
- Staggered Start. System shall stagger controlled equipment restart after power outage. Operator shall be able to adjust equipment restart order and time delay between equipment restarts.
- Energy Calculations.
- The system shall accumulate and convert instantaneous power (kW) or flow rates (L/s [gpm]) to energy usage data.
- The system shall calculate a sliding-window average (rolling average). Operator shall be able to adjust window interval to 15 minutes, 30 minutes, or 60 minutes.
- Anti-Short Cycling. All binary output objects shall be protected from short cycling by means of adjustable minimum on-time and off-time settings.
- On and Off Control with Differential. Provide an algorithm that allows a binary output to be cycled based on a controlled variable and a setpoint. The algorithm shall be direct-acting or reverse-acting.
- Runtime Totalization. Provide software to totalize runtime for each binary input and output. Operator shall be able to enable runtime alarm based on exceeded adjustable runtime limit. Configure and enable runtime totalization and alarms as specified in Section 23 09 93 (Sequence of Operations).

- **Controllers**

- General. Provide an adequate number of Building Controllers (BC), Advanced Application Controllers (AAC), Application Specific Controllers (ASC), Smart Actuators (SA), and Smart Sensors (SS) as required to achieve performance specified in Section 23 09 23 Article 1.9 (System Performance). Every device in the system which executes control logic and directly controls HVAC equipment must conform to a standard BACnet Device profile as specified in ANSI/ASHRAE 135,

BACnet Annex L. Unless otherwise specified, hardwired actuators and sensors may be used in lieu of BACnet Smart Actuators and Smart Sensors.

- BACnet.
- Building Controllers (BCs). Each BC shall conform to BACnet Building Controller (B-BC) device profile as specified in ANSI/ASHRAE 135, BACnet Annex L, and shall be listed as a certified B-BC in the BACnet Testing Laboratories (BTL) Product Listing.
- Advanced Application Controllers (AACs). Each AAC shall conform to BACnet Advanced Application Controller (B-AAC) device profile as specified in ANSI/ASHRAE 135, BACnet Annex L and shall be listed as a certified B-AAC in the BACnet Testing Laboratories (BTL) Product Listing.
- Application Specific Controllers (ASCs). Each ASC shall conform to BACnet Application Specific Controller (B-ASC) device profile as specified in ANSI/ASHRAE 135, BACnet Annex L and shall be listed as a certified B-ASC in the BACnet Testing Laboratories (BTL) Product Listing.
- Smart Sensors (SSs). Each SS shall conform to BACnet Smart Sensor (B-SS) device profile as specified in ANSI/ASHRAE 135, BACnet Annex L and shall be listed as a certified B-SS in the BACnet Testing Laboratories (BTL) Product Listing.
- BACnet Communication.
- Each BC shall reside on or be connected to a BACnet network using ISO 8802-3 (Ethernet) Data Link/Physical layer protocol and BACnet/IP addressing.
- BACnet routing shall be performed by BCs or other BACnet device routers as necessary to connect BCs to networks of AACs and ASCs.
- Each AAC shall reside on a BACnet network using ISO 8802-3 (Ethernet) Data Link/Physical layer protocol with BACnet/IP addressing, or it shall reside on a BACnet network using the ARCNET or MS/TP Data Link/Physical layer protocol.
- Each ASC shall reside on a BACnet network using the ARCNET or MS/TP Data Link/Physical layer protocol.
- Each SA shall reside on a BACnet network using the ARCNET or MS/TP Data Link/Physical layer protocol.
- Each SS shall reside on a BACnet network using ISO 8802-3 (Ethernet) Data Link/Physical layer protocol with BACnet/IP addressing, or it shall reside on a BACnet network using ARCNET or MS/TP Data Link/Physical layer protocol.
- Communication
- Service Port. Each controller shall provide a service communication port for connection to a Portable Operator's Terminal. Connection shall be extended to space temperature sensor ports where shown on drawings.
- Signal Management. BC and ASC operating systems shall manage input and output communication signals to allow distributed controllers to share real and virtual object information and to allow for central monitoring and alarms.
- Data Sharing. Each BC and AAC shall share data as required with each networked BC and AAC.
- Stand-Alone Operation. Each piece of equipment specified in Section 23 09 93 shall be controlled by a single controller to provide stand-alone control in the event of communication failure. All I/O

points specified for a piece of equipment shall be integral to its controller. Provide stable and reliable stand-alone control using default values or other method for values normally read over the network such as outdoor air conditions, supply air or water temperature coming from source equipment, etc.

- Environment. Controller hardware shall be suitable for anticipated ambient conditions.
- Controllers used outdoors or in wet ambient conditions shall be mounted in waterproof enclosures and shall be rated for operation at -29°C to 60°C (-20°F to 140°F).
- Controllers used in conditioned space shall be mounted in dust-protective enclosures and shall be rated for operation at 0°C to 50°C (32°F to 120°F).
- Keypad. Provide a local keypad and display for each BC and AAC. Operator shall be able to use keypad to view and edit data. Keypad and display shall require password to prevent unauthorized use. If the manufacturer does not normally provide a keypad and display for each BC and AAC, provide the software and any interface cabling needed to use a laptop computer as a Portable Operator's Terminal for the system.
- Real-Time Clock. Controllers that perform scheduling shall have a real-time clock.
- Serviceability. Provide diagnostic LEDs for power, communication, and processor. All wiring connections shall be made to a field-removable modular terminal strip or to a termination card connected by a ribbon cable. Each BC and AAC shall continually check its processor and memory circuit status and shall generate an alarm on abnormal operation. System shall continuously check controller network and generate alarm for each controller that fails to respond.
- Memory.
- Controller memory shall support operating system, database, and programming requirements.
- Each BC and AAC shall retain BIOS and application programming for at least 72 hours in the event of power loss.
- Each ASC and SA shall use nonvolatile memory and shall retain BIOS and application programming in the event of power loss. System shall automatically download dynamic control parameters following power loss.
- Immunity to Power and Noise. Controllers shall be able to operate at 90% to 110% of nominal voltage rating and shall perform an orderly shutdown below 80% nominal voltage. Operation shall be protected against electrical noise of 5 to 120 Hz and from keyed radios up to 5 W at 1 m (3 ft).
- Transformer. ASC power supply shall be fused or current limiting and shall be rated at a minimum of 125% of ASC power consumption.

- **Input and Output Interface**

- General. Hard-wire input and output points to BCs, AACs, ASCs, or SAs.
- Protection. All input points and output points shall be protected such that shorting of the point to itself, to another point, or to ground shall cause no damage to the controller. All input and output points shall be protected from voltage up to 24 V of any duration, such that contact with this voltage will cause no controller damage.
- Binary Inputs. Binary inputs shall allow the monitoring of ON/OFF signals from remote devices. The binary inputs shall provide a wetting current of at least 12 mA to be compatible with

commonly available control devices and shall be protected against contact bounce and noise. Binary inputs shall sense dry contact closure without application of power external to the controller.

- Pulse Accumulation Inputs. Pulse accumulation inputs shall conform to binary input requirements and shall also accumulate up to 10 pulses per second.
- Analog Inputs. Analog inputs shall monitor low-voltage (0–10 Vdc), current (4–20 mA), or resistance (thermistor or RTD) signals. Analog inputs shall be compatible with and field configurable to commonly available sensing devices.
- Binary Outputs. Binary outputs shall provide for ON/OFF operation or a pulsed low-voltage signal for pulse width modulation control. Binary outputs on Building Controllers shall have three-position (on-off-auto) override switches and status lights. Outputs shall be selectable for normally open or normally closed operation.
- Analog Outputs. Analog outputs shall provide a modulating signal for the control of end devices. Outputs shall provide either a 0–10 Vdc or a 4–20 mA signal as required to properly control output devices. Each Building Controller analog output shall have a two-position (auto-manual) switch, a manually adjustable potentiometer, and status lights. Analog outputs shall not drift more than 0.4% of range annually.
- Tri-State Outputs. Control three-point floating electronic actuators without feedback with tri-state outputs (two coordinated binary outputs). Tri-State outputs may be used to provide analog output control in zone control and terminal unit control applications such as VAV terminal units, duct-mounted heating coils, and zone dampers.
- System Object Capacity. The system size shall be expandable to at least twice the number of input/ output objects required for this project. Additional controllers (along with associated devices and wiring) shall be all that is necessary to achieve this capacity requirement. The operator interfaces installed for this project shall not require any hardware additions or software revisions in order to expand the system

- **Power Supplies and Line Filtering**

- Power Supplies. Control transformers shall be UL listed. Furnish Class 2 current-limiting type or furnish over-current protection in primary and secondary circuits for Class 2 service in accordance with NEC requirements. Limit connected loads to 80% of rated capacity.
- DC power supply output shall match output current and voltage requirements. Unit shall be full-wave rectifier type with output ripple of 5.0 mV maximum peak-to-peak. Regulation shall be 1.0% line and load combined, with 100-microsecond response time for 50% load changes. Unit shall have built-in over-voltage and over-current protection and shall be able to withstand 150% current overload for at least three seconds without trip-out or failure.
- Unit shall operate between 0°C and 50°C (32°F and 120°F). EM/RF shall meet FCC Class B and VDE 0871 for Class B and MILSTD 810C for shock and vibration.
- Line voltage units shall be UL recognized and CSA listed.
- Power Line Filtering.
- Provide internal or external transient voltage and surge suppression for workstations and controllers. Surge protection shall have:

- Dielectric strength of 1000 V minimum
- Response time of 10 nanoseconds or less
- Transverse mode noise attenuation of 65 dB or greater
- Common mode noise attenuation of 150 dB or greater at 40–100 Hz

- **Auxiliary Control Devices**

- Motorized Control Dampers, unless otherwise specified elsewhere, shall be as follow.
- Type. Control dampers shall be the parallel or opposed-blade type as specified below or as scheduled on drawings.
- Outdoor and return air mixing dampers and face-and-bypass dampers shall be parallel-blade and shall direct airstreams toward each other.
- Other modulating dampers shall be opposed-blade.
- Two-position shutoff dampers shall be parallel- or opposed-blade with blade and side seals.
- Frame. Damper frames shall be 2.38 mm (13 gauge) galvanized steel channel or 3.175 mm (⅛ in.) extruded aluminum with reinforced corner bracing.
- Blades. Damper blades shall not exceed 20 cm (8 in.) in width or 125 cm (48 in.) in length. Blades shall be suitable for medium velocity (10 m/s [2000 fpm]) performance. Blades shall be not less than 1.5875 mm (16 gauge).
- Shaft Bearings. Damper shaft bearings shall be as recommended by manufacturer for application, oil impregnated sintered bronze, or better.
- Seals. Blade edges and frame top and bottom shall have replaceable seals of butyl rubber or neoprene. Side seals shall be spring-loaded stainless steel. Blade seals shall leak no more than 50 $L/s \cdot m^2$(10 cfm per ft^2) at 1000 Pa (4 in. w.g.) differential pressure. Blades shall be airfoil type suitable for wide-open face velocity of 7.5 m/s (1500 fpm).
- Sections. Individual damper sections shall not exceed 125 cm × 150 cm (48 in. × 60 in.). Each section shall have at least one damper actuator.
- Modulating dampers shall provide a linear flow characteristic where possible.
- Linkages. Dampers shall have exposed linkages.
- Electric Damper and Valve Actuators.
- Stall Protection. Mechanical or electronic stall protection shall prevent actuator damage throughout the actuator's rotation.
- Spring-return Mechanism. Actuators used for power-failure and safety applications shall have an internal mechanical spring-return mechanism or an uninterruptible power supply (UPS).
- Signal and Range. Proportional actuators shall accept a 0–10 Vdc or a 0–20 mA control signal and shall have a 2–10 Vdc or 4–20 mA operating range. (Floating motor actuators may be substituted for proportional actuators in terminal unit applications as described in paragraph 2.6H.)
- Wiring. 24 Vac and 24 Vdc actuators shall operate on Class 2 wiring.
- Manual Positioning. Operators shall be able to manually position each actuator when the actuator is not powered. Non-spring-return actuators shall have an external manual gear release. Spring-return actuators with more than 7 N·m (60 in.-lb) torque capacity shall have a manual crank.
- Control Valves.

- Control valves shall be two-way or three-way type for two-position or modulating service as shown.
- Close-off (differential) Pressure Rating: Valve actuator and trim shall be furnished to provide the following minimum close-off pressure ratings:
- Water Valves:
- Two-way: 150% of total system (pump) head.
- Three-way: 300% of pressure differential between ports A and B at design flow or 100% of total system (pump) head.
- Steam Valves: 150% of operating (inlet) pressure.
- Water Valves.
- Body and trim style and materials shall be in accordance with manufacturer's recommendations for design conditions and service shown, with equal percentage ports for modulating service.
- Sizing Criteria:
- Two-position service: Line size.
- Two-way modulating service: Pressure drop shall be equal to twice the pressure drop through heat exchanger (load), 50% of the pressure difference between supply and return mains, or 5 psi, whichever is greater.
- Three-way modulating service: Pressure drop equal to twice the pressure drop through the coil exchanger (load), 35 kPa (5 psi) maximum.
- Valves ½ in. through 2 in. shall be bronze body or cast brass ANSI Class 250, spring-loaded, PTFE packing, quick opening for two-position service. Two-way valves to have replaceable composition disc or stainless steel ball.
- Valves 2½ in. and larger shall be cast iron ANSI Class 125 with guided plug and PTFE packing.
- Water valves shall fail normally open or closed, as scheduled on plans, or as follows:
- Water zone valves—normally open preferred.
- Heating coils in air handlers—normally open.
- Chilled water control valves—normally closed.
- Other applications—as scheduled or as required by sequences of operation.
- Steam Valves.
- Body and trim materials shall be in accordance with manufacturer's recommendations for design conditions and service with linear ports for modulating service.
- Sizing Criteria:
- Two-position service: pressure drop 10% to 20% of inlet psig.
- Modulating service: 100 kPa (15 psig) or less; pressure drop 80% of inlet psig.
- Modulating service: 101 to 350 kPa (16 to 50 psig); pressure drop 50% of inlet psig.
- Modulating service: over 350 kPa (50 psig); pressure drop as scheduled on plans.
- Binary Temperature Devices.
- Low-Voltage Space Thermostats. Low-voltage space thermostats shall be 24 V, bimetal-operated, mercury-switch type, with adjustable or fixed anticipation heater, concealed setpoint adjustment, 13°C–30°C (55°F–85°F) setpoint range, 1°C (2°F) maximum differential, and vented ABS plastic cover.

- Line-Voltage Space Thermostats. Line-voltage space thermostats shall be bimetal-actuated, open-contact type or bellows-actuated, enclosed, snap-switch type or equivalent solid-state type, with heat anticipator, UL listing for electrical rating, concealed setpoint adjustment, 13°C–30°C (55°F–85°F) setpoint range, 1°C (2°F) maximum differential, and vented ABS plastic cover.
- Low-Limit Thermostats. Low-limit airstream thermostats shall be UL listed, vapor pressure type. Element shall be at least 6 m (20 ft) long. Element shall sense temperature in each 30 cm (1 ft) section and shall respond to lowest sensed temperature. Low-limit thermostat shall be manual reset only.
- Temperature Sensors.
- Type. Temperature sensors shall be Resistance Temperature Device (RTD) or thermistor.
- Duct Sensors. Duct sensors shall be single point or averaging as shown. Averaging sensors shall be a minimum of 1.5 m (5 ft) in length per 1 m^2(10 ft^2) of duct cross-section.
- Immersion Sensors. Provide immersion sensors with a separable stainless steel well. Well pressure rating shall be consistent with system pressure it will be immersed in. Well shall withstand pipe design flow velocities.
- Space Sensors. Space sensors shall have setpoint adjustment, override switch, display, and communication port as shown.
- Differential Sensors. Provide matched sensors for differential temperature measurement.
- Humidity Sensors.
- Duct and room sensors shall have a sensing range of 20%–80%.
- Duct sensors shall have a sampling chamber.
- Outdoor air humidity sensors shall have a sensing range of 20%–95% RH and shall be suitable for ambient conditions of -40°C–75°C (-40°F–170°F).
- Humidity sensors shall not drift more than 1% of full scale annually.
- Flow Switches. Flow-proving switches shall be paddle (water service only) or differential pressure type (air or water service) as shown. Switches shall be UL listed, SPDT snap-acting, and pilot duty rated (125 VA minimum).
- Paddle switches shall have adjustable sensitivity and NEMA 1 enclosure unless otherwise specified.
- Differential pressure switches shall have scale range and differential suitable for intended application and NEMA 1 enclosure unless otherwise specified.
- Relays.
- Control Relays. Control relays shall be plug-in type, UL listed, and shall have dust cover and LED "energized" indicator. Contact rating, configuration, and coil voltage shall be suitable for application.
- Time Delay Relays. Time delay relays shall be solid-state plug-in type, UL listed, and shall have adjustable time delay. Delay shall be adjustable ±100% from setpoint shown. Contact rating, configuration, and coil voltage shall be suitable for application. Provide NEMA 1 enclosure for relays not installed in local control panel.
- Override Timers.

- Unless implemented in control software, override timers shall be spring-wound line voltage, UL Listed, with contact rating and configuration required by application. Provide 0–6 hour calibrated dial unless otherwise specified. Flush mount timer on local control panel face or where shown.
- Current Transmitters.
- AC current transmitters shall be self-powered, combination split-core current transformer type with built-in rectifier and high-gain servo amplifier with 4–20 mA two-wire output. Full-scale unit ranges shall be 10 A, 20 A, 50 A, 100 A, 150 A, and 200 A, with internal zero and span adjustment. Unit accuracy shall be ±1% full-scale at 500 ohm maximum burden.
- Transmitter shall meet or exceed ANSI/ISA S50.1 requirements and shall be UL/CSA recognized.
- Unit shall be split-core type for clamp-on installation on existing wiring.
- Current Transformers.
- AC current transformers shall be UL/CSA recognized and shall be completely encased (except for terminals) in approved plastic material.
- Transformers shall be available in various current ratios and shall be selected for ±1% accuracy at 5 A full-scale output.
- Use fixed-core transformers for new wiring installation and split-core transformers for existing wiring installation.
- Voltage Transmitters.
- AC voltage transmitters shall be self-powered single-loop (two-wire) type, 4–20 mA output with zero and span adjustment.
- Adjustable full-scale unit ranges shall be 100–130 Vac, 200–250 Vac, 250–330 Vac, and 400–600 Vac. Unit accuracy shall be ±1% full-scale at 500 ohm maximum burden.
- Transmitters shall meet or exceed ANSI/ISA S50.1 requirements and shall be UL/CSA recognized at 600 Vac rating.
- Voltage Transformers.
- AC voltage transformers shall be UL/CSA recognized, 600 Vac rated, and shall have built-in fuse protection.
- Transformers shall be suitable for ambient temperatures of 4°C–55°C (40°F–130°F) and shall provide ±0.5% accuracy at 24 Vac and 5 VA load.
- Windings (except for terminals) shall be completely enclosed with metal or plastic.
- Power Monitors.
- Selectable rate pulse output for kWh reading, 4–20 mA output for kW reading, N.O. alarm contact, and ability to operate with 5.0 amp current inputs or 0–0.33 volt inputs.
- 1.0% full-scale true RMS power accuracy, +0.5 Hz, voltage input range 120–600 V, and auto range select.
- Under voltage/phase monitor circuitry.
- NEMA 1 enclosure.
- Current transformers having a 0.5% FS accuracy, 600 VAC isolation voltage with 0–0.33 V output. If 0–5 A current transformers are provided, a three-phase disconnect/shorting switch assembly is required.
- Hydronic Flowmeters

- Insertion-Type Turbine Meter
- Dual counter-rotating axial turbine elements, each with its own rotational sensing system, and an averaging circuit to reduce measurement errors due to swirl and flow profile distortion. Single turbine for piping 2 inches and smaller. Flow sensing turbine rotors shall be non-metallic and not impaired by magnetic drag.
- Insertion type complete with 'hot-tap' isolation valves to enable sensor removal without water supply system shutdown.
- Sensing method shall be impedance sensing (non magnetic and non photoelectric)
- Volumetric accuracy
- ± 0.5% of reading at calibrated velocity
- ± 1% of reading from 3 to 30 ft/s (10:1 range)
- ± 2% of reading from 0.4 to 20 ft/s (50:1 range)
- Each sensor shall be individually calibrated and tagged accordingly against the manufacturer's primary standards which must be accurate to within 0.1% of flow rate and traceable to the National Institute of Standards and Technology (NIST).
- Maximum operating pressure of 400 psi and maximum operating temperature of 200°F continuous (220°F peak).
- All wetted metal parts shall be constructed of 316 stainless steel.
- Analog outputs shall consist of non interactive zero and span adjustments, a DC linearly of 0.1% of span, voltage output of 0-10 Vdc, and current output of 4-20 mA.
- Magnetic Flow-Tube Type Flowmeter
- Sensor shall be a magnetic flowmeter, which utilizes Faraday's Law to measure volumetric fluid flow through a pipe. The flowmeter shall consist of two elements, the sensor and the electronics. The sensor shall generate a measuring signal proportional to the flow velocity in the pipe. The electronics shall convert this EMF into a standard current output.
- Electronic replacement shall not affect meter accuracy (electronic units are not matched with specific sensors).
- Four-wire, externally powered, magnetic type flow transmitter with adjustable span and zero, integrally mounted to flow tube. Output signal shall be a digital pulse proportional to the flow rate (to provide maximum accuracy and to handle abrupt changes in flow). Standard 4-20 mA or 0-10 Vdc outputs may be used provided accuracy is as specified.
- Flow Tube:
- ANSI class 150 psig steel
- ANSI flanges
- Protected with PTFE, PFA, or ETFE liner rated for 245°F minimum fluid temperature
- Electrode and grounding material
- 316L Stainless steel or Hastelloy C
- Electrodes shall be fused to ceramic liner and not require o-rings.
- Electrical Enclosure: NEMA 4, 7
- Approvals:
- UL or CSA

- NSF Drinking Water approval for domestic water applications
- Performance
- Accuracy shall be ±0.5% of actual reading from 3 to 30 ft/s flow velocities, and 0.015 ft/s from 0.04 to 3 ft/s.
- Stability: 0.1% of rate over six months.
- Meter repeatability shall be ±0.1% of rate at velocities > 3 ft/s.
- Magnetic Insertion-Type Flowmeter
- Magnetic Faraday point velocity measuring device.
- Insertion type complete with hot-tap isolation valves to enable sensor removal without water supply system shutdown.
- 4-20 mA transmitter proportional to flow or velocity.
- Accuracy: larger of 1% of reading and 0.2 ft/s.
- Flow range: 0.2 to 20 ft/s, bidirectional.
- Each sensor shall be individually calibrated and tagged accordingly against the manufacturer's primary standards which must be accurate to within 0.1% of flow rate and traceable to the National Institute of Standards and Technology (NIST).
- Vortex Shedding Flowmeter
- Output: 4-20 mA, 0-10 Vdc, 0-5 Vdc.
- Maximum Fluid Temperature: 800ºF (427 °C).
- Wetted Parts: Stainless Steel.
- Housing: NEMA 4X.
- Turndown: 25:1 minimum.
- Accuracy: 0.5% of calibrated span for liquids, 1% of calibrated span for steam and gases.
- Body: Wafer style or ANSI flanged to match piping specification.
- Transit-Time Ultrasonic Flowmeter
- Clamp-On transit-time ultrasonic flowmeter
- Wide-Beam transducer technology
- 4-20 mA transmitter proportional to flow or velocity.
- Accuracy: 0.5% of reading in range 1 to 30 ft/s, 0.001 ft/s sensitivity.
- Thermal Energy Meters
- Matched RTD, solid state, or thermistor temperature sensors with a differential temperature accuracy of ±0.15°F.
- Flow meter : See "Hydronic Flowmeters" section.
- Unit accuracy of ±1% factory calibrated, traceable to NIST with certification.
- NEMA 1 enclosure.
- Panel mounted display.
- UL listed.
- Isolated 4–20 ma signals for energy rate and supply and return temperatures and flow.
- Current Switches.

- Current-operated switches shall be self-powered, solid-state with adjustable trip current. Select switches to match application current and DDC system output requirements.
- Pressure Transducers.
- Transducers shall have linear output signal and field-adjustable zero and span.
- Transducer sensing elements shall withstand continuous operating conditions of positive or negative pressure 50% greater than calibrated span without damage.
- Water pressure transducer diaphragm shall be stainless steel with minimum proof pressure of 1000 kPa (150 psi). Transducer shall have 4–20 mA output, suitable mounting provisions, and block and bleed valves.
- Water differential pressure transducer diaphragm shall be stainless steel with minimum proof pressure of 1000 kPa (150 psi). Over-range limit (differential pressure) and maximum static pressure shall be 2000 kPa (300 psi.)Transducer shall have 4–20 mA output, suitable mounting provisions, and 5-valve manifold.
- Differential Pressure Switches. Differential pressure switches (air or water service) shall be UL listed, SPDT snap-acting, pilot duty rated (125 VA minimum) and shall have scale range and differential suitable for intended application and NEMA 1 enclosure unless otherwise specified.
- Pressure-Electric (PE) Switches.
- Shall be metal or neoprene diaphragm actuated, operating pressure rated for 0–175 kPa (0–25 psig), with calibrated scale minimum setpoint range of 14–125 kPa (2–18 psig) minimum, UL listed.
- Provide one- or two-stage switch action (SPDT, DPST, or DPDT) as required by application Electrically rated for pilot duty service (125 VA minimum) and/or for motor control.
- Switches shall be open type (panel-mounted) or enclosed type for remote installation. Enclosed type shall be NEMA 1 unless otherwise specified.
- Each pneumatic signal line to PE switches shall have permanent indicating gauge.
- Occupancy Sensors. Occupancy sensors shall utilize Passive Infrared (PIR) and/or Microphonic Passive technology to detect the presence of people within a room. Sensors shall be mounted as indicated on the approved drawings. The sensor output shall be accessible by any lighting and/or HVAC controller in the system. Occupancy sensors shall be capable of being powered from the lighting or HVAC control panel, as shown on the drawings. Occupancy sensor delay shall be software adjustable through the user interface and shall not require manual adjustment at the sensor.
- Local Control Panels.
- All indoor control cabinets shall be fully enclosed NEMA 1 construction with (hinged door) key-lock latch and removable subpanels. A single key shall be common to all field panels and subpanels.
- Interconnections between internal and face-mounted devices shall be prewired with color-coded stranded conductors neatly installed in plastic troughs and/or tie-wrapped. Terminals for field connections shall be UL listed for 600 volt service, individually identified per control/ interlock drawings, with adequate clearance for field wiring. Control terminations for field connection shall be individually identified per control drawings.

- Provide ON/OFF power switch with overcurrent protection for control power sources to each local panel.

- **Wiring and Raceways**

- General. Provide copper wiring, plenum cable, and raceways as specified in applicable sections of Division 26.
- Insulated wire shall use copper conductors and shall be UL listed for 90°C (200°F) minimum service.

- **Fiber Optic Cable System**

- Optical Cable. Optical cables shall be duplex 900 mm tight-buffer construction designed for intra-building environments. Sheath shall be UL listed OFNP in accordance with NEC Article 770. Optical fiber shall meet the requirements of FDDI, ANSI X3T9.5 PMD for 62.5/125mm.
- Connectors. Field terminate optical fibers with ST type connectors. Connectors shall have ceramic ferrules and metal bayonet latching bodies.

EXECUTION

Section Includes

- **Examination**
- **Protection**
- **Coordination**
- **General Workmanship**
- **Field Quality Control**
- **Existing Equipment**
- **Wiring**
- **Communication Wiring**
- **Fiber Optic Cable**
- **Control Air Tubing**
- **Installation of Sensors**
- **Flow Switch Installation**
- **Actuators**
- **Warning Labels**
- **Identification of Hardware and Wiring**
- **Examination**
- **Controllers**
- **Programming**
- **Control system Checkout and Testing**
- **Control System Demonstration and Acceptance**
- **Cleaning**
- **Training**
- **Sequences of Operation**
- **Control Valve Installation**
- **Control Damper Installation**
- **Smoke Damper Installation**
- **Duct Smoke Detection**
- **Controls Communication Protocol**
- **Start-Up and Checkout Procedures**

- The contractor shall inspect the site to verify that equipment may be installed as shown. Any discrepancies, conflicts, or omissions shall be reported to the engineer for resolution before rough-in work is started.
- The contractor shall examine the drawings and specifications for other parts of the work. If head room or space conditions appear inadequate—or if any discrepancies occur between the plans and the contractor's work and the plans and the work of others—the contractor shall report these discrepancies to the engineer and shall obtain written instructions for any changes necessary to accommodate the contractor's work with the work of others. Any changes in the work covered by this specification made necessary by the failure or neglect of the contractor to report such discrepancies shall be made by—and at the expense of—this contractor.

- **Protection**

- The contractor shall protect all work and material from damage by his/her work or employees and shall be liable for all damage thus caused.
- The contractor shall be responsible for his/her work and equipment until finally inspected, tested, and accepted. The contractor shall protect any material that is not immediately installed. The contractor shall close all open ends of work with temporary covers or plugs during storage and construction to prevent entry of foreign objects.

- **Coordination**

- Site
- Where the mechanical work will be installed in close proximity to, or will interfere with, work of other trades, the contractor shall assist in working out space conditions to make a satisfactory adjustment. If the contractor installs his/her work before coordinating with other trades, so as to cause any interference with work of other trades, the contractor shall make the necessary changes in his/her work to correct the condition without extra charge.
- Coordinate and schedule work with other work in the same area and with work dependent upon other work to facilitate mutual progress.
- Submittals. See Section 23 09 23 Article 1.10 (Submittals).
- Test and Balance.
- The contractor shall furnish a single set of all tools necessary to interface to the control system for test and balance purposes.
- The contractor shall provide training in the use of these tools. This training will be planned for a minimum of 4 hours.
- In addition, the contractor shall provide a qualified technician to assist in the test and balance process, until the first 20 terminal units are balanced.
- The tools used during the test and balance process will be returned at the completion of the testing and balancing.
- Life Safety.
- Duct smoke detectors required for air handler shutdown are provided under Division 28. Interlock smoke detectors to air handlers for shutdown as specified in Section 23 09 93 (Sequences of Operation).

- Smoke dampers and actuators required for duct smoke isolation are provided under Division 23. Interlock smoke dampers to air handlers as specified in Section 23 09 93 (Sequences of Operation).
- Fire and smoke dampers and actuators required for fire-rated walls are provided under Division 23. Fire and smoke damper control is provided under Division 28.
- Coordination with controls specified in other sections or divisions. Other sections and/or divisions of this specification include controls and control devices that are to be part of or interfaced to the control system specified in this section. These controls shall be integrated into the system and coordinated by the contractor as follows:
- All communication media and equipment shall be provided as specified in Section 23 09 23 Article 2.2 (Communication).
- Each supplier of a controls product is responsible for the configuration, programming, start up, and testing of that product to meet the sequences of operation described in Section 23 09 93.
- The contractor shall coordinate and resolve any incompatibility issues that arise between control products provided under this section and those provided under other sections or divisions of this specification.
- The contractor is responsible for providing all controls described in the contract documents regardless of where within the contract documents these controls are described.
- The contractor is responsible for the interface of control products provided by multiple suppliers regardless of where this interface is described within the contract documents.

- **General Workmanship**

- Install equipment, piping, and wiring/raceway parallel to building lines (i.e. horizontal, vertical, and parallel to walls) wherever possible.
- Provide sufficient slack and flexible connections to allow for vibration of piping and equipment.
- Install equipment in readily accessible locations as defined by Chapter 1 Article 100 Part A of the National Electrical Code (NEC).
- Verify integrity of all wiring to ensure continuity and freedom from shorts and grounds.
- All equipment, installation, and wiring shall comply with industry specifications and standards for performance, reliability, and compatibility and be executed in strict adherence to local codes and standard practices.

- **Field Quality Control**

- All work, materials, and equipment shall comply with rules and regulations of applicable local, state, and federal codes and ordinances as identified in Section 23 09 23 Article 1.8 (Codes and Standards).
- Contractor shall continually monitor the field installation for code compliance and quality of workmanship.
- Contractor shall have work inspection by local and/or state authorities having jurisdiction over the work.

- **Existing Equipment**

- Wiring. Interconnecting control wiring shall be removed and shall become the property of the contractor unless specifically noted or shown to be reused.
- Local Control Panels. Remove and deliver existing control panels to Owner.
- Repair. Unless otherwise directed, the contractor is not responsible for repair or replacement of existing energy equipment and systems, valves, dampers, or actuators. Should the contractor find existing equipment that requires maintenance, the engineer is to be notified immediately.
- Indicator Gauges. Where these devices remain and are not removed, they must be made operational and recalibrated to ensure reasonable accuracy.
- Room Thermostats. Remove and deliver existing room thermostats to Owner unless otherwise noted. Patch and finish holes and marks left by removal to match existing walls.
- Electronic Sensors and Transmitters. Remove and deliver existing sensors and transmitters to Owner.
- Controllers and Auxiliary Electronic Devices. Remove and deliver existing controllers and auxiliary electronic devices to Owner.
- Damper Actuators, Linkages, and Appurtenances. Remove and deliver existing damper actuators, linkages and appurtenances to Owner.
- Control Valves. Replace existing control valves with new. Deliver removed control valves to Owner.
- Control Compressed Air Systems. Replace existing control compressed air systems with new unless otherwise noted. Deliver removed systems to Owner.
- Existing System Operating Schedule. Existing mechanical system may be disabled during this work.
- The scheduling of fans through existing or temporary time clocks or control system shall be maintained throughout the DDC system installation
- Install control panels where shown.
- Modify existing starter control circuits, if necessary, to provide hand-off-auto control of each controlled starter. If new starters or starter control packages are required, these shall be included as part of this contract.
- Patch holes and finish to match existing walls.

- **Wiring**

- All control and interlock wiring shall comply with national and local electrical codes, and Division 26 of this specification, Where the requirements of this section differ from Division 26, the requirements of this section shall take precedence.
- All NEC Class 1 (line voltage) wiring shall be UL listed in approved raceway according to NEC and Division 26 requirements.
- All low-voltage wiring shall meet NEC Class 2 requirements. Low-voltage power circuits shall be subfused when required to meet Class 2 current limit.
- Where NEC Class 2 (current-limited) wires are in concealed and accessible locations, including ceiling return air plenums, approved cables not in raceway may be used provided that cables are UL listed for the intended application.

- All wiring in mechanical, electrical, or service rooms – or where subject to mechanical damage – shall be installed in raceway at levels below 3 m (10ft).
- Do not install Class 2 wiring in raceways containing Class 1 wiring. Boxes and panels containing high-voltage wiring and equipment may not be used for low-voltage wiring except for the purpose of interfacing the two (e.g. relays and transformers).
- Do not install wiring in raceway containing tubing.
- Where Class 2 wiring is run exposed, wiring is to be run parallel along a surface or perpendicular to it and neatly tied at 3 m (10 ft) intervals.
- Where plenum cables are used without raceway, they shall be supported from or anchored to structural members. Cables shall not be supported by or anchored to ductwork, electrical raceways, piping, or ceiling suspension systems.
- All wire-to-device connections shall be made at a terminal block or terminal strip. All wire-to-wire connections shall be at a terminal block.
- All wiring within enclosures shall be neatly bundled and anchored to permit access and prevent restriction to devices and terminals.
- Maximum allowable voltage for control wiring shall be 120 V. If only higher voltages are available, the contractor shall provide step-down transformers.
- All wiring shall be installed as continuous lengths, with no splices permitted between termination points.
- Install plenum wiring in sleeves where it passes through walls and floors. Maintain fire rating at all penetrations.
- Size of raceway and size and type of wire type shall be the responsibility of the contractor in keeping with the manufacturer's recommendations and NEC requirements, except as noted elsewhere.
- Include one pull string in each raceway 2.5 cm (1 in.) or larger.
- Use color-coded conductors throughout with conductors of different colors.
- Control and status relays are to be located in designated enclosures only. These enclosures include packaged equipment control panel enclosures unless they also contain Class 1 starters.
- Conceal all raceways except within mechanical, electrical, or service rooms. Install raceway to maintain a minimum clearance of 15 cm (6 in.) from high-temperature equipment (e.g. steam pipes or flues).
- Secure raceways with raceway clamps fastened to the structure and spaced according to code requirements. Raceways and pull boxes may not be hung on flexible duct strap or tie rods. Raceways may not be run on or attached to ductwork.
- Adhere to this specification's Division 26 requirements where raceway crosses building expansion joints.
- Install insulated bushings on all raceway ends and openings to enclosures. Seal top end of vertical raceways.
- The contractor shall terminate all control and/or interlock wiring and shall maintain updated (as-built) wiring diagrams with terminations identified at the job site.
- Flexible metal raceways and liquid-tight flexible metal raceways shall not exceed 1 m (3 ft) in length and shall be supported at each end. Flexible metal raceway less than ½ in. electrical

trade size shall not be used. In areas exposed to moisture, including chiller and boiler rooms, liquid-tight, flexible metal raceways shall be used.

- Raceway must be rigidly installed, adequately supported, properly reamed at both ends, and left clean and free of obstructions. Raceway sections shall be joined with couplings (according to code). Terminations must be made with fittings at boxes, and ends not terminating in boxes shall have bushings installed.

- **Communication Wiring**

- The contractor shall adhere to the items listed in the "Wiring" article in Part 3 of the specification.
- All cabling shall be installed in a neat and workmanlike manner. Follow manufacturer's installation recommendations for all communication cabling
- Do not install communication wiring in raceways and enclosures containing Class 1 or other Class 2 wiring.
- Maximum pulling, tension, and bend radius for the cable installation, as specified by the cable manufacturer, shall not be exceeded during installation.
- Contractor shall verify the integrity of the entire network following cable installation. Use appropriate test measures for each particular cable.
- When a cable enters or exits a building, a lightning arrestor must be installed between the lines and ground. The lighting arrestor shall be installed according to manufacturer’s instructions.
- All runs of communication wiring shall be unspliced length when that length is commercially available.
- All communication wiring shall be labeled to indicate origination and destination data.
- All communication wiring shall be labeled to indicate origination and destination data.
- Grounding of coaxial cable shall be in accordance with NEC regulations article on "Communications Circuits, Cable, and Protector Grounding."
- BACnet MS/TP communications wiring shall be installed in accordance with ASHRAE/ANSI Standard 135. This includes but is not limited to:
- The network shall use shielded, twisted-pair cable with characteristic impedance between 100 and 120 ohms. Distributed capacitance between conductors shall be less than 100 pF per meter (30 pF per foot.)
- The maximum length of an MS/TP segment is 1200 meters (4000 ft) with AWG 18 cable. The use of greater distances and/or different wire gauges shall comply with the electrical specifications of EIA-485.
- The maximum number of nodes per segment shall be 32, as specified in the EIA 485 standard. Additional nodes may be accommodated by the use of repeaters.
- An MS/TP EIA-485 network shall have no T connections.

- **Fiber Optic Cable**

- Maximum pulling tensions as specified by the cable manufacturer shall not be exceeded during installation. Post-installation residual cable tension shall be within cable manufacturer's specifications.

- All cabling and associated components shall be installed in accordance with manufacturers' instructions. Minimum cable and unjacketed fiber bend radii, as specified by cable manufacturer, shall be maintained.

- **Installation of Sensors**

- Install sensors in accordance with the manufacturer's recommendations.
- Mount sensors rigidly and adequately for environment within which the sensor operates.
- Room temperature sensors shall be installed on concealed junction boxes properly supported by wall framing.
- All wires attached to sensors shall be sealed in their raceways or in the wall to stop air transmitted from other areas from affecting sensor readings.
- Sensors used in mixing plenums and hot and cold decks shall be of the averaging type. Averaging sensors shall be installed in a serpentine manner vertically across the duct. Each bend shall be supported with a capillary clip.
- Low-limit sensors used in mixing plenums shall be installed in a serpentine manner horizontally across duct. Each bend shall be supported with a capillary clip. Provide 3 m (1 ft) of sensing element for each 1 m^2(1 ft^2) of coil area.
- Do not install temperature sensors within the vapor plume of a humidifier. If installing a sensor downstream of a humidifier, install it at least 3 m (10 ft) downstream.
- All pipe-mounted temperature sensors shall be installed in wells. Install liquid temperature sensors with heat-conducting fluid in thermal wells.
- Install outdoor air temperature sensors on north wall, complete with sun shield at designated location.
- Differential Air Static Pressure.
- Supply Duct Static Pressure. Pipe the high-pressure tap to the duct using a pitot tube. Pipe the low-pressure port to a tee in the height-pressure tap tubing of the corresponding building static pressure sensor (if applicable) or to the location of the duct high-pressure tap and leave open to the plenum.
- Return Duct Static Pressure. Pipe high-pressure tap to duct using a pitot tube. Pipe the low-pressure port to a tee in the low-pressure tap tubing of the corresponding building static pressure sensor.
- Building Static Pressure. Pipe the low-pressure port of the pressure sensor to the static pressure port located on the outside of the building through a high-volume accumulator. Pipe the high-pressure port to a location behind a thermostat cover.
- The piping to the pressure ports on all pressure transducers shall contain a capped test port located adjacent to the transducer.
- All pressure transducers, other than those controlling VAV boxes, shall be located in field device panels, not on the equipment monitored or on ductwork. Mount transducers in a location accessible for service without use of ladders or special equipment.
- All air and water differential pressure sensors shall have gauge tees mounted adjacent to the taps. Water gauges shall also have shut-off valves installed before the tee.
- Smoke detectors, freezestats, high-pressure cut-offs, and other safety switches shall be hard-wired to de-energize equipment as described in the sequence of operation. Switches shall

require manual reset. Provide contacts that allow DDC software to monitor safety switch status.

- Install humidity sensors for duct mounted humidifiers at least 3 m (10 ft) downstream of the humidifier. Do not install filters between the humidifier and the sensor.

- **Flow Switch Installation**

- Use correct paddle for pipe diameter.
- Adjust flow switch according to manufacturer's instructions.

- **Actuators**

- General. Mount and link control damper actuators according to manufacturer's instructions.
- To compress seals when spring-return actuators are used on normally closed dampers, power actuator to approximately 5° open position, manually close the damper, and then tighten the linkage.
- Check operation of damper/actuator combination to confirm that actuator modulates damper smoothly throughout stroke to both open and closed positions.
- Provide all mounting hardware and linkages for actuator installation.
- Electric/Electronic
- Dampers: Actuators shall be direct mounted on damper shaft or jackshaft unless shown as a linkage installation. For low-leakage dampers with seals, the actuator shall be mounted with a minimum 5° travel available for tightening the damper seal. Actuators shall be mounted following manufacturer’s recommendations.
- Valves: Actuators shall be connected to valves with adapters approved by the actuator manufacturer. Actuators and adapters shall be mounted following the actuator manufacturer's recommendations.
- Pneumatic Actuators.
- Size pneumatic damper actuator to operate the related control damper(s) with sufficient reserve power to provide smooth modulating action or two-position action. Actuator also shall be sized for proper speed of response at the velocity and pressure conditions to which the control damper is subject.
- Pneumatic damper actuators shall produce sufficient torque to close off against the maximum system pressures encountered. Size the pneumatic damper actuator to close off against the fan shutoff pressure, as a minimum.
- Where two or more pneumatic damper actuators are installed for interrelated operation in unison, such as dampers used for mixing, provide the dampers with a positive pilot positioner. The positive pilot positioner shall be directly mounted to the pneumatic damper actuator and have pressure gauges for supply input and output pressures.
- The total damper area operated by an actuator shall not exceed 80% of the manufacturer's maximum area rating. Provide at least one actuator for each damper section. Each damper actuator shall not power more than 2 m^2(20 ft^2) of damper.
- Use line shafting or shaft couplings (jackshafting) in lieu of blade-to-blade linkages or shaft coupling when driving axially aligned damper sections.

- **Warning Labels**

- Permanent warning labels shall be affixed to all equipment that can be automatically started by the control system.
- Labels shall use white lettering (12-point type or larger) on a red background.
- Warning labels shall read as follows.

C A U T I O N
This equipment is operating under automatic control and may start or stop at any time without warning. Switch disconnect to"Off"position before servicing.

- Permanent warning labels shall be affixed to all motor starters and control panels that are connected to multiple power sources utilizing separate disconnects.
- Labels shall use white lettering (12-point type or larger) on a red background.
- Warning labels shall read as follows.

C A U T I O N
This equipment is fed from more than one power source with separate disconnects. Disconnect all power sources before servicing.

- **Identification of Hardware and Wiring**

- All wiring and cabling, including that within factory-fabricated panels shall be labeled at each end within 5 cm (2 in.) of termination with control system address or termination number.
- All pneumatic tubing shall be labeled at each end within 5 cm (2 in.) of termination with a descriptive identifier.
- Permanently label or code each point of field terminal strips to show the instrument or item served.
- Identify control panels with minimum 1 cm (½ in.) letters on laminated plastic nameplates.
- Identify all other control components with permanent labels. All plug-in components shall be labeled such that label removal of the component does not remove the label.
- Identify room sensors related to terminal boxes or valves with nameplates.
- Manufacturers' nameplates and UL or CSA labels shall be visible and legible after equipment is installed.
- Identifiers shall match record documents.

- **Controllers**

- Provide a separate controller for each AHU or other HVAC system. A DDC controller may control more than one system provided that all points associated with the system are assigned to the same DDC controller. Points used for control loop reset, such as outside air or space temperature, are exempt from this requirement.

- Building Controllers and Custom Application Controllers shall be selected to provide the required I/O point capacity required to monitor all of the hardware points listed in Section 23 09 93 (Sequences of Operation).

- **Programming**

- Provide sufficient internal memory for the specified sequences of operation and trend logging.
- Point Naming. Name points as shown on the equipment points list provided with each sequence of operation. See Section 23 09 93 (Sequences of Operation). If character limitations or space restrictions make it advisable to shorten the name, the abbreviations given in Appendix B to Section 23 09 93 may be used. Where multiple points with the same name reside in the same controller, each point name may be customized with its associated Program Object number. For example, "Zone Temp 1" for Zone 1, "Zone Temp 2" for Zone 2.
- Software Programming.
- Provide programming for the system and adhere to the sequences of operation provided. All other system programming necessary for the operation of the system, but not specified in this document, also shall be provided by the contractor. Embed into the control program sufficient comment statements to clearly describe each section of the program. The comment statements shall reflect the language used in the sequences of operation. Use the appropriate technique based on the following programming types:
- Text-based:
- Must provide actions for all possible situations
- Must be modular and structured
- Must be commented
- Graphic-based:
- Must provide actions for all possible situations
- Must be documented
- Parameter-based:
- Must provide actions for all possible situations
- Must be documented.
- Operator Interface.
- Standard Graphics. Provide graphics for all mechanical systems and floor plans of the building. This includes each chilled water system, hot water system, chiller, boiler, air handler, and all terminal equipment. Point information on the graphic displays shall dynamically update. Show on each graphic all input and output points for the system. Also show relevant calculated points such as setpoints. As a minimum, show on each equipment graphic the input and output points and relevant calculated points as indicated on the applicable Points List in Section 23 09 93.
- The contractor shall provide all the labor necessary to install, initialize, start up, and troubleshoot all operator interface software and its functions as described in this section. This includes any operating system software, the operator interface database, and any third-party software installation and integration required for successful operation of the operator interface.

- **Control System Checkout and Testing**

- Startup Testing. All testing listed in this article shall be performed by the contractor and shall make up part of the necessary verification of an operating control system. This testing shall be completed before the owner's representative is notified of the system demonstration.
- The contractor shall furnish all labor and test apparatus required to calibrate and prepare for service of all instruments, controls, and accessory equipment furnished under this specification.
- Verify that all control wiring is properly connected and free of all shorts and ground faults. Verify that terminations are tight.
- Enable the control systems and verify calibration of all input devices individually. Perform calibration procedures according to manufacturers' recommendations.
- Verify that all binary output devices (relays, solenoid valves, two-position actuators and control valves, magnetic starters, etc.) operate properly and that the normal positions are correct.
- Verify that all analog output devices (I/Ps, actuators, etc.) are functional, that start and span are correct, and that direction and normal positions are correct. The contractor shall check all control valves and automatic dampers to ensure proper action and closure. The contractor shall make any necessary adjustments to valve stem and damper blade travel.
- Verify that the system operation adheres to the sequences of operation. Simulate and observe all modes of operation by overriding and varying inputs and schedules. Tune all DDC loops.
- Alarms and Interlocks:
- Check each alarm separately by including an appropriate signal at a value that will trip the alarm.
- Interlocks shall be tripped using field contacts to check the logic, as well as to ensure that the fail-safe condition for all actuators is in the proper direction.
- Interlock actions shall be tested by simulating alarm conditions to check the initiating value of the variable and interlock action

- **Control System Demonstration and Acceptance**

- Demonstration.
- Prior to acceptance, the control system shall undergo a series of performance tests to verify operation and compliance with this specification. These tests shall occur after the Contractor has completed the installation, started up the system, and performed his/her own tests.
- The tests described in this section are to be performed in addition to the tests that the contractor performs as a necessary part of the installation, start-up, and debugging process and as specified in the "Control System Checkout and Testing" article in Part 3 of this specification. The engineer will be present to observe and review these tests. The engineer shall be notified at least 10 days in advance of the start of the testing procedures.
- The demonstration process shall follow that approved in Part 1, "Submittals." The approved checklists and forms shall be completed for all systems as part of the demonstration.
- The contractor shall provide at least two persons equipped with two-way communication and shall demonstrate actual field operation of each control and sensing point for all modes of operation including day, night, occupied, unoccupied, fire/smoke alarm, seasonal changeover,

and power failure modes. The purpose is to demonstrate the calibration, response, and action of every point and system. Any test equipment required to prove the proper operation shall be provided by and operated by the contractor.

- As each control input and output is checked, a log shall be completed showing the date, technician's initials, and any corrective action taken or needed.
- Demonstrate compliance with Part 1, "System Performance."
- Demonstrate compliance with sequences of operation through all modes of operation.
- Demonstrate complete operation of operator interface.
- Additionally, the following items shall be demonstrated:
- DDC loop response. The contractor shall supply trend data output in a graphical form showing the step response of each DDC loop. The test shall show the loop's response to a change in set point, which represents a change of actuator position of at least 25% of its full range. The sampling rate of the trend shall be from 10 seconds to 3 minutes, depending on the speed of the loop. The trend data shall show for each sample the set point, actuator position, and controlled variable values. Any loop that yields unreasonably under-damped or over-damped control shall require further tuning by the Contractor.
- Demand limiting. The contractor shall supply a trend data output showing the action of the demand limiting algorithm. The data shall document the action on a minute-by-minute basis over at least a 30-minute period. Included in the trend shall be building kW, demand limiting set point, and the status of sheddable equipment outputs.
- Optimum start/stop. The contractor shall supply a trend data output showing the capability of the algorithm. The change-of-value or change-of-state trends shall include the output status of all optimally started and stopped equipment, as well as temperature sensor inputs of affected areas.
- Interface to the building fire alarm system.
- Operational logs for each system that indicate all set points, operating points, valve positions, mode, and equipment status shall be submitted to the architect/engineer. These logs shall cover three 48-hour periods and have a sample frequency of not more than 10 minutes. The logs shall be provided in both printed and disk formats.
- Any tests that fail to demonstrate the operation of the system shall be repeated at a later date. The contractor shall be responsible for any necessary repairs or revisions to the hardware or software to successfully complete all tests.
- Acceptance.
- All tests described in this specification shall have been performed to the satisfaction of both the engineer and owner prior to the acceptance of the control system as meeting the requirements of completion. Any tests that cannot be performed due to circumstances beyond the control of the contractor may be exempt from the completion requirements if stated as such in writing by the engineer. Such tests shall then be performed as part of the warranty.
- The system shall not be accepted until all forms and checklists completed as part of the demonstration are submitted and approved as required in Part 1, "Submittals."
- **Cleaning**

- The contractor shall clean up all debris resulting from his/her activities daily. The contractor shall remove all cartons, containers, crates, etc., under his/her control as soon as their contents have been removed. Waste shall be collected and placed in a designated location.
- At the completion of work in any area, the contractor shall clean all work, equipment, etc., keeping it free from dust, dirt, and debris, etc.
- At the completion of work, all equipment furnished under this section shall be checked for paint damage, and any factory-finished paint that has been damaged shall be repaired to match the adjacent areas. Any cabinet or enclosure that has been deformed shall be replaced with new material and repainted to match the adjacent areas.

- **Training**

- Provide training for a designated staff of Owner's representatives. Training shall be provided via self-paced training, web-based or computer-based training, classroom training, or a combination of training methods.
- Training shall enable students to accomplish the following objectives.
- Day-to-day Operators:
- Proficiently operate the system
- Understand control system architecture and configuration
- Understand DDC system components
- Understand system operation, including DDC system control and optimizing routines (algorithms)
- Operate the workstation and peripherals
- Log on and off the system
- Access graphics, point reports, and logs
- Adjust and change system set points, time schedules, and holiday schedules
- Recognize malfunctions of the system by observation of the printed copy and graphical visual signals
- Understand system drawings and Operation and Maintenance manual
- Understand the job layout and location of control components
- Access data from DDC controllers and ASCs
- Operate portable operator's terminals
- Advanced Operators:
- Make and change graphics on the workstation
- Create, delete, and modify alarms, including annunciation and routing of these
- Create, delete, and modify point trend logs and graph or print these both on an ad-hoc basis and at user-definable time intervals
- Create, delete, and modify reports
- Add, remove, and modify system's physical points
- Create, modify, and delete programming
- Add panels when required
- Add operator interface stations
- Create, delete, and modify system displays, both graphical and others
- Perform DDC system field checkout procedures

- Perform DDC controller unit operation and maintenance procedures
- Perform workstation and peripheral operation and maintenance procedures
- Perform DDC system diagnostic procedures
- Configure hardware including PC boards, switches, communication, and I/O points
- Maintain, calibrate, troubleshoot, diagnose, and repair hardware
- Adjust, calibrate, and replace system components
- System Managers/Administrators:
- Maintain software and prepare backups
- Interface with job-specific, third-party operator software
- Add new users and understand password security procedures
- Organize the training into sessions or modules for the three levels of operators listed above. (Day-to-Day Operators, Advanced Operators, System Managers and Administrators). Students will receive one or more of the training packages, depending on knowledge level required.
- Provide course outline and materials according to the "Submittals" article in Part 1 of this specification. Provide one copy of training material per student.
- The instructor(s) shall be factory-trained and experienced in presenting this material.
- Classroom training shall be done using a network of working controllers representative of installed hardware.

- **Sequences of Operation**

  See Section 23, Appendix A (Sequences of Operation, With Points Lists).

- **Control Valve Installation**

- Valve submittals shall be coordinated for type, quantity, size, and piping configuration to ensure compatibility with pipe design.
- Slip-stem control valves shall be installed so that the stem position is not more than 60 degrees from the vertical up position. Ball type control valves shall be installed with the stem in the horizontal position.
- Valves shall be installed in accordance with the manufacturer's recommendations.
- Control valves shall be installed so that they are accessible and serviceable and so that actuators may be serviced and removed without interference from structure or other pipes and/or equipment.
- Isolation valves shall be installed so that the control valve body may be serviced without draining the supply/return side piping system. Unions shall be installed at all connections to screw-type control valves.
- Provide tags for all control valves indicating service and number. Tags shall be brass, 1.5 inch in diameter, with ¼ inch high letters. Securely fasten with chain and hook. Match identification numbers as shown on approved controls shop drawings.

- **Control Damper Installation**

- Damper submittals shall be coordinated for type, quantity, and size to ensure compatibility with sheet metal design.

- Duct openings shall be free of any obstruction or irregularities that might interfere with blade or linkage rotation or actuator mounting. Duct openings shall measure ¼ in. larger than damper dimensions and shall be square, straight, and level.
- Individual damper sections, as well as entire multiple section assemblies, must be completely square and free from racking, twisting, or bending. Measure diagonally from upper corners to opposite lower corners of each damper section. Both dimensions must be within 0.3 cm (1/8 in.) of each other.
- Follow the manufacturer's instructions for field installation of control dampers. Unless specifically designed for vertical blade application, dampers must be mounted with blade axis horizontal.
- Install extended shaft or jackshaft according to manufacturer's instructions. (Typically, a sticker on the damper face shows recommended extended shaft location. Attach shaft on labeled side of damper to that blade.)
- Damper blades, axles, and linkage must operate without binding. Before system operation, cycle damper after installation to ensure proper operation. On multiple section assemblies, all sections must open and close simultaneously.
- Provide a visible and accessible indication of damper position on the drive shaft end.
- Support ductwork in area of damper when required to prevent sagging due to damper weight.
- After installation of low-leakage dampers with seals, caulk between frame and duct or opening to prevent leakage around perimeter of damper.

- **Smoke Damper Installation**

- The contractor shall coordinate all smoke and smoke/fire damper installation, wiring, and checkout to ensure that these dampers function properly and that they respond to the proper fire alarm system general, zone, and/or detector trips. The contractor shall immediately report any discrepancies to the engineer no less than two weeks prior to inspection by the code authority having jurisdiction.
- Provide complete submittal data to controls system subcontractor for coordination of duct smoke detector interface to HVAC systems.

- **Duct Smoke Detection**

- Submit data for coordination of duct smoke detector interface to HVAC systems as required in Part 1, "Submittals."
- This Contractor shall provide a dry-contact alarm output in the same room as the HVAC equipment to be controlled.

- **Controls Communication Protocol**

- General. The electronic controls packaged with this equipment shall communicate with the building direct digital control (DDC) system. The DDC system shall communicate with these controls to read the information and change the control setpoints as shown in the points list, sequences of operation, and control schematics. The information to be communicated between the DDC system and these controls shall be in the standard object format as defined in ANSI/ASHRAE Standard 135 (BACnet). Controllers shall communicate with other BACnet

objects on the internetwork using the Read (Execute) Property service as defined in Clause 15.5 of Standard 135.

- Distributed Processing. The controller shall be capable of stand-alone operation and shall continue to provide control functions if the network connection is lost.
- I/O Capacity. The controller shall contain sufficient I/ O capacity to control the target system.
- The Controller shall have a physical connection for a laptop computer or a portable operator's tool.
- Environment. The hardware shall be suitable for the anticipated ambient conditions.
- Controllers used outdoors and/or in wet ambient conditions shall be mounted within waterproof enclosures and shall be rated for operation at 40°C to 60°C (40°F to 140°F).
- Controllers used in conditioned space shall be mounted in dust-proof enclosures and shall be rated for operation at 0°C to 50°C (32°F to 120°F).
- Serviceability. Provide diagnostic LEDs for power, communication, and processor. All wiring connections shall be made to field removable, modular terminal strips or to a termination card connected by a ribbon cable.
- Memory. The Controller shall maintain all BIOS and programming information in the event of a power loss for at least 30 days.
- Power. Controller shall be able to operate at 90% to 110% of nominal voltage rating.
- Transformer. Power supply for the Controller must be rated at minimum of 125% of ASC power consumption and shall be fused or current limiting type.

- **Start-Up and Checkout Procedures**

- Start up, check out, and test all hardware and software and verify communication between all components.
- Verify that all control wiring is properly connected and free of all shorts and ground faults. Verify that terminations are tight.
- Verify that all analog and binary input/output points read properly.
- Verify alarms and interlocks.
- Verify operation of the integrated system.

POST IMPLEMENTATION SCHEDULES

DEALERSHIP, TRAINING & SUPPORT

ITEM	DESCRIPTION	REQUIREMENT
Support / Supplier/ Dealership	1. Manufacturer details. 2. Authorization letter from dealership current to past 1 year	Provide hard copies of: 1. Letter from system manufacturer acknowledging after sales support. **Yes / No** 2. Letter from manufacturer giving contractor dealership rights for the system. **Yes / No**
Training	Attach certified training plans	Provide a full proposal for certified training on system for our client staff. **Yes / No**
Softwares & Upgrade	All software's to be licensed and open source and should require no future licenses (State availability and source of software updates)	Provide hard copies of: 1. Original CD. **Yes / No** 2. License. **Yes / No** 3. Proof of no future licenses. **Yes / No** 4. Source of updates. **Yes / No**
Spare Parts and Maintenance Proposal	1. Comprehensive Priced list for spares 2. 2 year maintenance cost. 3. Hourly call out charges	Provide: A comprehensive and fully priced list of system spare parts and lead times to our client. **Yes / No** Comprehensive and priced 2 year maintenance contract. **Yes / No** Hourly charges on a 24/7 basis. **Yes / No**

SCHEDULES & WARRANTIES

LIST OF TOOLS TO BE SUPPLIED WITH EACH INSTALLATION

The following tools shall be handed over to the Client or Engineer before completion of the contract:-

Item	Description	Price (KShs.)

LIST OF CONSUMABLES & SPARE PARTS TO BE SUPPLIED WITH EACH INSTALLATION

The following items shall be handed over to the Client or Engineer before completion of the contract. These items shall not be used by the Contractor to carry out his normal maintenance.

Item	Description	Price (Kshs).

FORM OF AGREEMENT

FORM OF AGREEMENT

THIS AGREEMENT, made the_____ day of_____ 20_____

between

KENYA MEDICAL SUPPLIES AUTHORITY of P.O.BOX 47715 – 00100 NAIROBI

(hereinafter called "the Employer") of the one part

AND_____

_____

of [or whose registered office is situated

at]_____

(hereinafter called "the Contractor") of the other part.

WHEREAS THE Employer is desirous that the Contractor executes

SUPPLY, INSTALLATION, TESTING AND COMMISSIONING OF BUILDING MANAGEMENT SYSTEM (BMS) AT KEMSA NEW WAREHOUSE

TENDER NO.: GF-KEMSA/CONST 01/ONT1/2021/2022 (hereinafter called "the Works") located on **Land LR No. 9042/176 Embakasi, Nairobi** and the Employer has accepted the tender submitted by the Contractor for the execution and completion of such Works and the remedying of any defects therein for the Contract Price of

Kenya Shillings_____(Amount in figures],

Kenya Shillings_____(Amount in figures],

NOW THIS AGREEMENT WITNESSETH as follows:

3. In this Agreement, words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Contract hereinafter referred to.
4. The following documents shall be deemed to form and shall be read and construed as part of this Agreement i.e.
    (viii) Letter of Acceptance
    (ix) Form of Tender
    (x) Conditions of Contract Part I
    (xi) Conditions of Contract Part II and Appendix to Conditions of Contract
    (xii) Specifications
    (xiii) Drawings
    (xiv) Priced Bills of Quantities
5. In consideration of the payments to be made by Kenya Medical Supplies Authority to the Contractor as hereinafter mentioned, the Contractor hereby covenants with Kenya Medical Supplies Authority to execute and complete the Works and remedy any defects therein in conformity in all respects with the provisions of the Contract.
6. Kenya Medical Supplies Authority hereby covenants to pay the Contractor in consideration of the execution and completion of the Works and the remedying of defects therein, the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

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

The common Seal of

_____

Was hereunto affixed in the presence

of_____

Signed Sealed, and Delivered by the said_____

Binding Signature of Kenya Medical Supplies Authority_____

_____

Binding Signature of Contractor_____

In the presence of

(i) Name_____

Address_____

Signature_____

(ii) Name_____

Address_____

Signature_____

FORM OF TENDER

FORM OF TENDER

Tender No: GF-KEMSA/CONST 01/ONT1/2021/2022

Date_____

To: Kenya Medical Supplies Authority

P. O. Box 47715 - 00100

NAIROBI.

Dear Sirs,

RE: TENDER FOR SUPPLY, INSTALLATION, TESTING AND COMMISSIONING OF BUILDING MANAGEMENT SYSTEM (BMS) AT KEMSA NEW WAREHOUSE

In accordance with the Instructions to Tenderers, Specifications and Bills of Quantities for the execution of the above named Works, we, the undersigned offer to construct, install and complete such Works and remedy any defects therein for the sum of Kshs.-

_____*[Amount in figure]*

Kenya

Shillings_____

_____ *[Amount in words]*.

We undertake, if our tender is accepted, to commence the Works as soon as is reasonably possible after the receipt of the Architect's notice to commence, and to complete the whole of the Works comprised in the Contract within _____*(In Words)* (_____) *(in Figures)* Weeks.

We agree to abide by this tender until _____ *[Insert date],* and it shall remain binding upon us and may be accepted at any time before that date. Unless and until a formal Agreement is prepared and executed this tender together with your written acceptance thereof, shall constitute a binding Contract between us.

We understand that you are not bound to accept the lowest or any tender you may receive. Dated this_____ day of _____ 20_____

Signature_____ in the capacity of_____ duly authorized to sign tenders

for and on behalf

of_____

Tenderer's Name:

_____

Tenderer's Address:

_____

Tenderer's Signature:

_____

Witness's Name:

_____

Witness's Address:

_____

Witness's Signature: _____ Date _____

BILLS OF QUANTITIES

BMS INSTALLATIONS

INSTALLATIONS QUICK NOTES

A GENERAL

a1 The Contractor shall supply labour and supply, deliver, install, fix, connect, test, label and commission the works, clean, complete and working to every detail as described below and in the related specifications and /or on the drawings to the satisfaction of the Consulting Engineers. The contractor will also be expected to attend site meetings / inspections to ascertain all necessary provisions are in place well in advance.

a2 Brand proposed in the bid document (if any) are guidelines and shall be used as guidelines. Bidders shall only give alternatives within the range specified or higher. This shall be to Engineers approval.

a3 Licenses: The prices of all software and driver licenses for all the items supplied shall be included in the price of the hardware components on which they are installed, including: operating systems, software, detectors, switchboards, controllers, servers, virtual environment and client stations of the various systems and any other items for proper functioning. All Licences shall be Non-Renewable

B CATALOGUES, CERTIFICATIONS & WARRANTIES

b1 Technical product catalogues and specifications for all the quoted models to be attached

b2 Manufacturers authorization letters from the suppliers to be attached as part of the documentation

b3 All Certifications and Warranties must be provided for by the supplier of the cable / Equipment at the end of the project.

b4 All Equipment shall have warranties of not less that 2 Years after practical completion.

C NETWORK AND INFRUSTRUCTURE

c1 Copper Installations Cabling in this document shall be Cat 6A solution end to end.

c2 Copper Installations and Cabling to be as specified and brochures to be issued.

c3 Fiber Installations and Cabling to be as specified and brochures to be issued.

c4 Patch Panels, Modules and all accessories shall to be as specified and brochures to be issued.

c5 Network cabinets shall be as specified and brochures to be issued.

c6 All network cabinets shall be equiped with PDU with measuring digital meter

c7 Servers shall be as specified and brochures to be issued.

c8 Workstations shall be as specified and brochures to be issued.

c9 Routers shall be as specified and brochures to be issued.

c10 Firewall shall be as specified and brochures to be issued.

c11 Network Switches shall be as specified and brochures to be issued.

D BMS SYSTEM

d1 BMS Systems shall be as specified and brochures to be issued. This shall be to Engineers approval.

A Power Rooms 01

Item	Description	Qty	DI	DO	AI	AO	PROTOCOL	FIELD DEVICE
a.1	HT Meter	1					Modbus / Backnet	
a.2	Ring Main Unit	1					Modbus / Backnet	
	TOTAL		**0**	**0**	**0**	**0**		

B Power Rooms 02

Item	Description	Qty	DI	DO	AI	AO	PROTOCOL	FIELD DEVICE
b.1	Generators	3					Modbus / Backnet	
b.2	Bulk Fuel Tanks	2						
	Fuel Level	2			2			Fuel Level Sensor
b.3	Voltage Stabilizer	1					Modbus / Backnet	
b.4	Transformer	1					Modbus / Backnet	
b.5	Transformer Isolator	1					Modbus / Backnet	
b.6	LV Panels & PFC	4					Modbus / Backnet	
b.7	UPS - Office Workstations	1					Modbus / Backnet	
	TOTAL		**0**	**0**	**2**	**0**		

C Main Warehouse (Ground Floor)

Item	Description	Qty	DI	DO	AI	AO	PROTOCOL	FIELD DEVICE
c.1	LV Panels	5					Modbus / Backnet	
c.2	Freezer Rooms and Cold rooms Panels	9					Modbus / Backnet	
c.3	UPS - IT Equipment	1					Modbus / Backnet	

Item	Description	Qty	DI	DO	AI	AO	PROTOCOL	FIELD DEVICE
c.4	Ventillation Fans	1						
	FAN RUN STATUS		1					Differential Pressure Switch
	Fan swith position		1					Voltage free contact
	Fan trip		1					Voltage free contact
	Fan Control in case of fire			1				Voltage free contact
	Fan start/stop			1				Voltage free contact
c.5	Fire Alarm Panel	1					Modbus / Backnet	
c.6	Smoke Vents (Panels)	3						
	RUN STATUS		3					Voltage free contact
	Trip Status		3					Voltage free contact
c.7	Temperature Monitors	20						
	Room Temperature				20			Room Temperature Sensor
c.8	Gates & Dock doors	9						
	Door Status		9					Voltage free contact
	Trip Status		9					Voltage free contact
	Open/Close Control			9				Voltage free contact
c.9	Sprinklers (Zones)	10						
	Zone water flow monitoring		10					Voltage free contact
	Zone tamper switch monitoring		10					Voltage free contact
c.10	Elevators	1						
	Power supply status		1					Voltage free contact
	Common alarm		1					Voltage free contact
	Cabin call alarm		1					Voltage free contact
c.11	CCTV System	1						
c.12	Access Control System	1						
	TOTAL		**50**	**11**	**20**	**0**		

D Main Warehouse (1st Floor)

Item	Description	Qty	DI	DO	AI	AO	PROTOCOL	FIELD DEVICE
d.1	Elevators	1						
	Power supply status		1					Voltage free contact
	Common alarm		1					Voltage free contact
	Cabin call alarm		1					Voltage free contact
d.2	Ventillation Fans	5						
	FAN RUN STATUS		5					Differential Pressure Switch
	Fan swith position		5					Voltage free contact
	Fan trip		5					Voltage free contact
	Fan Control in case of fire			5				Voltage free contact
	Fan start/stop			5				Voltage free contact
d.3	Air Conditioning Units - Server Rooms (Splits)	4						
	FAN RUN STATUS		4					Differential Pressure Switch
	Fan swith position		4					Voltage free contact
	Fan trip		4					Voltage free contact
	Fan Control in case of fire			4				Voltage free contact
	Fan start/stop			4				Voltage free contact
d.4	Water Tank	1						
	Water Level			1				Level Sensor
d.5	Solar Water heating Systems (Panels &	2						
	System On Status		2					Voltage free contact
	System Trip		2					Voltage free contact
	Water Outlet Temperature			2				Immersion Temperature Sensor
	TOTAL		**34**	**21**	**0**	**0**		

E Pump Room

Item	Description	Qty	DI	DO	AI	AO	PROTOCOL	FIELD DEVICE
e.1	Pumps	8						
	Pump run status		8					Voltage free contact
	Pump start/stop		8					Voltage free contact
	Pump trip		8					Voltage free contact
	Pump switch position		8					Voltage free contact
e.2	Borrehole	1						
	Pump run status		1					Voltage free contact
	Pump start/stop		1					Voltage free contact
	Pump trip		1					Voltage free contact
	Pump switch position		1					Voltage free contact
e.3	Tanks (Underground)	3						
	Water Level			3				Level Sensor
e.4	Tanks (Overhead)	1						
	Water Level			3				Level Sensor
e.5	Water Treatment System	1						
	Water Quality Sensor (pH)			1				pH Sensor
e.6	Fuel Tanks	2						
	Fuel Level	2			2			Fuel Level Sensor
e.7	LV Panel	1					Modbus / Backnet	
	TOTAL		**36**	**7**	**2**	**0**		

F Gate House

Item	Description	Qty	DI	DO	AI	AO	PROTOCOL	FIELD DEVICE
f.1	Bollards System (Sets)	4						
	System On Status		1					Voltage free contact
	System Trip Status		1					Voltage free contact
f.2	UVSS	2						
	System On Status		1					Voltage free contact
	System Trip Status		1					Voltage free contact
f.3	CCTV System	1						
f.4	Fire Alarm Panel	1					Modbus / Backnet	
	TOTAL		**4**	**0**	**0**	**0**		

G Flammable Goods Store

Item	Description	Qty	DI	DO	AI	AO	PROTOCOL	FIELD DEVICE
g.1	Ventillation Fans	4						
	FAN RUN STATUS		4					Differential Pressure Switch
	Fan swith position		4					Voltage free contact
	Fan trip		4					Voltage free contact
	Fan Control in case of fire			4				Voltage free contact
	Fan start/stop			4				Voltage free contact
g.2	Sprinkler System	1						
	Jockey pump ON status		1					Voltage free contact
	Diesel pump ON status		1					Voltage free contact
	Electric pump ON status		1					Voltage free contact

	Jockey pump trip		1					Voltage free contact
	Diesel pump trip		1					Voltage free contact
	Electric pump trip		1					Voltage free contact
g.3	CCTV System	1						
g.4	Access Control System	1						
Item	**Description**	**Qty**	**DI**	**DO**	**AI**	**AO**	**PROTOCOL**	**FIELD DEVICE**
g.5	Dock Doors	1						
	Door Status		1					Voltage free contact
	Trip Status		1					Voltage free contact
	Open/Close Control			1				Voltage free contact
g.6	Smoke Vents (Panels)	1						
	RUN STATUS		1					Voltage free contact
	Trip Status		1					Voltage free contact
	TOTAL		**22**	**9**	**0**	**0**		

H Office Block - Basement

Item	**Description**	**Qty**	**DI**	**DO**	**AI**	**AO**	**PROTOCOL**	**FIELD DEVICE**
h.1	Power Room - LV Panels	1					Modbus / Backnet	
h.2	UPS - Office Workstations	1					Modbus / Backnet	
h.3	Gate Systems	1						
	Gate Status		1					Voltage free contact
	Trip Status		1					Voltage free contact
h.4	Sump Pump	1						
	Pump run status		1					Voltage free contact
	Pump start/stop		1					Voltage free contact
	Pump trip		1					Voltage free contact
	Pump switch position		1					Voltage free contact
	TOTAL		6	0	0	0		

J Office Block - 1st Floor

Item	Description	Qty	DI	DO	AI	AO	PROTOCOL	FIELD DEVICE
j.1	Power Room - LV Panels & Busbars	5					Modbus / Backnet	
j.2	UPS - IT Equipment	1					Modbus / Backnet	
j.3	CCTV System	1						
j.4	Access Control System	1						
j.5	Server Rooms Temperature Sensors	14						
	Temperature Monitoring			14				Room Temperature Sensor
	TOTAL		**0**	**14**	**0**	**0**		

K Office Block - Roof

Item	Description	Qty	DI	DO	AI	AO	PROTOCOL	FIELD DEVICE
k.1	Water tanks (Overhead)	1						
	Water Level			1				Water Level Sensor
k.2	Ventillation Fans	6						
	FAN RUN STATUS		6					Differential Pressure Switch
	Fan swith position		6					Voltage free contact
	Fan trip		6					Voltage free contact
	Fan Control in case of fire			6				Voltage free contact
	Fan start/stop			6				Voltage free contact
k.3	Lifts	4						
	Power supply status		4					Voltage free contact
	Common alarm		4					Voltage free contact
	Cabin call alarm		4					Voltage free contact
k.4	Access Control System	1						
	TOTAL		**30**	**13**	**0**	**0**		

BMS (BUILDING MANAGEMENT SYSTEM)

The system will be a Monitoring & Control system

NOTE:

- *BMS System shall be* ***BACNET IP***
- *Technical product catalogues and specifications for quoted models to be attached*

ITEM	DESCRIPTION	Unit	Qty	Rates (KShs)	Costs (KShs)
	CENTRAL CONTROL STATION & ACCESSORIES				
1.01	**CENTRAL CONTROL STATIONS (SERVER):** Supplier shall Supply, install, test and commission the Equipment consisting of the following Paratmeters: • Type: Rack Mount • Memory (RAM): 2No. 16GB RDIMM, 266MT/s, DIMMs • Cache: 2GB of Non Volatile Cache • Hard Drive (SSD): 2No. 1TB 2.5in Hot-Plug Drives with Raid 1 Configuaration • OS: Microsoft Windows Server Standard Edition Preinstalled. • All other parameters as stated in the particular specifications of this document including connection cables, mounting devices, etc.	No.	1		
1.02	**WORKSTATION:** Supplier shall Supply, install, test and commission the Equipment consisting of the following: • Type: Tower • Memory (RAM): 4GB • GPU: Independent 3D graphics card • Graphics Card Memory: 4GB • Hard Drive (SSD): 1TB • OS: Windows 10 Profesional (64 Bit) • Mouse: Optical Mouse • Keyboard: 110 Keyboard • Monitor: 40" Display Monitor • All other parameters as stated in the particular specifications of this document including connection cables, mounting devices, etc.	No.	1		

ITEM	DESCRIPTION	Unit	Qty	Rates (KShs)	Costs (KShs)
1.03	**GRAPHICAL SOFTWARE:** The Graphical software shall provide facilities to create static & animate the graphics, navigation between the pages, display of logs, changing the time zones, popup alarms, configurable password etc. ● The BMS system software shall be a Unix based Graphical interface complete package software as required to execute the required functions and generate necessary dynamic graphics and building plans.The Entire System from Software Level to Field Controller Level shall be on Bacnet/IP.	Item	1		
1.04	**PRINTER:** Supplier shall Supply, install, test and commission the Equipment consisting of the following Paratmeters: ● Installation: Table Top ● Type: Network laser ink-jet color printer ● Media: A4 copy paper ● Memory (RAM): 128MB ● Interface: 10/100 Ethernet RJ45 ● Power Supply: 220VAC (±10%), Power saving mode ● Noise: Standby silent, Print is not more than 50dB ● All other accessories including connection cables, mounting devices, etc.	No.	1		
1.05	**SUPERVISORY CONTROLLER & INTEGRATOR (Main Router):** Supplier shall Supply, install, test, commission and maintain the Supervisory Controller Integrator consisting of the following:- ● ANSI/ASHRAE approved Network control unit to interface with BACnet/IP Devices simultaneously having inbuilt real time clock, POE, supporting TCP/IP connectivity . ● The System integration Unit shall be UL Listed & BTL tested & CE Certified. ● The units shall be housed in a vandal proof, lockable & secure Cabinets. ● The contractor shall estimate the required quantity of NAC according to their system and the quantity shall be mentioned in their offer.	No.	2		

ITEM	DESCRIPTION	Unit	Qty	Rates (KShs)	Costs (KShs)
1.06	All necessary Hardware & Software for interfacing with all the Controller Systems on BACnet/IP Communication Protocol	Item	1		
	DIGITAL CONTROLLERS & ACCESSORIES				
1.07	**DIGITAL CONTROLLERS (DDC):** Supplier shall Supply, install, test, commission and maintain the Controllers consisting of the following parameters: ● The DDC Box shall be vandal proof, lockable and secure Cabinets to be supplied along with the controllers. ● The DDC Box Shall be of PVC Material, have a Matte spray finish and c/w electromagnetic shielding ● The DDC Box Shall be IP54 Rated ● All the Controllers shall be Digital ● Controllers shall be Stand alone, POE, intelligent, ANSI/ASHRAE approved Interoperable BACnet/IP Controllers(IBC) as per the specifications. ● All the Controllers shall be UL Listed & BTL tested & CE certified. ● Each controllers shall be equipped with Universal Inputs with Internal Loop/Process Speed not more than 1/10th of a second (100 Millisecond). ● Controllers shall have 20% extra IO capacity per type of I/O's. ● CPU: 32 Bit ● Memory (RAM): Greater than 512 MB ● Flash Memory: Greater than 512 MB ● Interface: RS232 / 485 ● Alarms: On site remote sound & light alarm ● Network: RJ45 Ethernet front end. ● On Host PC offline Mode: It shall maintain independent operation ● Power: Preset Power to drive the output interfaces ● Signal Holding: 5 Years RAM Signal Holding ● OS: Built in real time operating system				

ITEM	DESCRIPTION	Unit	Qty	Rates (KShs)	Costs (KShs)
	● Programing: Built in programing, operating panel & field modulation operation with data analysis, processing, recording and other function trends. ● Built In watchdog circuit ● Built In signal processing, logic, PID Module Hot swappable ● Signal Isolation: Isolation relay configuaration between strong & weak electrical interface. ● Backup: Integrated backup battery for 2Hr operation ● Power Supply: 220VAC (±10%) ● The contractor shall estimate the required quantity of controllers to suit the complete requirement / operation as per Input / Output Summary attached with the specification & according to their system architecture and the quantity shall be mentioned in their offer. ● All other accessories including connection cables, mounting devices, etc.				
1.08	**DDC Control Box 1 - Power Room 01:** Appropriate Digital Controller Box as stated above to monitor the following: ● Enclosure c/w all accessories ● Gateways for HT Meter & RMU ● RS485 2 core screened cable 18AWG ● Spare Outputs	 No. No. LM	 1 2 50		
1.09	**DDC Control Box 2 - Power Room 02:** Appropriate Digital Controller Box as stated above to monitor the following: ● Enclosure c/w all accessories ● Gateways Integration Module for: • Generators - 3No. • AVS - 1No. • Transformer - 1No. • LV Panels & PFC - 4No. • UPS - 1No.	 No. No.	 1 1		

ITEM	DESCRIPTION	Unit	Qty	Rates (KShs)	Costs (KShs)
	● IO Module for: • 2 analogue output As per the IO Sheet	No.	1		
	● Fuel tank level sensor with 0-10vdc or 4-20mA output	No.	2		
	● Signal 6 core cable	LM	50		
	● RS485 2 core screened cable 18AWG	LM	250		
	● Spare Outputs				
1.10	**DDC Control Box 3 - Main Warehouse Ground Floor:** Appropriate Digital Controller Box as stated above to monitor the following:				
	● Enclosure c/w all accessories	No.	1		
	● Gateways Integration Module for: • Cold & Freezer Rooms - 9No. • LV Panels - 7No. • UPS - 1No.	No.	1		
	● IO Module for: • 50 digital inputs • 11 digital output • 20 analogue output As per the IO Sheet	No.	1		
	● Bacnet Interface Module for integration with fire alarm system	No.	1		
	● Room temperature sensor	No.	20		
	● Air Differential Pressure Switch	No.	1		
	● Signal 6 core cable	LM	8500		
	● RS485 2 core screened cable 18AWG	LM	1500		
	● Spare Outputs				
1.11	**DDC Control Box 4 - Main Warehouse 1st Floor:** Appropriate Digital Controller Box as stated above to monitor the following:				
	● Enclosure c/w all accessories	No.	1		
	● Gateways Integration Module for: • Elevators - 1No. • Ventillation Fans - 5No. • AC Units - 4No.	No.	1		

ITEM	DESCRIPTION	Unit	Qty	Rates (KShs)	Costs (KShs)
	● IO Module for: • 34 digital inputs • 21 digital output • 0 analogue output As per the IO Sheet	No.	1		
	● Water tank level sensor with 0-10vdc or 4-20mA output	No.	1		
	● Immersion temperature sensor	No.	2		
	● Air Differential Pressure Switch	No.	9		
	● Signal 6 core cable	LM	3800		
	● RS485 2 core screened cable 18AWG	LM	1500		
	● Spare Outputs				
1.12	**DDC Control Box 5 - Pump Room:** Appropriate Digital Controller Box as stated above to monitor the following:				
	● Enclosure c/w all accessories	No.	1		
	● Gateways Integration Module for: • LV Panels - 1No. • Pumps - 9No.	No.	1		
	● IO Module for: • 36 digital inputs • 7 digital output • 2 analogue output As per the IO Sheet	No.	1		
	● Water tank level sensor with 0-10vdc or 4-20mA output	No.	4		
	● Fuel tank level sensor with 0-10vdc or 4-20mA output	No.	2		
	● Water qualty sensor (pH monitoring) with 0-10vdc or 4-20mA output	No.	2		
	● Signal 6 core cable	LM	550		
	● RS485 2 core screened cable 18AWG	LM	750		
	● Spare Outputs				

ITEM	DESCRIPTION	Unit	Qty	Rates (KShs)	Costs (KShs)
1.13	**DDC Control Box 6 - Gate House:** Appropriate Digital Controller Box as stated above to monitor the following:				
	● Enclosure c/w all accessories	No.	1		
	● IO Module for: • 4 digital inputs • 0 digital output • 0 analogue output As per the IO Sheet	No.	1		
	● Bacnet Interface Module for integration with fire alarm system	No.	1		
	● Signal 6 core cable	LM	200		
	● RS485 2 core screened cable 18AWG	LM	100		
	● Spare Outputs				
1.14	**DDC Control Box 7 - Flammable Goods Store:** Appropriate Digital Controller Box as stated above to monitor the following:				
	● Enclosure c/w all accessories	No.	1		
	● IO Module for: • 22 digital inputs • 9 digital output • 0 analogue output As per the IO Sheet	No.	1		
	● Immersion temperature sensor	No.	2		
	● Air Differential Pressure Switch	No.	4		
	● Signal 6 core cable	LM	1800		
	● RS485 2 core screened cable 18AWG	LM	100		
	● Spare Outputs				
1.15	**DDC Control Box 8 - Office Block Basement:** Appropriate Digital Controller Box as stated above to monitor the following:				
	● Enclosure c/w all accessories	No.	1		
	● Gateways Integration Module for: • LV Panels - 1No. • UPS - 1No.	No.	1		

ITEM	DESCRIPTION	Unit	Qty	Rates (KShs)	Costs (KShs)
	● IO Module for: • 6 digital inputs • 0 digital output • 0 analogue output As per the IO Sheet	No.	1		
	● Signal 6 core cable	LM	1000		
	● RS485 2 core screened cable 18AWG	LM	400		
	● Spare Outputs				
1.16	**DDC Control Box 9 - Office Block 1st Floor:** Appropriate Digital Controller Box as stated above to monitor the following:				
	● Enclosure c/w all accessories	No.	1		
	● Gateways Integration Module for: • LV Panels - 5No. • UPS - 1No.	No.	1		
	● IO Module for: • 0 digital inputs • 14 digital output • 0 analogue output As per the IO Sheet	No.	1		
	● Room temperature sensor	No.	14		
	● Signal 6 core cable	LM	1200		
	● RS485 2 core screened cable 18AWG	LM	500		
	● Spare Outputs				
1.17	**DDC Control Box 10 - Office Block Roof:** Appropriate Digital Controller Box as stated above to monitor the following:				
	● Enclosure c/w all accessories	No.	1		
	● IO Module for: • 30 digital inputs • 13 digital output • 0 analogue output As per the IO Sheet	No.	1		
	● Water tank level sensor with 0-10vdc or 4-20mA output	No.	2		
	● Air Differential Pressure Switch	No.	6		
	● Signal 6 core cable	LM	2400		
	● RS485 2 core screened cable 18AWG	LM	750		
	● Spare Outputs				

ITEM	DESCRIPTION	Unit	Qty	Rates (KShs)	Costs (KShs)
1.18	**CO Concentration Detector:** Appropriate Device as follows: ● Principle: Unlimited ● Output: DC4~20mA Standard electrical signal with interface ● Installation: Ceiling Installation with hanger & all Accessories ● Power Module：24VDC	No.	10		
1.19	**ACCESSORIES:** Mounting, fixing, etc accessories such as RJ 45 connectors, fly / interconnect cables, terminations, labeling etc.	Item	1		
1.20	**ADDITIONAL ACCESSORIES:** Any other accessories that will be required for the complete functional installation of the above systems. Breakdown of the items should be done on a separate sheet and attached as an appendix to this document. If none indicate "NIL" in Bid.	Item	1		
1.21	**INSTALLATION SUM:** Sum for Installation of all the accessories and systems mentioned above with all accessories, interconnections, controls and the necessary programing.	Item	1		
1.22	**TESTING & COMMISSIONING:** Sum for Testing and commissioning of the entire installations set complete with all accessories, interconnections, controls, BMS link & activation and the necessary programing.	Item	1		
1.23	**POWER SUPPLY:** Sum for Power Supplies to all the equipment that require power within the scope	Item	1		
1.24	**CABLE MANAGEMENT:** Sum for cable Ties for holding the cables to the cable trays and cabinets	Item	1		
1.25	**LABELLING:** Allow sum for putting permanent Labels on all installations including cabling as required	Item	1		

ITEM	DESCRIPTION	Unit	Qty	Rates (KShs)	Costs (KShs)
1.26	**SIGNAGE:** Allow sum for putting Up signage as required by the International safety standards in Liaison with management.	Item	1		
1.27	**LIAISON:** Sub contractors liason with Other Contractors, Service Providers, Client team, etc for connections and all matters pertaining to above Installations for the project	Item	1		
1.28	**TRAINING:** Sum for Training of client personel / users (At least 5No Staff for 1Week)	Item	1		
1.29	**SHOP DRAWINGS:** Sum for Shop drawings, Manufacturer's technical product catalogues, etc.	Item	1		
1.30	**DOCUMENTATION (COMPLETION):** Sum for Completion documents: Comprising Workshop drawings, manufacturer's technical product catalogues, users manuals, maintenance manuals, as installed drawings, test certificates, etc. **{ NOTE: Penultimate Valuation will not be paid until these are fully availed & signed off by the engineer }**	Item	1		
1.31	**DLP SUM:** Sum for 12 months comprehensive maintenance from date of practical completion.	Item	1		
1.32	Preliminaries & Contractual Conditions	Item	1		

ITEM	DESCRIPTION	Unit	Qty	Rates (KShs)	Costs (KShs)
1.33	*Any other additional items, please specify below and attach catalogues. (If none write NIL)*				
i)		Item			
ii)		Item			
iii)		Item			
iv)		Item			
v)		Item			
1.34	Contingency Sum				2,000,000
1.35	**Total Exclusive of VAT**				
1.36	**Add:** 16% VAT (Including all contingencies & PC sums)				
1.37	**Total INCLUSIVE of VAT c/f to Form Of Tender**				