



REPUBLIC OF KENYA

MINISTRY OF ROADS AND TRANSPORT.

STATE DEPARTMENT OF ROADS.

ENGINEERS BOARD OF KENYA (EBK)

**HORN OF AFRICA GATEWAY DEVELOPMENT PROJECT
(HOAGDP)**

OFFICES PARTITIONING AT BARABARA PLAZA

REQUEST FOR BIDS

RFB NO.: KE-SDOI-257463-CW-RFB

Project No.: P161305

CLOSES: 22ND NOVEMBER 2023



**REPUBLIC OF KENYA
MINISTRY OF ROADS AND TRANSPORT**

**STATE DEPARTMENT OF ROADS
Request for Bids - Small Works
(One-Envelope Bidding Process)**

Country: KENYA

Name of Project: Horn of Africa Gateway Development Project (HOAGDP)

Contract Title: Offices Partitioning at BaraBara Plaza.

Credit No.: P161305

RFB Reference No: KE-SDOI-257463-CW-RFB

1. The Kenyan Government has received financing from the World Bank towards the cost of the Horn of Africa Gateway Development Project (HOAGDP) and intends to apply part of the proceeds toward payments under the contract for Offices Partitioning at BaraBara Plaza.

S/No.	CONTRACT TITLE	RFB REF NO.	BID SECURITY
1.	Offices Partitioning at BaraBara Plaza	KE-SDOI-257463-CW-RFB	2% (Bid Sum)

2. The State Department for Roads, now invites sealed bids from all eligible bidders for the Offices Partitioning works at BaraBara Plaza.
3. Bidding will be conducted through National Competitive procurement using a Request for Bids (RFB) as specified in the World Bank's "Procurement Regulations for IPF Borrowers" of July 2016 revised November 2017 and August 2018 and updated November, 2020" ("Procurement Regulations") and is open to all eligible Bidders as defined in the Procurement Regulations.
4. Interested eligible bidders may obtain further information and inspect the bidding document on www.transport.go.ke under the resources menu, the Public Procurement Information Portal www.tenders.go.ke or www.ebk.go.ke or visit the Supply Chain Management Office, Works Building, Ground Floor, Ngong Road, Room No.48, Nairobi during normal office working hours (0800 to 1700 hours EAT). Those who download the document should immediately send their particulars to scms@roads.go.ke for the purpose of registration and receipt of any further clarification and addendums.
5. The Bid document in English may be downloaded from the Public Procurement Information Portal www.tenders.go.ke or www.ebk.go.ke free of charge from the websites. Bidders are encouraged to download the bid document to minimize physical visit to Works Building.
6. Bids must be delivered to the tender address below on or before 10.00 am local time on **22nd November, 2023**. Late Bids will be rejected. Bids will be publicly opened immediately thereafter in the presence of the Bidders and/or designated representatives and anyone who chooses to attend at the **9th Floor Boardroom, Works Building, Nairobi on 22nd November, 2023**.
7. **All bids should** be accompanied with a Bid security in form of a bank guarantee or a bank draft issued by a reputable bank located in Kenya, or Insurance of 2% (Bid Sum) from a reputable insurance firm approved by Public Procurement Regulatory Authority (PPRA).
8. Pre-Bid Site visit and Pre-Bid meeting will be held on **31st October, 2023 at 10: 00 am at the Site, Barabara Plaza**.
9. Attention is drawn to the Procurement Regulations requiring the Borrower to disclose information on the successful bidder's ownership, as part of the Contract Award Notice, using the Beneficial

Ownership Disclosure Form as included in the bidding document.

10. The address (es) referred to above is (are):

Bid Inquiry Address:

Principal Secretary
Attention: Head Supply Chain Management Services
State Department for Roads
Ministry of Roads and Transport,
Works Building, Ngong' Road Ground Floor Room/Office Number 48
Telephone: +254 (20) 2723232
E-mail: scms@roads.go.ke
NAIROBI, KENYA

Bid Submission Address:

Principal Secretary
Attention: Head Supply Chain Management Services
Ministry of Roads and Transport
State Department for Roads
Tender Box Situated at Ground Floor, Opposite Office Number 48 Works Building, Ngong' Road
NAIROBI, KENYA



**Request for Bids Small Works
(One-Envelope Bidding Process)**

Procurement of:

The Proposed Offices Partitioning at Barabara Plaza.

RFB No: KE-SDOI-257463-CW-RFB

Project: Horn of Africa Gateway Development Project (HOAGDP)

Employer: State Department of Roads

Country: Kenya

Issued on 24th October 2023

Standard Procurement Document

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PART 1 – Bidding Procedures

Section I - Instructions to Bidders

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Section I - Instructions to Bidders

General

1. Scope of Bid

1.1 In connection with the Specific Procurement Notice - Request for

Bids (RFB), specified in the Bid Data Sheet (BDS), the Employer, as specified in the BDS, issues this bidding document for the provision of Works as specified in Section VII, Works' Requirements. The name, identification and number of lots (contracts) of this RFB are specified in the BDS.

1.2 Throughout this bidding document:

- (a) the term **“in writing”** means communicated in written form (e.g. by mail, e-mail, and fax, including if specified **in the BDS**, distributed or received through the electronic- procurement system used by the Employer) with proof of receipt;
- (b) if the context so requires, **“singular”** means **“plural”** and vice versa;
- (c) **“Day”** means calendar day, unless otherwise specified as **“Business Day”**. A Business Day is any day that is an official working day of the Borrower. It excludes the Borrower's official public holidays;
- (d) **“ES”** means environmental and social (including Sexual Exploitation and Abuse (SEA), and Sexual Harassment (SH));
- (e) **“Sexual Exploitation and Abuse” “(SEA)”** means the following:
 - “Sexual Exploitation”** is defined as any actual or attempted abuse of position of vulnerability, differential power or trust, for sexual purposes, including, but not limited to, profiting monetarily, socially or politically from the sexual exploitation of another;
 - “Sexual Abuse”** is defined as the actual or threatened physical intrusion of a sexual nature, whether by force or under unequal or coercive conditions;
- (f) **“Sexual Harassment” “(SH)”** is defined as unwelcome sexual advances, requests for sexual favors, and other verbal or physical conduct of a sexual nature by the Contractor's Personnel with other Contractor's or Employer's Personnel;
- (g) **“Contractor's Personnel”** is as defined in Sub- Clause 1 (ii) of the General Conditions of Contract; and

(h) **“Employer’s personnel”** is as defined in GCC Sub-Clause 1 (nn) of the General Conditions of Contract.

A non-exhaustive list of (i) behaviors which constitute SEA and(ii) behaviors which constitute SH is attached to the Code of Conduct form in Section IV.

2. Source of Funds 2.1 The Borrower or Recipient (hereinafter called “Borrower”)

specified **in the BDS** has received or has applied for financing (hereinafter called “funds”) from the International Bank for Reconstruction and Development or the International Development Association (hereinafter called “the Bank”) in an amount specified **in the BDS**, toward the project named **in the BDS**. The Borrower intends to apply a portion of the funds to eligible payments under the contract(s) for which this bidding document is issued.

2.2 Payment by the Bank will be made only at the request of the Borrower and upon approval by the Bank, and will be subject, in all respects, to the terms and conditions of the Loan (or other financing) Agreement. The Loan (or other financing) Agreement prohibits a withdrawal from the loan account for the purpose of any payment to persons or entities, or for any import of goods, equipment, plant, or materials, if such payment or import is prohibited by a decision of the United Nations Security Council taken under Chapter VII of the Charter of the United Nations. No party other than the Borrower shall derive any rights from the Loan (or other financing) Agreement or have any claim to the proceeds of the Loan (or other financing).

3. Fraud and

3.1 The Bank requires compliance with the Bank’s Anti-Corruption **Corruption** Guidelines and its prevailing sanctions policies and procedures as set forth in the WBG’s Sanctions Framework, as set forth in Section VI.

3.2 In further pursuance of this policy, bidders shall permit and shall cause their agents (where declared or not), subcontractors, subconsultants, service providers, suppliers, and personnel, to permit the Bank to inspect all accounts, records and other documents relating to any initial selection process, prequalification process, bid submission, proposal submission, and contract performance (in the case of award), and to have them audited by auditors appointed by the Bank.

4. Eligible Bidders

4.1 A Bidder may be a firm that is a private entity, or a state-owned enterprise or institution, subject to ITB 4.6, or any combination of them in the form of a joint venture (JV), under an existing agreement, or with the intent to enter into such an agreement supported by a letter of intent. In the case of a joint venture, all

members shall be jointly and severally liable for the execution of the entire Contract in accordance with the Contract terms. The JV shall nominate a Representative who shall have the authority to conduct all business for and on behalf of any and all the members of the JV during the Bidding process and, in the event the JV is awarded the Contract, during contract execution. Unless specified **in the BDS**, there is no limit on the number of members in a JV.

4.2 A Bidder shall not have a conflict of interest. All Bidders found to have a conflict of interest shall be disqualified. A Bidder may be considered to have a conflict of interest for the purpose of this Bidding process, if the Bidder:

- (a) directly or indirectly controls, is controlled by or is under common control with another Bidder; or
- (b) receives or has received any direct or indirect subsidy from another Bidder; or
- (c) has the same legal representative as another Bidder; or
- (d) has a relationship with another Bidder, directly or through common third parties, that puts it in a position to influence the Bid of another Bidder, or influence the decisions of the Employer regarding this bidding process; or
- (e) or any of its affiliates participated as a consultant in the preparation of the design or technical specifications of the works that are the subject of the Bid; or
- (f) or any of its affiliates has been hired (or is proposed to be hired) by the Employer or Borrower as Project Manager for the Contract implementation;
- (g) would be providing goods, works, or non-consulting services resulting from or directly related to consulting services for the preparation or implementation of the project specified in the BDS ITB 2.1 that it provided or were provided by any affiliate that directly or indirectly controls, is controlled by, or is under common control with that firm;
- (h) has a close business or family relationship with a professional staff of the Borrower (or of the project implementing agency, or of a recipient of a part of the loan) who: (i) are directly or indirectly involved in the preparation of the bidding document or specifications of the contract, and/or the Bid evaluation process of such contract; or (ii) would be involved in the implementation or supervision of such contract unless the conflict stemming from such relationship has been resolved in a manner acceptable to the Bank throughout the procurement process and execution of the contract.

- 4.3 A firm that is a Bidder (either individually or as a JV member) shall not participate in more than one Bid, except for permitted alternative Bids. This includes participation as a Subcontractor in other Bids. Such participation shall result in the disqualification of all Bids in which the firm is involved. A firm that is not a Bidder or a JV member may participate as a subcontractor in more than one Bid.
- 4.4 A Bidder may have the nationality of any country, subject to the restrictions pursuant to ITB 4.8. A Bidder shall be deemed to have the nationality of a country if the Bidder is constituted, incorporated or registered in and operates in conformity with the provisions of the laws of that country, as evidenced by its articles of incorporation (or equivalent documents of constitution or association) and its registration documents, as the case may be. This criterion also shall apply to the determination of the nationality of proposed subcontractors or sub consultants for any part of the Contract including related Services.
- 4.5 A Bidder that has been sanctioned by the Bank, pursuant to the Bank's Anti-Corruption Guidelines, in accordance with its prevailing sanctions policies and procedures as set forth in the WBG's Sanctions Framework as described in Section VI paragraph 2.2 d., shall be ineligible to be prequalified for, initially selected for, bid for, propose for, or be awarded a Bank-financed contract or benefit from a Bank-financed contract, financially or otherwise, during such period of time as the Bank shall have determined. The list of debarred firms and individuals is available at the electronic address specified in the BDS.
- 4.6 Bidders that are state-owned enterprises or institutions in the Employer's Country may be eligible to compete and be awarded a Contract(s) only if they can establish, in a manner acceptable to the Bank, that they (i) are legally and financially autonomous (ii) operate under commercial law, and (iii) are not under supervision of the Employer.
- 4.7 A Bidder shall not be under suspension from Bidding by the Employer as the result of the operation of a Bid-Securing or Proposal-Securing Declaration.
- 4.8 Firms and individuals may be ineligible if so indicated in Section V and (a) as a matter of law or official regulations, the Borrower's country prohibits commercial relations with that country, provided that the Bank is satisfied that such exclusion does not preclude effective competition for the supply of goods or the contracting of works or services required; or (b) by an act of compliance with a decision of the United Nations Security Council taken under

Chapter VII of the Charter of the United Nations, the Borrower's country prohibits any import of goods or contracting of works or services from that country, or any payments to any country, person, or entity in that country. When the Works are implemented across jurisdictional boundaries (and more than one country is a Borrower, and is involved in the procurement), then exclusion of a firm or individual on the basis of ITB 4.8 (a) above by any country may be applied to that procurement across other countries involved, if the Bank and the Borrowers involved in the procurement agree.

4.9 A Bidder shall provide such documentary evidence of eligibility satisfactory to the Employer, as the Employer shall reasonably request.

4.10 A firm that is under a sanction of debarment by the Borrower from being awarded a contract is eligible to participate in this procurement, unless the Bank, at the Borrower's request, is satisfied that the debarment;

(a) relates to fraud or corruption, and

(b) followed a judicial or administrative proceeding that afforded the firm adequate due process.

5. Eligible

5.1 The materials, equipment and services to be supplied under the **Materials**, Contract and financed by the Bank may have their origin in any **Equipment and** country subject to the restrictions specified in Section V, **Eligible Services**

Countries, and all expenditures under the Contract will not contravene such restrictions. At the Employer's request, Bidders may be required to provide evidence of the origin of materials, equipment and services.

Contents of Bidding Document

6. Sections of

6.1 The bidding document consists of Parts 1, 2, and 3, which include **Bidding** all the sections specified below, and which should be read in **Document** conjunction with any Addenda issued in accordance with ITB 8.

PART 1 Bidding Procedures

- Section I - Instructions to Bidders (ITB)
- Section II - Bid Data Sheet (BDS)
- Section III - Evaluation and Qualification Criteria
- Section IV - Bidding Forms
- Section V - Eligible Countries
- Section VI - Fraud and Corruption

PART 2 Works' Requirements

- Section VII - Works' Requirements

PART 3 Conditions of Contract and Contract Forms

- Section VIII - General Conditions of Contract (GCC)
- Section IX - Particular Conditions of Contract (PCC)
- Section X - Contract Forms

- 6.2 The Specific Procurement Notice - Request for Bids (RFB) issued by the Employer is not part of this bidding document.
- 6.3 Unless obtained directly from the Employer, the Employer is not responsible for the completeness of the bidding document, responses to requests for clarification, the minutes of the pre-Bid meeting (if any), or Addenda to the bidding document in accordance with ITB 8. In case of any contradiction, documents obtained directly from the Employer shall prevail.
- 6.4 The Bidder is expected to examine all instructions, forms, terms, and specifications in the bidding document and to furnish with its Bid all information and documentation as is required by the bidding document.

7. Clarification of Document,

- 7.1 A Bidder requiring any clarification of the bidding document shall **Bidding** contact the Employer in writing at the Employer's address specified **Site Visit, Pre-Bid in the BDS** or raise its inquiries during the pre-Bid meeting if **Meeting** provided for in accordance with ITB 7.4. The Employer will respond in writing to any request for clarification, provided that such request is received prior to the deadline for submission of Bids within a period specified **in the BDS**. The Employer shall forward copies of its response to all Bidders who have acquired the bidding document in accordance with ITB 6.3, including a description of the inquiry but without identifying its source. If so specified **in the BDS**, the Employer shall also promptly publish its response at the web page identified in the BDS. Should the clarification result in changes to the essential elements of the bidding document, the Employer shall amend the bidding document following the procedure under ITB 8 and ITB 22.2.
- 7.2 The Bidder is advised to visit and examine the Site of Works and its surroundings and obtain for itself on its own responsibility all information that may be necessary for preparing the bid and entering into a contract for construction of the Works. The costs of visiting the Site shall be at the Bidder's own expense.

- 7.3 The Bidder and any of its personnel or agents will be granted permission by the Employer to enter upon its premises and lands for the purpose of such visit, but only upon the express condition that the Bidder, its personnel, and agents will release and indemnify the Employer and its personnel and agents from and against all liability in respect thereof, and will be responsible for death or personal injury, loss of or damage to property, and any other loss, damage, costs, and expenses incurred as a result of the inspection.
- 7.4 If so specified **in the BDS**, the Bidder's designated representative is invited to attend a pre-Bid meeting and/or a Site of Works visit. The purpose of the meeting will be to clarify issues and to answer questions on any matter that may be raised at that stage.
- 7.5 The Bidder is requested, to submit any questions in writing, to reach the Employer not later than one week before the meeting.
- 7.6 Minutes of the pre-Bid meeting, if applicable, including the text of the questions asked by Bidders, without identifying the source, and the responses given, together with any responses prepared after the meeting, will be transmitted promptly to all Bidders who have acquired the bidding document in accordance with ITB 6.3 Any modification to the bidding document that may become necessary as a result of the pre-Bid meeting shall be made by the Employer exclusively through the issue of an addendum pursuant to ITB 8 and not through the minutes of the pre-Bid meeting. Nonattendance at the pre-Bid meeting will not be a cause for disqualification of a Bidder.
- 8.1 At any time prior to the deadline for submission of bids, the Employer may amend the bidding document by issuing addenda.
- 8.2 Any addendum issued shall be part of the bidding document and shall be communicated in writing to all who have obtained the bidding document from the Employer in accordance with ITB 6. The Employer shall also promptly publish the addendum on the Employer's web page in accordance with ITB 7.1.

**8. Amendment of
Bidding
Document**

- 8.3 To give prospective Bidders reasonable time in which to take an addendum into account in preparing their Bids, the Employer may, at its discretion, extend the deadline for the submission of Bids, pursuant to ITB 22.2.

Preparation of Bids

- 9. Cost of Bidding** 9.1 The Bidder shall bear all costs associated with the preparation and submission of its Bid, and the Employer shall in no case be responsible or liable for those costs, regardless of the conduct or outcome of the Bidding process.
- 10. Language of Bid** 10.1 The Bid, as well as all correspondence and documents relating to the Bid exchanged by the Bidder and the Employer, shall be written in the language specified **in the BDS**. Supporting documents and printed literature that are part of the Bid may be in another language provided they are accompanied by an accurate translation of the relevant passages in the language specified **in the BDS**, in which case, for purposes of interpretation of the Bid, such translation shall govern.
- 11. Documents Comprising the Bid**
- 11.1 The Bid shall comprise the following:
- (a) **Letter of Bid** prepared in accordance with ITB 12;
 - (b) **Bill of Quantities or Activity Schedule:** completed in accordance with ITB 12 and ITB 14, as specified **in the BDS**;
 - (c) **Bid Security or Bid-Securing Declaration**, in accordance with ITB 19.1;
 - (d) **Alternative Bid**, if permissible, in accordance with ITB 13;
 - (e) **Authorization:** written confirmation authorizing the signatory of the Bid to commit the Bidder, in accordance with ITB 20.3;
 - (f) **Bidder's Eligibility:** documentary evidence in accordance with ITB 17 establishing the Bidder's eligibility to Bid;
 - (g) **Qualifications:** documentary evidence in accordance with ITB 17 establishing the Bidder's qualifications to perform the contract if its Bid is accepted;
 - (h) **Conformity:** a technical proposal in accordance with ITB 16;
 - (i) any other document required **in the BDS**.
- 11.2 In addition to the requirements under ITB 11.1, Bids submitted by a JV shall include a copy of the Joint Venture Agreement entered into by all members. Alternatively, a letter of intent to execute a Joint Venture Agreement in the event of a successful bid shall be signed

by all members and submitted with the Bid, together with a copy of the proposed Agreement.

- 11.3 The Bidder shall furnish in the Letter of Bid information on commissions and gratuities, if any, paid or to be paid to agents or any other party relating to this Bid.

12. Letter of Bid and 12.1 The Letter of Bid and Schedules shall be prepared using the relevant **Schedules** forms furnished in Section IV, Bidding Forms. The forms must be completed without any alterations to the text, and no substitutes shall be accepted except as provided under ITB 20.3. All blank spaces shall be filled in with the information requested.

13. Alternative Bids

- 13.1 Unless otherwise specified **in the BDS**, alternative Bids shall not be considered.
- 13.2 When alternative times for completion are explicitly invited, a statement to that effect will be included **in the BDS** and the method of **evaluating** different alternative times for completion will be described in Section III, Evaluation and Qualification Criteria.
- 13.3 Except as provided under ITB 13.4 below, Bidders wishing to offer **technical** alternatives to the requirements of the bidding document must first price the Employer's design as described in the bidding document and shall further provide all information necessary for a complete evaluation of the alternative by the Employer, including drawings, design calculations, technical specifications, breakdown of prices, and proposed construction methodology and other relevant details. Only the technical alternatives, if any, of the Bidder with the Most Advantageous Bid conforming to the basic technical requirements shall be considered by the Employer.
- 13.4 When specified **in the BDS**, Bidders are permitted to submit alternative technical solutions for specified parts of the Works. Such parts will be identified **in the BDS** and described in Section VII, Works' Requirements. The method for their evaluation will be stipulated in Section III, Evaluation and Qualification Criteria.

14. Bid Prices and Discounts

- 14.1 The prices and discounts quoted by the Bidder in the Letter of Bid and in the Activity **Schedule** or Bill of Quantities shall conform to the requirements specified below.
- 14.2 The Bidder shall submit a Bid for the whole of the Works described in ITB 1.1 by filling in prices for all items of the Works, as identified in Section IV, Bidding Forms. In case of admeasurement contracts, the Bidder shall fill in rates and prices for all items of the Works described in the Bill of Quantities. Items against which no rate or price is entered by the Bidder will not be paid for by the Employer

when executed and shall be deemed covered by the rates for other items and prices in the Bill of Quantities.

- 143 The price to be quoted in the Letter of Bid, in accordance with ITB 12.1, shall be the total price of the Bid, excluding any discounts offered.
- 144 The Bidder shall quote any discounts and indicate the methodology for their application in the Letter of Bid in accordance with ITB 12.1.
- 145 Unless otherwise specified **in the BDS** and the Conditions of Contract, the **prices** quoted by the Bidder shall be fixed. If the prices quoted by the Bidder are subject to adjustment during the performance of the Contract in accordance with the provisions of the Conditions of Contract, the Bidder shall furnish the indices and weightings for the price adjustment formulae in the Schedule of Adjustment Data in Section IV- Bidding Forms and the Employer may require the Bidder to justify its proposed indices and weightings.
- 146 If so specified in ITB 1.1, Bids are invited for individual lots (contracts) or for any combination of lots (packages). Bidders wishing to offer discounts for the award of more than one Contract shall specify in their Bid the price reductions applicable to each package, or alternatively, to individual Contracts within the package. Discounts shall be submitted in accordance with ITB 14.4, provided the Bids for all lots (contracts) are opened at the same time.
- 147 All duties, taxes, and other levies payable by the Contractor under the Contract, **or** for any other cause, as of the date 28 days prior to the deadline for submission of Bids, shall be included in the rates and prices¹ and the total Bid price submitted by the Bidder.
- 15.1 The currency(ies) of the Bid and the currency(ies) of payments shall be the same and shall be as specified **in the BDS**.
- 15. Currencies of Bid and Payment**
- 15.2 Bidders may be required by the Employer to justify, to the Employer's satisfaction, their local and foreign currency requirements, and to substantiate that the amounts included in the unit rates and prices and shown in the Schedule of Adjustment Data are reasonable², in which case a detailed breakdown of the foreign currency requirements shall be provided by Bidders.

- 16. Documents**
- 16.1 The Bidder shall furnish a technical proposal including a statement **Comprising the** of work methods, equipment, personnel, schedule and any other **Technical** information as stipulated in Section IV, Bidding Forms, in sufficient **Proposal** detail to demonstrate the adequacy of the Bidders' proposal to meet the work's requirements and the completion time.
- 17. Documents the Qualifications of the Bidder**
- 17.1 To establish Bidder's eligibility in accordance with ITB 4, Bidders **Establishing** shall complete the **Letter** of Bid, included in Section IV, Bidding **Eligibility and** Forms.
- 17.2 In accordance with Section III, Evaluation and Qualification Criteria, to establish its qualifications to perform the Contract, the Bidder shall provide the information requested in the corresponding information sheets included in Section IV, Bidding Forms.
- 17.3 If a margin of preference applies as specified in accordance with ITB 33.1, domestic **Bidders**, individually or in joint ventures, applying for eligibility for domestic preference shall supply all information required to satisfy the criteria for eligibility specified in accordance with ITB 33.1.
- 18. Period of Validity of Bids**
- 18.1 Bids shall remain valid until the date specified **in the BDS** or any extended **date** if amended by the Employer in accordance with ITB 8. A Bid that is not valid until the date specified **in the BDS**, or any extended date if amended by the Employer in accordance with ITB 8, shall be rejected by the Employer as nonresponsive.
- 18.2 In exceptional **circumstances**, prior to the date of expiration of the Bid validity, the Employer may request Bidders to extend the period of validity of their Bids. The request and the responses shall be made in writing. If a Bid Security is requested in accordance with ITB 19, it shall also be extended for twenty-eight (28) days beyond the extended date for Bid validity. A Bidder may refuse the request without forfeiting its Bid Security. A Bidder granting the request shall not be required or permitted to modify its Bid, except as provided in ITB 18.3.
- 18.3 If the award is delayed by a period exceeding fifty-six (56) days beyond the date of expiry of the Bid validity specified in accordance with ITB 18.1, the Contract price shall be determined as follows:

- (a) in the case of **fixed price** contracts, the Contract price shall be the Bid **price** adjusted by the factor specified **in the BDS**;
- (a) in the case of **adjustable** price contracts, no adjustment shall be made; or
- (b) in any case, Bid evaluation shall be based on the Bid price without taking into consideration the applicable correction from those indicated above.

19. Bid Security

19.1 The Bidder shall furnish as part of its Bid, either a Bid-Securing Declaration **or** a Bid Security as specified **in the BDS**, in original form and, in the case of a Bid Security, in the amount and currency specified **in the BDS**.

19.2 A Bid Securing Declaration shall use the form included in Section IV, Bidding Forms.

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

- (a) an **unconditional** guarantee issued by a bank or non-bank financial institution (such as an insurance, bonding or surety company);
- (b) an **irrevocable** letter of credit;
- (c) a **cashier's** or certified check; or
- (d) another **security** specified **in the BDS**,

from a reputable source from an eligible country. If an unconditional guarantee is issued by a non-bank financial institution located outside the Employer's Country, the issuing non-bank financial institution shall have a correspondent financial institution located in the Employer's Country to make it enforceable, unless the Employer has agreed in writing, prior to Bid submission, that a correspondent financial institution is not required. In the case of a bank guarantee, the Bid Security shall be submitted either using the Bid Security Form included in Section IV, Bidding Forms, or in another substantially similar format approved by the Employer prior to Bid submission. The Bid Security shall be valid for twenty-eight (28) days beyond the original date of expiry of the Bid validity, or beyond any extended date if requested under ITB 18.2.

19.4 If a Bid Security or Bid Securing Declaration is specified pursuant to ITB 19.1, any Bid not accompanied by a substantially responsive

Bid Security or Bid-**Securing** Declaration shall be rejected by the Employer as non-responsive.

- 19.5 If a Bid Security is specified pursuant to ITB 19.1, the Bid Security of unsuccessful Bidders shall be returned as promptly as possible upon the successful Bidder's signing the Contract and furnishing the **Performance** Security and if required in the BDS, the Environmental and Social (ES) Performance Security pursuant to ITB 48.
- 19.6 The Bid Security of the successful Bidder shall be returned as promptly as possible once the successful Bidder has signed the Contract and furnished the required Performance Security, and if required in the BDS, the Environmental and Social (ES) Performance Security.
- 19.7 The Bid **Security** may be forfeited:
- (a) if a Bidder withdraws its Bid prior to the expiry date of the Bid validity specified by the Bidder on the Letter of Bid, or any extension thereto provided by the Bidder; or
 - (b) if the successful Bidder fails to:
 - (i) sign the Contract in accordance with ITB 47; or
 - (ii) furnish a Performance Security and if required in the BDS, the Environmental and Social (ES) Performance Security in accordance with ITB 48.
- 19.8 The Bid Security or the Bid-Securing Declaration of a JV shall be in the name of the JV that **submits** the Bid. If the JV has not been constituted into a legally enforceable JV, at the time of Bidding, the Bid Security or the Bid-Securing Declaration shall be in the names of all future members as named in the letter of intent mentioned in ITB 4.1 and ITB 11.2.
- 19.9 If a Bid Security is not required **in the BDS**, pursuant to ITB 19.1, and;
- (a) if a Bidder withdraws its Bid prior to the expiry date of the Bid validity specified by the Bidder on the Letter of Bid or any extended date provided by the Bidder; or
 - (b) if the successful Bidder fails to:
 - (i) sign the Contract in accordance with ITB 47; or
 - (ii) furnish a Performance Security and if required in the BDS, the Environmental and Social (ES) Performance Security in accordance with ITB 48,

the Borrower may, if provided for **in the BDS**, declare the Bidder ineligible to be awarded a contract by the Employer for a period of time stated **in the BDS**.

20. Format and Signing of Bid

- 20.1 The Bidder shall prepare one original of the documents comprising the Bid as described in ITB 11 and clearly mark it “ORIGINAL”. Alternative Bids, if permitted in accordance with ITB 13, shall be clearly marked “ALTERNATIVE”. In addition, the Bidder shall submit copies of the Bid in the number specified **in the BDS**, and clearly mark each of them “COPY.” In the event of any discrepancy between the original and the copies, the original shall prevail.
- 20.2 Bidders shall mark as “CONFIDENTIAL” information in their Bids which is confidential to their business. This may include **proprietary** information, trade secrets, or commercial or financially sensitive information.
- 20.3 The original and all copies of the Bid shall be typed or written in indelible ink and shall be signed by a person duly authorized to sign on behalf of **the** Bidder. This authorization shall consist of a written confirmation as specified **in the BDS** and shall be attached to the Bid. The name and position held by each person signing the authorization must be typed or printed below the signature. All pages of the Bid where entries or amendments have been made shall be signed or initialed by the person signing the Bid.
- 20.4 In case the Bidder is a JV, the Bid shall be signed by an authorized representative of the JV on behalf of the JV, and so as to be legally binding on all the members as evidenced by a power of attorney signed by their legally authorized representatives.
- 20.5 Any interlineations, **erasures**, or overwriting shall be valid only if they are signed or initialed by the person signing the Bid.

Submission and Opening of Bids

21. Sealing and Marking of Bids

- 21.1 The Bidder shall deliver the Bid in a single, sealed envelope (one-envelope Bidding process). Within the single envelope the Bidder shall place the following separate, sealed envelopes:
- (a) in an envelope marked “ORIGINAL”, all documents comprising the Bid, as described in ITB 11; and
 - (b) in an envelope marked “COPIES”, all required copies of the Bid; and
 - (c) if alternative Bids are permitted in accordance with ITB 13, and if relevant:

- (i) in an envelope marked “ORIGINAL - ALTERNATIVE BID”, the alternative Bid; and
- (ii) in the enveloped marked “COPIES –ALTERNATIVE BID” all required copies of the alternative Bid.

21.2 The inner and outer envelopes shall:

- (a) bear the name and address of the Bidder;
- (b) be addressed to the Employer in accordance with ITB 22.1;
- (c) bear the specific identification of this Bidding process specified in accordance with BDS 1.1; and
- (d) bear a warning not to open before the time and date for Bid opening.

21.3 If all envelopes are not sealed and marked as required, the Employer will assume no responsibility for the misplacement or premature opening of the Bid.

22. Deadline for Submission of Bids

221 Bids must be received by the Employer at the address and no later than the date and time specified **in the BDS**. When so specified **in the BDS**, Bidders shall have the option of submitting their Bids **electronically**. Bidders submitting Bids electronically shall follow the electronic bid submission procedures specified **in the BDS**.

222 The Employer may, at its discretion, extend the deadline for the **submission** of Bids by amending the bidding document in accordance with ITB 8, in which case all rights and obligations of the Employer and Bidders previously subject to the deadline shall thereafter be subject to the deadline as extended.

23. Late Bids

23.1 The Employer shall not consider any Bid that arrives after the deadline for submission of Bids, in accordance with ITB 22. Any Bid **received** by the Employer after the deadline for submission of Bids shall be declared late, rejected, and returned unopened to the Bidder.

24. Withdrawal, Substitution, and Modification of Bids

241 A Bidder may withdraw, substitute, or modify its Bid after it has been submitted by sending a written notice, duly signed by an authorized **representative**, and shall include a copy of the authorization in accordance with ITB 20.3, (except that withdrawal notices do not require copies). The corresponding substitution or modification of the Bid must accompany the respective written notice. All notices must be:

- (a) prepared and submitted in accordance with ITB 20 and ITB 21 (except that withdrawal notices do not require copies), and in

addition, the respective envelopes shall be clearly marked “WITHDRAWAL,” “SUBSTITUTION,” “MODIFICATION”; and

- (b) received by the Employer prior to the deadline prescribed for submission of Bids, in accordance with ITB 22.

- 242 Bids requested to be withdrawn in accordance with ITB 24.1 shall be returned **unopened** to the Bidders.
- 243 No Bid may be withdrawn, substituted, or modified in the interval between **the** deadline for submission of Bids and the date of expiry of the Bid validity specified by the Bidder on the Letter of Bid or any extended date thereof.

25. Bid Opening

- 25.1 Except in the cases specified in ITB 23 and ITB 24.2, the Employer shall publicly open and read out in accordance with this ITB, all Bids received by the deadline, at the date, time and place specified **in the BDS**, in the **presence** of Bidders’ designated representatives and anyone who chooses to attend. All Bidders, or their representatives and any interested party may attend a public opening. Any specific electronic Bid opening procedures required if electronic bidding is permitted in accordance with ITB 22.1, shall be as specified **in the BDS**.
- 25.2 First, envelopes marked “WITHDRAWAL” shall be opened and read out and the **envelope** with the corresponding Bid shall not be opened, but returned to the Bidder. No Bid withdrawal shall be permitted unless the corresponding withdrawal notice contains a valid authorization to request the withdrawal and is read out at Bid opening.
- 25.3 Next, envelopes marked “SUBSTITUTION” shall be opened and read out and exchanged with the corresponding Bid being substituted, and the substituted Bid shall not be opened, but returned to the Bidder. No Bid substitution shall be permitted unless the corresponding substitution notice contains a valid authorization to request the substitution and is read out at Bid opening.
- 25.4 Next, envelopes marked “MODIFICATION” shall be opened and read out with the **corresponding** Bid. No Bid modification shall be permitted unless the corresponding modification notice contains a valid authorization to request the modification and is read out at bid opening.
- 25.5 Next, all remaining envelopes shall be opened one at a time, reading out: the name of the Bidder and whether there is a modification; the total Bid Price, per lot (contract) if applicable, including any discounts and alternative Bids; the presence or absence of a Bid

Security, or Bid Securing Declaration, if required; and any other details as the Employer may consider appropriate.

- 25.6 Only Bids, alternative Bids and discounts that are opened and read out at Bid **opening** shall be considered further for evaluation. The Letter of Bid and the priced Schedules are to be initialed by representatives of the Employer attending Bid opening in the manner specified **in the BDS**.
- 25.7 The Employer shall neither discuss the merits of any Bid nor reject any Bid (**except** for late Bids, in accordance with ITB 23.1).
- 25.8 The Employer shall prepare a **record** of the Bid opening that shall include, as a minimum:
- (a) the name of the Bidder and whether there is a withdrawal, substitution, or modification;
 - (b) the Bid Price, per lot (contract) if applicable, including any discounts;
 - (c) the presence or absence of a Bid Security or Bid-Securing Declaration, if one was required; and
 - (d) any alternative Bids.
- 25.9 The Bidders' **representatives** who are present shall be requested to sign the record. The omission of a Bidder's signature on the record shall not invalidate the contents and effect of the record. A copy of the record shall be distributed to all Bidders.

Evaluation and Comparison of Bids

- 26. Confidentiality** 26.1 Information relating to the evaluation of Bids and recommendation of contract award, shall not be disclosed to Bidders or any other persons not **officially** concerned with the Bidding process until information on Intention to Award the Contract is transmitted to all Bidders in accordance with ITB 43.
- 26.2 Any effort by a Bidder to influence the Employer in the evaluation of the Bids or Contract **award** decisions may result in the rejection of its Bid.
- 26.3 Notwithstanding ITB 26.2, from the time of Bid opening to the time of Contract award, if a Bidder wishes to contact the Employer on any matter related to the Bidding process, it shall do so in writing.
- 27. Clarification of Bids** 27.1 To assist in the examination, evaluation, and comparison of the Bids, and qualification of the Bidders, the Employer may, at its discretion, ask any **Bidder** for a clarification of its Bid given a reasonable time for a response. Any clarification submitted by a

Bidder that is not in response to a request by the Employer shall not be considered. The Employer's request for clarification and the response shall be in writing. No change, including any voluntary increase or decrease in the prices or substance of the Bid shall be sought, offered, or permitted, except to confirm the correction of arithmetic errors discovered by the Employer in the evaluation of the Bids, in accordance with ITB 31.

27.2 If a Bidder does not provide clarifications of its Bid by the date and time set in the Employer's request for clarification, its Bid may be rejected.

28.1 During the **evaluation** of Bids, the following definitions apply:

**28. Deviations,
Reservations,
and Omissions**

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

291 The Employer's determination of a Bid's responsiveness is to be based on the contents of the Bid itself, as defined in ITB 11.

**29. Determination of
Responsiveness**

292 A substantially responsive Bid is one that meets the requirements of the bidding **document** without material deviation, reservation, or omission. A material deviation, reservation, or omission is one that:

- (a) if accepted, would:
 - (i) affect in any substantial way the scope, quality, or performance of the Works specified in the Contract; or
 - (ii) limit in any substantial way, inconsistent with the bidding document, the Employer's rights or the Bidder's obligations under the proposed Contract; or
- (b) if rectified, would unfairly affect the competitive position of other Bidders presenting substantially responsive Bids.

293 The Employer shall examine the technical aspects of the Bid submitted in accordance with ITB 16, in particular, to confirm that all requirements of Section VII, Works' Requirements have been met without any material deviation, reservation or omission.

294 If a Bid is not substantially responsive to the requirements of the bidding document, **it** shall be rejected by the Employer and may not

subsequently be made responsive by correction of the material deviation, reservation, or omission.

**30. Nonmaterial
Nonconformities**

- 30.1 Provided that a **Bid** is substantially responsive, the Employer may waive any nonconformities in the Bid.
- 30.2 Provided that a Bid is substantially responsive, the Employer may request that the Bidder submit the necessary information or documentation, within a reasonable period of time, to rectify nonmaterial nonconformities in the Bid related to documentation requirements. Requesting information or documentation on such nonconformities shall not be related to any aspect of the price of the Bid. Failure of the Bidder to comply with the request may result in the rejection of its Bid.
- 30.3 Provided that a Bid is substantially responsive, the Employer shall rectify quantifiable nonmaterial nonconformities related to the Bid Price. To this effect, the Bid Price shall be adjusted, for comparison purposes only **to** reflect the price of a missing or non-conforming item or component, by adding the average price of the item or component quoted by substantially responsive Bidders. If the price of the item or component cannot be derived from the price of other substantially responsive Bids, the Employer shall use its best estimate.
- 31.1 Provided that the Bid is **substantially** responsive, the Employer shall correct arithmetical errors on the following basis:

**31. Correction of
Arithmetical
Errors**

- (a) only for admeasurement contracts, if there is a discrepancy between the unit price and the total price that is obtained by multiplying the unit price and quantity, the unit price shall prevail and the total price shall be corrected, unless in the opinion of the Employer there is an obvious misplacement of the decimal point in the unit price, in which case the total price as quoted shall govern and the unit price shall be corrected;
- (b) if there is an error in a total corresponding to the addition or subtraction of subtotals, the subtotals shall prevail and the total shall be corrected; and
- (c) if there is a discrepancy between words and figures, the amount in words shall prevail, unless the amount expressed in words is related to an arithmetic error, in which case the amount in figures shall prevail subject to (a) and (b) above.

- 31.2 Bidders shall be requested to accept correction of arithmetical errors. Failure to accept the correction in accordance with ITB 31.1, shall result in the rejection of the Bid.
- 32. Conversion to Single Currency** 32.1 For evaluation and comparison purposes, the currency(ies) of the Bid shall be converted into a single currency as specified **in the BDS**.
- 33. Margin of Preference** 33.1 Unless otherwise specified **in the BDS**, a margin of preference for domestic Bidders³ shall not apply.
- 34. Subcontractors** 34.1 Unless otherwise stated **in the BDS**, the Employer does not intend to execute any specific elements of the Works by subcontractors selected in advance by the Employer, Financial Parts
- 34.2 The subcontractor's qualifications shall not be used by the Bidder to qualify for the Works unless their specialized parts of the Works were previously designated by the Employer **in the BDS** as can be met by subcontractors referred to hereafter as 'Specialized Subcontractors', in which case, the qualifications of the Specialized Subcontractors proposed by the Bidder may be added to the qualifications.
- 34.3 Bidders may propose subcontracting up to the percentage of total value of contracts or the volume of works as specified **in the BDS**. Subcontractors proposed by the Bidder shall be fully qualified for their parts of the Works.
- 35. Evaluation of Bids** 35.1 The Employer shall use the criteria and methodologies listed in this ITB and Section III, Evaluation and Qualification criteria. No other evaluation criteria or methodologies shall be permitted. By applying the criteria and methodologies the Employer shall determine the Most Advantageous Bid. This is the Bid of the Bidder that meets the Qualification Criteria and whose Bid has been determined to be:
- (a) substantially responsive to the bidding document; and
 - (b) the lowest evaluated cost.
- 35.2 To evaluate a Bid, the Employer shall consider the following:
- (a) the Bid price, excluding Provisional Sums and the provision, if any, for contingencies in the Summary Bill of Quantities⁴ for admeasurement contracts, but including Day work⁵ items, where priced competitively;

- (b) price adjustment for correction of arithmetic errors in accordance with ITB 31.1;
 - (c) price adjustment due to discounts offered in accordance with ITB 14.4;
 - (d) converting the amount resulting from applying (a) to (c) above, if relevant, to a single currency in accordance with ITB 32;
 - (e) price adjustment for nonconformities in accordance with ITB 30.3; and
 - (f) the additional evaluation factors are specified in Section III, Evaluation and Qualification Criteria.
- 35.3 The estimated effect of the price adjustment provisions of the Conditions of Contract, applied over the period of execution of the Contract, shall not be taken into account in Bid evaluation.
- 35.4 If this bidding document allows Bidders to quote separate prices for different lots (contracts), the methodology to determine the lowest evaluated cost of the contract combinations, including any discounts offered in the Letter of Bid, is specified in Section III, Evaluation and Qualification Criteria.

36. Comparison of Bids

The Employer shall compare the evaluated costs of all substantially responsive Bids established in accordance with ITB 35.2 to determine the Bid that has the lowest evaluated cost.

37. Abnormally Low

37.1 An Abnormally Low Bid is one where the Bid price, in combination with other constituent elements of the Bid, appears unreasonably low to the extent that the Bid price raises material concerns as to the capability of the Bidder to perform the Contract for the offered Bid price.

- 372 In the event of identification of a potentially Abnormally Low Bid, the Employer shall seek written clarifications from the Bidder, including detailed price analyses of its Bid price in relation to the subject matter of the contract, scope, proposed methodology, schedule, allocation of risks and responsibilities and any other requirements of the bidding document.
- 373 After evaluation of the price analyses, in the event that the Employer determines that the Bidder has failed to demonstrate its capability to perform the Contract for the offered Bid Price, the Employer shall reject the Bid.

38. Unbalanced or Loaded

38.1 If the Bid for an admeasurement contract, which results in the lowest **Front** evaluated cost is, in the Employer's opinion, seriously unbalanced **Bids** or, front loaded, the Employer may require the Bidder to provide written clarifications.

Clarifications may include detailed price analyses to demonstrate the consistency of the Bid priceas with the scope of works, proposed methodology, schedule and any other requirements of the bidding document.

38.2 After the evaluation of the information and detailed price analyses presented by the Bidder, the Employer may as appropriate:

- (a) accept the Bid; or
- (b) require that the amount of the Performance Security be increased at the expense of the Bidder to a level not exceeding 20% of the Contract Price; or
- (c) reject the Bid.

39. Qualification of the Bidder

39.1 The Employer shall determine to its satisfaction whether the eligible Bidder that is selected as having submitted the lowest evaluated cost and substantially responsive Bid meets the qualifying criteria specified in Section III, Evaluation and Qualification Criteria.

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

39.3 An affirmative determination of qualification shall be a prerequisite for award of the Contract to the Bidder. A negative determination shall result in disqualification of the Bid, in which event the Employer shall proceed to the substantially responsive Bid which offers the next lowest evaluated cost to make a similar determination of that Bidder's qualifications to perform satisfactorily.

40. Most

40.1 Having compared the evaluated costs of Bids, the Employer shall **Advantageous** determine the Most Advantageous Bid. The Most Advantageous **Bid** Bid is the Bid of the Bidder that meets the Qualification Criteria and whose Bid has been determined to be:

- (a) substantially responsive to the bidding document; and
- (b) the lowest evaluated cost.

- 41. Employer's to Reject Any or All** 41.1 The Employer reserves the right to accept or reject any Bid, and to **Right to Accept** annul the Bidding process and reject all Bids at any time prior to **Any Bid, and** Contract Award, without thereby incurring any liability to Bidders. In case of annulment, all Bids submitted and specifically, Bid **Bids** securities, shall be promptly returned to the Bidders.

- 42. Standstill Period** 42.1 The Contract shall not be awarded earlier than the expiry of the Standstill Period. The Standstill Period shall be ten (10) Business Days unless extended in accordance with ITB 46. The Standstill Period commences the day after the date the Employer has transmitted to each Bidder the Notification of Intention to Award the Contract. Where only one Bid is submitted, or if this contract is in response to an emergency situation recognized by the Bank, the Standstill Period shall not apply.

- 43. Notification of Award** 43.1 The Employer shall send to each Bidder the Notification of Intention to Award the Contract to the successful Bidder. The Notification of Intention to Award shall contain, at a minimum, the following information:
- (a) the name and address of the Bidder submitting the successful Bid;
 - (b) the Contract price of the successful Bid;
 - (c) the names of all Bidders who submitted Bids, and their Bid prices as readout, and as evaluated;
 - (d) a statement of the reason(s) the Bid (of the unsuccessful Bidder to whom the notification is addressed) was unsuccessful, unless the price information in c) above already reveals the reason;
 - (e) the expiry date of the Standstill Period;
 - (f) instructions on how to request a debriefing and/or submit a complaint during the standstill period.

Award of Contract

- 44. Award Criteria** 44.1 Subject to ITB 41, the Employer shall award the Contract to the successful Bidder. This is the Bidder whose Bid has been determined to be the Most Advantageous Bid as specified in ITB 40.

- 45. Notification of** 45.1 Prior to the expiration of the Bid validity, and upon expiry of the **Award** Standstill Period specified in ITB 42.1 or any extension thereof, and, upon satisfactorily addressing any complaint that has been filed within the Standstill Period, the Employer shall notify the successful Bidder, in writing, that its Bid has been accepted. The notification

of award (hereinafter and in the Conditions of Contract and Contract Forms called the “Letter of Acceptance”) shall specify the sum that the Employer will pay the Contractor in consideration of the execution of the contract (hereinafter and in the Conditions of Contract and Contract Forms called “the Contract Price”).

- 452 Within ten (10) Business Days after the date of transmission of the Letter of Acceptance, the Employer shall publish the Contract Award Notice which shall contain, at a minimum, the following information:
- (a) name and address of the Employer;
 - (b) name and reference number of the contract being awarded, and the selection method used;
 - (c) names of all Bidders that submitted Bids, and their Bid prices as read out at Bid opening, and as evaluated;
 - (d) names of all Bidders whose Bids were rejected either as nonresponsive or as not meeting qualification criteria, or were not evaluated, with the reasons therefor;
 - (e) the name of the successful Bidder, the final total contract price, the contract duration and a summary of its scope; and
 - (f) successful Bidder’s Beneficial Ownership Disclosure Form, if specified in BDS ITB 47.1.
- 453 The Contract Award Notice shall be published on the Employer’s website with free access if available, or in at least one newspaper of national circulation in the Employer’s Country, or in the official gazette. The Employer shall also publish the contract award notice in UNDB online.
- 454 Until a formal contract is prepared and executed, the Letter of Acceptance shall constitute a binding Contract.
- 46. Debriefing by the Employer**
- 461 On receipt of the Employer’s Notification of Intention to Award referred to in ITB 43.1, an unsuccessful Bidder has three (3) Business Days to make a written request to the Employer for a debriefing. The Employer shall provide a debriefing to all unsuccessful Bidders whose request is received within this deadline.
- 462 Where a request for debriefing is received within the deadline, the Employer shall provide a debriefing within five (5) Business Days, unless the Employer decides, for justifiable reasons, to provide the debriefing outside this timeframe. In that case, the standstill period shall automatically be extended until five (5) Business Days after such debriefing is provided. If more than one debriefing is so delayed, the standstill period shall not end earlier than five (5)

Business Days after the last debriefing takes place. The Employer shall promptly inform, by the quickest means available, all Bidders of the extended standstill period

463 Where a request for debriefing is received by the Employer later than the three (3)-Business Day deadline, the Employer should provide the debriefing as soon as practicable, and normally no later than fifteen (15) Business Days from the date of publication of Public Notice of Award of contract. Requests for debriefing received outside the three (3)-day deadline shall not lead to extension of the standstill period.

464 Debriefings of unsuccessful Bidders may be done in writing or verbally. The Bidder shall bear their own costs of attending such a debriefing meeting.

47. Signing of

47.1 The Employer shall send to the successful Bidder the Letter of **Contract** Acceptance including the Contract Agreement, and, if specified in the BDS, a request to submit the Beneficial Ownership Disclosure Form providing additional information on its beneficial ownership. The Beneficial Ownership Disclosure Form, if so requested, shall be submitted within eight (8) Business Days of receiving this request.

47.2 The successful Bidder shall sign, date and return to the Employer, the Contract Agreement within twenty-eight (28) days of its receipt.

48. Performance

48.1 Within twenty-eight (28) days of the receipt of the Letter of

Security

Acceptance from the Employer, the successful Bidder shall furnish the Performance Security and, if required in the BDS, the Environmental and Social (ES) Performance Security in accordance with the General Conditions of Contract, subject to ITB 38.2 (b), using for that purpose the Performance Security and ES Performance Security Forms included in Section X, Contract Forms, or another form acceptable to the Employer. If the Performance Security furnished by the successful Bidder is in the form of a bond, it shall be issued by a bonding or insurance company that has been determined by the successful Bidder to be acceptable to the Employer. A foreign institution providing a bond shall have a correspondent financial institution located in the Employer's Country, unless the Employer has agreed in writing that a correspondent financial institution is not required.

48.2 Failure of the successful Bidder to submit the above-mentioned Performance Security and, if required in the BDS, the Environmental and Social (ES) Performance Security, or to sign the Contract Agreement shall constitute sufficient grounds for the

annulment of the award and forfeiture of the Bid Security. In that event the Employer may award the Contract to the Bidder offering the next Most Advantageous Bid.

49. Adjudicator

49.1 The Employer proposes the person named **in the BDS** to be appointed as Adjudicator under the Contract, at the hourly fee specified **in the BDS**, plus reimbursable expenses. If the Bidder disagrees with this proposal, the Bidder should so state in his Bid. If, in the Letter of Acceptance, the Employer does not agree on the appointment of the Adjudicator, the Employer will request the Appointing Authority designated in the Particular Conditions of Contract (PCC) pursuant to Clause 23.1 of the General Conditions of Contract (GCC), to appoint the Adjudicator.

**50. Procurement
Related
Complaint**

50.1 The procedures for making a Procurement-related Complaint are as specified in the BDS.

Section II - Bid Data Sheet (BDS)

The following specific data for the Works to be procured shall complement, supplement, or amend the provisions in the Instructions to Bidders (ITB). Whenever there is a conflict, the provisions herein shall prevail over those in ITB.

ITB Reference	A. General
ITB 1.1	The reference number of the Request for Bids (RFB) is: KE-SDOI-257463-CW-RFB The Purchaser is: State Department of Roads. The name of the RFB is: The Proposed Offices Partitioning at Barabara Plaza. The number and identification of lots (contracts) comprising this RFB is: one contract
ITB 1.2(a)	N/A
ITB 2.1	The Borrower is: Government of Kenya Loan or Financing Agreement amount: N/A The name of the Project is: HORN OF AFRICA GATEWAY DEVELOPMENT PROJECT (HOAGDP)
ITB 4.1	Maximum number of members in the Joint Venture (JV) shall be: N/A
ITB 4.5	A list of debarred firms and individuals is available on the Bank's external website: http://www.worldbank.org/debarr.
B. Contents of Bidding Document	
ITB 7.1	For Clarification of Bid purposes only, the Purchaser's address is: Attention: The Chief Engineer (Roads), State Department of Roads. Address: P.O. Box 30260. City: Nairobi ZIP Code: 00100 Country: Kenya Telephone: Electronic mail address: roads@infrastructure.go.ke
ITB 7.1	Requests for clarification should be received before tender submission date after 14 days.
ITB 7.1	Web page: www.transport.go.ke
ITB 7.4	Pre-Bid meeting and/or a Site of Works visit will be held on 31st October, 2023 at 10:00 am at the Site, Barabara Plaza.
C. Preparation of Bids	
ITB 10.1	The language of the Bid is: English All correspondence exchange shall be in English language. Language for translation of supporting documents and printed literature is English.
ITB 11.1 (b)	The Bidder shall submit the following additional documents in its Bid: 1) Valid Copy of certificate of incorporation/ Registration from the Registrar of Companies/ Business Contractors; 2) List of directors with respect to shareholding & details of citizenship; (attach a

	copy of CR 12, ID copies for business name); 3) Written Power of Attorney with Proof of authorization if the signatory to the tender is not a director of the company (provide name and attach proof of citizenship of the signatory to the Tender); 4) Valid Current Tax Compliance Certificate-Statement of tax compliance from Bidding Company, and if Consortium, from each member of the consortium and proposed subcontractors; 5) Dully filled, signed, and stamped Form of Tender; 6) Audited accounts for each of the last three years (i.e., 2020-2022); 7) Valid copy of NCA 5 and above registration certificate in General Building Works, for bidder and respective categories and trade for proposed specialist subcontractors (see Specialist Subsections); 8) Provide Sub-Contractors' Agreement for both CCTV/Security Surveillance, Electrical, Structured Cabling, Audio Visual & Access Control System Installation Works with category NCA 2 and above and current category of Registration with National Construction Authority (NCA); 9) Current annual contractors practicing license from NCA for appropriate class and trade (Bidder and proposed subcontractors); 10) The Tender Security (Bid Bond) from a reputable bank or insurance firm approved by PPRA to the procuring entity that is in the required format and amount, valid for 120 days from the date of tender opening; 11) Written declaration letter signed and stamped by an Attorney/Commissioner of oaths that the firm/person/tenderers and his/her subcontractors, if any is not debarred from participating in procurement proceedings; 12) Written declaration letter signed and stamped by an Attorney/Commissioner of oaths that the tenderers have never and shall not engage in any corrupt or fraudulent practices in the procurement proceedings; 13) Dully filled and signed tender questionnaire; 14) Dully filled and signed Confidential Business Questionnaire; 15) The Bid has been submitted in the format required by the procuring entity (the bid should be submitted complete with all the copies, sections, ALL pages serialized, initialed and stamped; document TAPE BOUND as issued by the procuring entity); 16) The bidder must provide a manufacturers authorization letter for the CCTV, Audio Visual, NVR, UPS, Access Control and other active components being offered by the bidder. Brochures and Catalogues indicating or conforming to technical specifications.

ITB 11.1 (i)	The Bidder shall submit the following additional documents in its Bid: Code of Conduct for Contractor's Personnel (ES) The Bidder shall submit its Code of Conduct that will apply to Contractor's Personnel (as defined in Sub- Clause 1 (ii) of the General Conditions of Contract), to ensure compliance with the Contractor's Environmental and Social (ES) obligations under the Contract. The Bidder shall use for this purpose the Code of Conduct form provided in Section IV. No substantial modifications shall be made to this form, except that the Bidder may introduce additional requirements, including as necessary to take into account specific Contract issues/risks. Management Strategies and Implementation Plans (MSIP) to manage the (ES) risks The Bidder shall submit Management Strategies and Implementation Plans (MSIPs) to manage the following key Environmental and Social (ES) risks: e.g Traffic Management Plan to ensure safety of workers and members of staff from construction traffic This is in addition to all the other necessary documents already listed in ITB 11.1 (b) that must be submitted with the Bid
ITB 13.1	Alternative Bids shall not be considered.
ITB 13.2	Alternative times for completion shall not be permitted.
ITB 13.4	Alternative technical solutions shall be permitted for the following parts of the Works: CCTV/Security Surveillance, Electrical, Structured Cabling, Audio Visual & Access Control System Installation Works
ITB 14.5	The prices quoted by the Bidder shall not be subject to adjustment during the performance of the Contract.
ITB 15.1	The price shall be quoted by the Bidder in: Kenya Shillings
ITB 18.1	The Bid validity period shall be 120 days.
ITB 18.3 (a)	The Bid price shall be adjusted by the following factor(s): N/A
ITB 19.1	A Bid Security shall be required. A Bid-Securing Declaration shall not be required. If a Bid Security shall be required, the amount and currency of the Bid Security shall be 2% (Bid Sum)
ITB 19.3 (d)	Other types of acceptable securities: N/A
ITB 20.1	In addition to the original of the Bid, the number of copies is: one copy
ITB 20.3	The written confirmation of authorization to sign on behalf of the Bidder shall consist of: A letter of authorization from the bidder or a power of attorney if an agent submits a bid on behalf of a bidder.
D. Submission and Opening of Bids	

ITB 22.1	For <u>Bid submission purposes</u> only, the Purchaser's address is: Attention: Principal Secretary, Ministry of Roads & Transport, State Department of Roads. Street Address: P.O. Box 30260- 00100, Nairobi Floor/ Room number: Ground Floor, Tender Box City: Nairobi, Kenya ZIP/Postal Code: 00100 Or Be dropped in the Tender Box situated at Works Building, Ground Floor opposite room 48 The deadline for Bid submission is: Date: 22nd November 2023 Time: 10.00 am. Bidders shall not have the option of submitting their Bids electronically.
ITB 25.1	The Bid opening shall take place at: Physical Address: Works Building 9th Floor Board Room,
	Ngong Road, Nairobi, P.O. Box 30260, Nairobi, Kenya Code: 00100 City: Nairobi Date 22nd November 2023 Time: 10: 00 am
ITB 25.6	The Letter of Bid and Price Schedules shall be initiated by all representatives of the Purchaser conducting Bid opening.
E. Evaluation and Comparison of Bids	
ITB 32.1	The currency that shall be used for Bid evaluation and comparison purposes to convert at the selling exchange rate all Bid prices expressed in various currencies into a single currency is: Kenya shillings. The source of exchange rate shall be: Central Bank of Kenya. The date for the exchange rate shall be: N/A.....
ITB 33.1	A margin of domestic preference shall not apply.
ITB 34.2	The parts of the Works for which the Employer permits Bidders to propose Specialized Sub-contractors are designated as follows: a. STRUCTURED CABLING, b. IP CCTV, c. ACCESS CONTROL INSTALLATION WORKS. For the above-designated parts of the Works that may require Specialized Sub- contractors, the relevant qualifications of the proposed Specialized Subcontractors will be added to the qualifications of the Bidder for the purpose of evaluation.
ITB 34.3	Contractor's proposed subcontracting: Maximum percentage of subcontracting permitted is: --- % of the total contract amount or _____% of the volume of work_____. Bidders planning to subcontract more than 10% of total volume of work shall specify, in the Letter of Bid, the activity (ies) or parts of the Works to be subcontracted along with complete details of the subcontractors and their qualification and experience.

F. Award of Contract	
ITB 47.1	The successful Bidder shall submit the Beneficial Ownership Disclosure Form.
ITB 50.1	The procedures for making a Procurement-related Complaint are detailed in the “Procurement Regulations for IPF Borrowers (Annex III).” If a Bidder wishes to make a Procurement-related Complaint, the Bidder shall submit its complaint following these procedures, In Writing (by the quickest means available, such as by email or fax), to: For the attention: Head, Supply Chain Management Services; Title/position: Senior Deputy Director Supply Chain Management Services Procuring Agency: State Department of Roads. Email address: <i>roads@infrastructure.go.ke</i> In summary, a Procurement-related Complaint may challenge any of the following: 1. the terms of the Bidding Documents; and 2. the Purchaser’s decision to award the contract.

Section III - Evaluation and Qualification Criteria Table of Criteria

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Margin of Preference

If BDS so specifies, the Employer will grant a margin of preference of 7.5% (seven and one-half percent) to domestic contractors, in accordance with, and subject to, the following provisions:

- (a) Contractors applying for such preference shall be asked to provide, as part of the data for qualification, such information, including details of ownership, as shall be required to determine whether, according to the classification established by the Borrower and accepted by the Bank, a particular contractor or group of contractors qualifies for a domestic preference. The bidding document shall clearly indicate the preference and the method that will be followed in the evaluation and comparison of Bids to give effect to such preference.
- (b) After Bids have been received and reviewed by the Employer, responsive Bids shall be classified into the following groups:
 - (i) Group A: Bids offered by domestic contractors eligible for the preference.
 - (ii) Group B: Bids offered by other contractors.

All evaluated Bids in each group shall, as a first evaluation step, be compared to determine the Bid with lowest evaluated cost, and the Bid with the lowest evaluated cost in each group shall be further compared with each other. If a result of this comparison, a Bid from Group A is the lowest, it shall be selected for the award as the Most Advantageous Bid, if the Bidder is qualified. If a Bid from Group B is the lowest, as a second evaluation step, all Bids from Group B shall then be further compared with the lowest evaluated cost from Group A. For the purpose of this further comparison only, an amount equal to 7.5% (seven and one-half percent) of the respective Bid price corrected for arithmetical errors, including unconditional discounts but excluding provisional sums and the cost of dayworks, if any, shall be added to the evaluated cost offered in each Bid from Group B. If the Bid from Group A is the lowest, it shall be selected for award. If not, the lowest evaluated cost from Group B based on the first evaluation step shall be selected.

The Employer shall use the criteria and methodologies listed in this Section to evaluate Bids. By applying these criteria and methodologies, the Employer shall determine the Most Advantageous Bid. This is the Bid that has been determined to be:

- (a) substantially responsive to the bidding document, and
- (b) the lowest evaluated cost.

Evaluation

In addition to the criteria listed in ITB 35.2 (a) – (e) the following criteria shall apply:

2.1 Adequacy of Technical Proposal

Evaluation of the Bidder's Technical Proposal will include an assessment of the Bidder's technical capacity to mobilize key equipment and personnel for the contract consistent with its proposal regarding work methods, scheduling, and material sourcing in sufficient detail and fully in accordance with the requirements stipulated in Section VII, Works' Requirements.

2.2 Multiple Contracts

Pursuant to ITB 35.4 of the Instructions to Bidders, if Works are grouped in multiple contracts, evaluation will be as follows:

(a) Award Criteria for Multiple Contracts [ITB 35.4]: Lots

N/A

Bidders have the option to Bid for any one or more lots. Bids will be evaluated lot-wise, taking into account discounts offered, if any, after considering all possible combination of lots. The contract(s) will be awarded to the Bidder or Bidders offering the lowest evaluated cost to the Employer for combined lots, subject to the selected Bidder(s) meeting the required qualification criteria for lot or combination of lots as the case may be.

Packages N/A

Bidders have the option to Bid for any one or more packages and for any one or more lots within a package. Bids will be evaluated package-wise, taking into account discounts offered, if any, for combined packages and/or lots within a package. The contract(s) will be awarded to the Bidder or Bidders offering the lowest evaluated cost to the Employer for combined packages, subject to the selected Bidder(s) meeting the required qualification criteria for combination of packages and or lots as the case may be.

(b) Qualification Criteria for Multiple Contracts: N/A

Section III describes criteria for qualification for each lot (contract) for multiple lots (contracts). The criteria for qualification is aggregate minimum requirement for respective lots as specified under items 3.1, 3.2, 4.2(a) and 4.2(b). However, with respect to the specific experience under item 4.2 (a) of Section III, the Employer will select any one or more of the options as identified below:

N is the minimum number of contracts

V is the minimum value of a single contract

2.3 Alternative Completion Times

An alternative Completion Time, if permitted under ITB 13.2, will be evaluated as follows:

.....
.....N/A

2.4 Sustainable procurement

..... N/A

2.5 Alternative Technical Solutions for specified parts of Works

The acceptability of alternative technical solutions of parts of the Works, if permitted under ITB 13.4, will be determined as follows: Meeting the set specifications

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

2.6 Specialized Subcontractors

If permitted under ITB 34, only the specific experience of Subcontractors for specialized works permitted by the Employer will be considered. The general experience and financial resources of the Specialized Subcontractors shall not be added to those of the Bidder for purposes of qualification of the Bidder.

Qualification

Eligibility and Qualification Criteria				Compliance Requirements			Documentation
No.	Subject	Requirement	Single Entity	Joint Venture (existing or intended)			Submission Requirements
				All members Combined	Each Member	At least one Member	
1. Eligibility							
1.1	Nationality	Nationality in accordance with ITB 4.4	Must meet requirement	Must meet requirement	Must meet requirement	N/A	Forms ELI – 1.1 and 1.2, with attachments
1.2	Conflict of Interest	No conflicts of interest in accordance with ITB 4.2	Must meet requirement	Must meet requirement	Must meet requirement	N/A	Letter of Bid
1.3	Bank Eligibility	Not having been declared ineligible by the Bank, as described in ITB 4.5.	Must meet requirement	Must meet requirement	Must meet requirement	N/A	Letter of Bid
1.4	State-owned enterprise or institution of the Borrower country	Meets conditions of ITB 4.6	Must meet requirement	Must meet requirement	Must meet requirement	N/A	Forms ELI – 1.1 and 1.2, with attachments
1.5	United Nations resolution or Borrower’s country law	Not having been excluded as a result of prohibition in the Borrower’s country laws or official regulations against commercial relations with the Bidder’s country, or by an act of compliance with UN Security Council resolution, both in accordance with ITB 4.8 and Section V.	Must meet requirement	Must meet requirement	Must meet requirement	N/A	Forms ELI – 1.1 and 1.2, with attachments
2. Historical Contract Non-Performance							
2.1	History of Non-	Non-performance of a	Must meet	Must meet	Must meet	N/A	Form CON-2

Eligibility and Qualification Criteria				Compliance Requirements			Documentation
No.	Subject	Requirement	Single Entity	Joint Venture (existing or intended)			Submission Requirements
				All members Combined	Each Member	At least one Member	
	Performing Contracts	contract ¹ did not occur as a result of contractor default since 1 st January 2017	requirement ¹ & 2	requirements	requirement ²		
2.2	Suspension Based on Execution of Bid /Proposal Securing Declaration by the Employer	Not under suspension based on execution of a Bid/Proposal Securing Declaration pursuant to ITB 4.7 and ITB 19.9.	Must meet requirement	Must meet requirement	Must meet requirement	N/A	Letter of Bid
2.3	Pending Litigation	Bidder's financial position and prospective long term profitability sound according to criteria established in 3.1 below and assuming that all pending litigation will be resolved against the Bidder	Must meet requirement	N/A	Must meet requirement	N/A	Form CON – 2
2.4	Litigation History	No consistent history of court/arbitral award decisions against the Bidder ³ since 1 st January 2017	Must meet requirement	Must meet requirement	Must meet requirement	N/A	Form CON – 2
2.5	Declaration: Environmental and Social	Declare any civil work contracts that have been	Must make the declaration.	N/A	Each must make the declaration.	N/A	Form CON-3 ES Performance

Eligibility and Qualification Criteria				Compliance Requirements			Documentation
No.	Subject	Requirement	Single Entity	Joint Venture (existing or intended)			Submission Requirements
				All members Combined	Each Member	At least one Member	
	(ES) past performance	suspended or terminated and/or performance security called by an employer for breach of environmental or social (including Sexual Exploitation and Abuse) contractual obligations in the past five years. ⁴	Where there are Specialized Sub-contractor/s, the Specialized Sub-contractor/s must also make the declaration.		Where there are Specialized Sub-contractor/s, the Specialized Sub-contractor/s must also make the declaration.		Declaration
3. Financial Situation and Performance							
3.1	Financial Capabilities	(i) The Bidder shall demonstrate that it has access to, or has available, liquid assets, unencumbered real assets, lines of credit, and other financial means (independent of any contractual advance payment) sufficient to meet the construction cash flow requirements estimated as 10 Million <u>Kenya Shillings</u> for the subject contract(s) net	Must meet requirement	Must meet Requirement	N/A	N/A	Form FIN – 3.1, with attachments

⁴ The Employer may use this information to seek further information or clarifications in carrying out its due diligence.

Eligibility and Qualification Criteria			Compliance Requirements				Documentation
No.	Subject	Requirement	Single Entity	Joint Venture (existing or intended)			Submission Requirements
				All members Combined	Each Member	At least one Member	
		of the Bidder's other commitments (Attac					
		(ii) The Bidders shall also demonstrate, to the satisfaction of the Employer, that it has adequate sources of finance to meet the cash flow requirements on works currently in progress and for future contract commitments.	Must meet requirement	Must meet requirement	N/A	N/A	
		(iii) The audited balance sheets or, if not required by the laws of the Bidder's country, other financial statements acceptable to the Employer, for the last 3 Years years shall be submitted and must demonstrate the current soundness of the Bidder's financial position and indicate its prospective long-term profitability.	Must meet requirement	N/A	Must meet requirement	N/A	
3.2	Average Annual Construction Turnover	Minimum average annual construction turnover of Kshs. 100M	Must meet requirement	Must meet requirement	Must meet _____50_____, _____of the requirement	Must meet _____50%, _____of the requirement	Form FIN – 3.2

Eligibility and Qualification Criteria			Compliance Requirements				Documentation
No.	Subject	Requirement	Single Entity	Joint Venture (existing or intended)			Submission Requirements
				All members Combined	Each Member	At least one Member	
		_____, calculated as total certified payments received for contracts in progress and/or completed within the last _3_ years, divided by ____ years					
4. Experience							
4.1 (a)	General Construction Experience	Experience under construction contracts in the role of prime contractor, JV member, subcontractor, or management contractor for at least the last ____5years, starting 1 st January ____2016____.	Must meet requirement	N/A	Must meet requirement	N/A	Form EXP – 4.1
4.2 (a)	Specific Construction & Contract Management Experience	(i) A minimum number of 5No. similar contracts specified below that have been satisfactorily and substantially ⁵ completed as a prime contractor,	Must meet requirement	Must meet requirement ⁷	N/A	Must meet the following requirements for the key activities listed below [list key activities and the	Form EXP 4.2(a)

Eligibility and Qualification Criteria				Compliance Requirements			Documentation
No.	Subject	Requirement	Single Entity	Joint Venture (existing or intended)			Submission Requirements
				All members Combined	Each Member	At least one Member	
		joint venture member ⁶ , management contractor or sub-contractor ⁶ between 1st January 2016 and bid submission deadline: (i) N contracts, each of minimum value V [In case the Works are to be bid as individual contracts under a slice and package (multiple contract) procedure, the minimum number of contracts required for purposes of evaluating qualification shall be selected from the options mentioned in ITB 35.4] The similarity of the contracts shall be based on the following: [Based				corresponding minimum requirements to be met by one member otherwise state: "N/A"]	

Eligibility and Qualification Criteria				Compliance Requirements			Documentation
No.	Subject	Requirement	Single Entity	Joint Venture (existing or intended)			Submission Requirements
				All members Combined	Each Member	At least one Member	
		<i>on Section VII, Scope of Works, specify the minimum key requirements in terms of physical size, complexity, construction method, technology and/or other characteristics including part of the requirements that may be met by specialized subcontractors, if permitted in accordance with ITB 34.3]</i>					
4.2 (b)		For the above and any other contracts [substantially completed and under implementation] as prime contractor, joint venture member, or sub-contractor between 1st January 2017 and Application	Must meet requirements <i>[Specify activities that may be met through a specialized subcontractor, if permitted in accordance with ITB 34.3]</i>	Must meet requirements <i>[Specify activities that may be met through a Specialized Subcontractor, if permitted in accordance with ITB 34.3]</i>	N/A	Must meet the following requirements for key activities listed below <i>[if applicable, out of the key activities in the first column of this 4.2 b), list</i>	Form EXP – 4.2 (b)

Eligibility and Qualification Criteria				Compliance Requirements			Documentation
No.	Subject	Requirement	Single Entity	Joint Venture (existing or intended)			Submission Requirements
				All members Combined	Each Member	At least one Member	
		submission deadline, a minimum construction experience in the following key activities successfully completed⁸: <i>[list key activities indicating volume, number or rate of production as applicable.</i> <i>Under 4.2(a), specified requirements define similarity of contracts, whereas the key activities or production rates to be specified under 4.2 (b) define the required capability of the Applicant to execute the Works. There shall not be any inconsistency or repetition of</i>				<i>key activities (volume, number or rate of production as applicable) and the corresponding minimum requirements that have to be met by one member, otherwise this cell should state: “N/A”.]</i>	

Eligibility and Qualification Criteria				Compliance Requirements			Documentation
No.	Subject	Requirement	Single Entity	Joint Venture (existing or intended)			Submission Requirements
				All members Combined	Each Member	At least one Member	
		<i>requirement between 4.2(a) and 4.2(b).For the rate of production, specify that the rate of production shall be on the basis of either the average during the entire specified period OR the rate of annual production in any 12 month period in the specified period,]⁹</i>					
4.2 (c)		For contracts [substantially completed and under implementation] as prime contractor, joint venture member, or Subcontractor between 1st January 2017 and Application submission deadline, experience	Must meet requirements	Must meet requirements	Must meet the following requirements: [list key requirements to be met by each member otherwise state: "N/A"]	Must meet the following requirements: [list key requirements to be met by one member otherwise state: "N/A"]	Form EXP – 4.2 (c)

Eligibility and Qualification Criteria				Compliance Requirements			Documentation
No.	Subject	Requirement	Single Entity	Joint Venture (existing or intended)			Submission Requirements
				All members Combined	Each Member	At least one Member	
		in managing ES risks and impacts in the following aspects: <i>[Based on the ES assessment, specify, as appropriate, specific experience requirements to manage ES aspects.]</i>					

Key Personnel

The Bidder must demonstrate that it will have suitably qualified (and in adequate numbers) Key Personnel, as described in the Specifications.

The Bidder shall provide details of the Key Personnel and such other Key Personnel that the Bidder considers appropriate to perform the Contract, together with their academic qualifications and work experience. The Bidder shall complete the relevant Forms in Section IV, Bidding Forms.

Equipment

The Bidder must demonstrate that it will have access to the key Contractor's equipment listed hereafter:

No.	Equipment Type and Characteristics	Minimum Number required
1		
2		
3		
4		
5		

The Bidder shall provide further details of proposed items of equipment using the relevant Form in Section IV.

Section IV - Bidding Forms

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Letter of Bid

Date of this Bid submission 2023

RFB No.:

Alternative No- N/A

To: State Department of Roads.

- (a) **No reservations:** We have examined and have no reservations to the bidding document, including Addenda issued in accordance with ITB 8;
- (b) **Eligibility:** We meet the eligibility requirements and have no conflict of interest in accordance with ITB 4;
- (c) **Bid-Securing Declaration:** We have not been suspended nor declared ineligible by the Employer based on execution of a Bid-Securing Declaration or Proposal-Securing Declaration in the Employer's Country in accordance with ITB 4.7;
- (d) **Conformity:** We offer to execute in conformity with the bidding document the following *[insert Bid Name]*.
- (e) **Bid Price:** The total price of our Bid, excluding any discounts offered in item (f) below is: *[Insert one of the options below as appropriate]*
[Option 1, in case of one lot:] Total price is: [insert the total price of the Bid in words and figures, indicating the various amounts and the respective currencies];

 Or

*[Option 2, in case of multiple lots:] (a) Total price of each lot *[insert the total price of each lot in words and figures, indicating the various amounts and the respective currencies]*; and (b) Total price of all lots (sum of all lots) *[insert the total price of all lots in words and figures, indicating the various amounts and the respective currencies]*;*
- (f) **Discounts:** The discounts offered and the methodology for their application are:
 - (i) The discounts offered are: *[Specify in detail each discount offered.]*
 - (ii) The exact method of calculations to determine the net price after application of discounts is shown below: *[Specify in detail the method that shall be used to apply the discounts];*
- (g) **Bid Validity:** Our Bid shall be valid until *[insert day, month and year in accordance with ITB 18.1]*, and it shall remain binding upon us and may be accepted at any time on or before this date;
- (h) **Performance Security:** If our Bid is accepted, we commit to obtain a performance security *[and an Environmental and Social (ES) Performance Security, **Delete if not applicable**]* in accordance with the bidding document;

- (i) **One Bid Per Bidder:** We are not submitting any other Bid(s) as an individual Bidder or as a subcontractor, and we are not participating in any other Bid(s) as a Joint Venture member, and meet the requirements of ITB 4.3, other than alternative Bids submitted in accordance with ITB 13;
- (j) **Suspension and Debarment:** We, along with any of our subcontractors, suppliers, consultants, manufacturers, or service providers for any part of the contract, are not subject to, and not controlled by any entity or individual that is subject to, a temporary suspension or a debarment imposed by the World Bank Group or a debarment imposed by the World Bank Group in accordance with the Agreement for Mutual Enforcement of Debarment Decisions between the World Bank and other development banks. Further, we are not ineligible under the Employer's Country laws or official regulations or pursuant to a decision of the United Nations Security Council;
- (k) **State-owned enterprise or institution:** *[select the appropriate option and delete the other]* *[We are not a state-owned enterprise or institution]* / *[We are a state-owned enterprise or institution but meet the requirements of ITB 4.6];*
- (l) **Commissions, gratuities and fees:** We have paid, or will pay the following commissions, gratuities, or fees with respect to the Bidding process or execution of the Contract: *[insert complete name of each Recipient, its full address, the reason for which each commission or gratuity was paid and the amount and currency of each such commission or gratuity]*

Name of Recipient	Address	Reason	Amount

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

- (m) **Binding Contract:** We understand that this Bid, together with your written acceptance thereof included in your Letter of Acceptance, shall constitute a binding contract between us, until a formal contract is prepared and executed;
- (n) **Not Bound to Accept:** We understand that you are not bound to accept the lowest evaluated cost Bid, the Most Advantageous Bid or any other Bid that you may receive; and
- (o) **Fraud and Corruption:** We hereby certify that we have taken steps to ensure that no person acting for us or on our behalf engages in any type of Fraud and Corruption; and
- (p) **Adjudicator:** We accept the appointment of Chief Quantity Surveyor, State Department for Public Works. As the Adjudicator.

[or]

We do not accept the appointment of *[insert name proposed in Bid Data Sheet]* as the Adjudicator, and propose instead that *[insert name]* be appointed as Adjudicator, whose daily fees and biographical data are attached.

Name of the Bidder: *[insert complete name of the Bidder]

Name of the person duly authorized to sign the Bid on behalf of the Bidder: ** [insert complete name of person duly authorized to sign the Bid]

Title of the person signing the Bid: [insert complete title of the person signing the Bid]

Signature of the person named above: [insert signature of person whose name and capacity are shown above]

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

*: In the case of the Bid submitted by joint venture specify the name of the Joint Venture as Bidder

** : Person signing the Bid shall have the power of attorney given by the Bidder to be attached with the Bid

Schedules

Bill of Quantities

Attached.

2. Schedule of Payment Currencies -N/A

For _____ [insert name of Section of the Works]

Separate tables may be required if the various sections of the Works (or of the Bill of Quantities) will have substantially different foreign and local currency requirements. The Employer should insert the names of each section of the Works.

	A	B	C	D
Name of Payment Currency	Amount of Currency	Rate of Exchange to Local Currency	Local Currency Equivalent $C = A \times B$	Percentage of Total Bid Price (TBP) $\frac{100 \times C}{TBP}$
Local currency _____		1.00		
Foreign Currency #1 _____				
Foreign Currency #2 _____				
Foreign Currency #3 _____				
Total Bid Price				100.00
Provisional Sums Expressed in Local Currency		1.00		
TOTAL BID PRICE (Including provisional sum)				

3. Schedule(s) of Adjustment Data -N/A

Table A - Local Currency

Index Code	Index Description	Source of Index	Base Value and Date	Bidder's Local Currency Amount	Bidder's Proposed Weighting
	Nonadjustable	—	—	—	A: ____* B: ____* C: ____* D: ____* E: ____*
			Total		1.00

[* To be entered by the Employer. Whereas “A” should a fixed percentage, B, C, D and E should specify a range of values and the Bidder will be required to specify a value within the range such that the total weighting = 1.00]

Table B - Foreign Currency

Name of Currency: _____

If the Bidder wishes to quote in more than one foreign currency, this table should be repeated for each foreign currency.

Index Code	Index Description	Source of Index	Base Value and Date	Bidder's Currency in Type/Amount	Equivalent in FC1	Bidder's Proposed Weighting
	Nonadjustable	—	—	—		A: ____* B: ____* C : ____* D: * E: _ *_
				Total		1.00

[* To be entered by the Employer. Whereas “A” should a fixed percentage, B, C, D and E should specify a range of values and the Bidder will be required to specify a value within the range such that the total weighting = 1.00]

Forms of Bid Security**Form of Bid Security - Bank Guarantee**

[Guarantor letterhead or SWIFT identifier code]

Beneficiary:

[Insert name and address of the Employer]

Request for Bids No: *_[Insert reference number for the Request for Bids]*

Date: *[Insert date of issue]*

BID GUARANTEE No.: *[Insert guarantee reference number]*

Guarantor: *_[Insert name and address of place of issue, unless indicated in the letterhead]*

We have been informed that *[insert name of the Bidder, which in the case of a joint venture shall be the name of the joint venture (whether legally constituted or prospective) or the names of all members thereof]* (hereinafter called "the Applicant") has submitted or will submit to the Beneficiary its Bid (hereinafter called "the Bid") for the execution of *[insert description of contract]* under Request for Bids No. *[insert number]* ("the RFB").

Furthermore, we understand that, according to the Beneficiary's conditions, Bids must be supported by a Bid guarantee.

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

- (a) has withdrawn its Bid prior to the Bid validity expiry date specified by the Applicant in the Letter of Bid, or any extended date provided by the Applicant; or
- (b) having been notified of the acceptance of its Bid by the Beneficiary prior to the expiry date of the Bid validity or any extension thereto provided by the Applicant, (i) fails to execute the contract agreement or (ii) fails to furnish the performance security and, if required, the Environmental and Social (ES) Performance Security, in accordance with the Instructions to Bidders ("ITB") of the Beneficiary's bidding document.

This guarantee will expire: (a) if the Applicant is the successful Bidder, upon our receipt of copies of the contract agreement signed by the Applicant and the performance security and, if

required, the Environmental and Social (ES) Performance Security, issued to the Beneficiary in relation to such contract agreement; and (b) if the Applicant is not the successful Bidder, upon the earlier of (i) our receipt of a copy of the Beneficiary's notification to the Applicant of the results of the Bidding process; or (ii) twenty-eight days after the expiry date of the Bid validity.

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

This guarantee is subject to the Uniform Rules for Demand Guarantees (URDG) 2010 Revision, ICC Publication No. 758.

[signature(s)]

Note: All italicized text is for use in preparing this form and shall be deleted from the final product.

Form of Bid Security – Bid Bond

[The Surety shall fill in this Bid Bond Form in accordance with the instructions indicated.]

BOND NO. _____

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

WHEREAS the Principal has submitted a written Bid to the Employer dated the ____ day of _____, 20__ for the execution of *[name of Contract]* (hereinafter called the “Bid”).

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

- (a) has withdrawn its Bid prior to the Bid validity expiry date set forth in the Principal’s Letter of Bid, or any extended date provided by the Principal; or
- (b) having been notified of the acceptance of its Bid by the Employer prior to the expiry date of the Bid validity or any extension thereto provided by the Principal: (i) failed to execute the contract agreement; or (ii) has failed to furnish the Performance Security and, if required, the Environmental and Social (ES) Performance Security, in accordance with the Instructions to Bidders (“ITB”) of the Employer’s bidding document.

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

The Surety hereby agrees that its obligation will remain in full force and effect up to and including the date 28 days after the date of expiration Bid validity set forth in the Principal’s Letter of Bid or any extension thereto provided by the Principal.

IN TESTIMONY WHEREOF, the Principal and the Surety have caused these presents to be executed in their respective names this ____ day of _____ 20__.

¹ The amount of the Bond shall be denominated in the currency of the Employer’s country or the equivalent amount in a freely convertible currency.

Principal: _____
Corporate Seal (where appropriate)

Surety: _____

(Signature)
(Printed name and title)

(Signature)
(Printed name and title)

Form of Bid-Securing DeclarationDate: *[insert date (as day, month and year)]*RFB No.: *[insert number of Bidding process]*Alternative No.: *[insert identification No if this is a Bid for an alternative]*To: *[insert complete name of Employer]*

We, the undersigned, declare that:

We understand that, according to your conditions, bids must be supported by a Bid-Securing Declaration.

We accept that we will automatically be suspended from being eligible for bidding or submitting proposals in any contract with the Employer for the period of time of *[insert number of months or years]* starting on *[insert date]*, if we are in breach of our obligation(s) under the bid conditions, because we:

- (a) have withdrawn our Bid prior to the expiry date of the Bid validity specified in the Letter of Bid or any extended date provided by us; or
- (b) having been notified of the acceptance of our Bid by the Employer prior to the expiry date of the Bid validity in the Letter of Bid or any extended date provided by us, (i) fail or refuse to execute the Contract, if required, or (ii) fail or refuse to furnish the Performance Security and, if required, the Environmental and Social (ES) Performance Security, in accordance with the ITB.

We understand this Bid-Securing Declaration shall expire if we are not the successful Bidder, upon the earlier of (i) our receipt of your notification to us of the name of the successful Bidder; or (ii) twenty-eight days after the expiry date of the Bid validity.

Name of the Bidder* _____ *[insert complete name the Bidder]*

Name of the person duly authorized to sign the Bid on behalf of the Bidder** *[insert complete name of person duly authorized to sign the Bid]*

Title of the person signing the Bid *[insert complete title of the person signing the Bid]*

Signature of the person named above _____ *[insert signature of person whose name and capacity are shown above]*

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

*: In the case of the Bid submitted by joint venture specify the name of the Joint Venture as Bidder

**; Person signing the Bid shall have the power of attorney given by the Bidder to be attached with the Bid
[Note: In case of a Joint Venture, the Bid-Securing Declaration must be in the name of all members to the Joint Venture that submits the Bid.]

Technical Proposal

Technical Proposal Forms

- **Key Personnel Schedule**
- **Equipment**
- **Site Organization**
- **Method Statement**
- **Mobilization Schedule**
- **Construction Schedule**
- **ES Management Strategies and Implementation Plans**
- **Code of Conduct (ES)**
- **Others**

FORM PER -1**Key Personnel Schedule**

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

Key Personnel

1.	Title of position:	
	Name of candidate:	
	Duration of appointment:	<i>[insert the whole period (start and end dates) for which this position will be engaged]</i>
	Time commitment for this position:	<i>[insert the number of days/week/months/ that has been scheduled for this position]</i>
	Expected time schedule for this position:	<i>[insert the expected time schedule for this position (e.g. attach high level Gantt chart)]</i>
2.	Title of position: <i>Site Agent]</i>	
	Diploma Holder in Construction Management or related field with five (5) years of relevant experience	
	Name of candidate:	
	Duration of appointment:	<i>[insert the whole period (start and end dates) for which this position will be engaged]</i>
	Time commitment for this position:	<i>[insert the number of days/week/months/ that has been scheduled for this position]</i>
3.	Title of position: <i>[Clerks of Works]</i>	
	Must be a diploma holder in building construction or related area with 5 years' experience in similar works	
	Name of candidate:	
	Duration of appointment:	<i>[insert the whole period (start and end dates) for which this position will be engaged]</i>
	Time commitment for this position:	<i>[insert the number of days/week/months/ that has been scheduled for this position]</i>
	Expected time schedule for this position:	<i>[insert the expected time schedule for this position (e.g. attach high level Gantt chart)]</i>

4 & 5 666666 44		
	Title of position: [insert title]	Title of position: [Environment Specialist t] Must be registered with relevant professional body and with 5 years experience in the relevant field
	Name of candidate	Name of candidate
	Duration of appointment:	Duration of appointment:
	Time commitment: for this position:	Time commitment: for this position:
	Expected time schedule for this position:	Expected time schedule for this position:
	Title of position: [insert title]	Title of position:(Health and Safety Specialist] Must be registered with the relevant professional body with 5 years relevant experience
	Name of candidate	Name of candidate
	Duration of appointment:	Duration of appointment:
	Time commitment: for this position:	Time commitment: for this position:
Expected time schedule for this position:	Expected time schedule for this position:	

5		

**Form PER-2: Resume and
Declaration
Key Personnel**

Name of Bidder

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

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

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

Declaration

I, the undersigned Key Personnel, certify that to the best of my knowledge and belief, the information contained in this Form PER-2 correctly describes myself, my qualifications and my experience.

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

Commitment	Details
Commitment to duration of contract:	<i>[insert period (start and end dates) for which this Key Personnel is available to work on this contract]</i>
Time commitment:	<i>[insert the number of days/week/months/ that this Key Personnel will be engaged]</i>

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

- (a) be taken into consideration during Bid evaluation;
- (b) my disqualification from participating in the Bid;
- (c) my dismissal from the contract.

Name of Key Personnel: *[insert name]*

Signature: _____

Date: (day month year): _____

Countersignature of authorized representative of the Bidder:

Signature: _____

Date: (day month year): _____

Equipment

The Bidder shall provide adequate information to demonstrate clearly that it has the capability to meet the requirements for the key equipment listed in Section III (Evaluation and Qualification Criteria). A separate Form shall be prepared for each item of equipment listed, or for alternative equipment proposed by the Bidder. The Bidder shall provide all the information requested below, to the extent possible. Fields with asterisk (*) shall be used for evaluation.

Type of Equipment*		
Equipment Information	Name of manufacturer,	Model and power rating
	Capacity*	Year of manufacture*
Current Status	Current location	
	Details of current commitments	
Source	Indicate source of the equipment ☐ Owned ☐ Rented ☐ Leased ☐ Specially manufactured	

The following information shall be provided only for equipment not owned by the Bidder.

Owner	Name of owner	
	Address of owner	
	Telephone	Contact name and title
	Fax	Telex
Agreements	Details of rental / lease / manufacture agreements specific to the project	

Site Organization

[insert Site Organization information]

Method Statement

[insert Method Statement]

Mobilization Schedule

[insert Mobilization Schedule]

Construction Schedule

[insert Construction Schedule]

ES Management Strategies and Implementation Plans**(ES-MSIP)**

The Bidder shall submit comprehensive and concise Environmental and Social Management Strategies and Implementation Plans (ES-MSIP) as required by ITB

11.1 (i) of the Bid Data Sheet. These strategies and plans shall describe in detail the actions, materials, equipment, management processes etc. that will be implemented by the Contractor, and its subcontractors.

In developing these strategies and plans, the Bidder shall have regard to the ES provisions of the contract including those as may be more fully described in the Works Requirements in Section VII.

Code of Conduct for Contractor's Personnel (ES) Form

CODE OF CONDUCT FOR CONTRACTOR'S PERSONNEL

We are the Contractor, [enter name of Contractor]. We have signed a contract with [enter name of Employer] for [enter description of the Works]. These Works will be carried out at [enter the Site and other locations where the Works will be carried out]. Our contract requires us to implement measures to address environmental and social risks related to the Works, including the risks of sexual exploitation, sexual abuse and sexual harassment.

This Code of Conduct is part of our measures to deal with environmental and social risks related to the Works. It applies to all our staff, laborers and other employees at the Works Site or other places where the Works are being carried out. It also applies to the personnel of each subcontractor and any other personnel assisting us in the execution of the Works. All such persons are referred to as “**Contractor's Personnel**” and are subject to this Code of Conduct.

This Code of Conduct identifies the behavior that we require from all Contractor's Personnel.

Our workplace is an environment where unsafe, offensive, abusive or violent behavior will not be tolerated and where all persons should feel comfortable raising issues or concerns without fear of retaliation.

REQUIRED CONDUCT

Contractor's Personnel shall:

1. carry out his/her duties competently and diligently;
2. comply with this Code of Conduct and all applicable laws, regulations and other requirements, including requirements to protect the health, safety and well-being of other Contractor's Personnel and any other person;
3. maintain a safe working environment including by:
 - a. ensuring that workplaces, machinery, equipment and processes under each person's control are safe and without risk to health;
 - b. wearing required personal protective equipment;
 - c. using appropriate measures relating to chemical, physical and biological substances and agents; and
 - d. following applicable emergency operating procedures.
4. report work situations that he/she believes are not safe or healthy and remove himself/herself from a work situation which he/she reasonably believes presents an imminent and serious danger to his/her life or health;

5. treat other people with respect, and not discriminate against specific groups such as women, people with disabilities, migrant workers or children;
6. not engage in Sexual Harassment, which means unwelcome sexual advances, requests for sexual favors, and other verbal or physical conduct of a sexual nature with other Contractor's or Employer's Personnel;
7. not engage in Sexual Exploitation, which means any actual or attempted abuse of position of vulnerability, differential power or trust, for sexual purposes, including, but not limited to, profiting monetarily, socially or politically from the sexual exploitation of another;
8. not engage in Sexual Abuse, which means the actual or threatened physical intrusion of a sexual nature, whether by force or under unequal or coercive conditions;
9. not engage in any form of sexual activity with individuals under the age of 18, except in case of pre-existing marriage;
10. complete relevant training courses that will be provided related to the environmental and social aspects of the Contract, including on health and safety matters, and Sexual Exploitation and Abuse (SEA), and Sexual Harassment (SH);
11. report violations of this Code of Conduct; and
12. not retaliate against any person who reports violations of this Code of Conduct, whether to us or the Employer, or who makes use of the grievance mechanism for Contractor's Personnel or the project's Grievance Redress Mechanism.

RAISING CONCERNS

If any person observes behavior that he/she believes may represent a violation of this Code of Conduct, or that otherwise concerns him/her, he/she should raise the issue promptly. This can be done in either of the following ways:

1. Contact [*enter name of the Contractor's Social Expert with relevant experience in handling gender-based violence, or if such person is not required under the Contract, another individual designated by the Contractor to handle these matters*] in writing at this address [] or by telephone at [] or in person at []; or
2. Call [] to reach the Contractor's hotline (*if any*) and leave a message.

The person's identity will be kept confidential, unless reporting of allegations is mandated by the country law. Anonymous complaints or allegations may also be submitted and will be given all due and appropriate consideration. We take seriously all reports of possible misconduct and will investigate and take appropriate action. We will provide warm referrals to service providers that may help support the person who experienced the alleged incident, as appropriate.

There will be no retaliation against any person who raises a concern in good faith about any behavior prohibited by this Code of Conduct. Such retaliation would be a violation of this Code of Conduct.

CONSEQUENCES OF VIOLATING THE CODE OF CONDUCT

Any violation of this Code of Conduct by Contractor's Personnel may result in serious consequences, up to and including termination and possible referral to legal authorities.

FOR CONTRACTOR'S PERSONNEL:

I have received a copy of this Code of Conduct written in a language that I comprehend. I understand that if I have any questions about this Code of Conduct, I can contact [*enter name of Contractor's contact person with relevant experience*] requesting an explanation.

Name of Contractor's Personnel: [insert name]

Signature: _____

Date: (day month year): _____

Countersignature of authorized representative of the Contractor:

Signature: _____

Date: (day month year): _____

ATTACHMENT 1: Behaviors constituting Sexual Exploitation and Abuse (SEA) and behaviors constituting Sexual Harassment (SH)

ATTACHMENT 1 TO THE CODE OF CONDUCT FORM**BEHAVIORS CONSTITUTING SEXUAL EXPLOITATION AND ABUSE (SEA) AND BEHAVIORS CONSTITUTING SEXUAL HARASSMENT (SH)**

The following non-exhaustive list is intended to illustrate types of prohibited behaviors:

(1) Examples of sexual exploitation and abuse include, but are not limited to:

- A Contractor's Personnel tells a member of the community that he/she can get them jobs related to the work site (e.g. cooking and cleaning) in exchange for sex.
- A Contractor's Personnel that is connecting electricity input to households says that he can connect women headed households to the grid in exchange for sex.
- A Contractor's Personnel rapes, or otherwise sexually assaults a member of the community.
- A Contractor's Personnel denies a person access to the Site unless he/she performs asexual favor.
- A Contractor's Personnel tells a person applying for employment under the Contract that he/she will only hire him/her if he/she has sex with him/her.

(2) Examples of sexual harassment in a work context

- Contractor's Personnel comment on the appearance of another Contractor's Personnel (either positive or negative) and sexual desirability.
- When a Contractor's Personnel complains about comments made by another Contractor's Personnel on his/her appearance, the other Contractor's Personnel comment that he/she is "asking for it" because of how he/she dresses.
- Unwelcome touching of a Contractor's or Employer's Personnel by another Contractor's Personnel.
- A Contractor's Personnel tells another Contractor's Personnel that he/she will get him/her a salary raise, or promotion if he/she sends him/her naked photographs of himself/herself.

Others

Bidder's Qualification

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

Form ELI -1.1: Bidder Information Form

Date: _____
 RFB No. and title: _____
 Page _____ of _____ pages

Bidder's name
In case of Joint Venture (JV), name of each member:
Bidder's actual or intended country of registration: <i>[indicate country of Constitution]</i>
Bidder's actual or intended year of incorporation:
Bidder's legal address [in country of registration]:
Bidder's authorized representative information Name: _____ Address: _____ Telephone/Fax numbers: _____ E-mail address: _____
1. Attached are copies of original documents of ☐ Articles of Incorporation (or equivalent documents of constitution or association), and/or documents of registration of the legal entity named above, in accordance with ITB 4.4. ☐ In case of JV, letter of intent to form JV or JV agreement, in accordance with ITB 4.1. ☐ In case of state-owned enterprise or institution, in accordance with ITB 4.6 documents establishing: • Legal and financial autonomy • Operation under commercial law • Establishing that the Bidder is not under the supervision of the Employer 2. Included are the organizational chart, a list of Board of Directors, and the beneficial ownership. <i>[If required under BDS ITB 47.1, the successful Bidder shall provide additional information on beneficial ownership, using the Beneficial Ownership Disclosure Form.]</i>

Form ELI -1.2: Information Form for JV Bidders

(to be completed for each member of Joint Venture)

Date _____

RFB No. and title _____

Page _____ of _____ pages

Bidder's Joint Venture name:
JV member's name:
JV member's country of registration:
JV member's year of constitution:
JV member's legal address in country of constitution:
JV member's authorized representative information Name: Address: _____ Telephone/Fax numbers: _____ E-mail address: _____
1. Attached are copies of original documents of ☐ Articles of Incorporation (or equivalent documents of constitution or association), and/or registration documents of the legal entity named above, in accordance with ITB 4.4. ☐ In case of a state-owned enterprise or institution, documents establishing legal and financial autonomy, operation in accordance with commercial law, and is not under the supervision of the Employer, in accordance with ITB 4.6. 2. Included are the organizational chart, a list of Board of Directors, and the beneficial ownership. <i>[If required under BDS ITB 47.1, the successful Bidder shall provide additional information on beneficial ownership for each JV member using the Beneficial Ownership Disclosure Form.]</i>

Form CON – 2: Historical Contract Non-Performance, Pending Litigation and Litigation History

Bidder's Name: _____

Date: _____

Joint Venture Member's Name _____

RFB No. and title: _____

Page _____ of _____ pages

Non-Performed Contracts in accordance with Section III, Evaluation and Qualification Criteria

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

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

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

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

Year of dispute	Amount in dispute (currency)	Contract Identification	Total Contract Amount (currency), USD Equivalent (exchange rate)
		Contract Identification: _____ Name of Employer: _____ Address of Employer: _____ Matter in dispute: _____ Party who initiated the dispute: _____ Status of dispute: _____	
		Contract Identification: Name of Employer: Address of Employer: Matter in dispute: Party who initiated the dispute: Status of dispute:	
Litigation History in accordance with Section III, Evaluation and Qualification Criteria			
☐ No Litigation History in accordance with Section III, Evaluation and Qualification Criteria, Sub-Factor 2.4. ☐ Litigation History in accordance with Section III, Evaluation and Qualification Criteria, Sub-Factor 2.4 as indicated below.			
Year of award	Outcome as percentage of Net Worth	Contract Identification	Total Contract Amount (currency), USD Equivalent (exchange rate)

<i>[insert year]</i>	<i>[insert percentage]</i>	Contract Identification: [indicate complete contract name, number, and any other identification] Name of Employer: <i>[insert full name]</i> Address of Employer: <i>[insert street/city/country]</i> Matter in dispute: <i>[indicate main issues in dispute]</i> Party who initiated the dispute: <i>[indicate "Employer" or "Contractor"]</i> Reason(s) for Litigation and award decision <i>[indicate main reason(s)]</i>	<i>[insert amount]</i>

Form CON – 3**Environmental and Social Performance Declaration**

[The following table shall be filled in for the Bidder, each member of a Joint Venture and each Specialized Subcontractor]

Bidder's Name: *[insert full name]*

Date: *[insert day, month, year]*

Joint Venture Member's or Specialized Subcontractor's Name: *[insert full name]*

RFB No. and title: *[insert RFB number and title]*

Page *[insert page number]* of *[insert total number]* pages

Environmental and Social Performance Declaration in accordance with Section III, Qualification Criteria, and Requirements			
☐ No suspension or termination of contract: An employer has not suspended or terminated a contract and/or called the performance security for a contract for reasons related to Environmental, or Social (ES) performance since the date specified in Section III, Qualification Criteria, and Requirements, Sub-Factor 2.5.			
☐ Declaration of suspension or termination of contract: The following contract(s) has/have been suspended or terminated and/or Performance Security called by an employer(s) for reasons related to Environmental, or Social (ES) performance since the date specified in Section III, Qualification Criteria, and Requirements, Sub-Factor 2.5. Details are described below:			
Year	Suspended or terminated portion of contract	Contract Identification	Total Contract Amount (current value, currency, exchange rate and US\$ equivalent)
<i>[insert year]</i>	<i>[insert amount and percentage]</i>	Contract Identification: <i>[indicate complete contract name/ number, and any other identification]</i> Name of Employer: <i>[insert full name]</i> Address of Employer: <i>[insert street/city/country]</i> Reason(s) for suspension or termination: <i>[indicate main reason(s) e.g. for gender-based violence; sexual exploitation or sexual abuse breaches]</i>	<i>[insert amount]</i>
<i>[insert year]</i>	<i>[insert amount and percentage]</i>	Contract Identification: <i>[indicate complete contract name/ number, and any other identification]</i> Name of Employer: <i>[insert full name]</i> Address of Employer: <i>[insert street/city/country]</i>	<i>[insert amount]</i>

		Reason(s) for suspension or termination: <i>[indicate main reason(s)]</i>	
...	...	<i>[list all applicable contracts]</i>	...
Performance Security called by an employer(s) for reasons related to ES performance			
Year	Contract Identification		Total Contract Amount (current value, currency, exchange rate and US\$ equivalent)
<i>[insert year]</i>	Contract Identification: <i>[indicate complete contract name/ number, and any other identification]</i> Name of Employer: <i>[insert full name]</i> Address of Employer: <i>[insert street/city/country]</i> Reason(s) for calling of performance security: <i>[indicate main reason(s) e.g. for gender-based violence; sexual exploitation, or sexual abuse breaches]</i>		<i>[insert amount]</i>

Form CCC: Current Contract Commitments / Works in Progress

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

Name of contract	Employer, contact address/tel/fax	Value of outstanding work (current US\$ equivalent)	Estimated completion date	Average monthly invoicing over last six months (US\$/month)
1.				
2.				
3.				
4.				
5.				
etc.				

Form FIN – 3.1: Financial Situation and Performance

Bidder's Name: _____

Date: _____

Joint Venture Member's Name _____

RFB No. and title: _____

Page _____ of _____ pages

1. Financial data

Type of Financial information in (currency)	Historic information for previous _____ years, _____ (amount in currency, currency, exchange rate, USD equivalent)				
	Year 1	Year 2	Year 3	Year 4	Year 5
Statement of Financial Position (Information from Balance Sheet)					
Total Assets (TA)					
Total Liabilities (TL)					
Total Equity/Net Worth (NW)					
Current Assets (CA)					
Current Liabilities (CL)					
Working Capital (WC)					
Information from Income Statement					
Total Revenue (TR)					
Profits Before Taxes (PBT)					
Cash Flow Information					
Cash Flow from Operating Activities					

2. Sources of Finance

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

No.	Source of finance	Amount (US\$ equivalent)
1		
2		
3		

3. Financial documents

The Bidder and its parties shall provide copies of financial statements for _____ years pursuant Section III, Evaluation and Qualifications Criteria, Sub-factor 3.2. The financial statements shall:

- (a) reflect the financial situation of the Bidder or in case of JV member , and not an affiliated entity (such as parent company or group member).
- (b) be independently audited or certified in accordance with local legislation.
- (c) be complete, including all notes to the financial statements.
- (d) correspond to accounting periods already completed and audited.

☐ Attached are copies of financial statements² for the _____ years required above; and complying with the requirements

Form FIN - 3.2: Average Annual Construction Turnover

Bidder's Name: _____

Date: _____

Joint Venture Member's Name _____

RFB No. and title: _____

Page _____ of _____ pages

		Annual turnover data (construction only)	
Year	Amount Currency	Exchange rate	USD equivalent
<i>[indicate year]</i>	<i>[insert amount and indicate currency]</i>		
Average Annual Construction Turnover *			

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

Form FIN - 3.3: Financial Resources

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

Source of financing	Amount (US\$ equivalent)
1.	
2.	
3.	
4.	

Form EXP - 4.1: General Construction Experience

Bidder's Name: _____

Date: _____

Joint Venture Member's Name _____

RFB No. and title: _____

Page _____ of _____ pages

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

Form EXP - 4.2(a): Specific Construction and Contract Management Experience

Bidder's Name: _____

Date: _____

Joint Venture Member's Name _____

RFB No. and title: _____

Page _____ of _____ pages

Similar Contract No.	Information			
Contract Identification				
Award date				
Completion date				
Role in Contract	Prime Contractor ☐	Member in JV ☐	Management Contractor ☐	Sub-contractor ☐
Total Contract Amount			US\$ *	
If member in a JV or subcontractor, specify participation in total Contract amount			*	
Employer's Name:				
Address: Telephone/fax number				
E-mail:				

Form EXP - 4.2(a) (cont.)
Specific Construction and Contract Management Experience (cont.)

Similar Contract No.	Information
Description of the similarity in accordance with Sub-Factor 4.2(a) of Section III:	
1. Amount	
2. Physical size of required works items	
3. Complexity	
4. Methods/Technology	
5. Construction rate for key activities	
6. Other Characteristics	

Form EXP - 4.2(b): Construction Experience in Key Activities

Bidder's Name: _____

Date: _____

Joint Venture Member's Name _____

Subcontractor's Name³ (as per ITB 34.2 and 34.3): _____

RFB No. and title: _____

Page _____ of _____ pages

Subcontractor's Name (as per ITB 34.2 and 34.3): _____

All subcontractors for key activities must complete the information in this form as per ITB 34.2 and 34.3 and Section III, Qualification Criteria and Requirements, Sub-Factor 4.2.

1. Key Activity No One: _____

	Information			
Contract Identification				
Award date				
Completion date				
Role in Contract	Prime Contractor ☐	Member in JV ☐	Management Contractor ☐	Sub-contractor ☐
Total Contract Amount			US\$	
Quantity (Volume, number or rate of production, as applicable) performed under the contract per year or part of the year	Total quantity in the contract (i)	Percentage participation (ii)		Actual Quantity Performed (i) x (ii)
Year 1				
Year 2				
Year 3				
Year 4				
Employer's Name:				

Address:	
Telephone/fax number	
E-mail:	

	Information
Employer's Name:	
Address: Telephone/fax number	
E-mail:	

	Information
Description of the key activities in accordance with Sub-Factor 4.2(b) of Section III:	

2. Activity No. Two

3.

Form EXP - 4.2(c): Specific Experience in Managing ES aspects

[The following table shall be filled in for contracts performed by the Bidder, and each member of a Joint Venture]

Bidder's Name: _____
 Date: _____
 Bidder's JV Member Name: _____
 RFB No. and title: _____
 Page _____ of _____ pages

1. Key Requirement no 1 in accordance with 4.2 (c): _____

Contract Identification				
Award date				
Completion date				
Role in Contract	Prime Contractor ☐	Member in JV ☐	Management Contractor ☐	Subcontractor ☐
Total Contract Amount			US\$	
Details of relevant experience				

2. Key Requirement no 2 in accordance with 4.2 (c): _____

3. Key Requirement no 3 in accordance with 4.2 (c): _____

4. ...

Section V - Eligible Countries**Eligibility for the Provision of Goods, Works and Services in Bank- Financed Procurement**

In reference to ITB 4.8, and 5.1, for the information of the Bidders, at the present time firms, goods and services from the following countries are excluded from this Bidding process:

Under ITB 4.8 (a) and 5.1 *None*

Under ITB 4.8 (b) and 5.1 *None*

Section VI - Fraud and Corruption**(Section VI shall not be modified)****1. Purpose**

- 1.1 The Bank's Anti-Corruption Guidelines and this annex apply with respect to procurement under Bank Investment Project Financing operations.

2. Requirements

- 2.1 The Bank requires that Borrowers (including beneficiaries of Bank financing); bidders (applicants/proposers), consultants, contractors and suppliers; any sub-contractors, sub- consultants, service providers or suppliers; any agents (whether declared or not); and any of their personnel, observe the highest standard of ethics during the procurement process, selection and contract execution of Bank-financed contracts, and refrain from Fraud and Corruption.

- 2.2 To this end, the Bank:

- a. Defines, for the purposes of this provision, the terms set forth below as follows:

- i. "corrupt practice" is the offering, giving, receiving, or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party;
- ii. "fraudulent practice" is any act or omission, including misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain financial or other benefit or to avoid an obligation;
- iii. "collusive practice" is an arrangement between two or more parties designed to achieve an improper purpose, including to influence improperly the actions of another party;
- iv. "coercive practice" is impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party;
- v. "obstructive practice" is:
 - (a) deliberately destroying, falsifying, altering, or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede a Bank investigation into allegations of a corrupt, fraudulent, coercive, or collusive practice; and/or threatening, harassing, or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation; or
 - (b) acts intended to materially impede the exercise of the Bank's inspection and audit rights provided for under paragraph 2.2 e. below.

- b. Rejects a proposal for award if the Bank determines that the firm or individual recommended for award, any of its personnel, or its agents, or its sub-consultants, sub- contractors, service providers, suppliers and/ or their employees, has, directly or indirectly, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices in competing for the contract in question;
- c. In addition to the legal remedies set out in the relevant Legal Agreement, may take other appropriate actions, including declaring misprocurement, if the Bank determines at any time that representatives of the Borrower or of a recipient of any part of the proceeds of the loan engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices during the procurement process, selection and/or execution of the contract in question, without the Borrower having taken timely and appropriate action satisfactory to the Bank to address such practices when they occur, including by failing to inform the Bank in a timely manner at the time they knew of the practices;
- d. Pursuant to the Bank's Anti- Corruption Guidelines and in accordance with the Bank's prevailing sanctions policies and procedures, may sanction a firm or individual, either indefinitely or for a stated period of time, including by publicly declaring such firm or individual ineligible (i) to be awarded or otherwise benefit from a Bank-financed contract, financially or in any other manner;¹ (ii) to be a nominated² sub-contractor, consultant, manufacturer or supplier, or service provider of an otherwise eligible firm being awarded a Bank-financed contract; and (iii) to receive the proceeds of any loan made by the Bank or otherwise to participate further in the preparation or implementation of any Bank-financed project;
- e. Requires that a clause be included in bidding/request for proposals documents and in contracts financed by a Bank loan, requiring (i) bidders (applicants/proposers), consultants, contractors, and suppliers, and their sub-contractors, sub-consultants, service providers, suppliers, agents personnel, permit the Bank to inspect³ all accounts, records and other documents relating to the procurement process, selection and/or contract execution, and to have them audited by auditors appointed by the Bank.

PART 2 – Works’ Requirements

Section VII - Works' Requirements

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Specifications

Attached as Annex I

Environmental and Social Requirements

As per attached requirements

PAYMENT FOR ES REQUIREMENTS

As per Bills of Quantities attached

PART 3 – Conditions of Contract and Contract Forms

Section VIII - General Conditions of Contract

These General Conditions of Contract (GCC), read in conjunction with the Particular Conditions of Contract (PCC) and other documents listed therein, should be a complete document expressing fairly the rights and obligations of both parties.

These General Conditions of Contract have been developed on the basis of considerable international experience in the drafting and management of contracts, bearing in mind a trend in the construction industry towards simpler, more straightforward language.

The GCC can be used for both smaller admeasurement contracts and lump sum contracts.

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General Conditions of Contract

A. General

1. Definitions

Boldface type is used to identify defined terms.

- (a) The **Accepted Contract Amount** means the amount accepted in the Letter of Acceptance for the execution and completion of the Works and the remedying of any defects.
- (b) The **Activity Schedule** is a schedule of the activities comprising the construction, installation, testing, and commissioning of the Works in a lump-sum contract. It includes a lump-sum price for each activity, which is used for valuations and for assessing the effects of Variations and Compensation Events.
- (c) The **Adjudicator** is the person appointed jointly by the Employer and the Contractor to resolve disputes in the first instance, as provided for in GCC 23.
- (d) The financing Institution is the **World Bank**.
- (e) **Bill of Quantities** means the priced and completed Bill of Quantities forming part of the Bid.
- (f) **Compensation Events** are those defined in GCC Clause 42 hereunder.
- (g) The **Completion Date** is the date of completion of the Works as certified by the Project Manager, in accordance with GCC Sub-Clause 57.1.
- (h) The **Contract** is the Contract between the Employer and the Contractor to execute, complete, and maintain the Works. It consists of the documents listed in GCC Sub- Clause 2.3 below.
- (i) The **Contractor** is the party whose Bid to carry out the Works has been accepted by the Employer.
- (j) The **Contractor's Bid** is the completed bidding document submitted by the Contractor to the Employer.
- (k) The **Contract Price** is the Accepted Contract Amount stated in the Letter of Acceptance and thereafter as adjusted in accordance with the Contract.
- (l) **Days** are calendar days; months are calendar months.
- (m) **Dayworks** are varied work inputs subject to payment on a time basis for the Contractor's employees and

- Equipment, in addition to payments for associated Materials and Plant.
- (n) A **Defect** is any part of the Works not completed in accordance with the Contract.
 - (o) The **Defects Liability Certificate** is the certificate issued by Project Manager upon correction of defects by the Contractor.
 - (p) The **Defects Liability Period** is the period **named in the PCC** pursuant to GCC Sub-Clause 38.1 and calculated from the Completion Date.
 - (q) **Drawings** means the drawings of the Works, as included in the Contract, and any additional and modified drawings issued by (or on behalf of) the Employer in accordance with the Contract, include calculations and other information provided or approved by the Project Manager for the execution of the Contract.
 - (r) The **Employer** is the party who employs the Contractor to carry out the Works, **as specified in the PCC**.
 - (s) **Equipment** is the Contractor's machinery and vehicles brought temporarily to the Site to construct the Works.
 - (t) "**In writing**" or "**written**" means hand-written, type-written, printed or electronically made, and resulting in a permanent record;
 - (u) The **Initial Contract Price** is the Contract Price listed in the Employer's Letter of Acceptance.
 - (v) The **Intended Completion Date** is the date on which it is intended that the Contractor shall complete the Works. The **Intended Completion Date** is specified in the PCC. The **Intended Completion Date** may be revised only by the Project Manager by issuing an extension of time or an acceleration order.
 - (w) **Materials** are all supplies, including consumables, used by the Contractor for incorporation in the Works.
 - (x) **Plant** is any integral part of the Works that shall have a mechanical, electrical, chemical, or biological function.
 - (y) The **Project Manager** is the person named in the PCC (or any other competent person appointed by the Employer and notified to the Contractor, to act in replacement of the Project Manager) who is responsible for supervising the execution of the Works and administering the Contract.

- (z) **PCC** means Particular Conditions of Contract. (aa) The **Site** is the area defined as such in the PCC.
- (bb) **Site Investigation Reports** are those that were included in the bidding document and are factual and interpretative reports about the surface and subsurface conditions at the Site.
- (cc) **Specifications** means the Specifications of the Works included in the Contract and any modification or addition made or approved by the Project Manager.
- (dd) The **Start Date** is **given in the PCC**. It is the latest date when the Contractor shall commence execution of the Works. It does not necessarily coincide with any of the Site Possession Dates.
- (ee) 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.
- (ff) **Temporary Works** are works designed, constructed, installed, and removed by the Contractor that are needed for construction or installation of the Works.
- (gg) A **Variation** is an instruction given by the Project Manager which varies the Works.
- (hh) The **Works** are what the Contract requires the Contractor to construct, install, and turn over to the Employer, as defined in the PCC.
- (ii) “**Contractor’s Personnel**” refers to all personnel whom the Contractor utilizes on the Site or other places where the Works are carried out, including the staff, labor and other employees of each Subcontractor.
- (jj) “**Key Personnel**” means the positions (if any) of the Contractor’s personnel that are stated in the Specifications.
- (kk) “**ES**” means Environmental and Social (including Sexual Exploitation and Abuse (SEA), and Sexual Harassment (SH));
- (ll) “**Sexual Exploitation and Abuse**” “**(SEA)**” means the following:

Sexual Exploitation is defined as any actual or attempted abuse of position of vulnerability, differential power or trust, for sexual purposes, including, but not limited to, profiting monetarily, socially or politically from the sexual exploitation of another. In Bank financed

operations/projects, sexual exploitation occurs when access to or benefit from a Bank financed Goods, Works, Non-consulting Services or Consulting Services is used to extract sexual gain;

Sexual Abuse is defined as the actual or threatened physical intrusion of a sexual nature, whether by force or under unequal or coercive conditions;

(mm) **“Sexual Harassment” “(SH)”** is defined as unwelcome sexual advances, requests for sexual favors, and other verbal or physical conduct of a sexual nature by the Contractor’s Personnel with other Contractor’s or Employer’s Personnel; and

(nn) **“Employer’s Personnel”** refers to the Project Manager and all other staff, labor and other employees (if any) of the Project Manager and of the Employer engaged in fulfilling the Employer’s obligations under the Contract; and any other personnel identified as Employer’s Personnel, by a notice from the Employer or the Project Manager to the Contractor.

2. Interpretation 2.1 In interpreting these GCC, words indicating one gender include

all genders. Words indicating the singular also include the plural and words indicating the plural also include the singular. Headings have no significance. Words have their normal meaning under the language of the Contract unless specifically defined. The Project Manager shall provide instructions clarifying queries about these GCC.

2.2 If sectional completion is **specified in the PCC**, references in the GCC to the Works, the Completion Date, and the Intended Completion Date apply to any Section of the Works (other than references to the Completion Date and Intended Completion Date for the whole of the Works).

2.3 The documents forming the Contract shall be interpreted in the following order of priority:

- (a) Agreement,
- (b) Letter of Acceptance,
- (c) Contractor’s Bid,
- (d) Particular Conditions of Contract,
- (e) General Conditions of Contract, including Appendices,
- (f) Specifications,
- (g) Drawings,

- (h) Bill of Quantities,¹ and
- (i) any other document **listed in the PCC** as forming part of the Contract.

3. Language and Law 3.1 The country whose laws will be applicable is “Kenya”

Law

3.2 Throughout the execution of the Contract, the Contractor shall comply with the import of goods and services prohibitions in the Employer’s country when

- (a) as a matter of law or official regulations, the Borrower’s country prohibits commercial relations with that country; or
- (b) by an act of compliance with a decision of the United Nations Security Council taken under Chapter VII of the Charter of the United Nations, the Borrower’s Country prohibits any import of goods from that country or any payments to any country, person, or entity in that country.

4. Project

4.1 Except where otherwise specifically stated, the Project Manager **Manager’s** shall decide contractual matters between the Employer and the **Decisions** Contractor in the role representing the Employer.

5. Delegation

5.1 Unless otherwise **specified in the PCC**, the Project Manager may delegate any of his duties and responsibilities to other people, except to the Adjudicator, after notifying the Contractor, and may revoke any delegation after notifying the Contractor.

6. Communications

6.1 Communications between parties that are referred to in the Conditions 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 the Employer in writing. Subcontracting shall not alter the Contractor’s obligations. The Contractor shall require that its Subcontractors execute the Works in accordance with the Contract, including complying with the relevant ES requirements and the obligations set out in Sub-Clause 28.1.

8. Other Contractors

8.1 The Contractor shall cooperate and share the Site with other contractors, public authorities, utilities, and the Employer between the dates given in the Schedule of Other Contractors, as **referred to in the PCC**. The Contractor shall also provide facilities and services for them as described in the Schedule. The

Employer may modify the Schedule of Other Contractors, and shall notify the Contractor of any such modification.

- 8.2 The Contractor shall also, as stated in the Specifications or as instructed by the Project Manager, cooperate with and allow appropriate opportunities for the Employer's or any other personnel, notified to the Contractor by the Employer or Project Manager, to conduct any environmental and social assessment.

9. Personnel and

9.1 The Contractor shall employ the Key Personnel and use the

Equipment

Equipment identified in its Bid, to carry out the Works or other personnel and Equipment approved by the Project Manager. The Project Manager shall approve any proposed replacement of Key Personnel and Equipment only if their relevant qualifications or characteristics are substantially equal to or better than those proposed in the Bid.

The Project Manager may require the Contractor to remove (or cause to be removed) any person employed on the Site or Works, including the Key Personnel (if any), who:

- (a) persists in any misconduct or lack of care;
- (b) carries out duties incompetently or negligently;
- (c) fails to comply with any provision of the Contract;
- (d) persists in any conduct which is prejudicial to safety, health, or the protection of the environment;
- (e) based on reasonable evidence, is determined to have engaged in Fraud and Corruption during the execution of the Works;
- (f) has been recruited from the Employer's Personnel;
- (g) undertakes behavior which breaches the Code of Conduct for Contractor's Personnel (ES).

If appropriate, the Contractor shall then promptly appoint (or cause to be appointed) a suitable replacement with equivalent skills and experience.

Notwithstanding any requirement from the Project Manager to remove or cause to remove any person, the Contractor shall take immediate action as appropriate in response to any violation of

- (a) through (g) above. Such immediate action shall include removing (or causing to be removed) from the Site or other places where the Works are being carried out, any Contractor's Personnel who engages in (a), (b), (c), (d), (e) or (g) above or has been recruited as stated in (f) above."

The Contractor shall take all necessary safety measures to avoid the occurrence of incidents and injuries to any third party, associated with the use of, if any, Equipment on public roads or other public infrastructure. The Contractor shall monitor road safety incidents and accidents to identify negative safety issues, and establish and implement necessary measures to resolve them.

Labor

Engagement of Staff and Labor. The Contractor shall provide and employ on the Site for the execution of the Works such skilled, semi-skilled and unskilled labor as is necessary for the proper and timely execution of the Contract. The Contractor is encouraged, to the extent practicable and reasonable, to employ staff and labor with appropriate qualifications and experience from sources within the Country.

Unless otherwise provided in the Contract, the Contractor shall be responsible for the recruitment, transportation, accommodation and welfare facilities in accordance with GCC Sub-Clause 9.4.6, of the Contractor's Personnel, and for all payments in connection therewith.

The Contractor shall provide the Contractor's Personnel information and documentation that are clear and understandable regarding their terms and conditions of employment. The information and documentation shall set out their rights under relevant labor laws applicable to the Contractor's Personnel (which will include any applicable collective agreements), including their rights related to hours of work, wages, overtime, compensation and benefits, as well as those arising from any requirements in the Specifications. The Contractor's Personnel shall be informed when any material changes to their terms or conditions of employment occur.

Conditions of Labor. The Contractor shall inform the Contractor's Personnel about:

- (a) any deduction to their payment and the conditions of such deductions in accordance with the applicable laws or as stated in the Specifications; and
- (b) their liability to pay personal income taxes in the Country in respect of such of their salaries, wages, allowances and any benefits as are subject to tax under the laws of the Country for the time being in force.

The Contractor shall perform such duties in regard to such deductions thereof as may be imposed on him by such laws.

Where required by applicable laws or as stated in the Specifications, the Contractor shall provide the Contractor's Personnel written notice of termination of employment and details of severance payments in a timely manner. The Contractor shall have paid the Contractor's Personnel (either directly or where appropriate for their benefit) all due wages and entitlements including, as applicable, social security benefits and pension contributions, on or before the end of their engagement/ employment.

The Contractor may bring in to the Country any foreign personnel who are necessary for the execution of the Works to the extent allowed by the applicable Laws. The Contractor shall ensure that these personnel are provided with the required residence visas and work permits. The Employer will, if requested by the Contractor, use its best endeavors in a timely and expeditious manner to assist the Contractor in obtaining any local, state, national, or government permission required for bringing in the Contractor's personnel.

The Contractor shall at its own expense provide the means of repatriation to and the Contractor's Personnel employed on the Contract at the Site to their various home countries. It shall also provide suitable temporary maintenance of all such persons from the cessation of their employment on the Contract to the date programmed for their departure. In the event that the Contractor defaults in providing such means of transportation and temporary maintenance, the Employer may provide the same to such personnel and recover the cost of doing so from the Contractor.

Disorderly conduct. The Contractor shall at all times during the progress of the Contract use its best endeavors to prevent any unlawful, riotous or disorderly conduct or behavior by or amongst the Contractor's Personnel.

Facilities for Staff and Labor. Except as otherwise stated in the Specifications, the Contractor shall provide and maintain all necessary accommodation and welfare facilities for the Contractor's Personnel. If stated in the Specifications, the Contractor shall give access to or provide services that accommodate the physical, social and cultural needs of the Contractor's Personnel. The Contractor shall also provide similar facilities for the Employer's Personnel if stated in the Specifications.

The Contractor shall, in all dealings with the Contractor's Personnel, pay due regard to all recognized festivals, official holidays, religious or other customs and all local laws and regulations pertaining to the employment of labor. The Contractor shall provide the Contractor's Personnel annual holiday and sick, maternity and family leave, as required by applicable laws or as stated in the Specifications.

Supply of Foodstuffs. The Contractor shall arrange for the provision of a sufficient supply of suitable food as may be stated in the Specifications at reasonable prices for the Contractor's Personnel for the purposes of or in connection with the Contract.

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

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

Alcoholic Liquor or Drugs. The Contractor shall not, otherwise than in accordance with the laws of the Country, import, sell, give, barter or otherwise dispose of any alcoholic liquor or drugs, or permit or allow importation, sale, gift, barter or disposal thereto by Contractor's Personnel.

Arms and Ammunition. The Contractor shall not give, barter, or otherwise dispose of, to any person, any arms or ammunition of any kind, or allow Contractor's Personnel to do so.

Funeral Arrangements. The Contractor shall be responsible, to the extent required by local regulations, for making any funeral arrangements for any of its local employees who may die while engaged upon the Works.

Forced Labor. The Contractor, including its Subcontractors, shall not employ or engage forced labor. Forced labor consists of any work or service, not voluntarily performed, that is exacted from an individual under threat of force or penalty, and includes any kind of involuntary or compulsory labor, such as indentured labor, bonded labor or similar labor-contracting arrangements.

No persons shall be employed or engaged who have been subject to trafficking. Trafficking in persons is defined as the recruitment, transportation, transfer, harboring or receipt of persons by means of the threat or use of force or other forms of coercion, abduction, fraud, deception, abuse of power, or of a position of vulnerability, or of the giving or receiving of payments or benefits to achieve the consent of a person having control over another person, for the purposes of exploitation.

Child Labor. The Contractor, including its Subcontractors, shall not employ or engage a child under the age of 14 unless the national law specifies a higher age (the minimum age).

The Contractor, including its Subcontractors, shall not employ or engage a child between the minimum age and the age of 18 in a manner that is likely to be hazardous, or to interfere with,

the child's education, or to be harmful to the child's health or physical, mental, spiritual, moral, or social development.

The Contractor including its Subcontractors, shall only employ or engage children between the minimum age and the age of 18 after an appropriate risk assessment has been conducted by the Contractor with the Project Manager's approval. The Contractor shall be subject to regular monitoring by the Project Manager that includes monitoring of health, working conditions and hours of work.

Work considered hazardous for children is work that, by its nature or the circumstances in which it is carried out, is likely to jeopardize the health, safety, or morals of children. Such work activities prohibited for children include work:

- (a) with exposure to physical, psychological or sexual abuse;
- (b) underground, underwater, working at heights or in confined spaces;
- (c) with dangerous machinery, equipment or tools, or involving handling or
- (d) transport of heavy loads;
- (e) in unhealthy environments exposing children to hazardous substances, agents, or processes, or to temperatures, noise or vibration damaging to health; or
- (f) under difficult conditions such as work for long hours, during the night or in confinement on the premises of the employer.

Employment Records of Workers. The Contractor shall keep complete and accurate records of the employment of labor at the Site. The records shall include the names, ages, genders, hours worked, and wages paid to all workers. These records shall be summarized on a monthly basis and submitted to the project Manager.

Workers' Organizations. In countries where the relevant labor laws recognize workers' rights to form and to join workers' organizations of their choosing and to bargain collectively without interference, the Contractor shall comply with such laws. In such circumstances, the role of legally established workers' organizations and legitimate workers' representatives will be respected, and they will be provided with information needed for meaningful negotiation in a timely manner. Where the relevant labor laws substantially restrict workers' organizations, the Contractor shall enable alternative means for the Contractor's Personnel to express their grievances and

protect their rights regarding working conditions and terms of employment. The Contractor shall not seek to influence or control these alternative means. The Contractor shall not discriminate or retaliate against the Contractor's Personnel who participate, or seek to participate, in such organizations and collective bargaining or alternative mechanisms. Workers' organizations are expected to fairly represent the workers in the workforce.

Non-Discrimination and Equal Opportunity. The Contractor shall not make decisions relating to the employment or treatment of Contractor's Personnel on the basis of personal characteristics unrelated to inherent job requirements. The Contractor shall base the employment of Contractor's Personnel on the principle of equal opportunity and fair treatment, and shall not discriminate with respect to any aspects of the employment relationship, including recruitment and hiring, compensation (including wages and benefits), working conditions and terms of employment, access to training, job assignment, promotion, termination of employment or retirement, and disciplinary practices.

Special measures of protection or assistance to remedy past discrimination or selection for a particular job based on the inherent requirements of the job shall not be deemed discrimination. The Contractor shall provide protection and assistance as necessary to ensure non-discrimination and equal opportunity, including for specific groups such as women, people with disabilities, migrant workers and children (of working age in accordance with GCC Sub-Clause 9.4.15).

Contractor's Personnel Grievance Mechanism. The Contractor shall have a grievance mechanism for Contractor's Personnel, and where relevant the workers' organizations stated in GCC Sub-Clause 9.4.17, to raise workplace concerns. The grievance mechanism shall be proportionate to the nature, scale, risks and impacts of the Contract. The mechanism shall address concerns promptly, using an understandable and transparent process that provides timely feedback to those concerned in a language they understand, without any retribution, and shall operate in an independent and objective manner.

The Contractor's Personnel shall be informed of the grievance mechanism at the time of engagement for the Contract, and the measures put in place to protect them against any reprisal for its use. Measures will be put in place to make the grievance mechanism easily accessible to all Contractor's Personnel.

The grievance mechanism shall not impede access to other judicial or administrative remedies that might be available, or substitute for grievance mechanisms provided through collective agreements.

The grievance mechanism may utilize existing grievance mechanisms, providing that they are properly designed and implemented, address concerns promptly, and are readily accessible to Contractor's Personnel. Existing grievance mechanisms may be supplemented as needed with Contract-specific arrangements.

Training of Contractor's Personnel. The Contractor shall provide appropriate training to relevant Contractor's Personnel on ES aspects of the Contract, including appropriate sensitization on prohibition of SEA and SH, and health and safety training referred to in GCC Sub-Clause 18.2.

As stated in the Specifications or as instructed by the Project Manager, the Contractor shall also allow appropriate opportunities for the relevant Contractor's Personnel to be trained on ES aspects of the Contract by the Employer's Personnel.

The Contractor shall provide training on SEA and SH, including its prevention, to any of its personnel who has a role to supervise other Contractor's Personnel.

- 10.1 The Employer carries the risks which this Contract states are Employer's risks, and the Contractor carries the risks which this Contract states are Contractor's risks.

10. Employer's and Contractor's Risks

- 11.1 From the Start Date until the Defects Liability Certificate has been issued, the following are Employer's risks:

11. Employer's Risks

- (a) The risk of personal injury, death, or loss of or damage to property (excluding the Works, Plant, Materials, and Equipment), which are due to
 - (i) use or occupation of the Site by the Works or for the purpose of the Works, which is the unavoidable result of the Works or
 - (ii) negligence, breach of statutory duty, or interference with any legal right by the Employer or by any person employed by or contracted to him except the Contractor.
- (b) The risk of damage to the Works, Plant, Materials, and Equipment to the extent that it is due to a fault of the Employer or in the Employer's design, or due to war or

radioactive contamination directly affecting the country where the Works are to be executed.

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

- (a) a Defect which existed on the Completion Date,
- (b) an event occurring before the Completion Date, which was not itself an Employer's risk, or
- (c) the activities of the Contractor on the Site after the Completion Date.

12. Contractor's Risks

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

13. Insurance

13.1 The Contractor shall provide, in the joint names of the Employer and the Contractor, insurance cover from the Start Date to the end of the Defects Liability Period, in the amounts and deductibles **stated in the PCC** for the following events which are due to the Contractor's risks:

- (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.

13.2 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 to be payable in the types and proportions of currencies required to rectify the loss or damage incurred.

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

13.4 Alterations to the terms of an insurance shall not be made without the approval of the Project Manager.

135 Both parties shall comply with any conditions of the insurance policies.

14. Site Data

14.1 The Contractor shall be deemed to have examined any Site Data **referred to in the PCC**, supplemented by any information available to the Contractor.

15. Contractor to Construct the Works

15.1 The Contractor shall construct and install the Works in accordance with the Specifications and Drawings.

15.2 If the Contract specifies that the Contractor shall design any part of the permanent Works, the Contractor shall take into the Employer's requirements which may include, if stated in the Specifications:

- (a) designing structural elements of the Works taking into account climate change considerations;
- (b) applying the concept of universal access (the concept of universal access means unimpeded access for people of all ages and abilities in different situations and under various circumstances; and
- (c) considering the incremental risks of the public's potential exposure to operational accidents or natural hazards, including extreme weather events.

16. The Works to Be Completed Intended

16.1 The Contractor may commence execution of the Works on the **Be Completed** Start Date and shall carry out the Works in accordance with the **by the** Program submitted by the Contractor, as updated with the **Completion** approval of the Project Manager, and complete them by the **Date** Intended Completion Date.

16.2 The Contractor shall not carry out mobilization to the Site unless the Project Manager gives approval, an approval that shall not be unreasonably delayed, to the measures the Contractor proposes to address environmental and social risks and impacts, which at a minimum shall include applying the Management Strategies and Implementation Plans (MSIPs) and Code of Conduct for Contractor's Personnel submitted as part of the Bid and agreed as part of the Contract.

The Contractor shall submit, to the Project Manager for its approval any additional MSIPs as are necessary to manage the ES risks and impacts of ongoing Works. These MSIPs collectively comprise the Contractor's Environmental and Social Management Plan (C-ESMP). The Contractor shall review the C-ESMP, periodically (but not less than every six (6) months), and update it as required to ensure that it contains

measures appropriate to the Works. The updated C-ESMP shall be submitted to the Project Manager for its approval.

17. Approval by the 17.1 The Contractor shall submit Specifications and Drawings **Project** showing the proposed Temporary Works to the Project **Manager** Manager, for his approval.

172 The Contractor shall be responsible for design of Temporary Works.

173 The Project Manager's approval shall not alter the Contractor's responsibility for design of the Temporary Works.

174 The Contractor shall obtain approval of third parties to the design of the Temporary Works, where required.

175 All Drawings prepared by the Contractor for the execution of the temporary or permanent Works, are subject to prior approval by the Project Manager before this use.

**18. Health, Safety
and Protection
of the
Environment**

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

18.2 The Contractor shall:

- (a) comply with all applicable health and safety regulations and Laws;
- (b) comply with all applicable health and safety obligations specified in the Contract;
- (c) take care for the health and safety of all persons entitled to be on the Site and other places, if any, where the Works are being executed;
- (d) keep the Site and Works clear of unnecessary obstruction so as to avoid danger to these persons;
- (e) provide fencing, lighting, safe access, guarding and watching of the Works until the issue of the Contract Certificate of Completion;
- (f) provide any Temporary Works (including roadways, footways, guards and fences) which may be necessary, because of the execution of the Works, for the use and protection of the public and of owners and occupiers of adjacent land;
- (g) provide health and safety training of Contractor's Personnel as appropriate and maintain training records;
- (h) actively engage the Contractor's Personnel in promoting understanding, and methods for, implementation of health and safety requirements, as well as in providing

information to Contractor's Personnel, training on occupational safety and health, and provision of personal protective equipment without expense to the Contractor's Personnel;

- (i) put in place workplace processes for Contractor's Personnel to report work situations that they believe are not safe or healthy, and to remove themselves from a work situation which they have reasonable justification to believe presents an imminent and serious danger to their life or health;
- (j) Contractor's Personnel who remove themselves from such work situations shall not be required to return to work until necessary remedial action to correct the situation has been taken. Contractor's Personnel shall not be retaliated against or otherwise subject to reprisal or negative action for such reporting or removal;
- (k) where the Employer's Personnel, any other contractors employed by the Employer, and/or personnel of any legally constituted public authorities and private utility companies are employed in carrying out, on or near the site, of any work not included in the Contract, collaborate in applying the health and safety requirements, without prejudice to the responsibility of the relevant entities for the health and safety of their own personnel; and
- (l) establish and implement a system for regular (not less than six-monthly) review of health and safety performance and the working environment.

Subject to GCC Sub-Clause 16.2, the Contractor shall submit to the Project Manager for its approval a health and safety manual which has been specifically prepared for the Works, the Site and other places (if any) where the Contractor intends to execute the Works.

The health and safety manual shall be in addition to any other similar document required under applicable health and safety regulations and laws.

The health and safety manual shall set out all the health and safety requirements under the Contract,

- (a) which shall include at a minimum:
 - (i) the procedures to establish and maintain a safe working environment without risk to health at all workplaces, machinery, equipment and processes under the control of the Contractor, including control

measures for chemical, physical and biological substances and agents;

- (ii) details of the training to be provided, records to be kept;
 - (iii) the procedures for prevention, preparedness and response activities to be implemented in the case of an emergency event (i.e. an unanticipated incident, arising from both natural and man-made hazards, typically in the form of fire, explosions, leaks or spills, which may occur for a variety of different reasons including failure to implement operating procedures that are designed to prevent their occurrence, extreme weather or lack of early warning);
 - (iv) remedies for adverse impacts such as occupational injuries, deaths, disability and disease;
 - (v) the measures to be taken to avoid or minimize the potential for community exposure to water-borne, water-based, water-related, and vector-borne diseases,
 - (vi) the measures to be implemented to avoid or minimize the spread of communicable diseases (including transfer of Sexually Transmitted Diseases or Infections (STDs), such as HIV virus) and non-communicable diseases associated with the execution of the Works, taking into consideration differentiated exposure to and higher sensitivity of vulnerable groups. This includes taking measures to avoid or minimize the transmission of communicable diseases that may be associated with the influx of temporary or permanent Contract-related labor;
 - (vii) the policies and procedures on the management and quality of accommodation and welfare facilities if such accommodation and welfare facilities are provided by the Contractor in accordance with GCC Sub-Clause 9.4.6; and
- (b) any other requirements stated in the Specifications.

18.3 Protection of the environment

- (a) The Contractor shall take all necessary measures to: protect the environment (both on and off the Site); and

- (b) limit damage and nuisance to people and property resulting from pollution, noise and other results of the Contractor's operations and/ or activities.

The Contractor shall ensure that emissions, surface discharges, effluent and any other pollutants from the Contractor's activities shall exceed neither the values indicated in the Specifications, nor those prescribed by applicable laws.

In the event of damage to the environment, property and/or nuisance to people, on or off Site as a result of the Contractor's operations, the Contractor shall agree with the Project Manager the appropriate actions and time scale to remedy, as practicable, the damaged environment to its former condition. The Contractor shall implement such remedies at its cost to the satisfaction of the Project Manager.

19. Archaeological and Geological Findings

19.1 All fossils, coins, articles of value or antiquity, structures, groups of structures, and other remains or items of geological, archaeological, paleontological, historical, architectural or religious interest found on the Site shall be placed under the care and custody of the Employer. The Contractor shall:

- (a) take all reasonable precautions, including fencing-off the area or site of the finding, to avoid further disturbance and prevent Contractor's Personnel or other persons from removing or damaging any of these findings;
- (b) train relevant Contractor's Personnel on appropriate actions to be taken in the event of such findings; and
- (c) implement any other action consistent with the requirements of the Specifications and relevant laws.

The Contractor shall, as soon as practicable after discovery of any such finding, notify the Project Manager of such discoveries and carry out the Project Manager's instructions for dealing with them.

20. Possession of the Site

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

21. Access to the Site

21.1 The Contractor shall allow the Project Manager and any person authorized by the Project Manager (including the Bank staff or consultants acting on the Bank's behalf, stakeholders and third parties, such as independent experts, local communities, or non-governmental organizations), including to carry out

environmental and social audit, as appropriate, 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.

22. Instructions, 22.1 The Contractor shall carry out all instructions of the Project **Inspections and** Manager which comply with the applicable laws where the Site **Audits** is located.

22.2 The Contractor shall keep, and shall make all reasonable efforts to cause its Subcontractors and subconsultants to keep, accurate and systematic accounts and records in respect of the Works in such form and details as will clearly identify relevant time changes and costs.

22.3 Inspections & Audit by the Bank

Pursuant to paragraph 2.2 e. of Appendix A to the GCC- Fraud and Corruption, the Contractor shall permit and shall cause its agents (where declared or not), subcontractors, subconsultants, service providers, suppliers, and personnel, to permit, the Bank and/or persons appointed by the Bank to inspect the site and/or the accounts, records and other documents relating to the procurement process, selection and/or contract execution, and to have such accounts, records and other documents audited by auditors appointed by the Bank. The Contractor's and its Subcontractors' and subconsultants' attention is drawn to GCC Sub-Clause 25.1 (Fraud and Corruption) which provides, inter alia, that acts intended to materially impede the exercise of the Bank's inspection and audit rights constitute a prohibited practice subject to contract termination (as well as to a determination of ineligibility pursuant to the Bank's prevailing sanctions procedures).

23. Appointment of the Adjudicator

23.1 The Adjudicator shall be appointed jointly by the Employer and the Contractor, at the time of the Employer's issuance of the Letter of Acceptance. If, in the Letter of Acceptance, the Employer does not agree on the appointment of the Adjudicator, the Employer will request the Appointing Authority **designated in the PCC**, to appoint the Adjudicator within 14 days of receipt of such request.

23.2 Should the Adjudicator resign or die, or should the Employer and the Contractor agree that the Adjudicator is not functioning in accordance with the provisions of the Contract, a new Adjudicator shall be jointly appointed by the Employer and the Contractor. In case of disagreement between the Employer and the Contractor, within 30 days, the Adjudicator shall be designated by the Appointing Authority **designated in the PCC**

at the request of either party, within 14 days of receipt of such request.

24. Procedure for

- 24.1 If the Contractor believes that a decision taken by the Project **Disputes** Manager was either outside the authority given to the Project Manager by the Contract or that the decision was wrongly taken, the decision shall be referred to the Adjudicator within 14 days of the notification of the Project Manager's decision.
- 24.2 The Adjudicator shall give a decision in writing within 28 days of receipt of a notification of a dispute.
- 24.3 The Adjudicator shall be paid by the hour at the **rate specified in the PCC**, together with reimbursable expenses of the types **specified in the PCC**, and the cost shall be divided equally between the Employer and the Contractor, whatever decision is reached by the Adjudicator. Either party may refer a decision of the Adjudicator to an Arbitrator within 28 days of the Adjudicator's written decision. If neither party refers the dispute to arbitration within the above 28 days, the Adjudicator's decision shall be final and binding.
- 24.4 The arbitration shall be conducted in accordance with the arbitration procedures published by the institution named and in the place **specified in the PCC**.

25. Fraud and Corruption

- 25.1 The Bank requires compliance with the Bank's Anti-Corruption Guidelines and its prevailing sanctions policies and procedures as set forth in the WBG's Sanctions Framework, as set forth in Appendix A to the GCC.
- 25.2 The Employer requires the Contractor to disclose any commissions or fees that may have been paid or are to be paid to agents or any other party with respect to the bidding process or execution of the Contract. The information disclosed must include at least the name and address of the agent or other party, the amount and currency, and the purpose of the commission, gratuity or fee.

26. Stakeholder

Engagement

- 26.1 The Contractor shall provide relevant contract-related information, as the Employer and/or Project Manager may reasonably request to conduct Stakeholder engagements. "Stakeholder" refers to individuals or groups who:
- (i) are affected or likely to be affected by the Contract; and
 - (ii) may have an interest in the Contract.

The Contractor may also directly participate in Stakeholder engagements, as the Employer and/or Project Manager may reasonably request.

27. Suppliers (other than Subcontractors) 27.1 Forced Labor: The Contractor shall take measures to require its **suppliers** (other than Subcontractors) not to employ or engage **forced labor** including trafficked persons as described in GCC

Sub-Clause 9.4.14. If forced labor/trafficking cases are identified, the Contractor shall take measures to require the suppliers to take appropriate steps to remedy them. Where the supplier does not remedy the situation, the Contractor shall within a reasonable period substitute the supplier with a supplier that is able to manage such risks.

27.2 *Child Labor*: The Contractor shall take measures to require its suppliers (other than Subcontractors) not to employ or engage child labor as described in GCC Sub-Clause 9.4.15. If child labor cases are identified, the Contractor shall take measures to require the suppliers to take appropriate steps to remedy them. Where the supplier does not remedy the situation, the Contractor shall within a reasonable period substitute the supplier with a supplier that is able to manage such risks.

27.3 *Serious Safety Issues*: The Contractor, including its Subcontractors, shall comply with all applicable safety obligations, including as stated in GCC Sub-Clause 18.2. The Contractor shall also take measures to require its suppliers (other than Subcontractors) to adopt procedures and mitigation measures adequate to address safety issues related to their personnel. If serious safety issues are identified, the Contractor shall take measures to require the suppliers to take appropriate steps to remedy them. Where the supplier does not remedy the situation, the Contractor shall within a reasonable period substitute the supplier with a supplier that is able to manage such risks.

27.4 *Obtaining natural resource materials in relation to supplier*: The Contractor shall obtain natural resource *materials* from suppliers that can demonstrate, through compliance with the applicable verification and/ or certification requirements, that obtaining such materials is not contributing to the risk of significant conversion or significant degradation of natural or critical habitats such as unsustainably harvested woodproducts, gravel or sand extraction from river beds or beaches.

If a supplier cannot continue to demonstrate that obtaining such materials is not contributing to the risk of significant conversion or significant degradation of natural or critical habitats, the Contractor shall within a reasonable period substitute the

supplier with a supplier that is able to demonstrate that they are not significantly adversely impacting the habitats.

28. Code of Conduct

28.1 The Contractor shall have a Code of Conduct for the Contractor's Personnel.

The Contractor shall take all necessary measures to ensure that each Contractor's Personnel is made aware of the Code of Conduct including specific behaviors that are prohibited, and understands the consequences of engaging in such prohibited behaviors.

These measures include providing instructions and documentation that can be understood by the Contractor's Personnel and seeking to obtain that person's signature acknowledging receipt of such instructions and/or documentation, as appropriate.

The Contractor shall also ensure that the Code of Conduct is visibly displayed in multiple locations on the Site and any other place where the Works will be carried out, as well as in areas outside the Site accessible to the local community and project affected people. The posted Code of Conduct shall be provided in languages comprehensible to Contractor's Personnel, Employer's Personnel and the local community.

The Contractor's Management Strategy and Implementation Plans shall include appropriate processes for the Contractor to verify compliance with these obligations.

29. Security of the Site

29.1 The Contractor shall be responsible for the security of the Site, and:

- (a) for keeping unauthorized persons off the Site;
- (b) authorized persons shall be limited to the Contractor's Personnel, the Employer's Personnel, and to any other personnel identified as authorized personnel (including the Employer's other contractors on the Site), by a notice from the Employer or the Project Manager to the Contractor.

Subject to GCC Sub-Clause 16.2, the Contractor shall submit for the Project Manager's No-objection a security management plan that sets out the security arrangements for the Site.

The Contractor shall (i) conduct appropriate background checks on any personnel retained to provide security; (ii) train the security personnel adequately (or determine that they are properly trained) in the use of force (and where applicable, firearms), and appropriate conduct towards Contractor's

Personnel, Employer's Personnel and affected communities; and
 (iii) require the security personnel to act within the applicable Laws and any requirements set out in the Specifications.

The Contractor shall not permit any use of force by security personnel in providing security except when used for preventive and defensive purposes in proportion to the nature and extent of the threat.

In making security arrangements, the Contractor shall also comply with any additional requirements stated in the Specifications."

B. Time Control

30. Program and

30.1 Within the time **stated in the PCC**, after the date of the Letter **Progress** of Acceptance, the Contractor shall submit to the Project **Reports** Manager for approval a Program showing the general methods, arrangements, order, and timing for all the activities in the Works. In the case of a lump-sum contract, the activities in the Program shall be consistent with those in the Activity Schedule. 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.

302 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.

303 The Contractor shall monitor progress of the Works and submit to the Project manager progress report and any updated Program showing the actual progress achieved and the effect of the progress achieved on the timing of the remaining Works, including any changes to the sequence of the activities, at intervals no longer than the periods **stated in the PCC**. If the Contractor does not submit an updated Program within this period, the Project Manager may withhold the amount **stated in the PCC** 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. In the case of lump-sum Contract, the Contractor shall provide an updated Activity Schedule within 14 days of being instructed to by the Project Manager.

- 30.4 Unless otherwise stated in the Specifications, each progress report shall include the Environmental and Social (ES) metrics set out in Appendix B.
- 30.5 In addition to the progress reports, the Contractor shall inform the Project Manager immediately of any allegation, incident or accident in the Site, which has or is likely to have a significant adverse effect on the environment, the affected communities, the public, Employer's Personnel or Contractor's Personnel. This includes, but is not limited to, any incident or accident causing fatality or serious injury; significant adverse effects or damage to private property; or any allegation of SEA and/or SH. In case of SEA and/or SH, while maintaining confidentiality as appropriate, the type of allegation (sexual exploitation, sexual abuse or sexual harassment), gender and age of the person who experienced the alleged incident should be included in the information.

The Contractor, upon becoming aware of the allegation, incident or accident, shall also immediately inform the Project Manager of any such incident or accident on the Subcontractors' or suppliers' premises relating to the Works which has or is likely to have a significant adverse effect on the environment, the affected communities, the public, Employer's Personnel, or Contractor's, its Subcontractors' and suppliers' personnel. The notification shall provide sufficient detail regarding such incidents or accidents. The Contractor shall provide full details of such incidents or accidents to the Project Manager within the timeframe agreed with the Project Manager.

The Contractor shall require its Subcontractors and suppliers (other than Subcontractors) to immediately notify the Contractor of any incidents or accidents referred to in this Subclause.

31. Extension of the

31.1 The Project Manager shall extend the Intended Completion Date **Intended** if a Compensation Event occurs or a Variation is issued which **Completion** makes it impossible for Completion to be achieved by the **Date** Intended Completion Date without the Contractor taking steps to accelerate the remaining work, which would cause the Contractor to incur additional cost.

31.2 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 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 by this failure shall not be considered in assessing the new Intended Completion Date.

- 32. Acceleration** 32.1 When the Employer wants the Contractor to finish before the Intended Completion Date, the Project Manager shall obtain priced proposals for achieving the necessary acceleration from the Contractor. If the Employer accepts these proposals, the Intended Completion Date shall be adjusted accordingly and confirmed by both the Employer and the Contractor.
- 32.2 If the Contractor's priced proposals for an acceleration are accepted by the Employer, they are incorporated in the Contract Price and treated as a Variation.
- 33. Delays Ordered by the Project Manager** 33.1 The Project Manager may instruct the Contractor to delay the start or progress of any activity within the Works.
- 34. Management** 34.1 Either the Project Manager or the Contractor may require the **Meetings** other to attend a management meeting. The business of a management meeting shall be to review the plans for remaining work and to deal with matters raised in accordance with the early warning procedure.
- 34.2 The Project Manager shall record the business of management meetings and provide copies of the record to those attending the meeting and to 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.
- 35. Early Warning** 35.1 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.
- 35.2 The Contractor shall cooperate with the Project Manager in making and considering proposals for 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 instruction of the Project Manager.

C. Quality Control

- 36. Identifying** 36.1 The Project Manager shall check the Contractor's work and **Defects** notify the Contractor of any Defects that are found. Such checking 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.

37. Tests

- 37.1 If the Project Manager instructs the Contractor to carry out a test not specified in the Specifications to check whether any work has a Defect and the test shows that it does, the Contractor shall pay for the test and any samples. If there is no Defect, the test shall be a Compensation Event.

38. Correction of

- 38.1 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 PCC**. The Defects Liability Period shall be extended for as long as Defects remain to be corrected.

- 38.2 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.

39. Uncorrected

- 39.1 If the Contractor has not corrected a Defect within the time **Defects** specified in the Project Manager's notice, the Project Manager shall assess the cost of having the Defect corrected, and the Contractor shall pay this amount.

D. Cost Control

40. Contract Price² 40.1 The Bill of Quantities shall contain priced items for the Works

to be performed by the Contractor. The Bill of Quantities is used to calculate the Contract Price. The Contractor will be paid for the quantity of the work accomplished at the rate in the Bill of Quantities for each item.

41. Changes in the Price³

- 41.1 If the final quantity of the work done differs from the quantity **Contract** in the Bill of Quantities for the particular item by more than 25 percent, provided the change exceeds 1 percent of the Initial Contract Price, the Project Manager shall adjust the rate to allow for the change. The Project Manager shall not adjust rates from changes in quantities if thereby the Initial Contract Price is exceeded by more than 15 percent, except with the prior approval of the Employer.

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

42. Variations

- 42.1 All Variations shall be included in updated Programs⁴ produced by the Contractor.
- 42.2 The Contractor shall provide the Project Manager with a quotation for carrying out the Variation when requested to do so by the Project Manager. The Contractor shall also provide information of any ES risks and impacts of the Variation. The Project Manager shall assess the quotation, which shall be given within seven (7) days of the request or within any longer period stated by the Project Manager and before the Variation is ordered.
- 42.3 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.
- 42.4 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.
- 42.5 The Contractor shall not be entitled to additional payment for costs that could have been avoided by giving early warning.
- 42.6 If the work in the Variation corresponds to an item description in the Bill of Quantities and if, in the opinion of the Project Manager, the quantity of work above the limit stated in GCC Sub-Clause 41.1 or the timing of its execution do not cause the cost per unit of quantity to change, the rate in the Bill 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 Bill of Quantities, the quotation by the Contractor shall be in the form of new rates for the relevant items of work.⁵
- 42.7 Value Engineering: The Contractor may prepare, at its own cost, a value engineering proposal at any time during the performance of the contract. The value engineering proposal shall, at a minimum, include the following;
- (a) the proposed change(s), and a description of the difference to the existing contract requirements;
 - (b) a full cost/benefit analysis of the proposed change(s) including a description and estimate of costs (including

life cycle cost) the Employer may incur in implementing the value engineering proposal;

- (c) a description of any effect(s) of the change on performance/functionality; and
- (d) a description of the proposed work to be performed, a program for its execution and sufficient ES information to enable an evaluation of ES risks and impacts.

The Employer may accept the value engineering proposal if the proposal demonstrates benefits that:

- (a) accelerates the contract completion period; or
- (b) reduces the Contract Price or the life cycle costs to the Employer; or
- (c) improves the quality, efficiency, safety or sustainability of the Facilities; or
- (d) yields any other benefits to the Employer, without compromising the functionality of the Works.

If the value engineering proposal is approved by the Employer and results in:

- (a) a reduction of the Contract Price; the amount to be paid to the Contractor shall be the **percentage specified in the PCC** of the reduction in the Contract Price; or
- (b) an increase in the Contract Price; but results in a reduction in life cycle costs due to any benefit described in (a) to (d) above, the amount to be paid to the Contractor shall be the full increase in the Contract Price.

43. Cash Flow

43.1 When the Program,⁶ is updated, the Contractor shall provide the **Forecasts** Project Manager with an updated cash flow forecast. The cash flow forecast shall include different currencies, as defined in the Contract, converted as necessary using the Contract exchange rates.

44. Payment Certificates

- 44.1 The Contractor shall submit to the Project Manager monthly statements of the estimated value of the work executed less the cumulative amount certified previously.
- 44.2 The Project Manager shall check the Contractor's monthly statement and certify the amount to be paid to the Contractor.
- 44.3 The value of work executed shall be determined by the Project Manager.

- 44.4 The value of work executed shall comprise the value of the quantities of work in the Bill of Quantities that have been completed.⁷
- 44.5 The value of work executed shall include the valuation of Variations and Compensation Events.
- 44.6 The Project Manager may exclude any item certified in a previous certificate or reduce the proportion of any item previously certified in any certificate in the light of later information.
- 44.7 If the Contractor was, or is, failing to perform any ES obligations or work under the Contract, the value of this work or obligation, as determined by the Project Manager, may be withheld until the work or obligation has been performed, and/or the cost of rectification or replacement, as determined by the Project Manager, may be withheld until rectification or replacement has been completed. Failure to perform includes, but is not limited to the following:
- (a) failure to comply with any ES obligations or work described in the Works' Requirements which may include: working outside site boundaries, excessive dust, failure to keep public roads in a safe usable condition, damage to offsite vegetation, pollution of water courses from oils or sedimentation, contamination of land e.g. from oils, human waste, damage to archeology or cultural heritage features, air pollution as a result of unauthorized and/or inefficient combustion;
 - (b) failure to regularly review C-ESMP and/or update it in a timely manner to address emerging ES issues, or anticipated risks or impacts;
 - (c) failure to implement the C-ESMP e.g. failure to provide required training or sensitization;
 - (d) failing to have appropriate consents/permits prior to undertaking Works or related activities;
 - (e) failure to submit ES report/s (as described in Appendix B), or failure to submit such reports in a timely manner;
 - (f) failure to implement remediation as instructed by the Project Manager within the specified timeframe (e.g. remediation addressing non-compliance/s).

45. Payments

- 45.1 Payments shall be adjusted for deductions for advance payments and retention. The Employer shall pay the Contractor the

amounts certified by the Project Manager within 28 days of the date of each certificate. If the Employer makes a late payment, the Contractor shall be paid interest on the late payment in the next payment. Interest shall be calculated from the date by which the payment should have been made up to the date when the late payment is made at the prevailing rate of interest for commercial borrowing for each of the currencies in which payments are made.

- 45.2 If an amount certified is increased in a later certificate or as a result of an award by the Adjudicator or 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.
- 45.3 Unless otherwise stated, all payments and deductions shall be paid or charged in the proportions of currencies comprising the Contract Price.
- 45.4 Items of the Works for which no rate or price has been entered in shall not be paid for by the Employer and shall be deemed covered by other rates and prices in the Contract.

46. Compensation Events

46.1 The following shall be Compensation Events:

- (a) The Employer does not give access to a part of the Site by the Site Possession Date pursuant to GCC Sub-Clause 20.1.
- (b) The Employer modifies the Schedule of Other Contractors 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 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 bidders (including the Site Investigation Reports), from information available publicly and from a visual inspection of Site.

- (g) The Project Manager gives an instruction for dealing with an unforeseen condition, caused by the Employer, or additional work required for safety or other reasons.
 - (h) Other contractors, public authorities, utilities, or the Employer does not work within the dates and other constraints stated in the Contract, and they cause delay or extra cost to the Contractor.
 - (i) The advance payment is delayed.
 - (j) The effects on the Contractor of any of the Employer's Risks.
 - (k) The Project Manager unreasonably delays issuing a Certificate of Completion.
- 462 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.
- 463 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 shall assume that the Contractor shall react competently and promptly to the event.
- 464 The Contractor shall not be entitled to compensation to the extent that the Employer's interests are adversely affected by the Contractor's not having given early warning or not having cooperated with the Project Manager.

47. Tax

- 47.1 The Project Manager shall adjust the Contract Price if taxes, duties, and other levies are changed between the date 28 days before the submission of bids for the Contract and the date of the last Completion certificate. The adjustment shall be the change in the amount of tax payable by the Contractor, provided such changes are not already reflected in the Contract Price or are a result of GCC Clause 49.

48. Currencies

- 48.1 Where payments are made in currencies other than the currency of the Employer's country **specified in the PCC**, the exchange

rates used for calculating the amounts to be paid shall be the exchange rates stated in the Contractor's Bid.

49. Price Adjustment

- 49.1 Prices shall be adjusted for fluctuations in the cost of inputs only if **provided for in the PCC**. If so provided, the amounts certified in each payment certificate, before deducting for Advance Payment, shall be adjusted by applying the respective price adjustment factor to the payment amounts due in each currency. A separate formula of the type specified below applies to each Contract currency:

$$P_c = A_c + B_c \text{ Imc/Ioc}$$

where:

P_c is the adjustment factor for the portion of the Contract Price payable in a specific currency "c."

A_c and B_c are coefficients⁸ **specified in the PCC**, representing the nonadjustable and adjustable portions, respectively, of the Contract Price payable in that specific currency "c;" and

Imc is the index prevailing at the end of the month being invoiced and Ioc is the index prevailing 28 days before Bid opening for inputs payable; both in the specific currency "c."

- 49.2 If the value of the index is changed after it has been used in a calculation, the calculation shall be corrected and an adjustment made in the next payment certificate. The index value shall be deemed to take account of all changes in cost due to fluctuations in costs.

50. Retention

- 50.1 The Employer shall retain from each payment due to the Contractor the proportion **stated in the PCC** until Completion of the whole of the Works.
- 50.2 Upon the issue of a Certificate of Completion of the Works by the Project Manager, in accordance with GCC Sub-Clause 57.1, half the total amount retained shall be repaid to the Contractor and half when the Defects Liability Period has passed and the Project Manager has certified that all Defects notified by the Project Manager to the Contractor before the end of this period have been corrected. The Contractor may substitute retention money with an "on demand" Bank guarantee.

51. Liquidated Damages

- 51.1 The Contractor shall pay liquidated damages to the Employer at the rate per day **stated in the PCC** for each day that the Completion Date is later than the Intended Completion Date.

The total amount of liquidated damages shall not exceed the amount **defined in the PCC**. The Employer may deduct liquidated damages from payments due to the Contractor. Payment of liquidated damages shall not affect the Contractor's liabilities.

- 51.2 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 rates specified in GCC Sub-Clause 45.1.

52. Bonus

- 52.1 The Contractor shall be paid a Bonus calculated at the rate per calendar day **stated in the PCC** for each day (less any days for which the Contractor is paid for acceleration) that the Completion is earlier than the Intended Completion Date. The Project Manager shall certify that the Works are complete, although they may not be due to be complete.

53. Advance

- 53.1 The Employer shall make advance payment to the Contractor of **Payment** the amounts **stated in the PCC** by the date **stated in the PCC**, against provision by the Contractor of an Unconditional Bank Guarantee in a form and by a bank acceptable to the Employer in amounts and currencies equal to the advance payment. The Guarantee shall remain effective until the advance payment has been repaid, but the amount of the Guarantee shall be progressively reduced by the amounts repaid by the Contractor. Interest shall not be charged on the advance payment.

- 53.2 The Contractor is to use the advance payment only to pay for Equipment, Plant, Materials, and mobilization expenses required specifically for execution of the Contract. The Contractor shall demonstrate that advance payment has been used in this way by supplying copies of invoices or other documents to the Project Manager.

- 53.3 The advance payment shall be repaid by deducting proportionate amounts from payments otherwise due to the Contractor, following the schedule of completed percentages of the Works on a payment basis. No account shall be taken of the advance payment or its repayment in assessing valuations of work done, Variations, price adjustments, Compensation Events, Bonuses, or Liquidated Damages.

54. Securities

- 54.1 The Performance Security shall be provided to the Employer no later than the date specified in the Letter of Acceptance and shall be issued in an amount **specified in the PCC**, by a bank or

surety acceptable to the Employer, and denominated in the types and proportions of the currencies in which the Contract Price is payable. The Performance Security shall be valid until a date 28 days from the date of issue of the Certificate of Completion in the case of a Bank Guarantee, and until one year from the date of issue of the Certificate of Completion in the case of a Performance Bond.

55. Dayworks

- 55.1 If applicable, the Dayworks rates in the Contractor's Bid shall be used only when the Project Manager has given written instructions in advance for additional work to be paid for in that way.
- 55.2 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.
- 55.3 The Contractor shall be paid for Dayworks subject to obtaining signed Dayworks forms.

56. Cost of Repairs

- 56.1 Loss or damage to the Works or Materials to be incorporated in the Works between the Start Date and the end of the Defects Correction periods shall be remedied by the Contractor at the Contractor's cost if the loss or damage arises from the Contractor's acts or omissions.

E. Finishing the Contract**57. Completion**

- 57.1 The Contractor shall request the Project Manager to issue a Certificate of Completion of the Works, and the Project Manager shall do so upon deciding that the whole of the Works is completed.

58. Taking Over

- 58.1 The Employer shall take over the Site and the Works within seven days of the Project Manager's issuing a Certificate of Completion.

59. Final Account

- 59.1 The Contractor shall supply the Project Manager with a detailed account of the total amount that the Contractor considers payable 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 56 days of receiving the Contractor's account if it is correct and complete. If it is not, the Project Manager shall issue within 56 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.

60. Operating and Maintenance manuals 60.1 If “as built” Drawings and/or operating and maintenance **Maintenance** manuals are required, the Contractor shall supply them by the **Manuals** dates **stated in the PCC**.

60.2 If the Contractor does not supply the Drawings and/or manuals by the dates **stated in the PCC** pursuant to GCC Sub-Clause 60.1, or they do not receive the Project Manager’s approval, the Project Manager shall withhold the amount **stated in the PCC** from payments due to the Contractor.

61. Termination

61.1 The Employer or the Contractor may terminate the Contract if the other party causes a fundamental breach of the Contract.

61.2 Fundamental breaches of Contract shall include, but shall not be limited to, the following:

- (a) the Contractor stops work for 28 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 28 days;
- (c) the Employer or the Contractor is made bankrupt or goes into liquidation other than for a reconstruction or amalgamation;
- (d) a payment certified by the Project Manager is not paid by the Employer to the Contractor within 84 days of the date of the Project Manager’s certificate;
- (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;
- (g) the Contractor has delayed the completion of the Works by the number of days for which the maximum amount of liquidated damages can be paid, as **defined in the PCC**; or
- (h) if the Contractor, in the judgment of the Employer has engaged in Fraud and Corruption, as defined in

paragraph 2.2 a of the Appendix A to the GCC, in competing for or in executing the Contract, then the Employer may, after giving fourteen (14) days written notice to the Contractor, terminate the Contract and expel him from the Site.

- 61.3 Notwithstanding the above, the Employer may terminate the Contract for convenience.
- 61.4 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.
- 61.5 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 GCC Sub-Clause 61.2 above, the Project Manager shall decide whether the breach is fundamental or not.

62. Payment upon Termination

- 62.1 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 less advance payments received up to the date of the issue of the certificate and less the percentage to apply to the value of the work not completed, as **specified in the PCC**. Additional Liquidated Damages shall not apply. If the total amount due to the Employer exceeds any payment due to the Contractor, the difference shall be a debt payable to the Employer.
- 62.2 If the Contract is terminated for the Employer's convenience or because of a fundamental breach of Contract by the Employer, the Project Manager shall issue a certificate for the value of the work done, Materials ordered, the reasonable cost of removal of Equipment, repatriation of the Contractor's personnel employed solely on the Works, and the Contractor's costs of protecting and securing the Works, and less advance payments received up to the date of the certificate.

63. Property

- 63.1 All Materials on the Site, Plant, Equipment, Temporary Works, and Works shall be deemed to be the property of the Employer if the Contract is terminated because of the Contractor's default.

64. Release from Performance

- 64.1 If the Contract is frustrated by the outbreak of war or by any other event entirely outside the control of either the Employer or the Contractor, the Project Manager shall certify that the Contract has been frustrated. The Contractor shall make the Site safe and stop work as quickly as possible after receiving

this certificate and shall be paid for all work carried out before receiving it and for any work carried out afterwards to which a commitment was made.

**65. Suspension of
Loan or**

65.1 In the event that the Bank suspends the Loan or Credit to the Employer, from which part of Credit payments to the Contractor are being made:

- (a) The Employer is obligated to notify the Contractor of such suspension within 7 days of having received the Bank's suspension notice.
- (b) If the Contractor has not received sums due to it within 28 days for payment Clause provided for in GCC Sub-clause 45.1, the Contractor may immediately issue a 14-day termination notice.

APPENDIX A
TO GENERAL CONDITIONS

Fraud and Corruption
(Text in this Appendix shall not be modified)

1. Purpose

- 1.1 The Bank's Anti-Corruption Guidelines and this annex apply with respect to procurement under Bank Investment Project Financing operations.

2. Requirements

- 2.1 The Bank requires that Borrowers (including beneficiaries of Bank financing); bidders (applicants/proposers), consultants, contractors and suppliers; any sub-contractors, sub- consultants, service providers or suppliers; any agents (whether declared or not); and any of their personnel, observe the highest standard of ethics during the procurement process, selection and contract execution of Bank-financed contracts, and refrain from Fraud and Corruption.

- 2.2 To this end, the Bank:

- a. Defines, for the purposes of this provision, the terms set forth below as follows:

- i. "corrupt practice" is the offering, giving, receiving, or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party;
- ii. "fraudulent practice" is any act or omission, including misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain financial or other benefit or to avoid an obligation;
- iii. "collusive practice" is an arrangement between two or more parties designed to achieve an improper purpose, including to influence improperly the actions of another party;
- iv. "coercive practice" is impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party;
- v. "obstructive practice" is:
 - (a) deliberately destroying, falsifying, altering, or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede a Bank investigation into allegations of a corrupt, fraudulent, coercive, or collusive practice; and/or threatening, harassing, or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation; or

- (b) acts intended to materially impede the exercise of the Bank's inspection and audit rights provided for under paragraph 2.2 e. below.
- b. Rejects a proposal for award if the Bank determines that the firm or individual recommended for award, any of its personnel, or its agents, or its sub-consultants, sub- contractors, service providers, suppliers and/ or their employees, has, directly or indirectly, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices in competing for the contract in question;
 - c. In addition to the legal remedies set out in the relevant Legal Agreement, may take other appropriate actions, including declaring misprocurement, if the Bank determines at any time that representatives of the Borrower or of a recipient of any part of the proceeds of the loan engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices during the procurement process, selection and/or execution of the contract in question, without the Borrower having taken timely and appropriate action satisfactory to the Bank to address such practices when they occur, including by failing to inform the Bank in a timely manner at the time they knew of the practices;
 - d. Pursuant to the Bank's Anti- Corruption Guidelines and in accordance with the Bank's prevailing sanctions policies and procedures, may sanction a firm or individual, either indefinitely or for a stated period of time, including by publicly declaring such firm or individual ineligible (i) to be awarded or otherwise benefit from a Bank-financed contract, financially or in any other manner;¹ (ii) to be a nominated² sub-contractor, consultant, manufacturer or supplier, or service provider of an otherwise eligible firm being awarded a Bank-financed contract; and (iii) to receive the proceeds of any loan made by the Bank or otherwise to participate further in the preparation or implementation of any Bank-financed project;
 - e. Requires that a clause be included in bidding/request for proposals documents and in contracts financed by a Bank loan, requiring (i) bidders(applicants/proposers), consultants, contractors, and suppliers, and their sub-contractors, sub-consultants, service providers, suppliers, agents personnel, permit the Bank to inspect³ all accounts, records and other documents relating to the procurement process, selection and/or contract execution, and to have them audited by auditors appointed by the Bank.

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

² A nominated sub-contractor, nominated consultant, nominated manufacturer or supplier, or nominated service provider (different names are used depending on the particular bidding document) is one which has been: (i) included by the bidder in its pre- qualification application or bid because it brings specific and critical experience and know-how that allow the bidder to meet the qualification requirements for the particular bid; or (ii) appointed by the Borrower.

³ Inspections in this context usually are investigative (i.e., forensic) in nature. They involve fact-finding activities undertaken by the Bank or persons appointed by the Bank to address specific matters related to investigations/audits, such as evaluating the veracity of an allegation of possible Fraud and Corruption, through the appropriate mechanisms. Such activity includes but is not limited to: accessing and examining a firm's or individual's financial records and information, and making copies thereof as relevant; accessing and examining any other documents, data and information (whether in hard copy or electronic format) deemed relevant for the investigation/audit, and making copies thereof as relevant; interviewing staff and other relevant individuals; performing physical inspections and site visits; and obtaining third party verification of information.

APPENDIX B**Environmental and Social (ES) Metrics for Progress Reports**

Metrics for regular reporting:

- a. *environmental incidents or non-compliances with contract requirements, including contamination, pollution or damage to ground or water supplies;*
- b. *health and safety incidents, accidents, injuries that require treatment and all fatalities;*
- c. *interactions with regulators: identify agency, dates, subjects, outcomes (report the negative if none);*
- d. *status of all permits and agreements:*
 - i. *work permits: number required, number received, actions taken for those not received;*
 - ii. *status of permits and consents:*
 - *list areas/facilities with permits required (quarries, asphalt & batch plants), dates of application, dates issued (actions to follow up if not issued), dates submitted to resident engineer (or equivalent), status of area (waiting for permits, working, abandoned without reclamation, decommissioning plan being implemented, etc.);*
 - *list areas with landowner agreements required (borrow and spoil areas, camp sites), dates of agreements, dates submitted to resident engineer (or equivalent);*
 - *identify major activities undertaken in each area in the reporting period and highlights of environmental and social protection (land clearing, boundary marking, topsoil salvage, traffic management, decommissioning planning, decommissioning implementation);*
 - *for quarries: status of relocation and compensation (completed, or details of activities and current status in the reporting period).*
- e. *health and safety supervision:*
 - i. *safety officer: number days worked, number of full inspections & partial inspections, reports to construction/project management;*
 - ii. *number of workers, work hours, metric of PPE use (percentage of workers with full personal protection equipment (PPE), partial, etc.), worker violations observed (by type of violation, PPE or otherwise), warnings given, repeat warnings given, follow-up actions taken (if any);*

- f. *worker accommodations:*
 - i. number of expats housed in accommodations, number of locals;
 - ii. date of last inspection, and highlights of inspection including status of accommodations' compliance with national and local law and good practice, including sanitation, space, etc.;
 - iii. actions taken to recommend/require improved conditions, or to improve conditions.
- g. *Health services: provider of health services, information and/or training, location of clinic, number of non-safety disease or illness treatments and diagnoses (no names to be provided);*
- h. *gender (for expats and locals separately): number of female workers, percentage of workforce, gender issues raised and dealt with (cross-reference grievances or other sections as needed);*
- i. *training:*
 - i. number of new workers, number receiving induction training, dates of induction training;
 - ii. number and dates of toolbox talks, number of workers receiving Occupational Health and Safety (OHS), environmental and social training;
 - iii. number and dates of communicable diseases (including STDs) sensitization and/or training, no. workers receiving training (in the reporting period and in the past); same questions for gender sensitization, flag person training.
 - iv. number and date of SEA and SH prevention sensitization and/or training events, including number of workers receiving training on Code of Conduct for Contractor's Personnel (in the reporting period and in the past), etc.
- j. *environmental and social supervision:*
 - i. environmentalist: days worked, areas inspected and numbers of inspections of each (road section, work camp, accommodations, quarries, borrow areas, spoil areas, swamps, forest crossings, etc.), highlights of activities/findings (including violations of environmental and/or social best practices, actions taken), reports to environmental and/or social specialist/construction/site management;
 - ii. sociologist: days worked, number of partial and full site inspections (by area: road section, work camp, accommodations, quarries, borrow areas, spoil areas, clinic, HIV/AIDS center, community centers, etc.), highlights of activities (including violations of environmental and/or social requirements observed, actions taken), reports to environmental and/or social specialist/construction/site management; and
 - iii. community liaison person(s): days worked (hours community center open), number of people met, highlights of activities (issues raised, etc.), reports to environmental and/or social specialist /construction/site management.

- k. *Grievances*: list new grievances (e.g. number of allegations of SEA and SH) received in the reporting period and number of unresolved past grievances by date received, complainant's age and sex, how received, to whom referred to for action, resolution and date (if completed), data resolution reported to complainant, any required follow-up (Cross-reference other sections as needed):
 - i. Worker grievances;
 - ii. Community grievances
- l. *Traffic, road safety and vehicles/equipment*:
 - i. traffic and road safety incidents and accidents involving project vehicles & equipment: provide date, location, damage, cause, follow-up;
 - ii. traffic and road safety incidents and accidents involving non-project vehicles or property (also reported under immediate metrics): provide date, location, damage, cause, follow-up;
 - iii. overall condition of vehicles/equipment (subjective judgment by environmentalist); non-routine repairs and maintenance needed to improve safety and/or environmental performance (to control smoke, etc.).
- m. *Environmental mitigations and issues (what has been done)*:
 - i. dust: number of working bowsters, number of watering/day, number of complaints, warnings given by environmentalist, actions taken to resolve; highlights of quarry dust control (covers, sprays, operational status); % of rock/ spoil lorries with covers, actions taken for uncovered vehicles;
 - ii. erosion control: controls implemented by location, status of water crossings, environmentalist inspections and results, actions taken to resolve issues, emergency repairs needed to control erosion/sedimentation;
 - iii. quarries, borrow areas, spoil areas, asphalt plants, batch plants: identify major activities undertaken in the reporting period at each, and highlights of environmental and social protection: land clearing, boundary marking, topsoil salvage, traffic management, decommissioning planning, decommissioning implementation;
 - iv. blasting: number of blasts (and locations), status of implementation of blasting plan (including notices, evacuations, etc.), incidents of off-site damage or complaints (cross-reference other sections as needed);
 - v. spill clean-ups, if any: material spilled, location, amount, actions taken, material disposal (report all spills that result in water or soil contamination);
 - vi. waste management: types and quantities generated and managed, including amount taken offsite (and by whom) or reused/recycled/disposed on-site;
 - vii. details of tree plantings and other mitigations required undertaken in the reporting period;
 - viii. details of water and swamp protection mitigations required undertaken in the reporting period.

n. compliance:

- i. compliance status for conditions of all relevant consents/permits, for the Work, including quarries, etc.): statement of compliance or listing of issues and actions taken (or to be taken) to reach compliance;
- ii. compliance status of C-ESMP/ESIP requirements: statement of compliance or listing of issues and actions taken (or to be taken) to reach compliance
- iii. compliance status of SEA and SH prevention and response action plan: statement of compliance or listing of issues and actions taken (or to be taken) to reach compliance
- iv. compliance status of Health and Safety Management Plan re: statement of compliance or listing of issues and actions taken (or to be taken) to reach compliance
- v. other unresolved issues from previous reporting periods related to environmental and social: continued violations, continued failure of equipment, continued lack of vehicle covers, spills not dealt with, continued compensation or blasting issues, etc. Cross-reference other sections as needed.

Section IX - Particular Conditions of Contract

A. General	
GCC 1.1 (d)	The financing institution is: The World Bank
GCC 1.1 (r)	The Employer is State Department for Roads.
GCC 1.1 (v)	The Intended Completion Date for the whole of the Works shall be 24 weeks from the date of possession of site
GCC 1.1 (y)	The Project Manager is The Registrar, Engineers Board of Kenya
GCC 1.1 (aa)	The Site is located at Barabara Plaza and is defined in drawings No. As in the bills of quantities
GCC 1.1 (dd)	The Start Date shall be To be Agreed with Project Manager.
GCC 1.1 (hh)	The Works consist of <i>offices partitioning and associated Electrical and Mechanical Installations at Barabara Plaza.</i>
GCC 2.2	Sectional Completions are: N/A
GCC 2.3(i)	The following documents also form part of the Contract: Drawings, Bills of Quantities, and Specifications
GCC 3.1	The language of the contract is English . The law that applies to the Contract is the laws of the Republic of Kenya .
GCC 5.1	The Project manager <i>may</i> delegate any of his duties and responsibilities.
GCC 8.1	Schedule of other contractors: N/A
GCC 13.1	The minimum insurance amounts and deductibles shall be: (a) for loss or damage to the Works, Plant and Materials: Ksh.15,000,000.00. (b) For loss or damage to Equipment: Ksh. 500,000.00. (c) for loss or damage to property (except the Works, Plant, Materials, and Equipment) in connection with Contract Ksh. 1,000,000.00. (d) for personal injury or death: (i) of the Contractor's employees: Ksh. 1,000,000.00 (ii) of other people: Ksh. 1,000,000.00.

GCC 14.1	Site Data are: <i>As stated in the bills of quantities.</i>
GCC 20.1	The Site Possession Date(s) shall be: <i>Agreed with the Project Manager.</i>
GCC 23.1 & GCC 23.2	Appointing Authority for the Adjudicator <i>Chartered Institute of Arbitrators</i>
GCC 24.3	Hourly rate and types of reimbursable expenses to be paid to the Adjudicator: <i>Normal Government Allowances.</i>
GCC 24.4	Appointing Authority for the Adjudicator: Chartered <i>Institute of Arbitrators-Kenya Chapter.</i>
B. Time Control	
GCC 30.1	The Contractor shall submit for approval a Program for the Works within 7 Days days from the date of the Letter of Acceptance.
GCC 30.3	The period between Program updates is 14 Days days. The amount to be withheld for late submission of an updated Program is Whole Certificate. The period for submission of progress reports is 7 Days days.
C. Quality Control	
GCC 38.1	The Defects Liability Period is: 6 Months from Practical Completion
D. Cost Control	
GCC 42.7	If the value engineering proposal is approved by the Employer the amount to be paid to the Contractor shall be: N/A
GCC 48.1	The currency of the Employer's Country is: Kenya Shillings.
GCC 49.1	The Contract is NOT subject to price adjustment in accordance with GCC Clause 45, and the following information regarding coefficients DOES NOT apply. (a) The coefficients for adjustment of prices are: N/A For currency [Kshs]: (i) [insert percentage] percent nonadjustable element (coefficient A). [insert percentage] percent adjustable element (coefficient B). (b) For currency [insert name of currency]: (i) [insert percentage] percent nonadjustable element (coefficient A). (ii) [insert percentage] percent adjustable element (coefficient B). The Index I for local currency shall be [insert index]. The Index I for the specified international currency shall be [insert index]. [These proxy indices shall be proposed by the Contractor, subject to acceptance by the Employer] The Index I for currencies other than the local currency and the specified international

	currency shall be <i>[insert index]</i> .
GCC 50.1	The proportion of payments retained is: 10%
GCC 51.1	The liquidated damages for the whole of the Works are <i>Ksh. 7,000.00</i> per day. The maximum amount of liquidated damages for the whole of the Works is 5% of the final Contract Price.
GCC 52.1	The Bonus for the whole of the Works is (N/A) per day. The maximum amount of Bonus for the whole of the Works is <i>[N/A]</i> of the final Contract Price.
GCC 53.1	The Advance Payments shall be: NOT APPLICABLE and shall be paid to the Contractor no later than NOT APPLICABLE .
GCC 54.1	An Environmental and Social (ES) Performance Security SHALL NOT be provided to the Employer. [If an ES Security is required, replace GCC Sub-Clause 54.1 with the following otherwise delete.] “GCC Sub-Clause 54.1 is replaced with the following The Performance Security and an Environmental and Social (ES) Performance Security shall be provided to the Employer no later than the date specified in the Letter of Acceptance and shall be issued in an amount specified in the PCC (for GCC Sub-Clause 54.1). The Performance Security shall be issued by a bank or surety acceptable to the Employer, and denominated in the types and proportions of the currencies in which the Contract Price is payable. The ES Performance Security shall be issued by a bank acceptable to the Employer and denominated in the types and proportions of the currencies in which the Contract Price is payable. The Performance Security and, if applicable, the ES Performance Security, shall be valid until a date 28 days from the date of issue of the Certificate of
	Completion in the case of a Bank Guarantee, and until one year from the date of issue of the Certificate of Completion in the case of a Performance Bond.”
GCC 54.1	The Performance Security amount is [insert amount(s) denominated in the types and proportions of the currencies in which the Contract Price is payable, or in a freely convertible currency acceptable to the Employer] (a) Performance Security – Bank Guarantee: in the amount(s) of 5% of the contract price percent of the Accepted Contract Amount and in the same currency (ies) of the Accepted Contract Amount. (b) Performance Security – Performance Bond: in the amount(s) of 5% percent of the Accepted Contract Amount and in the same currency (ies) of the Accepted Contract Amount.
E. Finishing the Contract	
GCC 60.1	The date by which operating and maintenance manuals are required is AFTER PRACTICAL COMPLETION The date by which “as built” drawings are required is AGREED BY THE PROJECT MANAGER.
GCC 60.2	The amount to be withheld for failing to produce “as built” drawings and/or operating and maintenance manuals by the date required in GCC Sub-Clause 60.1 is Ksh 1,000,000.00 .
GCC 61.2 (g)	The maximum number of days is: 6 months; consistent with GCC Sub- Clause 51.1 on liquidated damages].
GCC 62.1	The percentage to apply to the value of the work not completed, representing the Employer’s additional cost for completing the Works, is 20%

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Notification of Intention to Award

For the attention of Bidder's Authorized Representative Name: *[insert*

Authorized Representative's name] Address: *[insert Authorized*

Representative's Address]

Telephone/Fax numbers: *[insert Authorized Representative's telephone/fax numbers]*

Email Address: *[insert Authorized Representative's email address]*

DATE OF TRANSMISSION: This Notification is sent by: *[email/fax]* on *[date]* (local time)

Notification of Intention to Award

Employer: *[insert the name of the Employer]*

Project: *[insert name of project]*

Contract title: *[insert the name of the contract]*

Country: *[insert country where RFB is issued]*

Loan No. /Credit No. / Grant No.: *[insert reference number for loan/credit/grant]*

RFB No: *[insert RFB reference number from Procurement Plan]*

This Notification of Intention to Award (Notification) notifies you of our decision to award the above contract. The transmission of this Notification begins the Standstill Period. During the Standstill Period, you may:

- a) request a debriefing in relation to the evaluation of your Bid, and/or
- b) submit a Procurement-related Complaint in relation to the decision to award the contract.

1. The successful Bidder

Name:	<i>[insert name of successful Bidder]</i>
Address:	<i>[insert address of the successful Bidder]</i>
Contract price:	<i>[insert contract price of the successful Bid]</i>

2. Other Bidders *[INSTRUCTIONS: insert names of all Bidders that submitted a Bid. If the Bid's price was evaluated include the evaluated price as well as the Bid price as read out.]*

Name of Bidder	Bid price	Evaluated Bid price (if applicable)
<i>[insert name]</i>	<i>[insert Bid price]</i>	<i>[insert evaluated price]</i>
<i>[insert name]</i>	<i>[insert Bid price]</i>	<i>[insert evaluated price]</i>
<i>[insert name]</i>	<i>[insert Bid price]</i>	<i>[insert evaluated price]</i>

[insert name]	[insert Bid price]	[insert evaluated price]
[insert name]	[insert Bid price]	[insert evaluated price]

3. Reason/s why your Bid was unsuccessful

[INSTRUCTIONS: State the reason/s why this Bidder's Bid was unsuccessful. Do NOT include: (a) a point by point comparison with another Bidder's Bid or (b) information that is marked confidential by the Bidder in its Bid.]

4. How to request a debriefing

DEADLINE: The deadline to request a debriefing expires at midnight on [insert date] (local time).

You may request a debriefing in relation to the results of the evaluation of your Bid. If you decide to request a debriefing your written request must be made within three (3) Business Days of receipt of this Notification of Intention to Award.

Provide the contract name, reference number, name of the Bidder, contact details; and address the request for debriefing as follows:

Attention: [insert full name of person, if applicable]

Title/position: [insert title/position] **Agency:**

[insert name of Employer] **Email address:** [insert email address]

Fax number: [insert fax number] **delete if not used**

If your request for a debriefing is received within the 3 Business Days deadline, we will provide the debriefing within five (5) Business Days of receipt of your request. If we are unable to provide the debriefing within this period, the Standstill Period shall be extended by five (5) Business Days after the date that the debriefing is provided. If this happens, we will notify you and confirm the date that the extended Standstill Period will end.

The debriefing may be in writing, by phone, video conference call or in person. We shall promptly advise you in writing how the debriefing will take place and confirm the date and time.

If the deadline to request a debriefing has expired, you may still request a debriefing. In this case, we will provide the debriefing as soon as practicable, and normally no later than fifteen (15) Business Days from the date of publication of the Contract Award Notice.

5. How to make a complaint

Period: Procurement-related Complaint challenging the decision to award shall be submitted by midnight, [insert date] (local time).

Provide the contract name, reference number, name of the Bidder, contact details; and address the Procurement-related Complaint as follows:

Attention: *[insert full name of person, if applicable]*

Title/position: *[insert title/position]* **Agency:**

[insert name of Employer] **Email address:** *[insert email address]*

Fax number: *[insert fax number]* **delete if not used**

At this point in the procurement process, you may submit a Procurement-related Complaint challenging the decision to award the contract. You do not need to have requested, or received, a debriefing before making this complaint. Your complaint must be submitted within the Standstill Period and received by us before the Standstill Period ends.

Further information:

For more information see the [Procurement Regulations for IPF Borrowers \(Procurement Regulations\)](https://policies.worldbank.org/sites/ppf3/PPFDocuments/Forms/DispPage.aspx?doc_id=4005) [\[https://policies.worldbank.org/sites/ppf3/PPFDocuments/Forms/DispPage.aspx?doc_id=4005\]](https://policies.worldbank.org/sites/ppf3/PPFDocuments/Forms/DispPage.aspx?doc_id=4005) (Annex III). You should read these provisions before preparing and submitting your complaint. In addition, the World Bank's Guidance "[How to make a Procurement-related Complaint](http://www.worldbank.org/en/projects-operations/products-and-services/brief/procurement-new-framework#framework)" [\[http://www.worldbank.org/en/projects-operations/products-and-services/brief/procurement-new-framework#framework\]](http://www.worldbank.org/en/projects-operations/products-and-services/brief/procurement-new-framework#framework) provides a useful explanation of the process, as well as a sample letter of complaint.

In summary, there are four essential requirements:

1. You must be an 'interested party'. In this case, that means a Bidder who submitted a Bid in this bidding process, and is the recipient of a Notification of Intention to Award.
2. The complaint can only challenge the decision to award the contract.
3. You must submit the complaint within the period stated above.
4. You must include, in your complaint, all of the information required by the Procurement Regulations (as described in Annex III).

6. Standstill Period

DEADLINE: The Standstill Period is due to end at midnight on *[insert date]* (local time).

The Standstill Period lasts ten (10) Business Days after the date of transmission of this Notification of Intention to Award.

The Standstill Period may be extended as stated in Section 4 above.

If you have any questions regarding this Notification, please do not hesitate to contact us. On behalf of the

Employer:

Signature: _____

Name: _____

Title/position: _____

Telephone:

Email:

Beneficial Ownership Disclosure Form

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

This Beneficial Ownership Disclosure Form ("Form") is to be completed by the successful Bidder¹. In case of joint venture, the Bidder must submit a separate Form for each member. The beneficial ownership information to be submitted in this Form shall be current as of the date of its submission.

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

- *directly or indirectly holding 25% or more of the shares*

RFB No.: [insert number of RFB process]

Request for Bid No.: [insert identification] **To:** [insert

complete name of Employer]

In response to your request in the Letter of Acceptance dated [insert date of letter of Acceptance] to furnish additional information on beneficial ownership: [select one option as applicable and delete the options that are not applicable]

(i) we hereby provide the following beneficial ownership information.

Details of beneficial ownership

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

OR

(ii) We declare that there is no Beneficial Owner meeting one or more of the following conditions:

- directly or indirectly holding 25% or more of the shares
- directly or indirectly holding 25% or more of the voting rights
- directly or indirectly having the right to appoint a majority of the board of directors or equivalent governing body of the Bidder

OR

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

- directly or indirectly holding 25% or more of the shares
- directly or indirectly holding 25% or more of the voting rights
- directly or indirectly having the right to appoint a majority of the board of directors or equivalent governing body of the Bidder]

Name of the Bidder: *[insert complete name of the Bidder] _____

Name of the person duly authorized to sign the Bid on behalf of the Bidder: **[insert complete name of person duly authorized to sign the Bid] _____

Title of the person signing the Bid: [insert complete title of the person signing the Bid] _____

Signature of the person named above: [insert signature of person whose name and capacity are shown above] _____

Date signed [insert date of signing] day of [insert month], [insert year] _____

Letter of Acceptance

..... *[date]*

To: *[name and address of the Contractor]*

Subject: *[Notification of Award Contract No.]*

This is to notify you that your Bid dated . . . *[insert date]* . . . for execution of the *[insert name of the contract and identification number, as given in the PCC]* for the Accepted Contract Amount of *[insert amount in numbers and words and name of currency]*, as corrected and modified in accordance with the Instructions to Bidders is hereby accepted by our Agency.

You are requested to furnish (i) the Performance Security and an Environmental and Social (ES) Performance Security *[Delete ES Performance Security if it is not required under the contract]* within 28 days in accordance with the Conditions of Contract, using for that purpose the of the Performance Security Form and the ES Performance Security Form, *[Delete reference to the ES Performance Security Form if it is not required under the contract]* and (ii) the additional information on beneficial ownership in accordance with BDS ITB 47.1, within eight (8) Business days using the Beneficial Ownership Disclosure Form, included in Section X - Contract Forms, of the bidding document.
[Choose one of the following statements:]

We accept that _____ *[insert the name of Adjudicator proposed by the Bidder]* be appointed as the Adjudicator.

[or]

We do not accept that _____ *[insert the name of the Adjudicator proposed by the Bidder]* be appointed as the Adjudicator, and by sending a copy of this Letter of Acceptance to _____ *[insert name of the Appointing Authority]*, the Appointing Authority, we are hereby requesting such Authority to appoint the Adjudicator in accordance with ITB 48.1 and GCC Sub-Clause 23.1.

Authorized Signature:

Name and Title of Signatory:

Name of Agency:

Attachment: Contract Agreement

Contract Agreement

THIS AGREEMENT made the day of, ..., between.....**[name of the Employer]**. (hereinafter “the Employer”), of the one part, and**[name of the Contractor]**.(hereinafter “the Contractor”), of the other part:

WHEREAS the Employer desires that the Works known as **[name of the Contract]** should be executed by the Contractor, and has accepted a Bid by the Contractor for the execution and completion of these Works and the remedying of any defects therein,

The Employer and the Contractor agree as follows:

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Contract documents referred to.
2. The following documents shall be deemed to form and be read and construed as part of this Agreement. This Agreement shall prevail over all other Contract documents.
 - (a) the Letter of Acceptance
 - (b) the Letter of Bid
 - (c) the addenda Nos _____ (if any)
 - (d) the Particular Conditions
 - (e) the General Conditions of Contract, including appendix;
 - (f) the Specifications
 - (g) the Drawings
 - (h) Bill of Quantities; ³² and
 - (i) any other document listed in the PCC as forming part of the Contract, but not limited to;
 - i. the ES Management Strategies and Implementation Plans; and
 - ii. Code of Conduct for Contractor’s Personnel (ES).
3. In consideration of the payments to be made by the Employer to the Contractor as specified in this Agreement, the Contractor hereby covenants with the Employer to execute the Works and to remedy defects therein in conformity in all respects with the provisions of the Contract.
4. The Employer hereby covenants to pay the Contractor in consideration of the execution and completion of the Works and the remedying of defects therein, the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

IN WITNESS whereof the parties hereto have caused this Agreement to be executed in accordance with the laws of **[name of the borrowing country]**..... on the day, month and year specified above.

Signed by:
for and on behalf of the Employer

in the
presence of:
Witness, Name, Signature, Address, Date

Signed by:
for and on behalf the Contractor

in the
presence of:
Witness, Name, Signature, Address, Date

Performance Security - Bank Guarantee

[Guarantor letterhead or SWIFT identifier code] **Beneficiary:**

[insert name and Address of Employer] **Date:** _ *[Insert date of issue]*

PERFORMANCE GUARANTEE No.: *[Insert guarantee reference number]*

Guarantor: *[Insert name and address of place of issue, unless indicated in the letterhead]*

We have been informed that _ *[insert name of Contractor, which in the case of a joint venture shall be the name of the joint venture]* (hereinafter called "the Applicant") has entered into Contract No. *[insert reference number of the contract]* dated *[insert date]* with the Beneficiary, for the execution of _ *[insert name of contract and brief description of Works]* (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, a performance guarantee is required.

At the request of the Applicant, we as Guarantor, hereby irrevocably undertake to pay the Beneficiary any sum or sums not exceeding in total an amount of *[insert amount in figures]* (_____) *[insert amount in words]*,¹ such sum being payable in the types and proportions of currencies in which the Contract Price is payable, upon receipt by us of the Beneficiary's complying demand supported by the Beneficiary's statement, whether in the demand itself or in a separate signed document accompanying or identifying the demand, stating that the Applicant is in breach of its obligation(s) under the Contract, without the Beneficiary needing to prove or to show grounds for your demand or the sum specified therein.

This guarantee shall expire, no later than the Day of, 2...², and any demand for payment under it must be received by us at this office indicated above on or before that date.

This guarantee is subject to the Uniform Rules for Demand Guarantees (URDG) 2010 Revision, ICC Publication No. 758, except that the supporting statement under Article 15(a) is hereby excluded.

[signature(s)]

Note: All italicized text (including footnotes) is for use in preparing this form and shall be deleted from the final product.

Performance Security - Performance Bond

By this Bond *[insert name of Principal]* as Principal (hereinafter called “the Contractor”) and *[insert name of Surety]* as Surety (hereinafter called “the Surety”), are held and firmly bound unto *[insert name of Employer]* as Obligee (hereinafter called “the Employer”) in the amount of *[insert amount in words and figures]*, for the payment of which sum well and truly to be made in the types and proportions of currencies in which the Contract Price is payable, the Contractor and the Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS the Contractor has entered into a written Agreement with the Employer dated the _____ day of _____, 20_____, for *[name of contract and brief description of Works]* in accordance with the documents, plans, specifications, and amendments thereto, which to the extent herein provided for, are by reference made part hereof and are hereinafter referred to as the Contract.

NOW, THEREFORE, the Condition of this Obligation is such that, if the Contractor shall promptly and faithfully perform the said Contract (including any amendments thereto), then this obligation shall be null and void; otherwise, it shall remain in full force and effect. Whenever the Contractor shall be, and declared by the Employer to be, in default under the Contract, the Employer having performed the Employer’s obligations thereunder, the Surety may promptly remedy the default, or shall promptly:

- (1) complete the Contract in accordance with its terms and conditions; or
- (2) obtain a Bid or Bids from qualified Bidders for submission to the Employer for completing the Contract in accordance with its terms and conditions, and upon determination by the Employer and the Surety of the lowest responsive Bidder, arrange for a Contract between such Bidder and Employer and make available as work progresses (even though there should be a default or a succession of defaults under the Contract or Contracts of completion arranged under this paragraph) sufficient funds to pay the cost of completion less the Balance of the Contract Price; but not exceeding, including other costs and damages for which the Surety may be liable hereunder, the amount set forth in the first paragraph hereof. The term “Balance of the Contract Price,” as used in this paragraph, shall mean the total amount payable by Employer to Contractor under the Contract, less the amount properly paid by Employer to Contractor; or
- (3) pay the Employer the amount required by Employer to complete the Contract in accordance with its terms and conditions up to a total not exceeding the amount of this Bond.

The Surety shall not be liable for a greater sum than the specified penalty of this Bond.

Any suit under this Bond must be instituted before the expiration of one year from the date of issue of the Certificate of Completion.

No right of action shall accrue on this Bond to or for the use of any person or corporation other than the Employer named herein or the heirs, executors, administrators, successors, and assigns of the Employer.

In testimony whereof, the Contractor has hereunto set his hand and affixed his seal, and the Surety has caused these presents to be sealed with his corporate seal duly attested by the signature of his legal representative, this _____ day of __20 .

SIGNED ON _____ on behalf of _____ -

By _____ in the capacity of _____

In the presence of _____

SIGNED ON _____ on behalf of _____

By _____ in the capacity of _____

In the presence of _____

Environmental and Social (ES) Performance Security

ES Demand Guarantee

[Guarantor letterhead or SWIFT identifier code]

Beneficiary: *[insert name and Address of Employer]*

Date: *_ [Insert date of issue]*

ES PERFORMANCE GUARANTEE No.: *[Insert guarantee reference number]*

Guarantor: *[Insert name and address of place of issue, unless indicated in the letterhead]*

We have been informed that _____ (hereinafter called "the Applicant") has entered into Contract No. _____ dated _____ with the Beneficiary, for the execution of _____ (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, a performance guarantee is required.

At the request of the Applicant, we as Guarantor, hereby irrevocably undertake to pay the Beneficiary any sum or sums not exceeding in total an amount of _____ (_____),¹ such sum being payable in the types and proportions of currencies in which the Contract Price is payable, upon receipt by us of the Beneficiary's complying demand supported by the Beneficiary's statement, whether in the demand itself or in a separate signed document accompanying or identifying the demand, stating that the Applicant is in breach of its Environmental and/or Social (ES) obligation(s) under the Contract, without the Beneficiary needing to prove or to show grounds for your demand or the sum specified therein.

This guarantee shall expire, no later than the Day of, 2...², and any demand for payment under it must be received by us at this office indicated above on or before that date.

This guarantee is subject to the Uniform Rules for Demand Guarantees (URDG) 2010 Revision, ICC Publication No. 758, except that the supporting statement under Article 15(a) is hereby excluded.

[signature(s)]

Advance Payment Security

Demand Guarantee

[Guarantor letterhead or SWIFT identifier code] **Beneficiary:** *[Insert*

name and Address of Employer] **Date:** *[Insert date of issue]*

ADVANCE PAYMENT GUARANTEE No.: *[Insert guarantee reference number]*

Guarantor: *[Insert name and address of place of issue, unless indicated in the letterhead]*

We have been informed that *[insert name of Contractor, which in the case of a joint venture shall be the name of the joint venture]* (hereinafter called "the Applicant") has entered into Contract No. *[insert reference number of the contract]* dated *[insert date]* with the Beneficiary, for the execution of *[insert name of contract and brief description of Works]* (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, an advance payment in the sum *[insert amount in figures]* () *[insert amount in words]* is to be made against an advance payment guarantee.

At the request of the Applicant, we as Guarantor, hereby irrevocably undertake to pay the Beneficiary any sum or sums not exceeding in total an amount of *[insert amount in figures]* (*_____*) *[insert amount in words]*¹ upon receipt by us of the Beneficiary's complying demand supported by the Beneficiary's statement, whether in the demand itself or in a separate signed document accompanying or identifying the demand, stating either that the Applicant:

- (a) has used the advance payment for purposes other than the costs of mobilization in respect of the Works; or
- (b) has failed to repay the advance payment in accordance with the Contract conditions, specifying the amount which the Applicant has failed to repay.

A demand under this guarantee may be presented as from the presentation to the Guarantor of a certificate from the Beneficiary's bank stating that the advance payment referred to above has been credited to the Applicant on its account number *[insert number]* at *[insert name and address of Applicant's bank]*..

The maximum amount of this guarantee shall be progressively reduced by the amount of the advance payment repaid by the Applicant as specified in copies of interim statements or payment certificates which shall be presented to us. This guarantee shall expire, at the latest, upon our receipt of a copy of the interim payment certificate indicating that ninety (90) percent of the Accepted Contract Amount, less

provisional sums, has been certified for payment, or on the *[insert day]* day of *[insert month]*, 2 *[insert year]*,² whichever is earlier. Consequently, any demand for payment under this guarantee must be received by us at this office on or before that date.

This guarantee is subject to the Uniform Rules for Demand Guarantees (URDG) 2010 Revision, ICC Publication No. 758, except that the supporting statement under Article 15(a) is hereby excluded.

[signature(s)]

SPECIFICATIONS

(Pages 1-16)

TRADE PREAMBLES.

NOTES:

Descriptions of the measured works in these bills of quantities shall be read in conjunction with these preambles. Where there is a conflict between the said descriptions and these preambles, clarification should be sought from the Architect. Should the Contractor find no parallel specification for items described in the bills, he should notify the Architect and seek further directions before pricing and / or proceeding with the work.

Any work which may be condemned because of the Contractor's failure to observe the provision here above shall be rectified at the Contractor's cost.

The term Engineer wherever used in this section refers to the project Structural Engineer.

TRADE PREAMBLES GENERAL

GENERALLY

Generally for the purpose of the proposed buildings the following British standard specifications are referred to or their equivalent Kenya Bureau of standard specifications.

Glossary of general building terms to conform to B.S.3589. Schedule
of weights of Building materials to conform to B.S.648 Glossary of
formwork terms to conform to B.S.4330

Glossary of terms relating to timber preservation to conform to B.S.426

Glossary of terms relating to builder's hardware to conform to B.S.3827, Part 1-4

Glossary of terms relating to internal flooring, external rendering and floor screeding to conform to B.S.4049

Glossary of terms applicable to sanitation to conform to B.S.4118

Glossary of terms used in glass industry to conform to B.S.3447

Glossary of terms applicable to paint to conform to B.S.2015

Glossary of terms applicable to landscapes work to conform to B.S.3975 Method of
testing plasters top to conform to B.S. 2782

Fire tests on building materials and structures to conform to B.S.476 part 2, 3, 4, 5, 6 and 7.

WALLING

CONCRETE

BLOCKS

Concrete blocks walling 150 mm thick shall have minimum crushing strength of 10.5 Newtons per square millimeter.

All concrete blocks must be cured for a minimum period of four weeks before they are used and all testing of blocks is to be carried out by the Ministry of Works Materials Testing Laboratory.

WALL REINFORCEMENT

Where so specified, shall consist of Hoop Iron 25 mm wide, one strip per 75 mm of wall thickness, laid in alternate joints for the full length of walls, lapped and cramped at running joints and full width of wall at angles and intersections.

CHASING

In load bearing walling for electrical conduit, pipes etc., is to be kept to a minimum. The size to be cut and position and runs of chases are to be approved by the Architect before any cutting is commenced. Horizontal runs will not be permitted. All walls less than 200 mm thick shall be reinforced.

CEMENT

The cement shall be as described under 'Concrete Works'.

SAND

The sand for mortars shall be as described in 'Concrete Work' except that it shall be fine.

LIME

The lime shall be as described in 'plaster work'.

NATURAL STONE WALLING

Where masonry walls are specified, they shall be constructed of Natural Blue Stone and finished as described under the specification item description in the measured works section of these Bills of Quantities.

MORTARS

Cement mortar shall consist of one part of Portland cement, and three parts of sand by volume. (1:3)

The cement/lime mortar shall consist of one part of Portland cement, one part of lime and six parts of sand by volume.(1:1:6)

The ingredients of mortar shall be measured in proper gauge boxes on boarded platform the ingredients being thoroughly mixed dry, and again whilst adding water. In case of cement/lime mortar the sand and lime shall be mixed first then the cement added. All mortar is to be thoroughly mixed to a uniform consistency with only sufficient water to obtain a plastic condition suitable for troweling. No mortar that has commenced to set is to be used or re-mixed.

SETTING OUT

The Contractor shall provide proper setting out rods and set out with the same all work showing openings, heights, cills and lintels and shall build the various walls and piers to the thickness, widths and heights shown upon the drawings. No part of the walling shall be carried up more than three feet higher at one time than any other part and in such cases the jointing shall be made in long steps so as to prevent cracks arising and all walls shall be leveled round at floors and wall heads.

BONDING

All blocks shall be properly bonded together and in such a manner that no vertical joints in any one course shall be within 115 mm of a similar joint in the course immediately above and below. Alternate courses of walling at all angles and intersections shall be carried through the full thickness of the adjoining walls.

All perpend, reveals, quoins and other angles and joints of the walls, etc. shall be built strictly true and square.

LAYING AND JOINTING

All bricks and blocks are to be well wetted before laying and tops of walls where left off shall be well wetted before commencing building. All joints are to be 9 mm thick and flushed up and grouted in solid as the work proceeds.

All the other faces shall be cleaned down on completion with a wire brush or as necessary and mortar droppings, smear marks, etc., removed and rates must include for this.

PUTLOG HOLES

All putlog holes shall be carefully, properly and completely filled up on completion of walling and before plastering is commenced.

FAIR FACE

Walling described as fair faced shall be built with selected blocks and pointed with neat recessed joints.

DAMP PROOF COURSE

Damp proof course shall be bituminous felt complying with B.S. 743 weighing not less than 3.80 Kg per metre, free from tears, holes, lapped and 150 mm at running joints and full width of wall at angles, and intersections and bedded in hot bitumen on a leveling screed of cement and sand (1.4) 10 mm thick neatly pointed where exposed.

PRICES TO INCLUDE

The prices for walling shall include for all straight cutting, bonding plumbing angles, forming reveals, pinning up to underside of concrete soffits and cutting up to sides of columns and cutting and pinning ends of lintels and cills.

CARPENTRY

TIMBER

All timber shall be in accordance with the latest approved Grading Rules issued by the Government of Kenya (legal notice No. 348). Timber for carpentry shall be second (or select) grade.

GENERALLY

All timber shall be inspected as it arrives on the site by the Contractor, and any timber brought on the site and not complying with Specification or not approved must be removed forthwith from the site and only approved timber shall be used in the works.

The Contractor shall upon signing the Contractor, purchase sufficient supplies of specified hardwood to avoid possible shortages of a later date.

SPECIES OF TIMBER

The following timber shall be used: - Standard

Common names

Cypress, Podo, Cedar, Camphor, African Mahogany (Munyama), Meru Oak

TOLERANCES IN THICKNESS

Shall conform with the following extracts from the Government of Kenya Grading Rules (or the Metric equivalent)

1) Hardwood Grading: (First and Second Grades) The

following tolerances in thickness will be admitted: -

- a) 1.5 mm oversize on pieces up to 25 mm in thickness
- b) 1/8 in oversize on pieces over 25 mm and up to 50 mm in thickness
- c) 6 mm oversize on pieces over 50 mm in thickness

2) Softwood grading: Strength Grades (for carpentry)

First and Second Grades. Undersize not allowed

Oversize: all timber to be sawn oversize by 1.5 mm per 25 mm thickness and width. Not more than 3 mm in thickness and not more than 6 mm in width.

3) Softwood Grading: appearance, grades (for Joinery) First and Second Grades All

as for Strength Grades above.

All timber shall be free of live or dead borer beetle or other insect attack when brought upon the site. The Contractor shall be responsible up to the end of the maintenance period for executing at his own cost all work necessary to eradicate insect attack of timber which becomes evident including the replacement of timber attacked or suspected of being attacked, notwithstanding that the timber concerned may have already been inspected and passed as fit for use.

SEASONING OF TIMBER

All timber shall be seasoned to moisture content of not more than 22% for carpentry.

PRESSURE IMPREGNATION TREATMENT

All carpentry timber, sawn joinery and timber grounds for fixing shall be treated with pressure impregnated 'Celcure' or 'Tanalith' solution with minimum net retention of 0.35 lbs. of dry salt per cubic foot. If so required 'charge sheets' issued after treatment with 'Celcure' or 'Tanalith' shall be submitted by the Contractor to the Architect for his retention. All cut ends and any other cut faces or timbers sawn after treatment shall be treated before fixing with 'Celcure' or 'Wolmol' solution brushed on. The Contractors prices for such timber hereinafter must allow for the above treatment.

INSPECTION AND TESTING

The Architect shall be given facilities for inspection of all works in progress whether in workshop or on site. The Contractor is to allow for testing or prototypes of special construction units and the Architect shall be at liberty to select any samples he may require for the purpose of testing i.e. for moisture content, or identification, strength, etc., Such tests shall be carried out by the Forestry Department, the University of Nairobi, or Kenya Bureau of Standards.

CLEARING UP

The Contractor is to clear out and destroy all cut ends, shaving and other wood waste from all parts of the building and the site generally, as the work progresses and at the conclusion of the work.

This is to prevent accidental borer infestation and to discourage termites and decay.

WORKMANSHIP

All Carpenter's work shall be accurately set out in strict accordance with the drawings and shall be framed together and securely fixed in the best responsible manner with properly made joints: all bands, nails and screws etc. shall be provided as necessary, directed, and approved, and the Contractor's prices shall allow for all the foregoing.

All workmanship shall be of the best quality.

All Carpenters' work shall be left with sawn surfaces except where particularly specified to be wrought.

DIMENSIONS

Dimensions of timber for Carpentry left with sawn faces shall comply with the previous clause specifying tolerance in thickness. Dimensions for wrought members shall be as described in joinery.

JOINTING

All timber shall be as long as possible and practicable to eliminate joints. Where joints are unavoidable surfaces shall be in contact over the whole area of the joint before fastenings are applied.

No nails, screws or bolts are to be fixed in any split end. If splitting is likely, or is encountered in the course of the work, holes for nails are to be pre-bored at diameters not exceeding $\frac{4}{5}$ th of the diameter of the nails. Clenched nails must be bent at right angles to the grain. Bulldog connectors shall also be used for connections where appropriate.

Lead holes are to be bored for all screws. When the use of bolts is specified the holes are to be bored from both sides of the timber and are to be of the diameter $D + 1.6$, where D is the diameter of the bolt. Nuts must be brought up tight but care is to be taken to avoid crushing of the timber under the washers.

FIXING JOINERY

All beads, fillets and small members shall be fixed with round or oval brads or nails well punched in and stopped. All larger members shall be fixed with screws. Brass screws shall be used for fixing of all hardwoods, the heads, let in and palleted over with wood to match the grain.

BEDDING FRAMES, ETC.

The contractor's rates must include for bedding frames, sills, etc., in mortar or dressing surfaces of walls etc. in lieu.

PLUGGING CONCRETE AND WALLS

Round wood plugs shall not be used, all work described shall be fixed with screws to plugs formed by drilling concrete walls, etc., with a proper tool of suitable size at 750 mm spacing and filling the holes completely with 'philplug' rawl plastic or rawl plugs in accordance with the manufacturer's instructions. Alternatively and where so agreed by the Architect hardwood dovetailed fixing slips, dipped in 'wolmanol' or 'Celcure B' solution and cut and pinned or bedded in cement mortar (1.3) may be used.

FIBREBOARD

Shall be 12 mm 'Celotex' or equal and approved

PLYWOOD

Shall comply with B.S. 1455 (First Quality 'interior type' unless otherwise specified)

BLOCKBOARD

Shall be laminated board faced both sides with 4 mm plywood. Exposed edges shall be lipped with 19 mm hardwood and rates shall include for lipping.

PROTECTION OF JOINERY

All fixed joinery which in the opinion of the architect is liable to become bruised or damaged in any way, shall be completely cased and protected by the Contractor until the completion of the works.

FLUSH DOORS

All flush doors shall be manufactured to the thicknesses specified and consists of 100 mm wide framing all round with horizontal core battens at not more than 75 mm centers pressure impregnated as described and bored with 12 mm diameter ventilation holes at 300 mm centers. Doors shall have two lock blocks and be faced both sides with 6 mm plywood as specified and have 25 mm mahogany twice rebated lipping all round and otherwise be equal to an approved sample. External flush doors shall be as described above but faced both sides with marine quality plywood.

PRICES TO INCLUDE

Prices of items hereafter shall include for the foregoing labours, etc., and in addition all prices for linear items are to include all internal and external angles, either mitred or tongued, all fair, fitted, stopped, notched or returned ends, all similar incidental labours and all short lengths.

BOTTOM EDGES

Bottom edges of doors shall be painted with one coat of approved primer before fixing.

IRONMONGERY

All locks and ironmongery shall be fixed with screws etc. to match. Before the woodwork is painted, handles shall be removed carefully stored and re-fixed after completion of painting and locks oiled and left in perfect working order. All keys shall be labeled with the door reference numbers marked on labels before handing over to the Architect on completion.

METAL WORKS

ALL MATERIALS

Shall be of the best quality, free from defects. The materials in all stages of transportation, handling and piling shall be kept clean and free from injury and breaking, bending and distortion prevented.

NAILS, SCREWS AND BOLTS

Shall be of the best quality mild steel of lengths and weights approved by the Architect. Nails shall be to B.S 1202 and bolts to B.S 916.

WORKMANSHIP

All work shall be carried out in the most workmanlike manner and strictly as directed by the Architect.

Welding shall be neatly cleaned off and units shall be prefabricated in the workshop whenever possible, the minimum of site welding being employed.

All screwed work shall have full internal and external threads and holes shall have been cleared off. Counter-sinking must be concentric.

FIXING METAL WINDOWS AND DOORS

The Contractor's prices for fixing metal windows, doors, etc., shall include for assembling and fixing, cutting mortises for lugs in concrete or walling and running with cement mortar (1.4) bedding frames in similar mortar and pointing in mastic, bedding cills, transoms and mullions in mastic, making good plaster around frames both sides and fixing, oiling and adjusting all fittings.

MILD STEEL

Steel for burglar bars and reinforcement shall comply with B.S 15. No work shall be fabricated until site dimensions have been checked and no additional claim will be accepted should final dimensions differ from those on the drawings.

All welds shall be ground smooth and the Contractor shall ensure that the metal work is prepared for painting as described in painting and decorating.

The Contractor is to ensure that all work is erected plumb and true and be so maintained until properly secured by permanent fixing.

ELECTRONIC WELDING

All welding is to be in accordance with the requirements of B.S 1856 and 938 and the electrode shall comply with B.S. 639.

Fusion faces shall be free from irregularities, which could interfere with the welding materials. Those faces shall also be free from any deleterious matter such as rust, grease and paint.

All welds shall be prepared by planning or machine frame cutting.

During welding all parts will be maintained in their correct position.

Welds shall be carried out with each run closely following the one prior with sufficient time between to allow for removal of slag.

Each run of weld is to be inspected and sub-contractor shall ensure that unsatisfactory welds are cut out or remade to the required standard.

The minimum size of fillet weld shall be 6 mm.

All completed welds shall have regular and smooth surfaces. The weld material shall be solid with complete fusion throughout the weld material and to the metal.

Any defects shall be cut or made good to approval.

External faces of butt welds are to be ground smooth.

PAINTING

All steel is to be wire brushed and sanded, and any loose scale, dirt or grease shall be removed before and painting is commenced. One coat of red oxide primer type A to BS 2523 shall be applied at the shop. Any damage to the priming paint shall be made good to the Architect's satisfaction.

PLASTER WORK AND OTHER

FINISHES CEMENT

The cement shall be as previously described in 'Concrete Work'.

SAND

The sand shall be as described for the fine aggregate but that for plastering shall be light in colour and well graded to a suitable fineness in accordance with the nature of the work in order to obtain the finish directed.

LIME

The lime for plastering shall comply with B.S 890 Class 'A' for non-hydraulic lime and shall be as rich as obtainable and to approval. It must be freshly burnt and shall be slaked at least one month before being used by drenching with water, well broken up and mixed and the wet mixture shall be passed through a sieve of sixty four meshes to the square inch. Lime putty shall consist of freshly slaked lime as above described, saturated with water until semi-fluid and passed through a fine sieve: it shall then be allowed to stand until superfluous water has evaporated and it has become of the consistency of thick paste, in no case for a shorter period than one month before use, during which it must be kept damp and clean and no portion of it allowed to become dry.

Alternatively, hydrated lime with 70% average calcium oxide content may be used and it must be protected from dampness until required for use. It shall be soaked to a putty at least 24 hours before use.

COMPOSITION OF PLASTERS, ETC.

A mix referred to as 1:4 shall mean 41 kg of cement and 0.45 cm. of sand. All other mixes shall be construed in a like manner.

HACKING ETC.

The prices for all paving and plastering, etc. shall include for hacking concrete surfaces and for racking out joints of walls 13 mm deep and for cross scoring undercoats to form a proper key.

Plastering on walls generally shall be taken to include flush faces of lintels, beams, etc. in same.

All surfaces to be paved or plastered must be brushed clean and well wetted before each coat is applied. All cement pavings and plaster shall be kept continually damp in the intervals between application of coat and for seven days after the application of the final coat.

DUBBING OUT

Where required shall be composed of one part of cement to six parts of sand.

Partially or wholly set materials will not be allowed to be used or re-mixed. The plaster, etc. mixed must be used within two hours of being combined with water.

SAMPLES

The Contractor shall prepare sample square yards or the screeds, pavings and plastering as directed until the quality, texture and finish required is obtained and approved by the Architect, after which all work executed shall conform with the respective approved samples.

FINISH GENERALLY

All screeds and paving shall be finished plump, square, smooth, hard and even and junctions between surfaces shall be perfectly true, straight and square.

All work shall be approved and any not complying with the above shall be hacked away and replaced at the Contractor's expense.

ARISES AND ANGLES

All arises and angles shall be clean and sharp or slightly rounded or thumb coved as directed including neatly forming mitres.

MAKING GOOD

All making good shall be cut out to a rectangular shape, the edges undercut to form dovetail key and finished flush with the face of the surrounding paving or plaster, cut out and make good all cracks, blister and other defects and leave the whole of the work perfect on completion.

PRICES TO INCLUDE

In addition to the foregoing, prices of superficial items are to include for work in narrow widths, all linear labours, angles and arises, all fair edges, for making good up to or stopping to a line at

the required level at top of skirting or dado rails where directed and for making good up to windows, doors and similar.

The prices for all linear items unless otherwise measured are to include for all short lengths, angles and arises, mitres and ends of every description.

FLOOR SCREEDS

Shall be composed of cement and sand and shall not be laid in an area exceeding one hundred and twenty square feet during any period of 24 hours. As bays are formed, batten strips must be used to retain the exposed edge of the screed.

Lime plastering shall consist of first coat in cement lime and sand (1:2:9) and finish coat of lime putty skin with 10% cement added. The two coats shall have a total finished coat of not less than 12 mm thick.

The first coat shall be trowelled to a perfectly true and even surface and finished with a wood float, the surface being sprinkled with water from a brush during the process and before it has set, thoroughly scratched to form key. The finishing coat shall not be less than 1 mm thick thoroughly worked with trowel and sprinkled with water as before and be brought to a uniform smooth hard surface.

Lightweight roof screeds shall consist of cement, sand and pumice (1:3:7) and finished with a 13 mm layer of cement and sand (1:4). Screeds shall not be laid in areas exceeding one hundred and twenty square feet during any period of 24 hours. As bays are formed batten strips must be used to retain the exposed edge of the screed. Screeds shall be finished to falls and cross falls to receive other finishes as specified.

P.V.C. FLOOR TILING

P.V.C. floor tiling shall be asbestos based vinyl floor tiles complying with B.S 3260.

WHITE GLAZED WALL TILES

Shall be imported quality and of approved size and thickness, with associated fittings all to B.S 1281. Tiles shall be soaked in water, laid with straight horizontal and vertical joints and bedded in cement screed (1:4) and pointed in white cement and cleaned down on completion all to Architect's approval.

Rates for linear items shall include for all special fittings and cutting at angles and intersections.

GRANOLITHIC PAVINGS

The granolithic shall consist of one part cement (by volume) to two and a half parts (by volume) of local granite chips graded from 6mm down to 3 mm with not more than 15% to pass a No. 50 B.S sieve.

Granolithic shall be spread well compacted and given only sufficient trowelling to produce a perfectly level surface immediately after laying. When the granolithic has stiffened sufficiently so that a hard surface can be obtained, then the surface shall be polished with a steel float to a perfectly even and smooth surface. On no account will dusting with neat cement to the surface be permitted.

POLISHED TERRAZZO

Shall be laid by an approved Sub-Contractor and shall consist of a screed or backing coat and a finishing of 'Snow Crete' and the marble chips (1:2) mixed with 'cementone No. 1' colouring in accordance with Manufacturer's instructions. Overall thickness is to be as later specified.

The finishing coat shall be a minimum of 12 mm thick for pavings and 9 mm thick for wall finishes, trowelled to a smooth and even finish and well rubbed and polished with carborandum.

TYROLEAN RENDERING

Tyrolean rendering shall consist of a backing coat approximately 12 mm thick of one part cement with 10% of lime by volume added to the cement and four parts of sand and a finishing coat of an approved shade of cement and sand of a suitable mix applied with a cement spraying machine to the Architect's approval. All adjoining surfaces shall be masked whilst spraying.

GLAZING

GLASS

All glass shall be of British manufacturers complying with B.S 952, free from flaws, bubbles, specks and other imperfections. All glass shall be delivered in proper containers with maker's name, guarantee, type of glass and thickness or weight of glass attached to the outside of the containers.

Glass panes shall be cut to sizes to fit the openings with not more than 1.5 mm play all round and where puttied shall be sprigged to wood or clipped to metal frames.

Clear sheet glass shall be ordinary glazing (O.Q.) quality. Polishes plate glass shall be G.G. quality.

Obscured glass shall be roughcast plain rolled glass 6 mm thick. Wired

glass shall be polished Georgian wired glass 6 mm thick. **BEADS**

AND WASHLEATHER

The glass to doors and screens and other places where vibration may occur shall be bedded in wash-leather with beads and fixed with brass cups and screws.

The timber rebates shall be cleaned, primed and painted with one coat of oil paint.

PUTTY

For glazing in wood frames shall be composed to pure linseed oil and powdered whiting free from tight grit in accordance with B.S 544 type 1 putty.

Putty for glazing in metal frames shall be quick hard setting tropical putty specifically manufactured for use with steel windows.

BEDDING STRIPS

Shall be of plastic or wash-leather approved by the Architect and shall be cut to fit exactly the line of frame and beads.

ON COMPLETION

Remove all broken scratched or cracked panes and replace with new to the satisfaction of the Architect; clean inside and out with an approved cleaner. On no account shall windows be cleaned by scrapping with glass.

PAINTING AND DECORATING

All work under this trade must be executed by an approved specialist, unless the Architect agrees otherwise.

GENERALLY

The Contractor shall arrange his programme for work such that all other trades within the area where painting is being done are completed before painting begins. Before painting the Contractor must prepare the surfaces to the satisfaction of the Architect and in accordance with the paint manufacturer's instructions.

All plaster, metal, wood or other surfaces which are to receive paint, stain, polish, distemper or paintwork of any description are to be carefully inspected by the painting Sub-Contractor and the main Contractor before paintwork commences. The Sub-Contractor should ensure that all such surfaces are finished (by the main Contractor) satisfactorily before commencing any paintwork as he (the Sub-Contractor) will be held responsible for any defective paintwork arising from the background being of unsatisfactory finish prior to the paint being applied on it.

PAINTING GENERALLY

All materials are to be of the best quality and shall be of an approved proprietary brand selected from the latest Schedule of approved paints issued by the Ministry of Works.

All materials to be applied externally shall be of exterior quality and/or recommended by the Manufacturer's for external use.

All materials shall be delivered on site intact in the original sealed drums or tins and shall be mixed and applied strictly in accordance with manufacturer's instructions and to the approval of the Architect.

Unless specifically instructed or approved by the Architect no paints distemper, etc., are to be thinned or otherwise adulterated, but are to be used as supplied by the Manufacturers and direct from the tins.

If required by the Architect the Contractor is to provide at his own expense samples of paints, etc., with containers and cases to be forwarded carriage paid by the Contractor for analysis to a laboratory.

The priming, undercoats and finishing coats shall each be of differing tints and the priming and undercoats shall be the correct brands and tints to suit the respective coats, in accordance with the Manufacturer's instructions. All finishing coats shall be of colours and tints selected by the Architect. Each coat must be approved by the Architect before the next coat is applied.

Each coat shall be properly dry and in the case of oil or enamel paints shall be well rubbed down with fine glass paper before the next coat is applied. The paintwork shall be finished smooth and free from brush marks.

Colour cards of all paints, etc., shall be submitted to and samples prepared for approval of the Architect before laying on and such samples, when approved, shall become the standard work.

Oil paints, emulsion paints and distempers shall be applied by means of a brush or spray gun or rollers of an approved type, where so agreed by the Architect. No painting is to be done in wet weather or on surfaces, which are not thoroughly dry.

Prices of paint, distemper, etc. shall include for preparation of surfaces, rubbing down between each coat, stopping, knotting, etc., and all other work in connection and as described and as necessary to obtain a first class and proper finish to approval.

Emulsion paint on ceiling and all undercoats of emulsion paint and completed oil painting on walls shall be completed before floorings are laid. Final coats of emulsion paints on walls shall be applied after such flooring has been laid complete.

SAMPLES

The contractor shall furnish at the earliest possible opportunity before work commences and at his own cost, samples of painting for the Architect's approval and any further samples in the case of rejection until such samples are approved by the Architect and such samples when approved shall be the minimum standard for the work to which they apply.

The Architect may reject any materials or workmanship not in his opinion up to the approved samples and these must be removed from the site without delay.

PREPARATION AND PRIMING OF PLASTER, ETC., SURFACES

Plaster surfaces shall be perfectly smooth, free from defects and ready for decoration. All such surfaces shall be allowed to dry for a minimum period of six weeks, stopped with approved plaster stopping compound and rubbed down flush, as necessary, and then be thoroughly brushed down and left free from all efflorescence, dirt and dust immediately prior to decorating.

Plaster surfaces which are to be finished with emulsion, oil or enamel paint, shall be primed with Leyland primoplas P.20 or other equal and approved and applied in accordance with the Manufacturer's instructions.

PREPARATION AND PRIMING OF FIBREBOARD

Fibreboard or similar surfaces shall be lightly brushed down to remove all dirt, dust and loose particles and have all nail holes or other defects stopped with an approved plaster stopping compound rubbed down flush and left with a texture to match surrounding materials and shall receive one coat primer at last.

PREPARATION AND PRIMING OF METAL WORK

All surfaces shall be thoroughly brushed down with wire brushes, sanded and scraped where necessary to remove all scale rust, etc., immediately prior to decoration and given one coat of red oxide primer, where severe rust exists and if approved by the Architect a proprietary de-rusting solution may be used in accordance with Manufacturer's instructions.

Galvanized surfaces shall be treated before painting with a solution of calcium plumbate, applied in strict accordance with the Manufacturer's printed instructions (agent: M/s. Dodwell & Company, Nairobi) or with an approved calcium plumbate primer.

PREPARATION AND PRIMING WOODWORK

All woodwork shall be rubbed down, all knots covered with a thick coat of good shellac or aluminium knotting; primed and one coat of approved ready mixed proprietary wood primer and all cracks, nail holes, defects and uneven surfaces, etc., stopped and faced up with hard stopping rubbed down flush. Plywood shall be brushed filled over the entire surface.

Woodwork to receive finishes other than paint shall have all stains removed and shall be well rubbed down and have all defects leveled with hard stopping of a colour to match the adjoining surface.

WOOD PRESERVATIVE

All woodwork in contact with walling or plaster shall be treated after cutting and preparation but before assembly or fixing with one coat of approved wood preservative.

WAX POLISH

Wax polish shall be furniture polish of an approved brand, and wood surfaces shall be clean, smooth, and free from oil or grease or any other blemishes. A minimum of two coats shall be applied to approval.

EMULSION PAINT

Emulsion paint shall be of approved brand. After preparation as specified above a minimum of three coats shall be applied using a thinning medium of water only if and as recommended by the Manufacturer.

An approved plaster primer tinted to match may be used for the first coat.

ENAMEL PAINT ON METAL WORK AND WOODWORK

Enamel paint shall be of approved brand. Apply one undercoat and two finishing coats, after preparation and priming as specified above.

IRONMONGERY

Where instructed, all ironmongery on existing components to be painted shall be removed from joinery, steel windows and louvers before painting is commence, and shall be cleaned and oiled and adjusted if necessary and re-fixed after completion of painting.

PAINTING ITEMS

Painting items as billed hereafter shall include for preparing and priming surfaces as described above.

COVER UP

Cover up all floors, fittings, etc., with dustsheets when executing all painting and decorating works.

CLEANING AND TOUCH UP

Paint splashes, spots and stains shall be removed from floors, woodwork, etc., any damaged surfaces touched up and the whole of the work left clean and excellent upon completion.

DRAWINGS

LIST OF DRAWINGS

ARCHITECTURAL:

- A.01.1 - Wing layouts – Barabara
- A.01.2 - Ground Floor plan – Barabara
- A.01.3 - First Floor plan – Barabara
- A.01.5 - Reflected Ceiling – Barabara
- A.01.6 - Reflected Ceiling – Details –
 - Partition elevation
 - Door Schedule
 - Internal Partitions
- A.01.7 – Demolition Works – Barabara.

A. ELECTRICAL.

B. MECHANICAL.

BILLS OF QUANTITIES

BILLS OF QUANTITIES:-

- ❑ Bill No. 1 – PRELIMINARIES. (pages 1.1-1.19)
- ❑ Bill No. 2 – BARABARA PLAZA. (pages 2.1-2.17)
- ❑ Bill No. 3 – PROVISIONAL SUMS. (pages 3.1)

EBK – Barabara Plaza.

BILL NO.1:- PRELIMINARY COSTS.

ITEM	DESCRIPTION	SHS.
	PARTICULAR MATTERS A. EMPLOYER:- The term “Employer” wherever used in these Bills of Quantities and in all other Contract Documents shall mean:- The Principal Secretary State Department of Roads. P.O 30324 - 00100, NAIROBI. B. PROJECT MANAGER The term “ PM” wherever used in this Bills of Quantities shall be deemed to imply Project Manager as defined in condition 1, of the conditions of Contracts or such person or persons as maybe duly authorized to represent him on behalf of the Government. C. ARCHITECT: - The term “Architect” shall be deemed to mean “The PM” as defined above. D. QUANTITY SURVEYOR: -The term “Quantity Surveyor” shall be deemed to mean “The PM” as defined above. E. MECHANICAL, ELECTRICAL AND ICT ENGINEER:- The term “Mechanical, Electrical and or ICT Engineer” shall be deemed to mean “The PM” as defined above. F. CONTRACTOR:- The term “the Contractor” wherever used hereinafter and in all Contract Documents shall mean the person or persons, partnership firm or company whose Tender for the works hereinafter defined has been accepted by the Employer and who has, or have signed this Contract and shall include his or their heirs, executors, administrators, assignees, successors and duly appointed representative (s) Carried to collection Kshs.	

ITEM	DESCRIPTION	SHS.
(A)	EMPLOYER’S REPRESENTATIVE:- Wherever the term “Architect, Quantity Surveyor and Engineers” as defined above are used in all Contract Documents they shall be deemed to imply the “Employer’s Representatives” to represent them on behalf of the Employer or the Successor in office of such persons as may be deputed by such representatives to act on their behalf for the purpose of this contract.	
(B)	LOCATION OF SITES:- The sites of the proposed works is on Ground floor and part first floor at BARBARA PLAZA.	
(C)	SCOPE OF CONTRACT:- The works to be executed under this contract comprise: Offices partitions DESCRIPTION OF THE WORKS	
(D)	BILL NO. 1 – PRELIMINARIES: - These shall be fully priced. 1.0 Measured Builder’s Works:- These shall comprise the following:- BILL NO. 2 – BARABARA PLAZA. Element No.1 – Demolitions of: - wallings, Doors, flush doors, ceilings.	
	Carried to collection	Kshs.

ITEM	DESCRIPTION	SHS.
	DESCRIPTION OF THE WORKS (CONT'D) BILL NO. 2 – BARABARA PLAZA (CONT'D) Element No.2 – Partitioning – Comprises: new gypsum board Double layer partition with cavity instilled with sound proof materials and on aluminium frame. Element No.3 – Doors and windows comprises: mahogany door frames, Architraves and Quadrants. Doors shall be – Laminated mdf glazed timber panel doors, solid timber panel doors complete with ironmongery. Windows shall be fitted with new vertical blinds and cleaned. Element No.4 – Internal wall finishes. New granito wall tiles will be supplied and fixed. Existing wall surfaces will be painted three coats of emulsion paint. Element No.5 – Floor finishes – New granito floor tiles shall be supplied and fixed at the lift lobby. New carpet will be fixed. Element No.6 – Ceiling finishes – New gypsum plasterboard on screw – up aluminium tee suspension grid including hangers. Fibre acoustic suspended ceiling panels. Element No.7 – Joinery Fittings – Shall comprise: New low level kitchen cupboards, drawers, high level kitchen cupboards, toilets, vanity tops, new doors at the service dusts and security desks. Bill No. 3 – PROVISIONAL SUMS. - Signage and contingencies. Carried to collection Kshs.	

ITEM	DESCRIPTION	SHS.
A.	PAYMENTS TO DOMESTIC SUB-CONTRACTORS:- The main Contractor will be fully responsible for paying his Domestic Sub-Contractors but the Employer reserves the right in very exceptional circumstances to make such payments direct in the interest of the project where the completion thereof might be jeopardized by any dispute or veraciousness between the Main Contractor and any of the Sub- Contractors.	
B.	PRELIMINARY ITEMS:- (a) All preliminary items shall be consistently priced and no “Front loading” shall be allowed. Any amount in excess of what the Employer, may consider as a fair proportion of the Contract Sum shall be relocated in the measured section of these Bills of Quantities or may, at the discretion of the Employer, render the tenderer liable to disqualification. (b) Lump sums entered against any item of General or Particular Preliminaries will be included in the appropriate valuation and interim certificates according to reasonable assessment by the Quantity Surveyor of actual costs involved in the item. (c) Any balance between this assessment and the figure in the Bills of Quantities will be included in subsequent valuations by Monthly instalments over the balance of the Contract period. Bills of Quantities will be included in subsequent valuations by monthly instalments over the balance of the contract period.	
C.	PRICE FLUCTUATIONS:- Shall not apply. The contract shall be a fixed price contract.	
	Carried to collection	Kshs.

ITEM	DESCRIPTION	SHS.
A.	DEFINITION AND ABBREVIATIONS:- Terms used in these Tender Documents shall be interpreted as follows:- “As described” shall mean as described in the ‘General description of materials and workmanship’ herebefore in the Bills of Quantities and “General specifications for Building works” published by Ministry of public works. “B.S” shall mean the current British Standard Specification published by the British Standard Institution, 2 Park Street, London W.1 England. “B.S.C.P” shall mean British Standard Code of Practice. "mm" shall mean linear millimetre(s). "mm²" shall mean square millimetre(s). "m or lm" shall mean linear metre(s). "sm or m²" shall mean square metre(s). "cm or m³" shall mean cubic metre(s). "Kg" shall mean Kilogram(s). "No" shall mean number. "Hr" shall mean hour. "Pr" shall mean Pair. Ditto shall mean the whole of the proceeding description except as qualified in the description in which it occurs. Where it occurs in brackets, it shall mean the whole of the preceeding description which is contained in the appropriate brackets. M/S Shall mean Measured Separately “Approved” shall mean as approved by the Employer’s Representative “As Directed” Shall mean as directed by the Employer’s Representative Carried to collection Kshs.	

ITEM	DESCRIPTION	SHS.
	A. DEFINATION AND ABBREVIATIONS (CONT'D):- “Selected” Shall mean selected by the Employer’s Representative “Singular and Plural” Words importing the singular only shall also include plural and Vice-versa where the context required. “100 – 200” shall mean over 100 but not exceeding 200. The same shall construed for all similar descriptions. B. PRICING BILLS OF QUANTITIES:- The Contractor shall price out individually and in detail all items in these Bills of Quantities and under no circumstances will Lump Sums be allowed. All rates and figures entered in the Bills of Quantities must be done in ink. Without authority, the Contractor shall not alter or otherwise qualify the text of the Bills of Quantities, otherwise such alterations may render the tender liable for disqualification and in any case will be ignored. C. SITES LEVELS:- Before commencing work, the Contractor must arrange for and agree with the Architect and Quantity Surveyor the existing sites levels and similarly establish and agree a bench mark. Carried to collection Kshs.	

ITEM	DESCRIPTION	SHS.
A.	SETTING OUT:- The Contractor shall set out the works in accordance with dimension and levels shown on the drawings and shall be responsible for the correctness of all dimensions and levels so set out by him and will be required to amend all errors arising from inaccurate setting out at his own cost and expense. In the even of any so set out by him and will be required to amend error or discrepancies these shall be reported by the Contractor to the Architect for his immediate attention. No work shall commenced by the Contractor until he has received instruction from the Architect to adjust such discrepancies which may be proved. Upon receipt of such instructions, the Contractors shall thereupon be responsible for adjustments necessary. No claim for extra expense or relief from the provisions of Clause 5 of the Conditions of Contract based on any discrepancy or error in the dimensions or levels shown on the Drawings may me made thereafter. Before any work is commenced by the Sub-Contractors or specialists firms, dimensions must be checked on the site and/or building and agreed with the Contractor irrespective of the comparable dimensions shown on the drawings. The Contractor shall be responsible for the accuracy of such dimensions.	
B.	TOOLS, PLANT AND SCAFFOLDING:- The Contractor shall provide all necessary vehicles, appliances, cranes, hoists and other plant including ladders, staging, access gangways, tarpaulins, tools, moulds, template etc necessary for the proper executions of the works and properly maintain them during the Contract period. And shall remove the same on completion. All such plant, tools and equipment shall comply with all regulations in force throughout the period of the contract and shall be altered or adopted during the contract period as may be necessary to comply with any amendments in or additions to such regulations.	
	Carried to Collection	Kshs.

ITEM	DESCRIPTION	SHS.
A. SANITATION FOR THE WORKS:- The Contractor shall provide and maintain proper sanitation of the works to the satisfaction of the Local Authorities, labour Department and the Architect. B. SECURITY OF WORKS:- The Contractor shall be entirely responsible for the security of all the works, stores, materials, plants, personnel, etc both his own and sub- contractor's and must provide all necessary watching, lighting and other precautions as necessary to ensure security against theft, loss or damage and the protection of the public. All articles and materials supplied by the Employer must be signed for by the Contractor at the time taking delivery as having received them in good order and thereafter the Contractor shall be responsible for any damage or loss of the same. C. SUPERVISION AND WORKING HOURS:- The works shall be executed under the direction and reasonable satisfaction of the Architect who shall at all times during normal working hours have access to all works or any other places where such work is being prepared for the contract. Working hours shall be those generally in force in the Building and civil Engineering Trades in Kenya. No work shall be carried out at night or gazzetted holidays unless the Architect shall so direct. No work shall be covered up nor shall any concreting be carried out in the absence of the clerk of works without the prior approval of the Architect in writing. D. DISTURBANCE OR NUISANCE:- The Contractor shall allow for taking all necessary precautions in the order of execution of the works so as to avoid causing disturbance or nuisance to the occupants of any existing buildings on or adjacent to the works and to the public and for complying with the Architects instruction in this project.	Carried to Collection	
	Carried to Collection Kshs.	

ITEM	DESCRIPTION	SHS.
A.	LABOUR REGULATIONS & FAIR WAGES:- The Contractor shall comply with the Regulation of Wages and Conditions of Employment Act and pay wages and other emoluments and observe working hours and Conditions of labour not less favourable than the minimum remuneration and conditions of employment applicable in the County in which the work is carried out.	
	B. ADVERTISEMENTS:- Any form of advertising upon the works or any place which the Contractor has possession for the purpose of carrying out this contract shall not be allowed except with express and written consent of the Architect and the Contractor shall not take, publish or advertise any photographs or use the name of any Consultants without consent granted in the aforesaid manner.	
C.	HOARDING:- Hoarding will be required. Provide erect and maintain all necessary scaffolding, sufficiently, strong and efficient for due performance of the works including sub-contract works, provide special scaffolding as required by sub-contractors, alter and adopt all scaffolding as when required during the works and remove on completion.	
	D. PLANT AND LABOUR RETURNS:- The Contractor shall prepare and deliver to the Architect or his representative detailed returns showing the number and category of his supervisors, numbers of the several classes of labour and plant employed on the works together with those of all his Sub-contractors. The Contractor shall keep a visitors book on the sites and shall ensure that the names of all visitors to the sites are duly recorded.	
	Carried to collection Kshs.	

ITEM	DESCRIPTION	SHS.
A. TRANSPORT TO AND FROM THE SITES:- The Contractor shall include in his tender price for the transport of materials, workmen, etc., to and from the sites of the proposed works, at such hours and by such routes as are permitted by the Authorities. B. BLASTING OPERATIONS:- Blasting will only be allowed with express permission of the Architect. All blasting operations shall be carried out at the Contractor's sole risk and in accordance with any Government Regulations laid down by the Architect governing the use and storage of explosive. C. INSURANCES:- The Contractor shall insure as required. No payment on account of the work executed shall be made to the Contractor until he has satisfied the Architect either by production of an insurance policy or an Insurance Certificate that the provisions of insurance have been complied with. Thereafter, the Architect shall from time to time ascertain that premiums are duly paid by the Contractor who shall, if called upon to do so, produce receipted premium renewals for the Architect's inspection. The Contractor shall maintain as required throughout the execution of the works and make good any damage, at his own expense, to public and private roads arising from or consequent upon the execution of the works to the satisfaction of the owners and the Architect. WATER FOR WORKS:- D. The Contractor shall provide at his own risk and cost all necessary clean and fresh water for the works including that required by the Sub- Contractors on site; and for any temporary plumbing, meter and storage facilities and clear away on completion and make good works disturbed. No guarantee is given or implied that sufficient water will be available from the mains and the Contractor must make his own arrangements for augmenting this supply at his own cost if necessary. Nominated Sub-Contractors are to be made liable for the cost of any water or any installation specially provided for their own use.		
	Carried to collection	Kshs.

ITEM	DESCRIPTION	SHS.
A.	LOCAL REGULATIONS AND BY-LAWS:- The Contractor is to comply with all local regulations and by laws of the Local Authority including serving of notices, paying of fees including all stamp charges.	
B.	POLICE REGULATIONS:- The Contractor shall at all times observe police and traffic Regulations including those regarding the loading or unloading of or waiting by vehicles on the Public Highways and Contract Sum shall be deemed to include for strict compliance therewith.	
C.	LIGHTING AND POWER FOR THE WORKS:- The Contractor shall provide at his own risk and cost for the required electricity supply for the works including that required by Sub-Contractors and others on site, and pay all fees and obtain all permits in connection therewith. Nominated Sub-contractors are to be made liable for the cost of any electrical power used and for any installations provided specially for their own use.	
D.	EXISTING PROPERTY:- The Contractor shall make all precautions to avoid damage to all existing property including roads, cables, drains and other services and he will be held responsible for and shall make good all such damage arising from the execution of this Contract at his own expense to the satisfaction of the Architect.	
E.	ACCESS TO SITES AND TEMPORARY ROADS:- Means of access to the sites shall be agreed with the Architect prior to commencement of the work and the Contractor must allow for construction and maintaining the necessary temporary access roads culverts, crossing etc. removing them and making good and reinstating all works and surfaces disturbed to the satisfaction of the Architect.	
	Carried to collection	Kshs.

ITEM	DESCRIPTION	SHS.
A.	AREA TO BE OCCUPIED BY THE CONTRACTOR:- The area of the sites which may be occupied by the Contractor for use as storage and for the purposed of erecting workshops etc, shall be defined on site by the Architect.	
B.	LABOUR CAMPS:- No labour may be housed on sites with the exception of watchmen. The Contractor shall, erect and maintain satisfactorily housing for the watchmen and shall remove the same on completion of the works. Unless the Architect otherwise agrees the Contractor is to recruit locally all his unskilled labour and as much as possible of his skilled labour.	
C.	TELEPHONE:- The Contractor shall apply for and arrange for the installation of modern telephone and pay all charges therewith. The telephone will be available for use by the Consultants free of any cost during working hours.	
D.	SITES OFFICES:- The Contractor shall erect and maintain a temporary sites offices for the sole use of the Consultants having a minimum floor area of 30 square, metres with a concrete or timber floor, glazed windows and equipped with desk with lockable drawers, table and chairs sufficient for sites meetings and plan chest for drawings. Provisions shall be made for lighting and cleaning facilities for the duration of the works. The Contractor shall also construct and maintain a lock-up pedestal type water closet or other acceptable toilet facilities for the use of the Consultants and pay all connection, maintenance and disconnection charges arising therefrom.	
	Carried to collection	Kshs.

ITEM	DESCRIPTION	SHS.
A.	SITES OFFICES (CONT'D):- The Contractor shall also provide on the sites as and when required by the Architect, a modern and accurate level together with a leveling staff, ranging rods and one 30 metre tape. The Consultants sites offices and the closet shall be completed before the Contractor is permitted to commence the works. Upon completion of the works the Contractor shall remove the site offices, clear away, make good and reinstate the works to the satisfaction of the Architect.	
B.	STORAGE OF MATERIALS:- The Contractor shall erect and maintain (for his own use and that of his sub-contractors) temporary office, mess rooms and weather proof lock-up stores for materials for the works and shall remove them on completion of the works making good damaged or disturbed surfaces to the satisfaction of the Architect. Nominated sub-Contractors shall be made liable for the cost of any storage accommodation provided specially for their own use.	
C.	PROTECTION OF THE WORKS:- The Contractor shall protect or cover-up all finished work liable to damage including provision of temporary roofs, gutters, drain etc during the progress of the works and until the completion of the works. Any damage occurring to the works, materials, drains, paths or other works due to weather or want of protection during the progress of the works shall be made good by the Contractor at no extra cost.	
	Carried to Collection	Kshs.

ITEM	DESCRIPTION	SHS.
A.	SIGN BOARD:- The Contractor shall provide and erect a sign boards on the sites showing titles of the projects the name and address of the Employer consultants, nominated suppliers and sub-contractors and such information as may be required by the Architect. A drawing of the sign board may be inspected in the offices of the Architect	
B.	PROGRAMME/PROGRESS CHART:- Within ten days of signing the Contract, the Contractor shall prepare a full detailed programme and progress chart in the form of bar chart precedence diagram or net work analysis showing completions dates of various sections of work. If the Contractor proposed sectional completion of the works, he must plan this deal including access roads and services and this programme shall be reflected on the chart. Upon letting of the Sub-contract works the Contractor shall incorporate times and details of each Sub-contractor's work – which information is to be agreed with the Sub-Contractor concerned and the chart shall be so designed to accommodate this information. At the end of each week the Contractor shall mark on the chart in a different colour the actual time taken to complete the respective stages and sections of the works. The Contractor shall also show upon the chart the anticipated weekly labour strength required, divided into labourers and craftsmen, and shall similarly mark up the actual numbers employed. The Contractors shall supply approved copies of the chart to the Architect, Quantity Surveyor and Engineer. The Contractor shall liase with the Architect, Nominated Sub-Contractors and Nominated suppliers to ensure that contract completion date remains unchanged.	
	Carried to Collection	Kshs.

ITEM	DESCRIPTION	SHS.
A.	PROGRESS PHOTOGRAPHS:- The Contractor shall allow for providing one copy of approved progress photographs to the Architect taken during the period of the Contract.	
B.	PROVISIONAL WORK:- All work measured provisionally shall be left uncovered for a reasonable time to allow all measurements needed to be taken by the Quantity Surveyor. The Contractor shall immediately notify the Quantity Surveyor when such work is completed. Should the Contractor default in these respects, he shall, if the Architect so directs the contractor will uncover the work at his own expense to enable measurements to be taken.	
C.	ATTENDANCE UPON OTHER TRADESMEN, ETC (CONT'D):- The Contractor shall perform such carting away for and making good after the work of such tradesmen or persons as may be ordered by the Architect and the work will be measured and paid for to the extent executed at rates provided for in these Bills of Quantities.	
	Carried to Collection	Kshs.

ITEM	DESCRIPTION	SHS.
A.	REMOVING OF RUBBISH AND CLEANING:- The Contractor shall remove all rubbish and debris from the buildings and sites as it accumulates and on completion of the works. All plants, scaffolding and unused materials must also be removed on completion of the works. Before final inspection and handing over date, the Contractor must clean the buildings both internally and externally to make the works perfect and fit for immediate occupation by the Employer.	
B.	SAMPLES:- The Contractor shall furnish at his own cost any samples of materials or workmanship or any tests that may be called for by the Architect unless otherwise provided in these Bills of Quantities. Any workmanship or materials not complying with the specific requirements or approved samples or which have been damaged contaminated or have deteriorated, must be immediately removed from site and replaced at the Contractor's expense, as required. Any approved samples shall be the minimum standard for the work to which they apply.	
C.	NOMINATED SUPPLIERS:- The cost of "Fix Only" materials to be obtained from Nominated Suppliers which are covered by Prime Cost or Provisional Sums shall include for taking delivery where directed, checking with invoices or indents, reporting and claiming damages for shortages and damaged goods, defraying demurrage, signing for as having been received in good order, transporting, unloading, storing, covering and protecting until the time of fixing, unpacking, replacing anything lost or damaged, sorting, assembling, hoisting to required levels and fixing as described. Before placing any orders with Nominated Sub-contractors or nominated Suppliers the Contractor must ascertain that the terms and conditions of the quotations and the dates of delivery of materials or execution of works comply with the terms of contract and the progress schedule	
	Carried to Collection	Kshs.

ITEM	DESCRIPTION	SHS.
A. CONCRETE CUBE TESTS:- The Contractor shall allow for the cost of preparing, delivery and testing of concrete samples required by the Engineers and shall obtain test certificates of concrete test cubes, each cube size 150 x 150 x 150mm or such other size as may be directed by the Engineer. Only successful tests will be considered. TRAINING LEVY:- B. The Contractor's attention is drawn to legal Notice No. 237 of October, 1971 (or such subsequent edition as may be current) together with the latest amendments (if any) which requires payment by the Contractor of a Training levy at the rate of ¼% (or Quarter per cent) of the Contract sum on all contracts of more than Kshs. 50,000.00 in value and his tender must include for all costs arising or resulting therefrom. Proof of payment of this levy will be required. PROTECTIVE CLOTHING:- C. The Contractor shall provide all protective or any other special clothing of equipment for his employees that may be necessary. This shall include, inter alia, safety helmets, gloves, goggles, earmuffs, gumboots, overalls etc, according to the type of work. The Contractor shall ensure that safety helmets are worn by all staff on sites at all times. PROPRIETY MATERIALS:- D. Where propriety materials are specified hereinafter, the contractor any propose the use of materials of other manufacturer but equal quality for approval by the Architect. All materials and goods where specified to be obtained for a particular manufacturer or supplier are to be used in accordance with their instructions.		
	Carried to collection Kshs.	

ITEM	DESCRIPTION	SHS.
A. PERFORMANCE BOND/BANK GUARANTEE. Before commencing the works, the Contractor shall provide one surety, who must be an established Bank to the approval of the Employer and who will be bound to the employer in the sum equivalent to ten per (10%) of the contract price for due performance of the contract until the certified date of practical completion. No payments shall be made to the Contractor before the said bond is provided. B. PRIME COST RATES:- Where description of items include P.C rate per unit, this rate is to cover the net supply cost of the unit only. The Contractor's price must include for the cost of the unit at the rate stated, plus waste, taking delivery, storage, fixing in position, profit and overheads. The actual net cost per unit will be adjusted in the final account against the P.C. rate stated. C. NATIONAL CONSTRUCTION AUTHORITY The National Construction Authority is a state corporation established under the national construction authority Act No.14 of 2011. The broad Mandate of the Authority is to oversee the construction industry and coordinate its development. The National Construction Authority Regulations 2014 with an effective date of 6th June 2014, regulation 25, D. COPYRIGHT:- The copyright of these Bills of Quantities is vested in the Quantity Surveyors and no part thereof may be reproduced without their express permission given in writing.		
	Carried to collection Kshs.	

ITEM	DESCRIPTION	SHS.																																																									
	COLLECTION PAGE:- <table> <tr> <td>From</td><td>Page</td><td>1.1</td></tr> <tr> <td>“</td><td>“</td><td>1.2</td></tr> <tr> <td>“</td><td>“</td><td>1.3</td></tr> <tr> <td>“</td><td>“</td><td>1.4</td></tr> <tr> <td>“</td><td>“</td><td>1.5</td></tr> <tr> <td>“</td><td>“</td><td>1.6</td></tr> <tr> <td>“</td><td>“</td><td>1.7</td></tr> <tr> <td>“</td><td>“</td><td>1.8</td></tr> <tr> <td>“</td><td>“</td><td>1.9</td></tr> <tr> <td>“</td><td>“</td><td>1.10</td></tr> <tr> <td>“</td><td>“</td><td>1.11</td></tr> <tr> <td>“</td><td>“</td><td>1.12</td></tr> <tr> <td>“</td><td>“</td><td>1.13</td></tr> <tr> <td>“</td><td>“</td><td>1.14</td></tr> <tr> <td>“</td><td>“</td><td>1.15</td></tr> <tr> <td>“</td><td>“</td><td>1.16</td></tr> <tr> <td>“</td><td>“</td><td>1.17</td></tr> <tr> <td>“</td><td>“</td><td>1.18</td></tr> <tr> <td>“</td><td>“</td><td>1.19</td></tr> </table> BILL NO. 1 - PRELIMINARY COSTS TOTAL CARRIED TO GRAND SUMMARY PAGE (GSP/1) KSHS.	From	Page	1.1	“	“	1.2	“	“	1.3	“	“	1.4	“	“	1.5	“	“	1.6	“	“	1.7	“	“	1.8	“	“	1.9	“	“	1.10	“	“	1.11	“	“	1.12	“	“	1.13	“	“	1.14	“	“	1.15	“	“	1.16	“	“	1.17	“	“	1.18	“	“	1.19	
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Item	Description	Qty	Unit	Rate	Shs.	Cts.
	THE PROPOSED OFFICES PARTITIONING AT BARABARA PLAZA : CONTRACT NO. BILL NO. 2 - BARABARA PLAZA (GROUND FLOOR, WINGS A-D, & 1ST FLOOR WING A) ELEMENT NO. 1 - DEMOLITIONS (ALL PROVISIONAL) Notes:- The Contractor is to allow for all temporary protection required during the works, including ordinary and special dust screens, hoarding, barriers, warning signs etc as directed by the consultant and as necessary for the protection of the existing structure. All protective devices are to be removed on completion of the works and any necessary making good consequent upon this is to be executed to the satisfaction of the Consultant. Useful material arising from the demolitions shall be handed over to Client and shall be delivered to stores; as directed otherwise reusable material shall become the property of the Contractor who must allow on the collection page of this element for the credit value of all such material. All debris arising therefrom shall be carted away from site. The works shall be propped, strutted and supported as necessary before the alteration work is commenced. Prices shall include for all preparatory work to structure and finishes and making good as necessary whether or not specifically directed. The works shall be executed in such order and sequence as the consultant may direct and as little disruption and inconvenience as possible shall be caused to the adjacent tenants. No demolitions shall be commenced without the express instruction of the Consultant. Carried to collection Bara bara Plaza Demolitions 2.1					
					Shs.	

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	<i>Demolitions</i>			
		2.3		

Item	Description	Qty	Unit	Rate	Shs.	Cts.
A.	BILL NO. 2 - BARABARA PLAZA (GROUND FLOOR, WINGS A-D, & 1ST FLOOR WING A) ELEMENT NO. 2 - PARTITIONING The following in Full Height gypsum board partitions In galvanised light steel framework 62 x 310 x 0.4mm Horizontal railing or framing to take gypsum panel (measured separately)	180	lm			
B.	In Heavy duty powder coated aluminium as supplied by Ms General Aluminium fabricators Ltd or other equal and approved 75 x 40 x 4mm "U"-shaped vertical railing or framing to take gypsum panel (measured separately) Dry wall partitions	156	lm			
C.	In gypsum board partitions, fixed with screws to 103 x 32mm U-section galvanised steel studs (measured separately), all exposed joints sealed with fiba-tape and smoothed with Readymix compound/altek, and sanded down:- 20mm Thick double layer partition with cavity infilled with sound proof material to aluminium framework (sound proofing and aluminium frame measured separately)					
D.	Insulation 75mm Thick wall insulation infill material in cavity of partitioning as per "Jumbolene Accoustic Insulation code IB100 or other equal and approved, complete as per manufacturer's specifications (Provisional)	123	sm			
		123	sm			
	Carried to collection					
					Shs.	
	Bara bara Plaza Partitioning					

Item	Description	Qty	Unit	Rate	Shs.	Cts.
	In wrot mahogany (Provisional)					
A.	20 x 100mm High skirtings screwed to 75 x 50 x3mm thick base member (measured separately) with and including screws	200	lm			
	The following in Full Height half-glazed half mdf partitions					
	In Heavy duty powder coated aluminium as supplied by Ms General Aluminium fabricators Ltd or other equal and approved					
B.	100 x 50 x 3mm Horizontal railing or framing to take mdf or glass panel (measured separately) (620+45)	732	lm			
C.	75 x 75 x 3mm Ditto to take louvre glazing or glass panel (measured separately) (229+18)	272	lm			
D.	75 x 50 x 3 mm Vertical studs or framing, ditto (844+64)	999	lm			
E.	75mm Wide "U" channel, to receive mdf (723+49)	849	lm			
F.	Ditto, but 35mm wide to receive glazing (1342+91)	1,576	lm			
G.	10mm Bead or glazing beads (4130+280)	4,851	lm			
	In resin coated wood grain beech laminate medium density fibre board (mdf) to aluminium frame (measured separately), all to Architect's details:-					
H.	25mm Thick partition to aluminium framework (measured separately)	238	sm			
	Glazing supplied and executed by approved specialist, as impala or other equal and approved, all edges polished					
I.	5mm Thick clear sheet glass and glazing in aluminium glazing beads (measured separately) with and including approved black rubber packing or bead, in panes over 0.5 but not exceeding 1.0 square metres (Fanlights over doors)					
	Ditto but over 1.0 but not exceeding 1.5 sq mtrs	16	sm			
J.	Carried to collection	318	sm			
	<i>Bara bara</i>					
	<i>Plaza</i>					
	<i>Partitioning</i>					
	2.5					

Item	Description	Qty	Unit	Rate	Shs.	Cts.
A.	Extra over glazing for one way scotch film	318	sm			
	In Aluminium louvre-end frames Set					
B.	of 5-blade frames, 600mm high	184	No.			
C.	5mm Thick float glass louvre glazing, fixed to frame, 150mm wide (In 920No. Lengths)	221	lm			
	The following in Half Height part-glazed part mdf partitions					
	In Heavy duty powder coated aluminium as supplied by Ms General Aluminium fabricators Ltd or other equal and approved					
D.	75 x 50 x 3mm Horizontal railing or framing to take mdf or glass panel (measured separately) (132+36)					
	75 x 50 x 3 mm Vertical studs or framing, ditto	185	lm			
E.	75mm Wide "U" channel, to receive mdf	109	lm			
F.	Ditto, but 35mm wide to receive glazing	216	lm			
G.	10mm Bead or glazing beads	186	lm			
H.	In resin coated wood grain beech laminate medium density fibre board (mdf) to aluminium frame (measured separately), all to Architect's details:-	805	lm			
I.	25mm Thick partition to aluminium framework (measured separately)					
	Glazing supplied and executed by approved specialist, as impala or other equal and approved, all edges polished	50	sm			
J.	5mm Thick clear sheet glass and glazing in aluminium glazing beads (measured separately) with and including approved black rubber packing or bead, in panes over 0.5 but not exceeding 1.0 square metres					
	Extra over glazing for one way scotch film					
		34	sm			
K		34	sm			
	Carried to collection					
	Bara bara					
	Plaza					
	Partitioning					
	2.6					
					Shs.	

Item	Description	Qty	Unit	Rate	Shs.	Cts.
	Stone walling partitions					
	Approved quality machine-cut dressed natural Stone walling, bedded and jointed in cement mortar (1:3), including 25 x 2mm thick hoop irons in every alternate course:-					
A.	150mm Thick walling	79	sm			
	Precast Concrete Class 20 (12mm aggregate) including formwork and finishing fair on all exposed surfaces:-					
B.	150x200mm Lintol, reinforced with and including 4No. 12mm diameter mild steel rods and 8mm dia rings (in 9No.)	10	lm			
	Carried to collection below					
					Shs.	
	COLLECTION					
	From Page No. 2.4					
	" " " 2.5					
	" " " 2.6					
	" " Above					
	ELEMENT NO. 2 - PARTITIONING AT					
	TOTAL CARRIED TO SUMMARY					
	END OF BILL NO. 2 -					
					SHS.	
	<i>Bara bara Plaza Partitioning</i>					
	2.7					

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Item	Description	Qty	Unit	Rate	Shs.	Cts.
	Painting and Decorating					
	On Woodwork					
	Knot, prime, stop, prepare and apply three coats clear varnish to:-					
	Surfaces over 200 but not exceeding 300mm girth.	60	lm			
	A. General surfaces of doors (both sides measured flat overall)	36	sm.			
	Carried to collection below				Shs.	
	COLLECTION					
	From Page No.					
	2.8 " " No. 2.9					
	" " Above					
	ELEMENT NO. 3 - DOORS & WINDOWS					
	TOTAL CARRIED TO SUMMARY AT END OF BILL NO. 2 -				SHS.	
	<i>Bara bara Plaza Doors & windows</i>					
	2.10					

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Item	Description	Qty	Unit	Rate	Shs.	Cts.
	ELEMENT NO. 5 - FLOOR FINISHES					
	Ceramic Tiles: fixed with cement paste or approved tile adhesive: jointed and pointed in approved grout: allow for tile spacers: in					
A.	10mm Thick non-slip floor tiles in approved colour (to new toilets and kitchen) (Provisional)	20	sm			
	Carpet					
B.	Heavy duty Xylon fibre or equal and approved, complete with deep compact underlay office carpet fixed to existing floor finish	577	sm			
	ELEMENT NO. 5 - FLOOR FINISHES					
	TOTAL CARRIED TO SUMMARY AT END OF BILL NO. 2 -					
				SHS.		
	<i>Bara bara</i>					
	<i>Plaza Floor</i>					
	<i>finishes</i>					
	2.12					

Item	Description	Qty	Unit	Rate	Shs.	Cts.
	ELEMENT NO. 6 - CEILING FINISHES					
	12.5mm Thick flush plastered gypsum plasterboard as 'Knauf Regular' suspended bulkheads on light steel stud framing at 600mm centres as supplied by Ms Classic Mouldings or other equal and approved					
A.	Extra over ceiling for 300 mm wide x 200mm drop to suspended gypsum ceiling	265	lm			
B.	Extra over ceiling for 600 mm wide x 200mm drop to suspended gypsum ceiling	7	lm			
C.	Ditto but for 700 mm wide x 200mm drop to suspended gypsum ceiling	269	lm			
D.	Extra over ceiling for 1000 mm wide x 200mm drop to suspended gypsum ceiling	9	lm			
	Fibre accoustic suspended ceiling panels with and including white powder coated horizontal aluminium T-grid system and all accessories to approval					
E.	15mm Thick suspended ceiling in 600 x 600mm panels	1133	sm			
	Painting and Decorating					
	Prepare and apply three coats first quality emulsion paint on the following surfaces, internally					
F.	General surfaces of skimmed gypsum suspended ceilings					
G.	General surfaces of existing concrete suspended ceilings (Provisional)	400	sm			
		320	sm			
	ELEMENT NO. 6 - CEILING FINISHES AT					
	TOTAL CARRIED TO SUMMARY					
	END OF BILL NO. 1 -					
				SHS.		
	<i>Bara bara</i>					
	<i>Plaza Ceiling</i>					
	<i>finishes</i>					
	2.13					

Item	Description	Qty	Unit	Rate	Shs.	Cts.
	ELEMENT NO. 7 - JOINERY FITTINGS (ALL PROVISIONAL)					
	The following in 1No. LOW-LEVEL KITCHEN CUPBOARD overall size 3340mm long x 650mm wide x 900mm high:-					
	Plain concrete (1:3:6-38mm aggregate), in:-					
A.	50mm Plinth	2	sm			
	Sawn formwork, as described, to:-					
B.	Edge of plinth over 75mm but not exceeding 150mm high	3	lm			
	Dwarf walling					
C.	Approved quality machine-cut dressed natural Stone walling, bedded and jointed in cement mortar (1:3), including 25 x 2mm thick hoop irons in every alternate course:-	1	sm			
	Granite tops					
D.	10mm Thick marble facing laid on blockboard backing (measured separately)	2	sm			
E.	Form hole in granite for sink size 450 x 400mm	1	no.			
	20mm thick laminated hardwood veneered medium density fibre board (MDF); moisture - resistant (MR) bonded in:-					
F.	50x38mm Frame with one labour	8	lm			
G.	38 x 25mm Bearer	4	lm			
H.	20mm Thick door size 250x825mm high	2	no.			
I.	20mm Thick door size 350x675mm high	2	no.			
J.	20mm Thick shelves or divisions	3	sm			
	Carried to collection					
					Shs.	
	Bara bara Plaza Joinery fittings					
	2.14					

Item	Description	Qty	Unit	Rate	Shs.	Cts.
	The following in 1No. LOW-LEVEL KITCHEN CUPBOARD :-(Cont'd)					
	Drawers					
A.	Drawer size 450x150x600mm deep, comprising 150x18mm thick MDF fascia, 10mm thick hardwood back and sides with 6mm plywood bottom, all housed and glued together, including grooves on sides for and including 25x25mm runners	6	no.			
	In Blockboard, with hardwood lipping to exposed edges:-					
	25mm Thick top					
B.	Supply and fix the following ironmongery to timber with matching screws:-	2	sm			
	100mm "Malpa" hinges to approval					
C.	100mm Aluminium "D" pull handles	4	prs.			
D.	10mm Brass ball catch	10	No.			
E.	(End of Low level Kitchen cupboard)	2	No.			
	The following in HIGH-LEVEL KITCHEN CUPBOARD overall size 3495mm long x 350mm wide x 450mm high:-					
	20mm thick laminated hardwood veneered medium density fibre board (MDF); moisture - resistant (MR) bonded in:-					
	38 x 25mm Bearer					
	20mm Thick door size 580x450mm high					
F.	20mm Thick tops, bottoms or divisions	3	lm			
G.	Supply and fix the following ironmongery to timber with matching screws:-	6	no.			
H.	Supply and fix the following ironmongery to timber with matching screws:-	4	sm			
	100mm "Malpa" hinges to approval					
	100mm Aluminium "D" pull handles					
I.	10mm Brass ball catch	6	prs.			
J.	(End of High level Kitchen cupboard)	6	No.			
K.		3	No.			
	Carried to collection					
	Bara bara Plaza Joinery fittings				Shs.	
	2.15					

Item	Description	Qty	Unit	Rate	Shs.	Cts.
	The following in 2No. CONCRETE VANITY TOPS overall size 2600 x 550 mm in Toilets :- Granite tops A. 10mm Thick marble facing laid on 50mm thick concrete top and blockboard backing (measured separately) with and including cement paste B. Form hole in granite for sink size 450 x 400mm In Blockboard, with hardwood lipping to exposed edges:- C. 25mm Thick top (End of Concrete vanity tops) Carried to collection COLLECTION From Page No. 2.14 " " No. 2.15 " " Above ELEMENT NO. 7 - JOINERY FITTINGS TOTAL CARRIED TO SUMMARY AT END OF BILL NO. 2 - Bara bara Plaza Joinery	2	sm			
		2	no.			
		2	sm			
					Shs.	
					SHS.	

	<i>fittings</i>			
		2.16		

Item	Description	Qty	Unit	Rate	Shs.	Cts.
	BILL NO. 2 - BARABARA PLAZA (GROUND FLOOR, WINGS A-D, & 1ST FLOOR WING A) SUMMARY					
	ELEMENT NO.	DESCRIPTION		PAGE NO.		
	1	DEMOLITIONS		2.3		
	2	PARTITIONING		2.7		
	3	DOORS & INTERNAL WINDOWS		2.10		
	4	INTERNAL WALL FINISHES		2.11		
	5	FLOOR FINISHES		2.12		
	6	CEILING FINISHES		2.13		
	7	JOINERY FITTINGS		2.16		
	BILL NO. 2 - SUMMARY	TOTAL CARRIED TO GRAND SUMMARY PAGE (GS/1)_		SHS.		
	<i>Bara bara Plaza</i>					
	<i>Bill No. 2 Summary</i>					
		2.17				

Item	Description	Shs.	Cts.
	BILL NO 3 _____PROVISIONAL SUMS CONTINGENCIES A. Allow the provisional sum of Kshs. 5,000,000.00 for contingencies (Builders works & services), to be spent in whole or in part as directed by the project manager. SIGNAGE: B. Allow the provisional sum of Kshs. 450,000.00 for signage to be spent in whole or in part as directed by the Project Manager. BILL NO. 4 - TOTAL CARRIED PROVISIONAL SUMS TO GRAND SUMMARY PAGE GS/1 SHS. 3.1		

THE PROPOSED OFFICES PARTITIONING AT BARABARA PLAZA

GRANDSUMMARY. PAGE (GS/1)

Item	GRAND SUMMARY	PAGE NO.	SHS.	CTS
	VOLUME NO. 1 - PRELIMINARY COSTS, BUILDERS WORKS AND PROVISIONAL SUMS. 1.0 • BILL NO. 1 - PRELIMINARY COSTS. 1.19 2.0 • BILL NO. 2 - BARABARA PLAZA - (BUILDERS WORKS). 2.17 3.0 • BILL NO. 3 - PRIME COSTS PROVISIONAL SUMS. 3.1 VOLUME NO. 2 - ELECTRICAL INSTALLATIONS AND ASSOCIATED SERVICES 4.0 • BARABARA PLAZA ELECTRICAL INSTALLATIONS AND ASSOCIATED SERVICES (J7) VOLUME NO. 3 - MECHANICAL INSTALLATIONS AND ASSOCIATED SERVICES. 5.0 • BARABARA PLAZA MECHANICAL INSTALLATIONS AND ASSOCIATED SERVICES (G3) TOTAL CARRIED TO FORM OF BID - Read: Kenya Shillings: (GS/1.)			
		SHS.		



REPUBLIC OF KENYA

MINISTRY OF ROADS AND TRANSPORT

**STATE DEPARTMENT OF ROADS
ENGINEERS BOARD OF KENYA (EBK)**

**HORN OF AFRICA GATEWAY DEVELOPMENT PROJECT
(HOAGDP)**

OFFICES PARTITIONING AT BARABARA PLAZA

**VOLUME TWO OF THREE, COMPRISING BILLS OF
QUANTITIES FOR:**

- **Electrical Installations**
- **Fire Detection and Alarm Installations**
- **UPs Installations**
- **Communication (ICT) Services Installations**
- **CCTV, Security and Access Control Installations**
- **Audio Visual System Installations**

**See volumes: ONE and THREE for Builders Works & Mechanical
Services**

RFB NO. : KE-SDOI-213607-CW-RFB

Project No.: P161305

CLOSES ON: 22ND NOVEMBER 2023

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4. PART B: Particular Specifications for Electrical Installations	B1-B9
5. PART C: Technical Specifications for Fire Alarm Systems	C1-C17
6. PART D: Technical Specifications for UPS Equipment Installations	D1-D16
7. PART E: Technical Specifications for Communication (ICT) Services	E1-E24
8. PART F: Technical Specifications for CCTV Installations	F1-F9
9. PART G: Technical Specifications for Access Control System	G1-G16
10. PART H: Technical Specifications for Audio Visual System	H1-H4
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12. PART J1: Bills of Quantities for Electrical Installations	J1/1-J1/20
13. PART J2: Bills of Quantities for Fire Detection and Alarm Installations	J2/1-J2/12
14. PART J3: Bills of Quantities for UPS Installations	J3/1-J3/9
15. PART J4: Bills of Quantities for Communication (ICT) Services	J4/1-J4/12
16. PART J5: Bills of Quantities for CCTV, Security and Access Control	J5/1-J5/14
17. PART J6: Bills of Quantities for Audio Visual Installations	J6/1-J6/11
18. PART J7: Summary Page for Electrical Installations and Associated Services	J7
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OCTOBER, 2023

ENGINEERS BOARD OF KENYA (EBK)
PROPOSED OFFICES PARTITIONING AT BARABARA
PLAZA ELECTRICAL INSTALLATIONS AND
ASSOCIATED SERVICES

SPECIAL NOTES FOR ALL TENDERERS:

Important: **The site for the proposed works is an existing and occupied building with a number of existing services. The Sub-contractor will be required to ensure the existing services are not interfered with throughout the entire period of this exercise. The sub-contractor will be required to take all precaution and care so that no damage will occur to the existing installations on site. The sub- contractor is also advised to secure all the necessary insurance policies as he will be solely held responsible for any damages to the existing system, injuries to persons resulting from his activities and/or interference with normal operations of the building that may result from his negligence, actions or otherwise.**

1. These notes shall form part of the specifications.
2. The tenderer is required to check the number of pages in this document and should any be found to be missing or the figures indistinct, he must inform the Engineers at once and have the same rectified. Should the tenderer be in doubt about the precise meaning of any item, word or figures, or for any reason whatsoever observe any apparent omission of words or figures, he must inform the Engineer in order that the correct meaning may be decided upon before the date for the submission of the tenders.
3. No liability whatsoever will be admitted nor claim allowed in respect of errors in the completed tender due to mistakes in this document which should have been rectified in the manner described above.
4. The tenderer shall not alter or otherwise qualify the text of this specification. Any alteration or qualification made without authority will be ignored and the text of the specification as printed will be adhered to.
5. The tenderer shall be deemed to have made allowances in his unit prices generally to cover items of preliminaries or additions to Prime cost Sums or other items, if those have not been priced against the respective items.
6. The tenderer's price shall include all government taxes including duties, V.A.T. etc. No claims whatsoever will be allowed in respect of duties, VAT etc if the tenderer fails to include them in his unit prices. It is also to be noted that VAT will be included in the unit rates and NOT worked out as a percentage of the total.
7. In no case will any expenses incurred by the tenderer in preparation of this tender be reimbursed.
8. The copyright of this specification is vested in the Engineers and no part thereof may be reproduced without their express permission, given in writing.
9. The specifications must be priced in Kenya Currency i.e. Shillings and Cents.
10. The quantities given in the Bill of Quantities are for guidance only. Precise re-measurements will be done at the end of the contract and the sub-contractor will only be paid for the actual work done.
11. The works shall be carried out in accordance with provisions of the 17th Edition of IEE wiring Regulations, the most current Kenya Standards governing such works, and relevant provisions of the current KPLC by-laws. The sub-contractor is also presumed to be familiar with the standard General Specifications governing such works; a copy can however be obtained from our office any working day. The Particular Specifications have been detailed in the drawings and Bills of Quantities, but the sub-contractor is advised to seek clarification from the Engineers on any

matter whatsoever where he has the slightest of doubts.

12. The proposed domestic sub-contractors **MUST** be approved by the Services Engineers before commencement of Work. In any case the name of the Domestic Sub-contractor submitted does not meet the above qualifications then the bidder will submit another name to the satisfaction of the Services Engineers and the Client. Once the domestic sub-contractor is approved by the Services Engineers then they can only be replaced with the written approval of the Services Engineers and the Client.
13. Prior to accepting any domestic sub-contractor proposed by the Main contractor, both the Electrical/Mechanical Engineer and the Client shall conduct comprehensive due diligence on the proposed firm including physical inspection of their offices, interview with the directors, management and the technical staff of the proposed firm, inspection of their equipment to be used on the project, and visits to at least three (3) successfully completed projects by the proposed firm where confidential reports/comments will be invited from the owners/users of the completed projects.
14. Preliminaries for this sub-contract to be included in the Main-Contract (Volume One)
15. The domestic sub-contractors **MUST** meet the following qualifications:
 - i) **Electrical, Fire Detection and Alarm Systems, and UPS Installations**
 - Show proof of Registration under the Kenya's Company Act.
 - Show proof of Registration with the National Construction Authority, NCA 2 and above.
 - Show proof of Class A registration as an electrical contractor with the Energy and Petroleum Regulatory Authority.
 - Show Proof of Technical Competence of key staff. Submit detailed CVs showing names and qualifications and a list of projects handled.
 - Proof of at least **Three** projects completed in the last Five years relevant to this sub-contract in both complexity and magnitude. The projects submitted must have minimum sub-contract values of Ksh. 20 Million or more for Electrical, Ksh. 2 Million or more for Fire Alarm and Detection, and Ksh. 2 Million or more for UPS Installations. Include referees (Contact Persons and their telephone contacts)
 - Show proof of Tax Compliance with Kenya Revenue Authority.
 - Show copies of VAT and PIN Certificates
 - ii) **Communications (ICT) Services, Security Systems and Audio Visual Installations**
 - Show proof of Registration under the Kenya's Company Act.
 - Show proof of Registration with the National Construction Authority, NCA 2 and above.
 - Show proof of Registration with Communications Authority of Kenya
 - Show Proof of Technical Competence of key staff. Submit detailed CVs showing names and qualifications and a list of projects handled.
 - Proof of at least **Three** projects completed in the last Five years relevant to this sub-contract in both complexity and magnitude. The projects submitted must have minimum sub-contract values of Ksh. 15 Million or more for Communication (ICT) Installations, Ksh. 10 Million or more for Security Systems Installations, and Ksh. 10 Million or more for Audio Visual Installations. Include referees (Contact Persons and their telephone contacts)
 - Show proof of Tax Compliance with Kenya Revenue Authority.
 - Show copies of VAT and PIN Certificates

Signed (As in Tender) Date/Stamp

GENERAL CONDITIONS

1. DEFINITIONS

The following terms and expressions used in the Sub-Contract document shall have the following meanings:

Employer	Engineers Board of Kenya Fortis Suites, 9th floor, Upper Hill, Hospital Road P.O. Box 30324-00100 NAIROBI.
Architect	Makro Consultancy Ltd., P.O. Box 5461-00506, NAIROBI.
Quantity Surveyor	Beeque Consultants Ltd. P. O. Box 3280-00200, NAIROBI.
Electrical/Mechanical Engineer	Feradon Associates Ltd., Consulting Engineers, P.O. Box 7375-0030, NAIROBI.

2. DESCRIPTION OF SITE

The site for these works is **Barabara Plaza, JKIA opposite KCAA Headquarters, Nairobi County**. The works will be carried out within and next to existing buildings. Due care will be required during construction so that the occupants of the building and nearby buildings are not interfered with in any way.

The Sub-Contractor is recommended to visit the site and will be deemed to have satisfied himself with regard to the relevant details of preliminary. If the Sub-Contractor, for whatever reason, feels specialized attendance will be required, with significant financial implications, or requires specialized mobilization to start the works, he should spread the cost of such works in his unit rates. No claims whatsoever by the Sub-Contractor for additional payment will be allowed on the grounds of any misunderstanding or misapprehension in respect of any such matters or otherwise, should the Sub- Contractor be required to offer specialized attendance prior to, or during, the performance of the Sub-contract.

In case of difficulty in locating the sites, the tenderer should contact the Engineer who will give relevant direction.

3. DESCRIPTION OF THE WORKS MEASURED IN THE BILLS OF QUANTITIES

The works measured and described in the Bills of Quantities comprise the following:-

Supply, installation, setting to work to the entire satisfaction of the Engineer all the Electrical Installation and Associated Services (including Fire Detection and Alarm, UPS, Communication/ICT, CCTV, Security and Access Control, and Audio Visual Installation) works asset out in the Bills of Quantities and drawings, as per the attached drawings.

4. WARRANTY AND PERFORMANCE STANDARDS

The Sub-Contractor must furnish the Employer through the Architect/Engineer with a general written warranty covering quality of workmanship, material and equipment and be compelled thereby for a one year period after practical completion of the Sub-Contract.

The Sub-Contractor must make good, at his own expense, such repairs and replacements as may be required as a consequence of negligent workmanship or defective materials. The Sub- Contractor must also procure such warranties and guarantees as aforesaid from all manufactures and/or suppliers of materials or equipment incorporated in the project under this Sub-Contract.

The Sub-Contractor must comply in all respects with given standards of workmanship as defined and described in the Specifications and Bills of Quantities and relevant Codes of Practice. The Sub-Contractor must also comply with all tests of materials as required and/or as directed by Architect /Engineer.

5. TESTING

The Sub-Contractor shall allow for all testing of material and installations required by these Specifications and he shall be responsible for all expenses incurred in completing such tests, including costs of materials and labour, equipment, transport and all other costs.

6. SAMPLES

The Sub-Contractor shall furnish at his own cost any samples of materials or workmanship that may be called for by the Engineer for his approval or rejection and any further samples in the case of rejection until such are approved by the Engineer, and the Engineer may reject any materials or workmanship not in his opinion up to the approved samples.

The Engineer shall arrange for the testing of such materials as he may at his discretion deem desirable but the testing shall be made at the expense of the Employer and not at the expense of the Sub-Contractor unless the materials fail to pass the test or are in the opinion of the Engineer not in accordance with the specification, in either case the Sub-Contractor shall pay for testing in accordance with the current scales of testing charges of approved testing authorities.

The procedure for submitting sample of materials for testing and the method of marking for identification shall be laid down by the Engineer.

The Sub-Contractor shall allow in his Tender for such samples and tests.

7. FOREMAN

The Sub-Contractor shall keep constantly on Works a competent English-speaking foreman and any directions or explanations given by the Architect/Engineer to such foreman shall be deemed to have been given to the Sub-Contractor.

8. TRADE NAMES

Where trade names or manufacturer's catalogue numbers are mentioned in these specifications the reference is intended as a guide to the type of the article or material required. The Sub- Contractor may use any article or material equal in type or quality to those therein described subject to the prior approval of the Architect /Engineer, and at his (the Architect's/Engineer's) absolute discretion. The onus of proof as to equivalent quality will rest with the Sub-Contractor, whose Tender will be deemed to include for the makes described hereafter.

PART A:

**GENERAL SPECIFICATIONS FOR ELECTRICAL
INSTALLATIONS**

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INSTALLATIONS**

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PART A:

GENERAL ELECTRICAL SPECIFICATION

1 GENERAL

This section specifies the general requirement for plant, equipment and materials forming part of the Sub-contract Works and shall apply except where specifically stated elsewhere in the Specification or on the Contract Drawings.

1.1 Quality of Materials

All plant, equipment and materials supplied as part of the Sub-contract Works shall be new and of first class commercial quality, shall be free from defects and imperfections and where indicated shall be of grades and classifications designated herein.

All products or materials not manufactured by the Sub-contractor shall be products of reputable manufacturers and so far as the provisions of the Specification is concerned shall be as if they had been manufactured by the Sub-contractor.

Materials and apparatus required for the complete installation as called for by the Specification and Contract Drawings shall be supplied by the Sub-contractor unless mention is made otherwise.

Materials and apparatus supplied by others for installation and connection by the Sub-contractor shall be carefully examined on receipt. Should any defects be noted, the Sub-contractor shall immediately notify the Engineer.

Defective equipment or that damaged in the course of installation or tests shall be replaced as required to the approval of the Engineer.

1.2 Regulations and Standards

The Sub-contract Works shall comply with the current editions of the following:

- a) The Kenya Government Regulations.
- b) The United Kingdom Institution of Electrical Engineers (IEE) Regulations for the Electrical Equipment of Buildings.
- a) The United Kingdom Chartered Institute of Building Services Engineers (CIBSE) Guides.
- d) British Standard and Codes of Practice as published by the British Standards Institution (BSI)
- e) The Local Council By-laws.
- f) The Electricity Supply Authority By-laws.
- g) Local Authority By-laws.
- h) The Kenya Building Code Regulations.
- i) The Kenya Bureau of Standards

1.03 Power Supply on Site

The supply voltage will be 240 volts single phase and 415 volts 3 phase 50 Hz. TN-S system, viz. separate neutral and protective conductor throughout the system.

2. INSTALLATION OF CABLES

2.01 General

Bending of cables shall be in accordance with table 52c of the IEE Regulations and no cable shall be bent to radius less than that specified by the cable manufacturers.

Cables shall be rated for the maximum connected load with due consideration to the following factors:-

- (i) Voltage drop not in excess of 4% of the nominal voltage.
- (ii) Ambient temperature.
- (iii) Degree of excess-current protection.
- (iv) Grouping.
- (v) Cables run under defined conditions.

2.02 Cables in conduits and Trunking

All cables shall be polyvinyl chloride (PVC) insulated to BS 6604, "PVC-insulated cables (non-armoured) for electric power lighting", 450/750 volt grade, unless an alternative is specified elsewhere in the contract documents. The quality and size of cables contained in any one conduit shall comply with IEE Regulation 529-7 and Appendix 12.

No cable with a cross-section area of less than 1.5mm² shall be used. All cables installed in a conduit or trunking system shall be PVC single insulated conductors and shall be colour coded in accordance with the IEE Regulation 524-3 and Table 52A.

Final sub-circuits shall be run in conduits separate from main or sub-main cables. All cables in conduit shall be drawn in simultaneously. All cables shall be drawn in without the use of excessive force, without the use of lubricants and the wiring shall be easily withdrawable.

2.03 PVC/SWA/PVC Cable

These cables shall comprise copper conductors unless specifically detailed otherwise, laid up with PVC fillers bedded with an extruded inner PVC sheath, armoured with a single layer of galvanized steel wires, aluminium or strip as specified, and covered overall with PVC sheath.

Cables shall be manufactured to BS 6346 "PVC insulated cables for electrical supply" with conductor dimensions and resistances in accordance with BS 6360:1969, "copper conductors in insulated cables and cords", Armouring shall be galvanised steel to BS 1442.

Attention is drawn to Chapter 52 of the IEE Regulations and Appendix 9. Where the armour wires of cables are used to provide protective conductor they shall comply with the requirements of Chapter 54 of the IEE Regulations, particularly section 543; alternatively, additional cables with copper conductors shall be

installed to reduce the impedance to a level which ensures compliance with Section 543 of the IEE Regulations.

Unless permission is given by the Engineer, no joints will be allowed. In the event of joints being authorized, they shall be made using plastic boxes of approved design filled with an approved cold pouring plastic or resin compound. The cable box shall incorporate suitable copper tapes and clamps to bond the armouring of the jointed cables.

The PVC/SWA/PVC cables should be terminated in the cable manufacture's approved glands. These shall be of the compression type providing controlled radial compression of the sheath seal. The gland shall incorporate an armour clamping ring and earthing ring and, where used outdoors, a lead washer shall be used to ensure a watertight joint between the gland and the unit to which it is fitted. The earthing ring shall be rigidly fixed to the item of equipment and terminated using brass nuts, bolts and washers. All gland terminations shall be protected by a PVC shroud which shall fit tightly over the cables.

The electrical Sub-Sub-Contractor is responsible for determining the true nature and extent of cable routes. No claim on the grounds of lack of knowledge will be entertained. All cable routes shall be agreed with the Engineer. After the cables have been installed and terminated, but prior to putting into service, they shall be subjected to an insulation test of 500 volts and the results of these tests (recorded on test sheets) forwarded to the Engineer.

3. CONDUIT AND CONDUIT FACILITIES - MILD STEEL CONDUIT SYSTEM

3.01 Conduits

Conduits shall be installed as required by the IEE Regulations and as detailed in this specification.

All metal conduits must be heavy gauge, seam welded, steel tube screwed conduits manufactured to BS 31, "steel tube screwed conduits and fittings for electrical wiring", Class B, BS 4568, "Steel conduit and fittings with thread of ISO form for electrical installation", for metric conduit, unless specified otherwise. Conduits shall be finished black stove enamelled, except in positions exposed to water (other than water used in construction), steam condensation or the action of weather, where hot galvanised conduits shall be used.

Any conduits work rejected by the Engineer shall be replaced at no extra cost. No conduit smaller than 20 mm in diameter or longer than 50mm diameter shall be used.

All bends in conduit shall be in accordance with the IEE Regulation 529-5, and made in a conduit bending machine fitted with a former of the correct radius for each conduit size.

Conduits shall be secured in an efficient pipe vice whilst being screwed. Conduit system shall be installed so as to ensure compliance with requirements of IEE Regulations 529-7. Attention is drawn to Appendix 12 of the IEE Regulations.

3.02 Conduit Fittings

Conduit fittings shall have same finish as the conduits being used and shall comply with BS 31 or BS 4586. All conduit fittings shall be screwed or loop-in malleable iron circular type, fitted with covers secured by brass screws. Rectangular adaptable steel boxes may be used on multi-conduit runs.

All circular type boxes must be fitted with long screwed spout conduit entries with the screwed thread terminating within the spout and the edges of the internal orifice of the box rounded and smoothed to act as a bush except for the adaptable steel rectangular boxes and loop-in conduit boxes, in which case male

bush and coupling must be used for conduit connections. In concealed installation, boxes shall be fixed with the rims flush with the finished surface, but when, for any reason whatsoever, the rims are below the surface, suitable extension rings of the required depth shall be provided and installed to finish flush with the surrounding surfaces and with the lids of sufficient oversize (7.5 mm minimum all round) to cover the junction between box and plaster. In no case will the use of site-manufactured bends, sets, elbows, inspection elbows or tees be permitted.

3.03 Fixing of Conduits

All conduits must be firmly and rigidly fixed to be entirely without whip or movement. Space-bar saddles, or strap saddles, must be used on the timbers in roof spaces and will be allowed when the conduits are run on the underside of exposed unsealed floor or ceiling joints. Pipe hooks or crumpets will not be allowed except for security conduits in chases, or screeds, when the top of the hook must at least be 10 mm below the finished surface of the wall, or 25 mm below the floor finish. Pipe hooks shall be galvanised.

The finish of the saddles must in all cases conform to the finish of the supported conduits. Galvanised, sherardised or cadmium plated screws shall be used in all cases where galvanised conduits are installed.

The standard cast iron distance saddle, (single fixing base and two-screw fixing top), must be used for all conduits run on the surface of walls and ceilings etc., fixed at intervals of not more than 1.2 metres.

3.04 Conduit Runs and Concealment

The routes of the conduit installation shall be agreed with the Engineer prior to commencing the installation. Conduits shall be installed at least 150 mm from, and preferably under, any hot water pipes and at least 50 mm from other surface pipes and cables. Conduits shall be bonded to other surfaces in accordance with the requirements of IEE Regulations 413-2 and 547-4 to 547-7 inclusive.

Each continuity test shall be applied to the system before plastering, screeding, or casting of concrete is commenced. Surface work will be allowed where certain pre-fabricated methods of construction preclude the concealment of the runs, and or fair-faced brickwork or block work or other unplastered walls.

Conduit runs shall be planned to obviate the need for draw-in boxes, but where the use of such boxes is unavoidable they shall be accessible at all times and be fitted with covers. When Conduits are specified as being installed on the surface the runs must be arranged to render the whole system as neat and inconspicuous as possible, having regard to the existing architectural features. All vertical and horizontal runs must be taken where conduits converge and run together near distribution centres to obtain a symmetrical layout. The distance between the conduits shall be maintained through bends and sets and shall not vary noticeably.

3.05 Flexible Metallic Conduit

Flexible Conduit shall comply with the BS 731 part 1. "Flexible steel conduit and adaptors for the protection of electrical cables." It shall be used for the final connection from a rigid conduit installation to the terminal boxes of all the equipment provided with a means of positional adjustment and /or where vibration may reasonably be expected to occur.

Flexible conduits shall be PVC sheathed and shall be terminated using approved glands. In all instances a separate PVC insulated green and yellow coloured protective conductor complying with table 41A1 or 41A2 and section 543 of the IEE Regulations shall be installed, terminating at each end into purpose-made earthing terminals.

Under no circumstances will flexible conduits be accepted in lieu of sets and bends in a rigid conduit installation.

In normal circumstances flexible conduits shall have a minimum length of 300 mm and a maximum unstretched length of 800mm. It shall permit a full range of withdrawal, adjustment or movement of the equipment.

3.06 Locking, Bushing and Coupling

All conduit ends must be filed square and reamed before erection to ensure freedom from internal burrs and roughness.

Running couplings shall only be used on black enamelled steel conduit installations, and the use of this shall be kept to the minimum. All running couplings shall be secured by means of the lock nuts or lock rings, and the exposed thread painted after installation.

Every conduit connection to the equipment, boxes, distribution boards, loop-inboxes, cable trunking etc, shall be made by means of a screw coupling and a male hexagonal headed smooth bore brass bush. The smooth bore shall be fitted to secure the conduit to the item connected via a purpose-made clear hole to be closed by the bush and coupling when fitted. Paint must be removed from the surface of the item connected to allow it to be covered by the end of the coupling which shall be filed, clean and square, to ensure a good mechanical and electrical metal to metal joint. Any exposed area of metal from which paint has been removed must be made good in a matching paint. Bushes shall be fitted and tightened by means of correctly fitting spanners. Mutilated bushes damaged whilst being fitted must be removed and replaced.

Conduits connecting via couplings shall be connected by a means of 15 mm long threaded section and shall have a gap of approximately 2 mm between them. No thread shall be exposed except running couplings.

3.07 Continuity and Earthing

The whole of the conduit installations shall be mechanically and electrically sound and continuous throughout their length in accordance with the IEE Regulations.

Where the conduit system is used to provide a protective conductor it shall comply with the requirements of Chapter 54 of the IEE Regulations particularly Section 543; alternatively, a separate protective conductor shall be installed in the conduit to comply with Section 543 of the IEE regulations.

4. CABLE TRUNKING-SHEET STEEL

Trunking shall only be installed in situations which will remain readily accessible throughout the life of the buildings. No cable trunking shall be installed behind a plastered ceiling or in other inaccessible situations.

All cable trunking shall comply with BS 4678, part 1 "Steel surface trunking" and part 2 for "Steel underfloor (duct) trunking".

Sheet steel cable trunking may be used on installations employing steel conduits, for connecting two or more switchboards together or where several conduits would otherwise have to run alongside each other. Proper allowances should be made for the derating of cables installed together in a container system. The cables must be capable of carrying the current imposed by the equipment connected. Attention is drawn to Chapter 52 of the IEE Regulations, particularly Section 522, and Appendix 9: the current carrying capabilities of cables indicated shall not be exceeded. The Engineer must be consulted as to precise details concerning trunking routes and applications.

All lengths of trunking shall be heavy gauge zinc coated steel connected together by internally fitted rectangular couplings of sufficient width to provide a minimum bearing face of 25mm, to which the lengths shall be bolted on site or welded at the factory.

Adequate provision shall be made to allow for expansion.

All Tee pieces and bends shall be formed with similar means of connection and the inner radii area shall be such that cables will not be bent through a radius less than that prescribed in the IEE Regulations. Only bends and tees of approved pattern will be accepted.

All fixing screws within the trunking shall be of the round head type. The trunking shall have an over-lapping well-fitted lid securely fixed to the trunking by approved means that will avoid damage to the cables. Self-tapping screws shall not be used.

All necessary accessories including long sleeve couplings, end piece, bends, sets, tees, reducers, branches, fillets, pin racks, cable retainers etc., shall be purpose-made units rather than being fabricated on site.

Where a change in direction of trunking run occurs, the deviation should be effected by a purpose-made unit manufactured on similar lines to the bends and tee pieces described above. Where this is not practical, changes in direction shall be fabricated in a neat workmanlike manner. All joints shall fit closely and gaps will not be permitted. All burrs and sharp edges shall be removed and no screw shall protrude into the trunking.

Trunking shall be firmly attached to its associated equipment either by bolted flanges or by male bushes and couplings.

Where trunking is connected to equipment by means of flange connectors, the entry into the equipment shall be of the same cross-section as the trunking.

Where trunking does not terminate in equipment, the otherwise open end shall be capped with a cover suitable bolted in position.

Where communications, extra low voltage circuits (category 1) etc., are contained in a trunking, the requisite number of separate compartments shall be provided to segregate the wiring. Where conduits are taken off such trunking they shall not pass through other compartments unless prior permission is obtained from the Engineer.

The entire trunking is required to be recessed in the structure of the building, the finished edge of the trunking is to be installed flush with the plasterwork.

Trunking runs shall be so arranged that the lid or cover plate is always on the top or side and not underneath, unless this cannot be avoided, in which case the Engineer's permission shall be obtained.

Wherever trunking passes through walls, vertical partitions etc., a fixed piece of trunking lid shall be fitted to the trunking extended 25 mm either side of the wall or other barrier, this is to allow removal of the adjacent lid without

disturbing the building fabric. Care shall be taken to ensure that no opening is left between the trunking and the building structure through which fire might spread. In addition a suitable barrier of incombustible material shall be provided and fitted inside the trunking, in accordance with the IEE Regulations 528-1. On vertical runs of trunking internal incombustible barriers shall be fitted at the distance between floors or 5m, whichever is the less, in accordance with IEE Regulations 523-6.

All necessary trunking support work, hangers, brackets and fixing requirements shall be provided by the electrical Sub-Sub-Contractor.

Earth links of the appropriate size and type shall be installed at every jointing coupling, manufactured bend, etc., throughout the entire trunking system. Where trunking is used to provide a protective conductor it shall comply with the requirements of Chapter 54 of the IEE Regulations, particularly Section 543; alternatively, a separate protective conductor shall be installed in the trunking to comply with section 543 of the IEE Regulations.

In cases where sheet steel trunking is installed and there is danger of movement, a flexible earth conductor shall be installed bonding all joints in the trunking. This shall be fitted in addition to the standard earth links. Cable retaining strips shall be fitted at 1 m intervals. Insulated cable support pins shall be fitted at intervals of 4 m in vertical runs of trunking and at the top of the vertical trunking.

5 CABLE TRAYS

Cable trays shall be formed from perforated steel of not less than 0.9 mm thickness up to and including 100 mm width - 1.25 mm thickness from 150 mm up to and including 300 mm width - and 2.00 mm thickness above 300 mm width. They shall be galvanised unless otherwise specified. Tray shall be adequately sized to support the cable without bunching.

Support shall be by means of steel brackets installed at intervals necessary to provide a rigid fixing and ensure that no undue deflection occurs in the complete installation. The brackets shall be galvanised prior to fixing. Dome-headed bolts, nuts and washers of finish suitable to the tray shall be used between tray and brackets. Fixing to the surfaces of walls, ceilings, etc. shall be by means of expansion-type masonry plugs or bolts. Fixings shall be galvanised unless otherwise stated. Cable trays shall be installed using factory-formed bends, elbows, tees, couplers and risers etc. Site fabrication of elbows etc., will only be permitted with prior approval of the Engineer and where it is not possible to obtain the necessary factory-made item.

Where cuts have been made, the tray shall be painted with zinc rich paint.

Holes which have been cut to allow cables to pass through shall be suitably bushed.

Suspension sets shall comprise threaded M12 cadmium plated hanger rods together with nuts and locking washers, vertical hanger brackets, support channel, tray hold-down clips etc., all of which shall have a galvanised finish.

All cables shall be securely fixed to traywork and the complete installation must be carried out in a neat and workmanlike manner without crossovers. A 25% reserve margin in size and weight shall be allowed for all cable tray works.

Cables of 30 mm diameter and above shall be fixed using the appropriate size cable straps of approved manufacture.

On light duty multi-cable runs, cable straps of plastic coated metal shall be used to secure cables.

Bunching of cables will not be permitted.

Cables shall be clipped by means of copper or brass saddles and clips where high temperature or humid conditions are likely to be experienced. In all cases, saddles, clips, straps, etc., shall be fixed to the tray by means of brass screws or bolts and nuts.

6. PROTECTION OF PVC/SWA/PVC CABLES

6.01 General

Cable routing shall be such that the maximum degree of protection against accidental damage is obtained by running cables along the inside of channels and beams, etc.

Cables shall be laid in preformed trenches or duct throughout all paved areas. Ducts shall be installed for underground cables before the paving is constructed.

Cable ducts shall be sealed at both ends using materials which are resistant to any likely corrosive and insect attack in the area concerned.

All cables rising through floors and trench covers, except in switch rooms, shall be protected by a length of steel pipe which shall project at least 150 mm above the finished surface level.

The open end of the pipe shall be sealed with a suitable compound. Care must be taken that all phases of single core cables pass through the same protective steel duct.

6.02 Cables Direct in Ground

All excavation and backfilling of cable trenches will be carried out by the main Sub-Contractor unless otherwise specified, but the electrical Sub-Sub-Contractor shall in any case make sure that trenches are made to a depth as specified. The electrical Sub-Sub-Contractor shall lay cables direct in the ground in the following manner:-

75 mm (3 inches) of dry fine sand shall be placed to form a bed for the cables. After cables have been laid they shall be covered with additional dry fine sand well punned over and around the cables to a level of 75 mm above the top of the uppermost cable. Mechanical punners shall not be used for this work. The electrical Sub-Sub-Contractor shall supply and install concrete cable tiles which shall be carefully placed over the cable forming each circuit.

Until all the cables have been laid in the trench and have been covered with their protective tiles, no sharp metal tools such as spades or fencing stakes, shall be used in the trench. Rollers used during laying of cables shall have no sharp projecting parts liable to damage the cables.

6.03 Cables above Ground

For main cable runs the cable shall be run on approved tray or ladder rack, and secured to it at intervals of not more than 400 mm horizontally and 600 mm vertically.

Cables shall be dressed together and fixed with a common saddle. If the number of cables is such as to require the tiering of cables, the number of tiers shall generally be two.

7 TERMINATION OF CABLES

Cables shall be terminated in accordance with Chapter 52 of the IEE Regulations, particularly Section 527.

Cables shall be terminated by one of the following methods:-

- (i) The cable conductors shall be sweated into lugs of the appropriate size for the cable and equipment terminal.
- (ii) The cable conductors shall be secured by compression type lugs of the correct size for the cable and equipment terminal.
- (iii) The cable conductors shall be secured in pinch screw terminals.
- (iv) The cable shall be secured by means of clamps.

Where cables are required to terminate at connectors, as at lighting points, such connectors shall secure all the strands of stranded cables. Care shall be taken to ensure that cables are not damaged during preparation for termination.

Cables terminating at pinch screw terminals shall be twisted together and single cables shall have the conductor doubled back to ensure adequate purchase for pinching screws.

Cables connected to lamp holders or other components at which heat is produced shall be insulated with heat resisting material capable of withstanding, without detriment, the temperature encountered.

All terminations on PVC/SWA/PVC insulated cables shall be by compression type glands of an approved design and manufacture with facilities for clamping the armouring the outer sheath of the cable.

Glands mounted outdoors shall incorporate a seal to prevent ingress of moisture into the gland, and all glands shall be fitted with a thermoplastic shroud.

Where circular terminations are to be made, these shall be completed using Ross Counterney terminals.

Where cables are terminated in "Klippon" type terminals with parallel faced jaws, the individual cores shall be terminated using the appropriate flat or hook blade crimped lugs. Where the terminal faces are concaved, the cores shall be terminated in wires pin crimped lugs.

The electrical Sub-Sub-Contractor shall avoid multiple connections under one screw or one pin. Where more than two wires are required, a common termination jumper bar shall be used.

Terminals shall be mounted on rails or supports. All internal wiring is to be clearly marked by markers.

8 SEGREGATION OF SERVICES

Cables of differing voltages shall be segregated so that there is no possibility of a fault in a power cable damaging any adjacent cables or imposing a different voltage upon them.

9 IDENTIFICATION OF CABLES

All cables shall be fitted with non-corrosive cable identification bands at each end, and at all changes of direction where they leave a group of cables. All cables cores connected to equipment having marked terminals shall be fitted with non-corrosive identification bands bearing markings corresponding to those of the terminals at both ends.

10. EARTHING

The whole of the metallic portion of the installation, other than current carrying parts, shall be electrically and mechanically bonded to the consumer's main earth terminal and also if applicable, to the lighting protection system or other points specified.

The installation shall be earthed in accordance with the Sixteenth Edition of the Regulations for Electrical Installation issued by the IEE, BS CP1013, "Earthing" and BS 6651 "The protection of structures against Lightning". The electrical Sub-Sub-Contractor's attention is drawn to Chapter 54 of the IEE Regulations.

A main earth terminal shall be supplied and installed adjacent to the electricity supply cable termination. The terminal shall be of ample size and capacity to suit the installation. All items of equipment, switchgear, etc., shall be bonded to this earth terminal using PVC insulated PVC sheathed cables, coloured green and yellow and sized in accordance with Tables 41A1 of the IEE Regulations. An invarine label reading **"SAFETY ELECTRICAL CONNECTION - DO NOT REMOVE"** in engraved upper case characters not less than 4.75mm high, shall be permanently fixed immediately adjacent to or on the earth terminal.

A heavy duty copper clamp complying with BS. 951 shall be used to bond the main protective conductor to the electricity supply cable armouring or metallic sheath (where applicable the armouring and sheath shall be bonded together).

All protective conductors shall, where possible, be enclosed within metal trunking or conduit serving switchgear, distribution board etc., so as to provide mechanical protection. Where protective conductors are run on building surfaces they shall be properly fixed and supported by means of PVC coated metal saddles along selected routes.

Earth continuity between separate items of switchgear, distribution boards etc., mounted adjacent to one another shall be affected by means of high conductivity continuous copper tape, or PVC sheathed cable, coloured green and yellow, and sized in accordance with the Table 41A1 or 41A2 and Section 543 of the IEE Regulations, connecting all items to the earth terminal.

All items of switchgear, accessories, luminaries, conduits, and the outer sheaths of MICS cables, the armouring of all PVC/SWA/PVC cables together with all other items of electrical plant and equipment shall be effectively earthed by means of a protective conductor in accordance with Table 41A1 and 41A2 and section 543 of the IEE Regulations.

At every terminal point on the fixed wiring an integral earth terminal shall be provided e.g. BESA boxes, accessory boxes etc. A protective conductor shall be provided and installed between this terminal and the earth terminal on the associated switch, socket outlet, luminaire etc.

Each circuit protective conductor shall be connected to a multi-way earth terminal provided and fixed within each distribution board. The earth terminal shall be provided with an adequate number of ways such that not more than one conductor per terminal shall be installed and the earthing conductors shall be connected in the same sequence as the current carrying conductors.

All metal piped services, e.g., Heating, Water and Gas Services, metal wastes and piped services at sinks, baths and showers etc., shall be bonded to the earth terminal in accordance with the IEE Regulations 413-2.

A 50mm section of each gas and water pipe, at position close to their entry into the relevant building, shall be cleaned and made smooth. A copper earthing clamp designed to permit the connection of protective conductors shall be provided and sized in accordance with Table 41A1 and 41A2 and Section 543 of the IEE Regulations.

The clamp shall be a proprietary type or shall be fabricated from high conductivity copper strip, minimum size 40 mm x 4 mm which shall encircle the cleaned sections of the pipe. A permanent label indelibly marked with the words, "**SAFETY ELECTRICAL CONNECTION - DO NOT REMOVE**" in legible type not less than 4.75 mm high, shall be permanently fixed at the points of connections.

The final connection of bonding conductors from gas, water pipes and other services to the earthing terminal shall not be completed until earth electrode and earth impedance tests have been satisfactorily completed.

Bonding connections to pipework shall be as unobstructive as possible where practicable shall be made in service ducts or accessible voids and shall be readily on the Record Drawings. All materials and sundry item shall be provided whether or not specifically mentioned, necessary to completely and effectively earth the installation. The installation shall be fully protected against dampness and corrosion and the effect of electrolytic action between dissimilar materials. A completely permanent installation shall be provided which shall be fully accessible for regular testing and inspection.

The value of earth resistance from any point of an installation to the general mass of earth shall be low enough to ensure operation of circuit protective devices and shall in any case not exceed four(4) ohms for electrical equipment, seven (7) ohms for lighting protection. Each earthing cable shall terminate in an approved design of cable lug.

Where earth conductors are run upon structures or walls they shall be fastened by means of heavy gauge non-ferrous fasteners not more than 0.75 m apart on horizontal runs and not more than 1.2 m apart on vertical runs and to give a minimum clearance of 4 mm from the fixing face.

In the event of the electrical sub-Sub-Contractor not being able to establish a suitable earth connection to the electricity supply cable, earth electrodes shall be installed which shall be galvanised or copper clad steel extendable rods not less than 16 mm diameter and not less than 1.2 m in length. Connections to electrodes shall be made by means of solderless mechanical clamps.

To avoid corrosion, all earth system connections shall be cleaned bright and immediately covered with silicon MS4 compound or approved equal.

Earth pits, where required, shall be in accordance with the Sub-Contractor's relevant drawings, with the facility to disconnect the earth ring while measuring the electrode earth resistance.

11 LIGHTNING PROTECTION

Lighting protection shall be provided on high buildings/structures more than 10m in height. such protection shall be effected by bonding each individual building/structures direct to the earthing system, in accordance with the BS CP 326, by a minimum size of 170mm² conductor.

12 FUSED-SWITCH UNITS, SWITCHFUSES AND ISOLATORS

The above units comply with BS 5419 and shall be 500 volt type and installed where specified and indicated on the relevant drawings.

All switchgear shall be provided with suitable locks for padlocking the switches in the 'OFF' position. The cover shall be interlocked with the operating mechanism to prevent it from being opened in the 'ON' position. This interlocking shall also prevent the switch from being closed with the cover open unless for maintenance purposes. The cover shall be gasketed to prevent ingress of dust.

The switch action mechanism shall be of the parallel operation (double break type having cartridge fuses mounted switches) and shall be ASTA certified to meet adequately all the duties specified.

The end plates shall be removable for drilling for conduit or cable entry and shall be fitted with additional distance pieces where necessary. Switchgear boards shall be fixed to the wall/floor by Rawl bolts or other approved fixings.

No building alteration shall be allowed when moving the switchboard into position, the switchboard being supplied in sections to be built in position, if so required. Switchgear shall be delivered to site when required to suit the progress of the works. Care shall be taken to preserve the manufacturer's paint finish. Any refurbishing etc. shall be carried out, using paint obtained from the switchboard manufacturer, to the original standard of finish.

All fuses in switchgear shall be HRC fuses sized for the fused-switch units or switch-fuses etc., in which they are incorporated. They shall be ASTA certified for compliance with BS 88, Category of Duty 440 A.C 5 Class 01 and in all cases fuse links shall be selected to provide circuits discrimination.

13 CONTROL PANELS AND CUBICLES

The details specified in clause 4.11 shall apply as far as fused switches, bus-bars and rating etc are concerned. The panels shall be constructed from rolled steel channel minimum size 60 mm x 30 mm deep x 5 mm or equivalent angle section clad with sheet steel of 3 mm gauge. 2 mm gauge may be used for covers and doors of not more than 1 m square.

Terminals shall be of the "Klippon" standards rail-mounted feed-through type or approved equal. All terminals shall be identified by means of numbered or lettered marking tags, which shall be identical to the number of letter applied to the cables. Cables shall be identified as terminations by means of cable markers as manufactured by "Klippon" or approved equal. 25% spare terminals capacity within wiring duct shall be provided. All components motors, starters, relays, timers, etc. shall be labelled showing their reference and function and these shall relate to the panels' schematic wiring diagram provided with the "As-built" drawing and manuals.

All control panels shall be fitted with multi-pole isolating switches through which all electricity supplies shall pass. The door(s) of the control panel shall not open unless the isolating switch is in the "off" position. A facility to lock the control panel-isolating switch in the "off" position shall be included.

14 DISTRIBUTION BOARDS

14.1 General

All distribution boards, unless stated otherwise, shall be miniature Circuit Breaker Distribution Boards and shall be of surface or flush type, as specified. Facilities for local isolation of the distribution boards shall be provided by either a local fused-switch unit or an integral isolating switch, whichever is specified.

Where surface mounted on a flush installation, all conductors shall terminate behind the board in an adequate box. For surface mounting, trunking shall be fixed between the board and ceiling level, or conduits run directly into the board. Adequate earth continuity connection shall be made between the various components.

14.2 Fused Distribution Boards

All fuse boards shall be of 500 volt rating to BS. 5486 part 11 "Particular requirements for Fuse boards". The details specified in clause 4.12 shall apply

as far as cabinet and construction, cabling arrangements, bus bars, neutral bars, earthing and isolating switches are connected.

Fuse banks shall be spaced so as to obviate the necessity for insulating barriers, but protection shall be provided by means of insulating shields to prevent accidental contact with the main bus bars and connections.

All fuses lighting and heating circuits shall be of the HRC cartridge type, ASTA certified, for compliance with BS. 88, category of Duty 440 A.C 5 class 01.

14.3 Miniature Circuit-Breaker Distribution Boards

MCB distribution boards shall comply with BS. 5486 part 12 'Particular requirements for miniature circuits-breaker boards'. The cases shall be constructed of heavy gauge sheet steel, in such a manner as to afford rigidity and maximum ease of wiring for full size circuit and main cables.

The cover shall be provided with an efficient gasket or alternatively designed with generous overlapping edges to prevent the ingress of dust. Components shall not be manufactured from zinc alloy in conjunction with sheet steel where they are relied upon for earth continuity.

Where the cover is required to be lockable, cylinder type locks shall be provided, having two keys per lock. All locked distribution boards shall be handed to the Engineering Supervisor on completion of the works. The cases shall be provided with detachable cable/conduit terminating plates, which shall be reversible and interchangeable from top to bottom.

All screws and nuts used in the construction of the case shall be fitted with shake proof washers and care taken to ensure efficient earth continuity. An external earthing terminal with cable socket shall be fitted.

All MCB banks shall be fitted to frames, with robust locking plates provided to ensure the frames rigidly in the fixed position.

The banks shall be so spaced to obviate the necessity for insulating barriers, but protection shall be provided by means of insulating shields to prevent accidental contact with main bus bars and incoming mains cable.

Bus-bars shall be of high conductivity, hard drawn copper conductors connected to the MCB contacts by means of spring washered screws or bolts, unless plug-in type MCBs are specified.

Neutral bars shall be similar to the main bus bars and shall have two screw terminals per way for rating of 30 amps or over. Single screw connections will be allowed for capacities up to 30 amps. The neutral bars shall have one terminal for each MCB within the board, and connection of conductors to the neutral bar shall be in the same order as the MCB ways.

Where installations are carried out with cables with a protective conductor, all distribution boards shall also contain internal earthing bars similar to the neutral bars detailed above, with one terminal for each MCB within the board. Earthing conductors shall be connected in the manner described for neutral conductors to neutral bars.

Where a main integral isolating switch is provided in an MCB case it shall be arranged to isolate incoming live and neutral main cables from the bus-bars. The isolator switch shall be rated at 500 volts and of the quick make-and break pattern with positive action. Incoming and outgoing terminals shall be fitted with two clamping screws and outgoing conductors to the bus-bars shall be high conductivity hard drawn copper rods.

Isolating switches shall comply with IEE Regulations, Part 537, and shall be capable of carrying their full rated load continuously and shall 'make' or 'break' their full rated load without undue burning of the contacts.

14.4 Miniature Circuits Breaker (MCB)

All MCBs shall have movements which are positive in both directions (make and break) so as to enable units to be closed decisively by the operation of the handle, and to be able to assume the 'OFF' position unless the contacts are definitely separated, to safeguard against false indications.

The handle shall be trip free to make it impossible for the operator to hold the breaker in the closed position under faulty conditions. The operating mechanism and arc chambers of the circuit breaker shall be separated from the terminals and fixing screws.

Terminal identification shall be readily discernable as viewed from the front of the board with automatic and clear signal identification for both 'ON' and 'OFF' position.

All terminals shall be readily accessible from the front and each wiring chamber shall be closed by a screw fixed cover which protects the terminals and prevents dust from settling on the insulation.

Where the full capacity of a distribution board is not required the electrical Sub-Sub-Contractor shall fix blanking plates in the vacant MCB housings. All MCBs shall be rated at 500 volts minimum, and comply with BS 3871. "Miniature and moulded case circuits breakers" and 4752 part 1, "Circuit breakers".

14.5 Moulded Case Circuit Breakers (MCCB)

Where specified, MCCBs shall be of the thermal/magnetic type, having a quick make, quick break, trip free mechanism which prevents the MCCB from being closed or held against short circuits or overloads. Tripping of every multi-pole MCCB shall be such that operation ensures simultaneous action in all phases.

Clear indication shall be provided for the three positions of operation of the mechanism - 'ON', 'OFF' and 'TRIPPED'. The operation shall be such that the MCCB shall trip automatically under fault conditions and, to reset, the handle shall require first moving through the 'off' position. All MCCBs shall be provided with facilities for locking the breaker in 'OFF' position.

All MCCBs shall be rated at 500 volts minimum, be ASTA certified for this operational duty, and comply with BS. 3871 and BS. 4752 Part 1.

15 LABELLING AND ENGRAVING

15.1 Labelling

All fused-switch units, switch-fuses, switches, bus-bars chambers, distribution boards etc., and all items of equipment on the main panel shall be identified in accordance with section 514 of the IEE Regulations and shall have securely fitted externally a white 'Traffolyte', 'Formica' or other approved plastic laminate label engraved with 6 mm high black letters detailing the function of the equipment and any reference number.

Red, yellow, blue, plastic laminate phase discs shall be fixed inside all switchgear and distribution boards to indicate to which phase of the supply the various circuits are connected. The colourings shall comply with Part 524 of the IEE Regulations.

Each TP or TP & N item of switchgear shall have fitted on the cover a white plastic laminate label having 'CAUTION' - 415 VOLTS' engraved in 10 mm high red lettering.

5.2 Engraving

The electrical Sub-Sub-Contractor shall allow for engraving of all switched fused spurs, double pole switch accessories and any other accessories, which are customarily required.

The accessory plate shall be engraved in either black or red, capital letters 5 mm high, detailing and appliance or equipment being supplied by the accessory e.g., 'WATER PUMP' etc.

16 MOUNTING HEIGHTS

The approximate position of main switchgear, control equipment distributionboards, fittings and accessories shall be as indicated on the Drawings. Actual positions shall be determined on site by the Engineer.

Unless otherwise stated on the relevant drawings or directed by the Engineer the following mounting heights of all accessories above finished floor level shall be adhered to: -

Lighting Switches	-	1400 mm to centre
Socket Outlet and Spur	-	300 mm to centre (or 150 mm above work top level to centre)
Distribution Boards	-	1800 mm to lower edges.

All groups of accessories shall be in line either vertically or horizontally or as specified.

17 LUMINAIRES

All Luminaires shall be of the manufacture, size and type specified and shall comply in all respects to BS 4533 "Electric Luminaires".

The electrical Sub-Sub-Contractor shall supply and install all luminaires including lamps, lamp-holders, control gear, capacitors, glassware, diffusers or other attachments, heat resistant internal cables, fuses and terminals and all necessary suspension gear. In case where Luminaires are supplied by the client the Sub-Sub-Contractor shall deliver to site store, install, commission and set to work.

Unless otherwise stated, Luminaires shall be suitable for Class 1 normal indoor environments, giving a degree of protection against ingress of moisture or dust.

All Luminaires shall be assembled and installed in accordance with the respective manufacturer's instructions/recommendations, in the position and mounting heights specified.

Luminaires shall not be installed under dirty and hazardous site conditions, and any damage or deterioration to luminaires installed under these conditions shall be made good by the electrical Sub-Sub-Contractor.

The Luminaires shall be cleaned free of dust and dirt after completion of the installation. Where dirt, dust, corrosion or other conditions cause imperfections in the luminaires, they shall be replaced.

Luminaires, diffusers, attachments or glassware etc., shall be properly stored to final erection, in such a manner as to avoid damage of any kind.

Luminaires fixings shall generally be suitable for direct connection to conduit boxes or as otherwise specified. Luminaires not provided with suitable BESA box shall be modified as necessary.

Where a flexible cord supports, or partly supports, a luminaire the maximum mass supported by the cord shall not exceed the values set out in IEE Regulations 523-32.

The minimum cross-section area flexible core to the employed shall be 0.75mm^2 .

Specified attention shall be given to Chapter 52 of the IEE Regulations, particularly Regulation 521-5 and 521-6, Appendices 9 and 10.

Pendant tungsten luminaires shall be fitted with heat resistant flexible cord complying with BS 6500, capable of continuous operation with a conductor temperature of 150 degrees C. The cable shall be of the circular multicore type, finished white, if not otherwise specified.

Ceiling mounted tungsten luminaires, spotlights and other luminaires of the category 'hot' luminaires shall be wired internally with cable suitable for continuous operation at 185 degree C. Where cable tails are provided they shall be of the heat resistant type capable of operation at 185 degree C.

Exterior luminaires, fixed to the walls of buildings etc., shall be wired such that final circuit wiring terminates within the luminaire. All final circuit cables so installed shall be provided with heat resistant sleeves from the connection point within the luminaire for a distance of 300 mm.

All fluorescent and other discharge luminaires shall be provided with an integral fused connector block. The rating of the fuse shall be in accordance with the manufacturer's instructions to protect the internal wiring of the luminaire and to provide discrimination between final circuit protection and luminaire protection.

All recessed and semi-recessed luminaires in ceilings shall be connected by three core 0.75 mm^2 high temperature flexible cord from the terminals of the luminaires to a plug-in ceiling rose fixed and connected to an accessible outlet box in the wiring system, within the suspended ceiling immediately above the luminaire. The ceiling rose shall be accessible via the opening provided in the ceiling.

The electrical Sub-Sub-Contractor shall ensure that the methods of suspension for luminaires are electrically and mechanically sound.

Luminaires suspended by means of tubes shall be fitted to ball joints allowing a swing of at least 20 degrees all round. Reliable earthing between the fixed and moving parts shall be provided by means of a flexible braided copper tape.

Fluorescent luminaires shall be provided with a minimum of two fixings, except in the case of recessed modular luminaires or surface-mounted luminaires exceeding 300 mm in width, where four number fixings (one from each corner) shall be provided by means of conduit drops or threaded rods.

Normally visible luminaires support shall be conduit. All fluorescent luminaires shall be solidly mounted with all assembly nuts, bolts and accessories made tight to prevent vibrations and noise. Anti-vibration packing shall be fitted where necessary. Luminaires mounted direct to trunking shall be fixed by means of the manufacturer's recommended fixing assemblies.

Unless stated otherwise, all luminaire supports shall be fixed to the building primary structure. Luminaires shall not be supported from suspended ceiling unless otherwise specified. The electrical Sub-Sub-Contractor shall be responsible for mounting and fixing arrangements.

Break joint rings of approved colour shall be provided for all suspended luminaires and fluorescent battery luminaires where the batten is of insufficient width to cover completely the conduit box and its associated clearance hole in the ceiling.

The metalwork of all luminaires shall be effectively bonded to the earthing system in accordance with Chapter 54 of the IEE Regulations.

Care shall be taken to ensure that the internal wiring of luminaires and the cable of any fixed wiring shall not be in contact with high temperature areas in luminaires.

Lighting track shall be of the type, size, finish, number of circuits and manufacture specified and shall comply with the requirements of the relevant section of BS. 4533. The positions of luminaires as shown on the Drawings are approximate only and exact position shall be determined after reference to the Engineering supervisor.

18. CEILING ROSES

Surface mounted ceiling roses shall be of all insulated, high impact moulded plastic construction complying with BS. 67 and shall be suitable for direct attachment to conduit outlet boxes. Recessed or semi-recessed ceiling roses shall be manufactured from porcelain. Break joint rings shall be provided when used on flush conduit outlet boxes.

Ceiling roses shall not be connected to fixed wiring in such a manner that one of the terminals remains 'live' when the associated switch is in the 'off' position, unless that terminal is inaccessible to touch when the ceiling rose cover is removed, e.g. for replacement flexible cord.

Terminals shall be provided for switched live, neutral and protective conductors. Loop-in facilities shall also be provided.

19 LAMPS

Lamps shall be compatible with the luminaire for which they are intended and shall be of the wattage, type and colour specified. Lamps shall be of the correct voltage rating for the particular electricity supply concerned.

Tungsten filament lamps, unless otherwise specified, shall be of the 'PEARL' type and of the long-life type giving 2000 hours average life.

Luminaires designed to accommodate lamps with reduced physical dimensions shall be fitted with lamps of the mushroom type of approved equal.

20 EXTERNAL LIGHTING

External lighting system shall comprise the lighting points at the position shown on the Drawings and shall include the provision, erection and connection of all lighting columns, bollards, wall and ceiling luminaires and the provision and connection of all control gear together with the laying, jointing and connection of all necessary cables.

All excavation, trenching, backfilling etc., will be undertaken by the main Sub-Contractor.

All lighting columns shall be of the type specified, suitable for looping in and out three No.2 Core PVC/SWA/PVC cables of the specified size.

Where discharge lamps are specified the associated controlgear shall be mounted in the base of the column above the fused 'cut out', all on a timberboard housed within the base of the column.

Each lighting column/bollard shall be completed with all adaptors, spigots, mounting brackets, luminaires, controlgear and lamps and shall be provided with a base compartment and locking door.

All column/bollards shall be fixed in the position specified.

Cable routes are shown on the relevant drawings and the electric Sub-Sub-Contractor shall lay the lighting cables in the trenches.

All connections shall be made in an approved manner, and the installations shall be finished complete and handed over in working order to the full satisfaction of the Engineer.

21 LIGHTING SWITCHES

Lighting switches shall be of the type, size and manufacture as specified.

Wall and ceiling switches shall comply with BS 3676. Wall and ceiling switches controlling A.C lighting circuits shall be rated 20 amp and be of the slow break quick make, type unless stated otherwise.

Where several switches on one phase are shown at one position, a ganged box shall be used.

Where switches at any location are connected to different phases, purpose-made phase barrier switches shall be installed. The phases shall be separated by means of rigidly fixed barriers and the cable for each phase shall be confined to the area enclosed by the barriers for that phase.

Switches connected to a particular phase shall have separate cover or covers fitted over each phase. The covers shall be engraved "CAUTION 415 VOLTS".

The switch plate of the specified finish shall be fitted over phase covers to render the switch unit indistinguishable from the switches that are not phase barrier switches.

Alternatively, each gang shall have its own piping and box for each phase, physically separated from other phases with similar arrangements.

For flush position on a plastered or equivalent finish wall, the switches shall have overlapping plates.

In any places where the finish is fair-faced brickwork, the wiring shall be installed on the back of the wall and make a back entry into the accessories. Each switch in these areas shall be neatly recessed and incorporate an overlapping plate.

For surface-mounted positions and such Plant Rooms, Electrical Switch room etc., employing a surface-mounted system or wiring, switches shall be surface-mounted, having metal front plates of an aluminium finish, mounted in matching metal boxes.

22 SOCKETS OUTLETS

All socket outlets and plugs shall be supplied and installed in accordance with the manufacture, type, sizes and finish specified.

All round pin 2A , 5A, 15A, and 30A socket outlets shall comply with the requirements of BS 546.

All sockets outlets shall be switched, unless otherwise specified.

All switched sockets outlets shall be complete with steel boxes of the same manufacture, complete with earth terminal.

Assemblies shall comply fully with the requirements of the IEE Regulations concerning the bonding of protective conductor terminals and each such terminal shall be connected by a conductor, having a minimum cross-sectional area of 2.5 mm², to a permanent earthing terminal incorporated in the associated box providing an effective, solid connection to the earth continuity conductor of the installation.

Where the assembly does not provide a reliable electrical contact between the cover plate and box with effective connection of metal operating bars and toggles, then an insulated earthing lead shall be provided, solidly connected to the metal plate and operating bar or toggle and terminating at the fixed earthing terminal incorporated in the associated box. 13 amp sockets will generally be installed using ring circuits in accordance with Appendix 5, Table 5A of the IEE Regulations.

All plugs shall be of moulded rubber or other resilient material complying with BS 1363 or BS 546. The plug shall have internal cord grip. 13 amp plugs shall be fitted with cartridge fuse links to BS 1362. The fuse rating shall be selected to give protection to the flexible cord or cable connected.

All fuses installed within 13 amp plug top, fused spurs, clock connections etc., shall be cartridge fuse links rated at 240 volts, ASTA certified for compliance with BS 1362 'General purpose fuse links for domestic and similar purposes', or BS 464 'Cartridge fuse links (rated at up to 5 amperes) for AC and DC service', or BS 2950 'Cartridge fuse-link for telecommunications and light electrical apparatus'.

All equipment, which is locally fused, shall have fitted fuses with characteristics, which are recommended by the manufacturer of the equipment.

If any appliance or equipment suffers due to incorrect fusing of the appliances, such appliances or equipment shall be repaired or replaced at the electrical Sub-Sub-Contractor's cost, to the satisfaction of the Engineer.

23 INSPECTION AND TESTING

A visual inspection shall be made in accordance with IEE Regulations 612-1. References shall be made to appendix 14 of the IEE Regulations, which is a checklist for initial inspection of installations.

The electrical installation shall be inspected and tested by the electrical Sub-Sub-Contractor in accordance with part 6 of the IEE Regulations.

Where any part of installation is to be concealed within a building, fabric tests shall be made to ensure that the installation is satisfactory prior to concealment.

Upon completion of the works the whole installation shall be subjected to the tests detailed hereafter and every defect shall be noted, corrected and brought to the notice of the Engineer.

All tests shall be witnessed by the Engineer to his full satisfaction and he shall be given at least one week's notice in writing of the proposed tests.

All labour and test instruments shall be provided by the electrical Sub-Sub-Contractor and the instruments shall be correctly calibrated and certified for the limits of accuracy required and shall be operated by competent person. If, in the Engineer's opinion, a particular instrument is not suitable, then an acceptable alternative shall be provided. The Engineer shall be at liberty to demand the use of any testing instrument or apparatus that he may reasonably consider to be necessary in the execution of the testing.

In the event of the installation failing to pass the test, the Engineer has the full authority of the Employer to deduct from the Contract Price all reasonable expenses incurred, due to him being required to attend a repetition of the test.

The following items, where relevant, shall be tested in the sequence indicated. Standard methods of testing, in respect of some of the following regulations of this section, are given in Appendix 15 of the IEE Regulations.

- i) Continuity of ring final circuit conductors.
- ii) Continuity of protective conductors, including main supplementary equipotential bonding.
- iii) Earth electrode resistance.
- iv) Insulation resistance.
- v) Insulation of site-built assemblies.
- vi) Protection of barriers or enclosures provided during erection.
- vii) Insulation of non-conducting floors and walls.
- viii) Polarity.
- ix) Earth fault loop impedance.
- x) Operation of residual current devices and fault voltage operated protected devices.

Upon completion of all tests and commissioning, two copies of detailed certificates shall be provided by the electrical Sub-Contractor to show that the equipment, materials, installation etc., have been tested and commissioned. One copy of each, duly completed and signed shall be submitted to the Engineer within 154 days of the results being obtained. The second copy of the certificates shall be retained to be included with operator and maintenance manuals.

The results of the test and details of completion for the electrical test shall be detailed on the Test and Completion Certificates respectively; issued by the National Inspection council for Electrical Installation Contracting or other approved authority.

24 AS BUILT DRAWINGS, AND DOCUMENTATION

Within one month of the date of completion the electrical Sub-Contractor shall provide 3 prints of all electrical drawings showing the electrical installations "As built". In case the electrical Sub-Contractor fails to provide "As Built" drawings as required, these will be prepared by others at the expense of the electrical Sub-Contractor.

APPENDIX 1

SUPPLEMENTARY SPECIFICATION FOR PVC INSULATED CABLES AND NON-METALLIC CONDUITS WIRING SYSTEM.

1. PVC 1 CABLE

The wiring shall be carried out in 250-volt grade or 440 volt grade for 3-phase PVC Insulated cable, as specified elsewhere run in non-metallic conduit. The cable shall be of the sizes specified on the drawing.

2. INSTALLATION OF WIRING

Cable shall be drawn into accessories, distribution boards and switchgear after the erection of the conduit system. Under no circumstances shall it be permitted to draw cable into an incomplete section of the conduit installation.

3. JOINTS IN CABLES

The wiring shall be carried out on the looping-in principle. All joints shall be made at the terminals of main switches, distribution boards, ceiling roses, switches and socket outlets, etc. and fixed apparatus only. No joints shall be made in boxes unless approved.

4. CAPACITY OF CONDUITS

The cable shall run in the conduit so as not to exceed the capacities as set out in Table 10 of the IEE Regulations (13th Edition with current amendments).

Conduits shall be best quality new super high impact grade heavy gauge 'A' rigid PVC unplasticised conduits as manufactured by Egetude limited suitable for plain connections.

Conduit of sizes less than 20 mm shall not be used without the written authority of the D.R.

5. BENDING

The conduit shall be bent and formed strictly in accordance with the manufacturer's instructions: -

- i) Small size, i.e. 20 and 25 mm shall be bent cold by inserting the correct size bending spring. It is essential for right angle bends that the conduit is bent past 90 degrees to allow for "spring back".
- ii) Large size of conduit shall be pre-heated before inserting rubber cord to prevent kinking. Conduit badly formed or bent or damaged in any way, shall not be used.

6. JOINTING

Joints shall be made water-tight by the use of 'Egaweld' cement applied with a brush or rug. 'Egaweld' shall be applied to the complete circumference of conduit. Conduit shall be thoroughly cleaned at the ends to ensure a good adhesion of the fittings. 'Egaweld' shall not be permitted to enter into the conduit.

7. CONDUIT FITTINGS

All conduit fittings and accessories, including couplers, ordinary clips, saddles, pipe hooks, reducers, stopping plugs, lockouts and male and female bushes

shall be manufactured dimensionally, similar to B.S.S. 31/1940. Solid tees shall not be used. Solid inspection elbows or bends or inspection tees shall be used only in exceptional circumstances and then only with D.R.'s approval.

Where it eases the installation of cast-in-situ back entry boxes on the loop-in system, purpose made bends manufactured by Egatube and comprising a tight bend with a push socket at one end and a threaded socket at the other end may be used with the D.R.'s approval.

8. FIXING OF CONDUITS

Conduit shall be installed on the loop-in system and shall either be cast-in-situ in the main concrete structure, concealed in chases cast in concrete walls, or chases cut in solid partition walls, run in ceiling spaces or in hollow partitions of floors, or concealed below the floor screed, whichever shall prove to be the most suitable method of installation for use in the building under construction.

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

Sunken conduit run in chases in walls shall be fixed by means of mild steel pipe hooks or non-metallic saddles spaced not more than 1 m apart. Where conduit is concealed behind plaster it shall be sunk to a depth of either 10 mm below finished plaster level, or installed flush with the structural wall level before application of plaster, whichever is the lesser depth.

Conduit fixed on the surface of walls or ceiling shall be fixed by spacer bar saddles fixed not more than 1 m apart.

Surface conduit shall also be fixed 230 mm on both sides of all boxes, the box itself securely fixed. Where such an arrangement of boxes and saddles would prove to be both unsightly and unnecessary, short lengths of conduit not exceeding 1 m in length between boxes need not be secured further than by connection to the adjacent boxes. In such cases the D.R. reserves the right to insist upon additional fixing being provided, should he for any reason whatsoever consider such additional fixing necessary.

Where two or more lines of conduit run parallel to each other, on the surface of walls, etc., the distance between them shall not be less than 15 mm and conduits shall not cross.

Conduit shall be installed in such a manner as to prevent interference with other services and shall be kept at least 180 mm clear of gas or water pipes, and heat in excess of 68 degrees C.

A means of expansion shall be provided in conduit runs in excess of 6 m without any bend or set, by use of 'Egetude' expansion couplings, which shall also be used at building expansion joints.

Conduit cast-in-situ shall be frequently secured to the steel reinforcement work, with heavy binding wire to prevent movement of the conduit and conduit boxes during the pouring and vibrating of the concrete. Outlet boxes shall be securely fixed to the shuttering with nails, or by means, which shall be visible as a marker on removal of the shuttering only where marks can be concealed.

Conduit shall be installed after the first grid of steel reinforcement work is securely fixed and all open ends of conduits shall be protected by couplings plugged with a suitable non-metallic stopping plug. The number of right angle bends in conduit cast-in-situ shall not exceed two between boxes.

Immediately prior to installation the wiring all conduit and fittings shall be dried and cleaned out by drawing through a cloth swab. Rawl plugs shall be used for fixing to brickwork, self-tapping screws for fixing to aluminium section, raw nuts, raw anchors spring toggles, gravity toggles or rawl bolts, shall be used for fixing to other materials as approved by the D.R.

Corners shall be turned by easy bends or sets made in accordance with the manufacturer's instructions without altering the section or splitting conduit.

9. CIRCULAR INSPECTION

Boxes will not be permitted in floors unless approved. Boxes cast-in-situ must face downwards from the ceiling/floor section. Small standard circular non-metallic conduit boxes, conforming dimensionally with B.S. 31/1940 with standard circular non-metallic (4mm) lids and nylon fixing screws, shall be provided and fixed at all junctions.

The above circular boxes or equivalent looping boxes shall be provided and securely fixed for all ceiling points. When the conduit is run on the surface, all circular boxes for ceiling points shall be fixed with screws.

Where ceiling roses occur and the ceiling box is recessed below the finished level of the ceiling, suitable extensive rings to accommodate the ceiling rose must be provided. Where ceiling boxes, including extension rings, are flush with the ceiling surface, break joints rings shall be provided to hide the joints.

Where a non-metallic outlet box of thermoplastic material is used for the suspension of a lighting fitting, care shall be taken to ensure that the temperature of the box does not exceed 60 degrees c. The weight suspended from the box shall not exceed 3 kg.

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

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

Conduit and trunking shall be mechanically and electrically continuous. Conduit shall be tightly screwed between the various lengths so that they butt at the socketed joints. The internal edges of conduit and all fittings shall be smooth, free from burrs and other defects. Oil and other insulating substance shall be removed from the screw threads. Where conduits terminate in fuse-gear, distribution board, adaptable boxes, non-spouted switchboxes, etc., they shall, unless otherwise stated, be connected thereto by means of smooth bore male brass brushes, compression washers and sockets. All exposed threads and abrasions shall be painted (using an oil point for black enamelled tubing and galvanised tubing immediately after the conduits are erected. All bends and sets shall be made cold without altering the section of the conduit. The inner radius of the bend shall not be less than four (4) times the outside diameter of the conduit. Not more than two right angle bends will be permitted without the inter-position of a draw-in box. Where straight runs of conduit are installed, draw-in boxes shall be provided at distances not exceeding 15 m. No tees, elbows, sleeves, either of inspection or solid type, will be permitted.

Conduit throughout shall be of sufficient section and so arranged with draw-in boxes to allow easy drawing in and out of any one or all of the cables in the conduit.

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

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

Conduits installed and buried in walls shall allow a minimum of 15 mm cover. These conduits and those cast-in-situ concrete slabs shall be given one coat of rust prevention paint before installation of conduit and before concrete is placed.

Sunk circular conduit boxes shall be provided with break joint rings of whitemoulded material or metal.

Surface conduit shall be run in square symmetrical lines and shall be marked onsite for approval before installation. Conduits shall be fixed by means of distance saddles spaced at not more than 1.2 m for 20mm and 50mm conduit and 1.5 m for larger sizes. Conduits shall be fixed each side of conduit boxes at a distance not exceeding 250 mm, and the saddles shall be equally spaced.

Where conduit runs enter specified areas requiring flameproof equipment, barrier boxes shall be inserted immediately before the conduit enters the flameproof area.

All conduit installed within this area shall be solid drawn galvanised, as shall be conduit fittings and accessories and Buxton Certified as suitable for Group 11 Hazards. Equipment shall comply with B.S 229, B.S.S. 889, and Code of Practice C.P. 1003. In no case shall conduits from different distribution boards be connected at one box, likewise cables from different distribution boards shall not be housed in the same conduit specified.

All conduit boxes, except loop-in pattern concrete floor shall be fixed direct to the structure apart from the support provided by the conduits. Box lids where required shall be heavy gauge metal, secured by means of zinc plated or cadmium steel screws. All adaptable boxes and lids of the same size shall be interchangeable.

Boxes used in conjunction with mineral insulated copper sheathed cable boxes shall be galvanised and painted after erection.

Draw-in boxes in the floor are generally to be avoided but where they are essential they must be grouped in positions approved by the D.R. and covered by suitable floor straps, with non-ferrous tray and covers.

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

The Sub-Contractor must take full responsibility for the fillings of all covers, but the fillings in materials will be supplied and the filling shall be carried out by the Main Building Sub-Contractor.

Where it is intended to fix enclosed lighting fittings directly to a box to suspend a fitting of weight in excess of 3 kg., Egetude steel insert clips shall be used.

10. SWITCH AND SOCKET OUTLET BOXES

All boxes intended for switches, socket outlet or other outlets shall be fitted with brass ferrules to accommodate fixing screws.

11. STOPPING PLUGS

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

12. EARTHING

Where fittings and accessories require earthing, an earth continuity conductor shall be run through the conduit. The earth continuity conductor shall be a green coloured PVC insulated copper wire of minimum size 2.5 sq. mm and shall be continuous between terminals. Where the earth terminal is formed by a brass screw and washer, "Ross Courtney" type terminations shall be used. All switch, socket outlet, ceiling boxes etc., shall be supplied with an earth terminal.

13. EARTH CONTINUITY

Each final sub-circuit that is required to be earthed shall be provided with its own individual earth continuity conductor which shall be run from a terminal on the earth bar in the distribution board or consumer's control unit protecting any particular final sub-circuit.

PART B:
PARTICULAR SPECIFICATIONS FOR ELECTRICAL
INSTALLATIONS

PART B:

PARTICULAR SPECIFICATIONS FOR ELECTRICAL INSTALLATIONS

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PART B:

PARTICULAR SPECIFICATIONS

SECTION 1: GENERAL

- 1.01 The electrical Sub-Contractor shall supply labour and supply, deliver, install, fix, connect, test, label, and commission the electrical works, clean, complete and working to every detail as described in the specification and by related specifications to the satisfaction of the Consulting Engineer/Architect.

1.02 Exclusions

Excluded from this Sub-contract is:-

- i) Control panels for motor-starters and internal wiring between control-panels, motor thermostat, etc.

SECTION 2

SUPPLY AND DISTRIBUTION

2.01 Supply and Distribution system

At Barabara Plaza, the power shall be supplied from the existing Sub-switchboards within the Electrical Duct through the existing cables (4C 25 mm² PVC/SWA/PVC Cu) to the existing Distribution Boards in each wing. The outdoor Air Conditioning Units shall get their power directly from the Sub- switchboards within the Electrical Duct.

2.02 Power Distribution

Mains power distribution is through ducts and mainly cable trays.

The schematic for all the Distribution Boards are shown on the drawings.

All switch fuses, fuse switches, MCCBs, MCBs, including meters, if any, shall be of reputable manufacture meeting current British and Kenya Standards as stipulated in the general specifications. Any other quality that does not strictly meet these standards shall not be acceptable.

SECTION 3

LIGHTING AND SMALL POWER INSTALLATIONS

3.01 INSTALLATION SYSTEM

With the exception of where otherwise noted on the drawings, the installations shall throughout be carried out in PVC insulated copper cables of not less than 1.5 mm² copper drawn in high grade PVC conduit.

3.02 LIGHTING CONTROL

SYSTEM Indoor Lighting

- 3.03 Types of accessories and fixed apparatus to be used shall be as manufacture Legrand or Schneider. Subject to the approval of the Engineer, equivalent makes may be used. All light fittings to be of manufacture shown on the detailed descriptions, or approved equivalent.

3.04 CONNECTIONS TO FIXED APPLIANCES

The Sub-contractor shall supply and interconnect flexible cords between spur units/outlets boxes and the appliances where the symbols for flex connections are shown.

All connections shall be made by white heat-resisting PVC flexible cords having fuse rating in accordance with the respective circuits subjected to a minimum of 0.75mm².

3.05 MOUNTING HEIGHTS AND LOCATIONS

All mounting heights stated shall mean the heights from finished floor level (FFL) to underside of the accessory.

Each mounting heights for wall fixtures shall, however, be re-confirmed onsite.

Lighting control Switches

1400 mm above floor level and 100 mm away from architrave. If mounted in a column they shall be located in the centre.

Sockets Outlets

300 mm above finished floor except for areas that are otherwise stated.

Connection Units and Outlets

Connection units having cord outlets shall be located as to limit the length of the flex cord to approx. 600 mm and be located slightly higher than the inlet on the appliances. The same applies to outlet boxes.

Conduit Boxes (General)

Where one fitting is shown in a room, the box shall be in the centre (unless otherwise stated). Where two or more fittings are to be installed, they shall be half of the distance between two fittings.

Where one row of fittings is to be installed, they shall be located in the centre. Where installation is between beams, they shall be midway in between two beams.
All boxes shall be with covers.

3.06 WALL AND CEILING FINISHINGS

The Sub-Contractor is to obtain information regarding the ceiling claddings before any installation is commenced as he will be held responsible if the conduit boxes as well as boxes for switches and socket outlets, telephone, etc are not installed at the right depth.

3.07 LIGHTING FITTINGS

The sub-Contractor shall supply, deliver to site, install and commission all the fittings.

The existing fittings for re-use shall be carefully uninstalled, cleaned, properly stored, and carefully re-installed, tested and commissioned.

The tenderer may submit an alternative schedule of equal makes of fittings with the tender where applicable.

Where appliances fittings shall be supplied complete with bulbs or tubes, the bulbs/tubes shall be as Philips Manufacturer. Equivalent makes may be substituted subject to due approval of the Engineers, and the sub-contractor proving that what is specified is not available.

3.08 FIXING AND LOCATION

Details of fixing and location of various fittings are as shown on relevant drawings.

Fluorescent and incandescent fittings shall, in addition to being fixed to the conduit boxes, also be fixed by means of PVC covered raw plugs (no wooden plugs) at the fixing centres.

A rubber gasket shall be fitted on the conduit boxes for the outdoor fittings in order to provide a waterproof seal.

- 3.09 All switch panels shall be as Legrand/Schneider manufacture or equivalent subject to the Engineer's approval. Each panel shall be fed from a particular phase as NOT more than one shall be allowed inside one panel. Separate conduits shall be installed to each panel.

3.10 POWER INSTALLATIONS

The sub-Contractor shall include for all installations shown on the drawings.

The sub-contractor shall satisfy himself that there is a continuous conduit, trunking and /or duct system to facilitate installation of the entire power installation and shall be held responsible where continuity does not exist.

3.11 INSTALLATION SYSTEM

The installation system for the indoor installation shall be carried out in concealed PVC conduits, PVC ducts, surface mounted trunking, and cable

trays inside ceiling. The size of the cables shall not be less than 2.5 mm² for ring main circuits.

SECTION 4

4. FIRE ALARM SYSTEMS

4.01 INSTALLATION

The sub-contractor shall ensure continuous link-up between individual fire alarm points including break-glass/manual call units, detectors, bells/beacons and panels.

SECTION 5

INSTALLATION FOR COMMUNICATION, SECURITY, AND AUDIO VISUALSERVICES

5.01 INSTALLATION SYSTEM

The Electrical Sub-contractor shall provide support for all cables in the communications, security, and audio visual services. This shall include cable trays, trunking, conduits, etc. to ensure a continuous supply system from the Network Switches/Telephone switch (PBX) to any individual outlet.

Holes in structures shall be provided by the main-contractor.

The conduits shall at each point terminate in deep switch-boxes as specified for lighting control switches.

5.02 MOUNTING HEIGHTS AND LOCATIONS

Mounting heights shall be as for socket outlets.

5.03 BLANK-OFF PLATES

As the approved switch plates, both make and colour.

SECTION 6

INSTALLATION FOR MECHANICAL SERVICES

6.01 INSTALLATION SYSTEM

The Electrical Sub-contractor shall provide support for all cables in the Mechanical services. This shall include cable trays, trunking, conduits, etc. and wiring up to the isolators.

6.02 MOUNTING HEIGHTS AND LOCATIONS

Mounting heights shall be as for socket outlets.

6.03 BLANK-OFF PLATES

As the approved switch plates, both make and colour.

**PART C: TECHNICAL
SPECIFICATIONS
FOR FIRE ALARM SYSTEM**

PART C:

TECHNICAL SPECIFICATION FOR FIRE ALARM SYSTEM

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SECTION A:

1.0 SYSTEM DESIGN

1.1 The Code of Practice for design, installation and servicing

This specification is for the design and installation of fire detector alarm systems for general applications and is based on BS5839 Part 1: 1988 and NFPA 72 – 2013 Edition.

1.2 Property Protection

A satisfactory fire alarm system for the protection of property will automatically detect a fire at an early stage, indicate its location and raise an effective alarm in time to summon the fire fighting forces (both resident staff and fire brigade).

The general attendance time of the fire brigade should be less than 10 minutes. Therefore an automatic direct link to the fire brigade is essential.

1.3 Life Protection

A satisfactory fire alarm system for the protection of life can be relied upon to sound a fire alarm while sufficient time remains for the occupants to escape.

2.0 ZONE DETAILS

2.1 Zoning of the system

To ensure a fast and unambiguous identification of the fire source, the protected area should be divided into zones.

When determining the area to be covered by a zone, consideration should be given to accessibility, size, the fire routine determined for the premises, and particularly in occupied premises, that each zone is accessible from the main circulation routes leading from where the control panel is sited.

In general the following guidelines for the size of a zone should be observed:

1. **If the total area** (i.e. the total of the floor areas of each storey) of the building **is not greater than 300m²** then the building need only be one zone, no matter how many floors it has.
2. **The total floor area** for a zone should not exceed **2000m²**
3. **The search distance should not exceed 30m.** This means the distance that has to be travelled by a searcher inside a zone to determine visually the position of a fire should not exceed 30m. The use of remote indicator lamps outside doors may reduce the number of zones required.
4. **Where stairwells or similar structures extend beyond one floor but are in one fire compartment,** the stairwell should be a separate zone.
5. **If the zone covers more than one fire compartment, then the zone boundaries should follow compartment boundaries.**
6. **If the building is split into several occupancies, no zone should be split between two occupancies.**

Notes:

1. A fire compartment is an area bordered by a fire resisting structure usually at least 30 minutes resistance.
2. Zone limits can be relaxed only in certain manually operated systems.
3. It may be an advantage to have manual call points on separate zones to detectors. This will avoid misleading information regarding the position of fire, particularly on staircase landings.
4. Removal of a detector from a zone circuit must not isolate a break glass call point on the same circuit.

3.0 ADDRESSABLE SYSTEMS

In an addressable system several zones may be connected to the control panel by a single loop circuit.

Maximum area covered by one loop is 10,000 sq m.

In addressable systems the detector or manual call point in alarm can be shown by the use of an alpha numeric display. This on its own will not be acceptable and the zone in which the detector/manual call point has operated must be displayed.

The zonal indication may be mounted adjacent to the control panel, and the plan of the building/floor should also be displayed. This means, the use of mimic diagram would seem to be the most suitable means for zone identification.

However in small systems where the identification of location of an incident by an individual device is not confusing, then zonal information may not be required.

4.0 BREAK GLASS AND MANUAL CALL POINTS

The break glass call point is a device to enable personnel to raise the alarm in the event of a fire, by simply breaking a frangible element and thus activating the alarm system.

The following guidelines should be observed for the correct siting and positioning of break glass call points:

1. Break glass call points should be **located on exit routes** and in particular on the floor landings of staircases and at all exits to the open air.
2. Break glass call points should be located so that no person need travel more than 30m from any position within the premises in order to give an alarm.
3. Generally, call points should be fixed at a height of 1.4m above the floor, at easily accessible, well-illuminated and conspicuous positions free from obstruction.
4. The method of operation of all call points in an installation should be identical unless there is a special reason for differentiation.
5. Manual and automatic devices may be installed on the same system although it may be advisable to install the manual call points on separate zones for speed of identification.

5.0 ALARM SOUNDERS

An important component of any fire alarm system is the alarm sounder, normally a bell or electronic sounder, which must be audible throughout the building in order to alert and/or evacuate the occupants of the building.

The following guidelines should be observed for the correct use of alarm sounders:

1. A minimum sound level of either 65dBA or 5dBA above any background noise likely to persist for a period longer than 30 seconds, whichever is greater should be produced by the sounders at any occupiable point in the building.
2. If the alarm system is to be used in premises such as hotels, boarding houses etc., where it is required to wake sleeping persons then the sound level should be 75dBA minimum at the bedhead.
3. All audible warning devices used in the same system should have a similar sound and be distinct from any other audible alarms used for other purposes. Except in noisy areas where high performance sounders may be required.
4. A large number of quieter sounders rather than a few very loud sounders may be preferable to prevent noise levels in some areas from becoming too loud.
5. It is unlikely that sounder noise levels in a room will be satisfactory if more than one dividing wall or door separates it from the nearest sounders.
6. The level of sound provided should not be so high as to cause permanent damage to hearing.
7. The number of fire alarm sounders used inside a building should be sufficient to produce the sound level recommended, but should in any case be at least two.

5.1 Other requirements include:

1. The sounders should be arranged on at least two separate circuits, so that the failure of one circuit does not cause all sounders in the building to fail.
2. Frequency range between 500 – 1000Hz.
3. Most single doors will cause a 20db drop in sound level. Fire doors – 30db.
4. Where mains sounders are being used to supplement 24V DC sounders, the 240V AC supply should be monitored.
5. To achieve 75db at the bedhead, a sounder should be installed in the bedroom.

6.0 SELECTION OF EQUIPMENT DETECTION TYPES

When choosing the type of detector to be used in a particular area it is important to remember that the detector has to discriminate between fire and the normal environment existing within the building, i.e. smoking in hotel bedrooms, fumes from forklift trucks in warehouses, steam from bathrooms, kitchens etc.

6.1 Heat detectors

Heat detectors may be the Point type (which responds to temperatures surrounding one particular spot), or the Line type (which responds to temperature change along its line).

All Point type heat detectors should include a fixed temperature element operating at a pre-determined temperature. Some may also include a rate-of-rise element designed to operate in response to a rapid rise in temperature. Heat detectors are in general less sensitive than other types of detector and should therefore not be used where a small fire will cause unacceptable losses.

6.2 Smoke detectors

There are two principal methods of smoke detection: the ionisation chamber, and the optical scatter chamber. The detection method chosen will usually depend on the type of risk to be protected against. In the ionisation chamber, an electric current flows between two electrodes and is reduced by smoke. Ionisation detectors are particularly sensitive to small particle smoke such as that produced in rapidly burning fires but are relatively insensitive to large particle smoke such as that produced by overheated PVC or smouldering polyurethane foam. In the optical chamber, light is scattered, or in some cases absorbed by smoke. Optical detectors are more sensitive to large particles found in optically dense smoke, but are less sensitive to the small particle smoke.

Today, optical smoke detectors are more widely used than ionisation types due to the growing use of flame retardant materials in building construction, decoration and furnishings. Careful consideration must be given to any specific risks that might occur.

6.3 Siting and spacing of detectors

In a building the greatest concentration of smoke and heat will generally collect at the highest parts of the enclosed areas and it is here therefore, that detectors should normally be sited. Heat detectors should be sited so that the heat sensitive element is not less than 25mm, nor more than 150mm, below the ceiling or roof. If a protected space has a pitched or north light roof, then smoke detectors should be installed in each apex. The following parameters should be followed when spacing detectors:

The maximum horizontal distance between any point in the area and the nearest detector:

1. Under flat horizontal ceilings and corridors more than 5m wide

- i) For Point type Heat Detectors 5.3m (maximum area 50m²)
- ii) For Point type Smoke Detectors 7.5m (maximum area 100m²)

Heat Detectors

Max area of coverage per detector = 50m²

Max distance covered = 5.3m (for square layout this is 3.5m to wall 7m between detectors)

Smoke Detectors

Max area of coverage = 100m²

Max distance covered – 7.5m (for a square layout this is 5m to wall, 10m spacing)

2. In a corridor less than 5m wide (where adjoining rooms are protected by automatic detection)

ADD to the maximum horizontal distance 50% of the difference between 5m and the actual width of the corridor.

e.g.: In a 2m wide corridor, the difference between: 2m and 5m = 3m
50% of 3m = 1.5m
Maximum distance of travel for a Point type Smoke Detector = 7.5m + 1.5m = 9m

3. In the apex of a pitched or north light roof

A row of detectors should be sited in the apex. One row of detectors should be sited at the highest point, a minimum distance of 0.5m from the vertical wall.

ADD to the maximum horizontal distance 1% for each degree of slope up to a maximum increase of 25%

e.g.: A Point type detector at the apex of a 20 degree slope.
20% of 7.5m = 1.5m
Maximum distance of travel 9m
The maximum area of coverage may also be increased proportionally.

4. Obstructions

- (i) Where the passage of smoke or hot gas from a position to a detector is likely to be disturbed by a ceiling obstruction (such as a beam) having a depth greater than 150mm, but less than 10% of the height of the ceiling, then the horizontal distance should be decreased by twice the depth of the obstruction.
e.g.: For a point type smoke detector obstructed by a beam of 200mm depth
Maximum distance of travel
$$= 0.2 \times 2 = 0.4\text{m}$$
$$7.5\text{m} - 0.4\text{m} = 7.1\text{m}$$
- (ii) Where a ceiling obstruction, such as a beam, is greater than 10% of the height of the ceiling then the areas either side of the obstruction should be considered as separate rooms.
- (iii) Ceiling beams less than 150mm can be ignored.

5. Detectors (Other than beam type)

Detectors should not be mounted less than 500mm from any walls or partitions. Where rooms are divided into sections by walls, partitions or storage racks reaching within 300mm of the ceiling, the dividers should be considered as if they reach the ceiling.

7.0 LIMITS OF CEILING HEIGHT

Detectors should not normally be mounted on ceilings higher than the general limits on Table 1 below. If small sections of a ceiling (not exceeding in total 10% of the ceiling area) exceed in height the general limits of the table, those higher sections may be protected by Point type heat detectors provided that the ceiling height in the higher sections does not exceed 10.5m, or by Point type smoke detectors provided that the ceiling height in the higher sections does not exceed 12.5m.

Limits of ceiling height		
Detector type	Ceiling heights in metres	
	General Limits	Rapid attendance
Heat detectors BS5445: Part 5		
Grade 1	9.0	13.5
Grade 2	7.5	12.0
Grade 3	6.0	10.5
Point smoke detectors BS 5445: Part 7	10.5	15.0
High temperature heat detectors BS 5445: Part 8	6.0	10.5
Optical beam smoke detectors BS 5839: Part 5	25.0	40.0
Siting limits for smoke beam detectors	Minimum (m)	Maximum (m)
Height of optical beam above floor	2.7	25.0*
Optical beam length	10.0	100.0
Distance of optical beam from a flat ceiling or apex	0.3	0.6
Horizontal distance between optical beams measured at right angles to a beam	--	14.0
Horizontal distance between optical beam and an adjacent wall or partition.	See Note	7.0

* The height may be increased to 40m provided that the rapid attendance criteria are met.

Note: Generally the beam should not pass closer to the wall or partition than 500mm, and not closer to an obstruction than 500mm. However, up to 3m of the beam may be closer than this.

8.0 CEILING HEIGHT LIMITS WITH RAPID ATTENDANCE

Although an increased ceiling height means that the fire will be larger when it is detected, the size of the fire when fire fighting starts will also depend on the delay between detection and the start of fire fighting. If this delay is small, then the increase in fire size at detection due to a higher ceiling can be acceptable.

If the detection system is automatically connected to the fire brigade either directly or via a central (fire alarm) station and the usual attendance time of the fire brigade is not more than 5 minutes, then the rapid attendance limits of ceiling height given in the table in the top right may be applied. If small sections of a ceiling (not exceeding in total 10% of the ceiling area) exceed in height the limits of the table in the top right, those

higher sections may be protected by Point type heat detectors if their height does not exceed 18 metres.

9.0 CONTROL EQUIPMENT

The control and indicating panel will depend on the size of the protected building and the extent of the automatic protection provided.

Specification of equipment would be based on numbers of zone circuits, sounder circuit, battery standby, remote center link ancillary control relays, and other individual customer requirements.

Next to the control unit should be a diagrammatic plan showing zone locations. Siting of control and indication equipment

1. In an area of low fire risk
2. On the ground floor by entrance used by the fire brigade.
3. In an area common to all building users.
4. Where automatic detectors are in use, the control equipment area must be protected.
5. Alarm sounder must be sited next to the control unit.

10.0 STANDBY POWER SUPPLIES

Standby supplies will usually be from secondary batteries with automatic chargers. These batteries must have an expected life of at least 4 years and the code specifically bans the use of automotive type batteries.

When the mains supply fails the standby must be able to operate the alarm load for 30 minutes after a certain minimum duration. The minimum duration varies with the type of system and building occupancy.

For life protection (L) if a mains failure will be recognized within 12 hours, a standby duration of 24 hours is required. If the 12-hour requirement is not likely to be met, a standby of 24 hours after the detection of the fault is required.

For property protection (P) if the mains failure will immediately be recognized then a 24 hours standby is required, if not, then the required duration is 24 hours longer than the building may remain unoccupied.

11.0 WIRING

The satisfactory operation of a fire alarm system depends on the interconnection of its components. Some interconnections may have to function correctly for significant periods after being attacked by fire, e.g: cables to power supplies, control equipment and sounders.

Other cables must function when a trigger device operates, but are not needed after an alarm has been raised, e.g: cables to manual call points, smoke detectors and heat detectors.

Cables can therefore be classed in two groups:

1. Cables permissible if operation is not required during fire, e.g: Cables to manual call points, smoke and heat detectors.
2. Cables permissible if operation is required during a fire, e.g: Cables to power supplies, control equipment and alarm sounders.

While mineral insulated cables are preferable for fire alarm applications, the following cables can be used for the two groups:

Group 1

1. **MICC** to BS 6207: Part 1 with or without **PVC** sheath.
2. Cables complying with BS 6387 at least in categories **AWX** or **SWX** or **A** or **S**.
3. **PVC** – insulated to BS 6004 sheathed or non-sheathed with mechanical protection.
4. Rubber insulated to BS 5007
5. **PVC** single type **BK**, **BR** and **BU** to BS 6231.
6. **PVC** insulated **SWA** to **BS** 6346
7. Cross-linked polyethylene or hard ethylene-propylene rubber insulated **SWA**
8. to BS 5467
9. Polyethylene insulated **PVC** sheathed coaxial cable to the dimensional requirements of BS 2316: Part 3 but with a minimum of 16-strands/0.2mm diameter central conductor.
10. Cables designed for the detection of heat.

Group 2

Cables 1 & 2 in Group 1 may be used for Group 2 applications. All the other cables shown above may also be used provided that they are protected either by burying them within a wall and covering them with 12mm of plaster or equivalent, or protecting them from a significant fire risk by shielding them with a wall, partition or floor having a minimum demonstrate 0.5 hour fire resistance.

These requirements may in certain cases be reduced when included in areas of low risk or when covered by an automatic extinguishing system.

Certain cables may also need mechanical protection against impact, abrasion or rodent attack. As a guide, cables 1, 6 and 7 above will not need further protection but all others may in risk circumstances. BS5839 Part 1 gives full details.

Other types of cables can be used provided that their suitability can be clearly demonstrated.

Conductors carrying fire alarm power or signals should be separated from conductors used for other systems.

12.0 INSTALLATION OF CABLES

Cables should be installed in accordance with the good practices recommended in the latest edition of the IEE wiring regulations.

Connection to a mains supply should be via an isolating switch fuse reserved solely for the purpose. Its cover must be painted red and labelled **fire alarm – do not switch off**.

Conductor size should take voltage drop into account. In any case conductors should have a cross-sectional area of not less than 1 square mm or, if stranded, of not less than 0.5 square mm.

Where possible, cables should be routed through areas of low fire risk.

Cables installed in damp, corrosive or underground locations should be PVC sheathed. Where there is a risk of mechanical damage, cables should be protected accordingly.

Cables in cavities or voids should be separated from other cables by 300mm, unless enclosed in a conduit, ducting or trunking.

Screened cables complying to be BS 7629 can be run in duct or tray without segregation.

13.0 ROUTINE TESTING OF SYSTEM

The system should be regularly tested and serviced. BS5839 Part 1 makes the following recommendations:

Daily

- (i) Check that the panel indicates normal operation. If not, record any fault indicated in the event log and report the fault to a responsible person.
- (ii) Check that any fault recorded for the previous day has received attention

Weekly

- (i) Operate a manual call point or smoke detector to ensure the system operates properly. Each week a different detector should be checked.
- (ii) Check that the sounders have operated and then reset the system
- (iii) Check the battery connections.
- (iv) Complete the event log with details of date, time, trigger device tested and enter “**Routine Weekly Test**” the “**Action Required**” and reported to a responsible person

Quarterly

- (i) Check entries in the log book and take any necessary action.
- (ii) Examine the batteries and their connections.
- (iii) Operate a manual call point or smoke detector to ensure the system operates properly, checking that all sounders are operating.
- (iv) Check that all functions of the alarm control panel operate by simulating fault conditions.
- (v) Visually check that structural alterations have not been made that could have an effect on the siting of detectors and other trigger devices.
- (vi) Complete the event log with details of date, time, trigger device tested and “**Quarterly Test**” in the event sections. Any defects or alterations to equipment should also be entered.

Annually

- (i) Carry out an inspection as detailed for the quarterly inspection.
- (ii) Every detector should be tested **in situ**.
- (iii) All cable fittings and equipment should be checked to ensure that they are secure and undamaged.

SECTION B:

14.0 ANALOGUE ADDRESSABLE FIRE DETECTION SYSTEMS

Analogue Addressable Systems provide combined enhanced detection sensitivity and reduced false alarm potential to create a safer, trouble-free detection environment.

Analogue addressable systems should achieve levels of fire detection and protector which embrace the virtues of fast and accurate response and high levels of detection sensitivity with a significantly reduced false alarm potential.

The addressable system to meet the following:-

- The requirements of BS. EN54 Pt. 2 and 4: 1998
- Installer-friendly 'plug in' feature
- 2km maximum loop length
- Up to 120 devices per loop.
- **Other Required Features:-**
 - Programmable sounder circuits direct from control panel.
 - Capability to add manual sounder circuits, via loop alarm interface units.
 - Sounders wired directly on to the detector loop
 - Large capacity high intensity LCD-8 lines, with 40 characters per line
 - Capacity for repeater panels on loop
 - Facilities for on-site programming
 - Password protected user and service menus
 - Networking facility
 - Dirty detector fault warning facility
 - Day/night sensitivity adjustment capability
 - Coincidence detection
 - Pre-alarm facility
 - Power supply remote option

14.1 Network Capability

The loop control panels should be capable of being interconnected easily to produce larger systems.

When a fire or fault condition is detected on any of the control units an event message is passed to all the other panels connected to the system. It should be possible to interconnect fire detection systems on larger sites to form a single-site network.

Within information from individual panels, available across the network, an overall fireplan, involving alerting or evacuating affected parts of the site can be implemented.

When a fire or fault condition is detected on any of the control units, an event message is passed on to all other panels connected to the system. Each panel will then display event information such as panel number, loop, zone/sector and address data. Alarm line operation across the network can be facilitated using zone and sector numbering.

Alarm sounder options

Alarm sounders can be connected to the system as follows:

- (i) On dedicated alarm lines, wired directly from the control panel. Four and eight separate alarm outputs to be provided in the two and four loop control panels respectively.

Each alarm circuit to be separately programmable to activate from any designated zone or zones of devices on the detection loop.

- (ii) Additional alarm lines to be connected to the system via alarm line interface units. Each unit to provide four programmable alarm line outputs and be capable of being positioned anywhere on the detection loop wiring.
- (iii) Where loop-wired sounders are used, these should be connected directly on the detector loop wiring. These units to be programmed either to sound a general alarm or be individually operated by a signal from any designated zone or zones of detection devices-hence offering a complete analogue addressable system on a single pair of wires.

Electronic sounders to give sound outputs complying with the requirements of BS5839 Pt 1: 1998. The sounders to be capable of giving various sound types.

14.2 Additional programmable features

The following additional features to be programmed into the system:

- address to zone number allocation (up to 128 zones)
- address to device type (e.g. detector or call point)
- zone, address, device type and sector text (24 characters each)
- zone or sector intermittent alarm pattern allocation
- 2 stage alarm timer
- zone or sector to auxiliary relay timed operation. Further relays may be added by using remote relay interface units.
- auxiliary input operation (e.g. silence/sound/evacuate etc)
- 40 characters of site text displayed by the panel in normal state, with the time and date.
- customer fire or fault programming
- double knock/coincidence

- day/night sensitivity
- adjustable detector threshold levels

15.0 SYSTEM FEATURES

Styled for the buildings of tomorrow

Information relating to the status of the system to be clearly indicated via the panel's alphanumeric 8 line, high intensity liquid crystal display.

15.1 1, 2 or 4 Loop options

The panels to be capable of being connected to either 1, 2 or 4 detector loops each loop being up to 2 km in length and 4 or 8 programmable sounder circuits, respectively.

Additionally, the panels to be capable of being networked together to provide even higher levels of detection and alarm system capacity. When networked, each panel to be configured to provide information relating to the entire fire detection system, thus enhancing the level of building safety.

15.2 Operation

Access level one controls to be positioned on the front of the panel, for ease of operation. Level two controls are to be concealed behind a key operated cover, and once exposed, they should enable the operator to interrogate the system's memory to obtain information on the location, status and progress of any fire incident.

Further levels of control, for example the disablement of, and reinstatement of detectors and zones, to be available via a security access code.

The system's memory to be capable of recording historical information relating to the minimum, maximum and current analogue levels received from any address, providing the facility for the constant monitoring of detector condition and a record of 'normal' fluctuations in the environment at each location, for simplification of routine testing and maintenance procedures.

15.3 Installation

Each panel to be supplied with address modules 1-60 for each loop. These are to be inserted into each appropriately numbered detector or call point on the system. Address modules 61-120 to be supplied separately to cater for systems with more than 60 addressable devices per loop.

15.4 Standard

The system to comply with BS EN54 Pt 2 1998 – Control and Indicating Equipment (CIE) and BS EN54 Pt 4 1998 – Power Supply Equipment (PSE)

16.0 SYSTEM OPERATION

16.1 Operational characteristics

The following is a brief summary of the main functions and the expected operational characteristics of the system.

- Adjustable pre and full alarm facilities

Adjustable pre and full alarm thresholds to be set for individual detector addresses. Once a pre-alarm threshold has been reached, a signal to be sent to designated locations, alerting those responsible for system monitoring, that the potential for a fire incident may exist. When the full alarm threshold is reached, the system to automatically provide warning signals to pre-determined areas of the system, for purposes of facilitating orderly evacuation of those areas affected.

A day/night operation facility to be provided to give a desensitized level of detection during the day and full sensitivity during night time operation, without affecting immediate alarms from manual call points.

- Automatic detector fault facility

High and low-level fault thresholds to be indicated. If a device's analogue level drifts, over a period of time from its normal background value, a fault indication to be given at the panel, showing the address of the detector. The detector can then be inspected and serviced or replaced if necessary. This facility to be included to increase building safety through simplification of routine maintenance, and testing.

- Line extensions

Alarm and relay extension lines to be connected at any address on the analogue detection loop, using the appropriate interface.

- Repeater facility

The dedicated repeater panel to be either connected to the detection loop, or spurred directly from a panel, if preferred. The Repeater Unit to be supplied with an 80 character LCD and integral power supply unit.

- Enhanced detector addressing

Each system to be programmed to provide an address/detector indication for each device, which enables a 'DEVICE TYPE ERROR' indication to be displayed at the control panel in the event of a wrong device being fitted.

- PC control colour graphics and data acquisition facility

This add-on package, to feature a PC and monitor, complete with software and the origination of up to 12 site plans. Additional plans can be added as extras.

SECTION C: ANALOGUE ADDRESSABLE DETECTORS

17.0 ANALOGUE DETECTORS

The analogue photoelectric smoke detector is ideally suited to the detection of slow burning fires. It employs an infra-red light source and photodiode to provide early warning of a hazard. Smoke particles entering the detection chamber cause light scatter, which is detected by the photodiode. The detector to be resistant to false alarms caused by dust, insects, high humidity and draughts.

17.1 Analogue Ionization Smoke Detector

Particularly suitable for identifying clean burning fires. The detector to incorporate twin sampling chambers which provide enhanced stability and inhibit the potential for false alarms caused by changing environmental conditions.

Analogue Heat Detector **to be capable of being configured by the control panel to operate either as a fast response, medium response heat detector, or a high temperature detector.**

Common Mounting Base to be compatible with detectors (both analogue and conventional). The base to incorporate a secure locking tab and position indicator, facilitating the correct orientation of the detector for optimum viewing of the detector's LED.

18.0 ANALOGUE REPEATER

PANELS Analogue Addressable Repeater

Panel

The repeater unit to incorporate a 2 x 40 character liquid crystal display, with the optional facility of an integral printer. Additional features to include own log, to receive and store information from the main panel, and an output to facilitate the addition of a mimic repeater panel. The standard unit to be surface or flush mounted.

Slimline Mimic Diagram (SMD)

The slimline machine is designed to augment the information provided by main or repeat panel.

The SMD helps to maximize alarm flexibility, whilst reducing system wiring to an absolute minimum.

The module is installed either as a sounder detector base or as a stand-alone wall or ceiling mounted unit. Either option is accommodated directly on the two wire detector loop.

The fully programmable SMD to allow alarm organization on a single sounder, zonal or general alarm basis.

The self-powered facility to allow up to 120 detection devices and up to 55 addressable sounders to be connected on to the loop wiring.

The SMD to have selectable tones, continuous intermittent or warble. To be used in systems designed to BS5839 Pt 1. The sound output to be rated at 93 dB.

Addressable Sounder

The loop wired addressable sounder is to be used with analogue addressable fire systems.

Installed either in conjunction with a detector or on a stand alone basis, the sounder is addressed and powered directly from the detector loop.

The unit to provide a sound level of 85 dBA, and offer continuous intermittent or warblesound types, all within the recommended BS5839 Pt 1 frequency.

Each analogue loop to have a maximum of 30 units.

19.0 LOOP INTERFACE UNITS

To help provide input/output signals from anywhere on the loop wiring. This device to enable automatic operation of building plant in the event of a fire or the interface with existing fire detection or fire extinguishing systems to be easily incorporated.

Alarm/power supply interface units to allow additional alarm lines to be wired from many loop location. Each unit to provide the facility for using four independent programmable alarm circuits (1A maximum per alarm line, 3A maximum load). Alarm lines to be controlled without the need to wire directly back to the panel.

Relay/power supply interface unit to provide four additional programmable relay contacts (5A, 30 VDC) to enable output signals for operating external equipment.

This unit to have a dedicated 240VAC supply and should be capable of being connected at any address location on the detection loops.

Interface units, loop maximums. A maximum of 3 alarm interfaces and 4 relay interfaces may be connected to each loop controller, with each loop controller controlling two loops.

As a two loop panel contains a single loop controller, a maximum of 3 alarm line interfaces and 4 relay interfaces may be connected to loops 1 and 2 or a combination of both. A four loop panel contains 2 loop controllers enabling a maximum of 3 alarm interfaces to be connected to either loop 1 or 2 with a similar number on either loop 3 or 4.

Short circuit isolator provides protection of the detection loop. This ensures that the remainder of the loop protected by the short circuit isolator arrangement continues to function should a fault occur.

Standard interface unit enables a spur, containing a maximum of 5 standard detectors, and an unlimited number of conventional call points to be connected to the detection loop. UP to 10 interface units may be connected to a loop. Conventional call points should be wired before conventional detectors on any spur circuit. They should not be mixed.

Input/Output interface unit provides both input and output signals directly on to the loop. Input signals from other fire protection systems can be displayed at the control panel. Output signals can be provided in order to operate plant shut down or door release equipment.

20.0 ADDRESSABLE BREAK GLASS CALL POINTS

The call point is addressed in a similar manner to the addressable detector bases, using the same set of address modules. There is no restriction on the number that may be used on a loop, up to a maximum of 120 address points. An LED indicator is incorporated as standard to confirm that the unit has operated.

Weatherproof break glass callpoint

For exterior applications, where required.

PART D

TECHNICAL SPECIFICATIONS FOR THE UPS EQUIPMENT

PART D: TECHNICAL SPECIFICATIONS FOR UPS EQUIPMENT

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PART 1: DESCRIPTION

1.0 **Introduction**

This technical specification describes an electronic Uninterruptible Power Supply (UPS) with a three-phase input and single/three phase output, connected in series between the electrical distribution system and the load. This system is designed to operate in conjunction with the electrical distribution system of a building in view of supplying the load with a clean and uninterrupted source of power, regardless of disturbances on the upstream AC power system.

2.0 **System Operation**

Double-conversion (on-line) UPS, designed to operate in the following modes:

2.1 Normal

The UPS must continuously supply the critical loads.

The rectifier/charger draws alternating current (AC) from the normal AC input source and converts it into direct current (DC) for the inverter while simultaneously maintaining the battery charged.

2.2 Battery Backup

In the event of a failure of the normal AC input source, the critical loads are supplied by the inverter with power from the battery.

2.3 Battery Recharge

When the normal AC input source has been restored, the rectifier/charger again supplies the load via the inverter and recharges the battery. The inverter supplies current identical to that supplied during operation in normal mode.

2.4 Via the Automatic Bypass

In the event of UPS shutdown (voluntary or not), the automatic bypass ensures no-break transfer of the critical loads to the bypass AC source. Transfer back occurs automatically when the UPS has returned to normal operation.

2.5 Via the Manual Bypass (maintenance / test)

A manual-bypass switch to be used to isolate the inverter output and the automatic bypass for maintenance purposes. This facility to make it possible to repair the UPS without interrupting the load which remains supplied directly by the normal AC source.

2.6 Economy Mode (For Less Sensitive Loads)

On this mode, the UPS to operate as follows:-

The load is supplied by the bypass AC source via the automatic bypass. If the source fails or goes out of tolerance, the load is automatically transferred to the inverter without any interruption. No-break transfer back to the bypass AC source is carried out when the source returns to within tolerances.

3.0 Rectifier/Charger

3.1 Operation

A solid-state rectifier, fully microprocessor controlled, to be provided to convert the AC power from the normal AC input source into regulated DC power. A temperature sensor is to be provided for regulation as a function of temperature. The power is then filtered to supply the inverter and charge the battery. The rectifier/charger to be sized to support an inverter supplying full rated load and simultaneously charge the battery to 95% of its full capacity over a period equal to ten times the battery backup duration.

3.2 Input protection

The input of the rectifier/charger is to be protected by fuses.

3.3 Input current limiting

125% of the rated input current.

4.0 The Battery Bank

A battery bank shall be provided to give back-up of not less than 30 minutes.

5.0 The Inverter

5.1 Operation

The inverter to be made up of three inverter legs with IGBT transistors. To operate in free-frequency mode with pulse width modulation (PWM) and have a built-in transformer.

5.2 Input Voltage and Frequency

Voltage:	415V	$\pm$	20%
Frequency:	50Hz	$\pm$	7.5%

5.3 Output voltage and frequency

Voltage:	240/415V	$\pm$	1.5%
Frequency:	50Hz	$\pm$	1%

5.4 Thermal Overloads

The inverter to operate for a maximum time that depends on the current drawn, before shutting down to protect the various components against excessive temperature rise. The permissible operating times are listed below (where P.F. = 0.8):

2 hrs for 1.05 In to 1.1 In

30 minutes for 1.1 In to 1.15 In

10 minutes for 1.15 In to 1.25 In

3 minutes for 1.25 In to 1.35 In

1 minute for 1.35 In to 1.65 In.

5.5 Steady-state variations

+/- 1% in voltage for the rms values of the phase-to-neutral and phase-to-phase voltages.

5.6 Synchronisation range

0.25 to 2 Hz (0.5Hz as standard) adjustable in 0.25 Hz steps.

5.7 Dynamic performance

Operation with battery (battery-backup mode):

+ 2% / - 2% for load steps of 100% to 0 and 0 to 100%. Operation

without battery (normal or battery-recharge mode):

+ 2% / - 4 % for load steps of 100 % to 0 and 0 to 100%.

return to the 1% range (rms value) in less than 20 ms.

5.8 Performance with non-linear loads

All phase conductors to be sized for the rated current.

The neutral conductor to be sized for 1.5 times the rated current.load

crest factor: up to 3

output-voltage (Ph-Ph) distortion = 2 % maximum.

output-voltage (Ph-N) distortion = 3 % maximum.

6.0 Automatic Bypass

The automatic bypass to be sized for continuous operation under the following conditions:

6.1 Transfer without interruption to the load

The automatic bypass to ensure automatic, no-break transfer of the load to the bypass AC source when the control logic detects one of the following situations:

- a. the load is greater than the UPS rated power;
- b. battery backup time has elapsed and the bypass AC source is available;
- c. UPS failure.

6.2 Bypass source tolerances / transfer conditions

The bypass AC source MUST BE within tolerances and MUST accept no-breakload transfers

from the inverter if:

- a. voltage is within the range $U_n - 20\%$ to $U_n + 20\%$;
- b. frequency is within the personalised tolerances;
- c. phase shift between inverter and bypass-source voltages less than 3 degrees.

6.3 Manual Transfer

It must be possible to carry out a manual transfer from the UPS control panel.

6.4 Overload Capacity of the Automatic Bypass

Thermal overloads < 1.35 In: same overload capacity as the inverter (no derating for power factor)

Overloads > 1.35 In: 1 minute.

The short-circuit capacity (x In) for 20ms at 415V to be 23/In.

7.0 Maintenance Bypass

The UPS to be equipped with a maintenance bypass which may be used to transfer the load directly to the bypass AC source.

This to be carried out using three switches. Step by step help to be provided on the front panel of the UPS when the doors are open.

The manual-bypass switch to isolate the inverter output and the automatic bypass for maintenance purposes. Prior to transferring the load to the maintenance bypass, the UPS (or the parallel-connected UPS units) must be shut down.

8.0 Micro-processor-based control functions

The UPS control circuits to be microprocessor-based. All operations and parameters to be managed by internal software. Manual settings and potentiometers will not be accepted. Self-test and diagnostics circuits to be used to detect and isolate a fault, right down to the PC-board or wiring connections.

9.0 Control and Indication Panel

The UPS to be equipped with a control panel comprising system-status indications that may be used to control, monitor and display various system functions and parameters. The graphic display to be capable of displaying data in English, French, Spanish, Dutch, Italian, German, Swedish, Portuguese and, as an option, in Kiswahili.

9.1 System Parameters

The following parameters to be displayed:

- input voltage (phase-to-phase);
- input current per phase;
- bypass input voltage (Ph/Ph and Ph/N);
- bypass input frequency;
- inverter output voltage (Ph/Ph and Ph/N);
- inverter output current per phase;
- input, output and bypass frequency;
- percent load on inverter;
- inverter output power factor;
- inverter output in kVA and kW;
- DC voltage;
- crest factor;

- battery current (charge/discharge);
- battery backup time and remaining service life;
- temperature in the battery cabinet.

9.2 Mimic Panel

Five LEDs to indicate the status of the following elements:

- rectifier/charger;
- battery;
- automatic bypass;
- inverter;
- load.

9.3 Buzzer OFF button

This button to be provided to turn the buzzer OFF. However, a new malfunction will activate the buzzer again.

9.4 Complete Shutdown

Pressing the "complete shutdown" button to activate the following:

- shutdown of the inverter;
- opening of the static switch on the bypass;
- opening of the battery circuit-breaker;

It should be possible to activate the "complete shutdown" function externally via a relay contact in order to implement an EPO (Emergency Power Off) function.

10.0 Event Log

This PC board should have a capacity to store at least 500 events (alarms, UPS status information, etc.). It should also provide statistical information on the UPS parameters (battery backup time, number of transfers to battery power, number of transfers to the automatic bypass, current limiting, operating time on the inverter and on the bypass AC source).

It should be possible to access this information locally on the standard display or on a remote terminal via the JBUS protocol.

11.0 Optimised Footprint

It should be possible to position the UPS cabinet against a wall. It will be the contractor's duty to give information on the cabling (size/type) required, and the floor cable trenches, cable trays, trunking etc. which may be required for efficient cable management and termination.

PART 2: INSTALLATION

1.0 Positioning

1.1 Layout of Cabinets on a False or Normal Floor

The attached diagrams show the required clearances for the UPS installations.

2.0 Cable Sizes

2.1 Electrical Parameters to Determine Cable Size for EACH UPS Unit will be as follows

2.1.1 Live Current

- Normal AC Source (240/415V): 20A for 10 KVA
- By-pass AC Source (240/415V): 20A for 10 KVA
- Battery 45A for 10 KVA

2.1.2 Cable Size (mm²)

- Normal AC Source (240/415V): 4C 6mm² for 10 KVA
- By-pass AC Source (240/415V): 4C 6mm² for 10 KVA
- Battery 2x10mm² for 10 KVA

3.0 Upstream Protection

Max permissible level : 23 In

Recommended circuit breakers are :

10 KVA

- Normal AC input: 20A TPN MCCB
- By-pass AC input: 20A TPN MCCB

4.0 Downstream Protection

These protection devices ensure discrimination on each of the outgoers downstream of the UPS. If the downstream protection indications are not observed and a short-circuit occurs on one outgoer, the result may be an outage longer than 20 ms on all the other outgoers.

The following circuit breakers are recommended –

On 415V A/C output (Three phase in/Three phase out): 20A TPN MCCB

On 240V A/C output (Three phase in/Single phase out): 45A SPN MCCB

PART 3: ARCHITECTURE

1.0 Single-UPS Configurations

1.1 Single UPS in normal mode

A single UPS is a modular unit made up of:

- two AC inputs
- a rectifier/charger
- a battery
- an inverter
- a static switch (automatic bypass)
- a manual bypass (maintenance bypass)

In normal mode, the load is continuously supplied by the rectifier and inverter modules. If the normal AC source fails, the static switch ensures no-break transfer to battery power (battery mode). The load is transferred to the bypass AC source only if the inverter fails or the battery has reached the end of its backup time.

1.2 Single UPS in Economy mode

This operating mode must be part of the UPS basic design.

It increases efficiency by using the bypass AC input as long as its power characteristics remain within strict tolerances (those of the load).

The system must automatically transfer to normal mode if the power characteristics on the bypass AC input go out of tolerances. The system must

transfer to battery mode if the normal AC source is not available and the bypass AC source is out of tolerances.

1.3 Single UPS operating as a frequency converter

Operation as a frequency converter is similar to normal mode. However, because the frequencies upstream and downstream are different, bypassing is not possible from the AC input and the automatic and manual bypasses are therefore not included. A static switch ensures automatic, no-break transfer to the battery in the normal AC source fails.

2.0 Parallel Configurations

2.1 Modular Active Redundancy (2 modular UPSs)

In this type of configuration, parallel connection is intended to increase overall UPS reliability through redundancy.

The UPS units are identical and equally share the load. The load rating is less than or equal to the rating of a single UPS unit, such that if one unit fails, the other can continue to supply the entire load.

This type of redundancy is called 1/2.

Parallel connection must be carried out without interrupting the supply of power to the load because each UPS unit is equipped with a maintenance bypass.

2.2 Modular Parallel Connection for Capacity (3 or 4 units)

In this type of configuration, parallel connection (up to 4 units) is intended to increase the overall capacity and provide redundancy.

The UPS units are identical and equally share the total load, with some redundancy.

Example: a UPS configuration with 1/3 redundancy means that there are a total of three UPS units. If one unit fails, the other two can still provide enough power for the entire load.

Parallel connection must be carried out without interrupting the supply of power to the load. The UPS system is made up of identical units with a common external maintenance bypass sized to handle the overall power rating.

2.3 Hot Standby Redundancy

In this configuration, one UPS unit backs up the other. If the downstream unit fails, the static switch transfers the load to the upstream unit without a break in

the supply of power. This configuration offers the highest level of availability and protection.

PART 4: STANDARD FUNCTIONS

1.0 Cold Start

This function makes it possible to start the UPS even when the AC input source is absent. The power is supplied by the battery for a period determined by the battery charge level and the power required by the load. However, the battery discharge time should never exceed three times the rated backup time plus two hours.

2.0 Intelligent Economy mode

For less sensitive loads, the Economy mode options should be provided to reduce energy consumption. Under normal conditions, the load is supplied continuously by the bypass AC source via the automatic bypass. If the power supply fails or is no longer within tolerances, i.e. voltage outside the permissible $\pm 20\%$ in amplitude ($\pm 25\%$ as an option) or ± 2 Hz, the load is transferred to the inverter. The time required for transfer should be less than 15 ms.

3.0 Start on engine generator set

The following features should be provided for use with a standby generator:-

3.1 Charger walk-in lasting 6 to 10 seconds

This function (see fig. 19) avoids an excessive inrush current at start-up that could disrupt engine generator set operation.

3.2 Time Delay

This function, in conjunction with the walk-in, delays charger start. The purpose, in installations comprising multiple UPS units, is to avoid simultaneous starts that could disrupt engine generator set operation.

3.3 Power and Battery Charge Current Limiting

The UPS should be set to carry out one of the following limiting functions when an external signal is received via an auxiliary contact:

- ☐ limiting of the power drawn by the rectifier-charger in kVA. In this case, part of the power can be supplied by the battery for a period of up to 3 times the rated backup time.
- ☐ limiting of the charge current to 0 A, thereby stopping the charger to limit the power drawn during operation on an engine generator set.

3.4 Battery-Room Ventilation Fault

It should be possible to set UPS parameters such that when an external signal is received via an auxiliary contact, the rectifier/charger shuts down when a ventilation fault in the battery room is detected. Reset must be manual for the system to restart (safety function).

Advanced Battery Management

The UPS unit should optimise the service life of the battery and continuously maintain a high degree of operational security by ensuring the following functions:

- calculation of the true available backup time, taking into account the battery age, the temperature and the charge level;
- estimation of the battery service life;
- protection against excessive discharges;
- regulation of battery voltage depending on the temperature, which increases battery service life;
- limiting of battery current;
- automatic battery testing:
- battery discharge at programmable time intervals;
- battery status, used for preventive detection of battery faults;
- continuity of the battery circuit;
- protection against deep discharges depending on the discharge curves and battery isolation by the circuit breaker;
- progressive buzzer indicating the end of backup time;
- temperature monitoring used to:
- regulate the charger voltage depending on the temperature in the battery room;
- warn the operator if the set permissible temperatures are overrun;
- enhance the accuracy of the battery backup time calculation carried out by the standard UPS function.

PART 5: COMMUNICATIONS FUNCTIONS

1.0 Standard Communication

1.1 Media contact card

This board to provide isolated relay contacts 250 V 5 A (6 x 2 changeover contacts) that may be used to activate indicating lights or buzzers to inform the user of the operating status of the UPS and the battery, for the following information:

- load on UPS;
- load on battery power;
- load on bypass (maintenance position);
- low-battery warning;
- general alarm;
- complete shutdown.

PART 6: OPTIONS

1.0 “BACKFEED” Protection on Bypass AC Input

The bypass AC input should be optionally equipped with a device to prevent flow of battery current upstream via the automatic bypass.

This device, placed upstream of the static switch, mechanically disconnects the bypass AC input when the load is transferred to battery power or if the bypass AC source fails. It ensures complete safety for persons servicing the installation upstream of the UPS.

2.0 THM (Total Harmonic Management) Filter

2.1 Total Control over Harmonics

The UPS should offer a complete set of solutions to control harmonic phenomena in low-voltage installations. The solutions to cover both harmonics reinjected upstream of the UPS and those created by non-linear loads.

These solutions should comprise:

- harmonic filters (see below "other harmonic filters):
- passive filters using inductors and capacitors;
- active filters, that calculate and compensate harmonics in real time:
- SineWave active harmonic conditioners, the universal solution to eliminate harmonics at all points in low-voltage installations;
- on-site evaluation visits with guaranteed results for the proposed solution.

2.2 THM (Total Harmonic Management) built-in filters

The THM filters built into the UPS to use the SineWave active harmonic conditioner technology, optimised to provide the most cost-effective solution for each UPS.

The filter considerably reduces the harmonic current reinjected into the distribution system, thus avoiding disturbances for loads. It is also a means to increase the power factor upstream of the UPS.

2.3 Other harmonic filters

In addition to built-in THM filters, the following harmonic-filtering should be provided:

- non-compensated filters to filter one or a number of fixed harmonics;
- compensated or dynamic filters, depending on the case, intended for use when an engine generator set supplies the UPS ;
- SineWave active harmonic conditioner, the most effective solution because the system automatically adapts to the harmonics drawn, whatever their spectrum. As a result, the electrical distribution system continuously supplies a perfect sinusoidal current wave.

3.0 MultiSlot

MultiSlot is a device which adapts the UPS to the communications protocols of the applications (computer and electrical) by combining three functions.

3.1 Expansion Module for Communications Cards

MultiSlot expands UPS communications capacity if the number of available ports or slots is not sufficient.

Two MultiSlot units can be connected in series to use up to seven communications cards.

3.2 Protocol Converter

MultiSlot converts Basic relay-contact or U-Talk serial communications to the ASCII, SNMP and JBus protocols.

For these two functions, MultiSlot uses a U-Talk/Basic acquisition card.

3.3 Data Concentrator for parallel UPS systems

MultiSlot monitors an installation made up of two UPS units. It provides an overall view by concentrating the data from the connected units.

4.0 LED indications unit

The LED indications unit gives remote indication of the main operating-status information on the UPS.

It supplies the following information via LEDs and a buzzer:

- load on battery power;
- low-battery warning;
- inverter off;

- general alarm.

It should be equipped with a battery to ensure operation even in the event of a power outage.

5.0 Battery Circuit-Breaker Enclosure

The battery circuit breaker should be housed in an enclosure.

6.0 External Manual Bypass Enclosure (for greater capacity)

An external Manual by-pass system, rated 450A (3-phase), should be provided across the UPS. The by-pass system should comprise a 450A TP/N manual change-over switch, 3 No. 450A TP MCCB to isolate manual supply, UPS supply, and load respectively. All the above devices to be enclosed in a common solidly bonded enclosure with adequate internal space for cable management and proper termination.

7.0 Software

A software should be included to control and monitor the electrical installation from a PC-type supervision station. To access the commands and measurements for the supervised UPSs, simply click the functions displayed on the screen.

8.0 External Surge Protection

An external surge protection device should be provided to offer surge protection in the ratio 5000:1.

9.0 Teleservice

Teleservice is a means to provide continuous remote monitoring of the UPSs via a modem built into the UPS and connected to a telephone line.

10.0 Voltage – Matching Transformer

This transformer is to be provided to:

- match the electrical distribution-system voltage to that of the UPS;
- create galvanic isolation between the load and the normal AC input source or to set up a suitable system earthing arrangement.

**PART E: TECHNICAL SPECIFICATIONS
FOR COMMUNICATIONS SERVICES**

PART E: TECHNICAL SPECIFICATIONS FOR COMMUNICATIONS SERVICES

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1.0 AN OVERVIEW OF CABLING STANDARDS

1.1 ANS/TIA/EIA-568-A and ISO/IEC 11801

The latest editions of the ANS/TIA/EIA-568-A (568-A) AND iso/iec 11801 ('11801) cabling standards were both published in 1995. The following overview provides some of the requirements and recommendations of each standard including differences between them.

1.2 ANS/TIA/EIA-568-A

Commercial Building Telecommunications Cabling Standard.

The Telecommunications Industry Association (TIA) TR42.1 (formerly TR41.8.1) working Group on telecommunications cabling published the ANSI/TIA/EIA-568-A standard in 1995.

1.3 ISO/IEC 11801

Information Technology – Generic Cabling for Customer Premises.

The International Organization for Standardization (ISO) SC 25/WG 3 Working Group on telecommunications cabling published the ISO/IEC 11801 standard in 1995.

Following are highlights of the '568-A standard and related Telecommunication Systems Bulletins (TSBs) with notes on differences in terminology and technical requirements with respect to '11801. For clarity and consistency, '568-A based terminology is used in the following overview.

Purpose

- To specify a generic voice and data telecommunications cabling system that will support a multi-product, multi-vendor environment.
- To provide direction for the design of telecommunications equipment and cabling products intended to serve commercial enterprises.
- To enable the planning and installation of a structured cabling system for commercial buildings that is capable of supporting the diverse telecommunications needs of building occupants.
- To establish performance and technical criteria for various types of cable and connecting hardware and for cabling system design and installation.

Scope

- Specifications are intended for telecommunications installations that are "office oriented".
- Requirements are for structured cabling system with a usable life in excess of 10 years.
- Specifications addressed:
 - Recognized Media
 - Cable and connecting Hardware
 - Performance
 - Topology
 - Cabling Distance
 - Installation Practices

- User Interfaces
- Channel Performance

Cabling Elements

- Horizontal Cabling:
 - Horizontal Cross-connect (HC)
 - Horizontal Cable
 - Transition Point (optional)
 - Consolidation Point (optional)
 - Telecommunications-Outlet/Connector (TO)
- Backbone Cabling
 - Main Cross-connect (MC)
 - Interbuilding Backbone Cable
 - Intermediate Cross-connect (IC)
 - Intrabuilding Backbone Cable
- Work Area (WA)
- Telecommunications Closet (TC)
- Equipment Room (ER)
- Entrance Facility (EF)
- Administration

2.0 HORIZONTAL CABLING SYSTEM STRUCTURE

The horizontal cabling system extends from the telecommunications outlet in the workarea to the horizontal cross-connect in the telecommunications closet. It includes the telecommunications outlet, an optional consolidation point or transition point connector, horizontal cable, and the mechanical terminations and patch cords (or jumpers) that comprise the horizontal cross-connect.

2.1 Some points specified for the horizontal cabling subsystem include:

- Recognized Horizontal Cables:
 - 4 pair 100 $\square$ unshielded twisted-pair.
 - 2-fiber (duplex) 62.5/125 $\square$ m or multimode optical fiber 9note: 50/125 $\square$ mmultimode fiber will be allowed in '568-B)
- A minimum of two telecommunications outlets are required for each individual workarea.

First outlet: 100 $\square$ twisted pair (category 5e is recommended)Second outlet: 100 $\square$ twisted pair.

Two-fiber multimode optical fiber either 62.5/125 $\square$ m or 50/125 $\square$ m.
- One transition point (TP) is allowed between different forms of the same cable type(i.e. where undercarpet cable connects to round cable)
- 50 $\square$ coax and 150 $\square$ STP-A cabling is not recommended for new installations.

- Additional outlets may be provided. These outlets are in addition to and may not replace the minimum requirements of the standard.
- Bridged taps and splices are not allowed for copper-based horizontal cabling. (Splices are allowed for fiber).
- Application specific components shall not be installed as part of the horizontal cross-connect (eg. Splitters, baluns).
- The proximity of horizontal cabling to sources of electromagnetic interference (EM) shall be taken into account.

3.0 BACKBONE CABLING SYSTEM STRUCTURE

The backbone cabling system provides interconnections between telecommunications closets, equipment rooms, and entrance facilities. It includes backbone cables, intermediate and main cross-connects, mechanical terminations, and patch cords or jumpers used for backbone-to-backbone cross-connections. The backbone also extends between buildings in a campus environment.

- Equipment connections to backbone cabling should be made with cable lengths of 30m (98 ft) or less.
- The backbone cabling shall be configured in a star topology. Each horizontal cross-connect is connected directly to a main cross-connect or to an intermediate cross-connect, then to a main cross-connect.
- The backbone is limited to no more than two hierarchical levels of cross-connects (main and intermediate). No more than one cross-connect may exist between a main and a horizontal cross-connects may exist between any two horizontal cross-connects.
- A total maximum backbone distance of 90m (295 ft.) is specified for high band-width capability over copper. This distance is for uninterrupted backbone runs. (No intermediate cross-connect).
- The distance between the terminations in the entrance facility and the main cross-connect shall be documented and should be made available to the service provider.
- Recognized media may be used individually or in combination, as required by the installation. Quantity of pairs and fibers needed in individual backbone runs depends on the area served. Recognized backbone cables are:

100 □ UTP

150 □ stp-a

625/125 □ Multimode Optical Fiber

Single mode Optical Fiber

- Multipair cable is allowed, provided that it satisfies the power sum crosstalk requirements.
- The proximity of backbone cabling to sources of electromagnetic interference (EMI) shall be taken into account.
- Cross-connects for different cable types must be located in the same facilities.
- Bridged taps are not allowed.

3.1 WORK AREA:

The telecommunications outlet serves as the work area interface to the cabling system. Work area equipment and cables used to connect to the telecommunications outlet are outside the scope of '568-A and '11801, but are expected to be specified in the next edition of these standards.

4.0 OPEN OFFICE CABLING:

Additional specifications for horizontal cabling in areas with moveable furniture and partitions have been introduced in TIA/EIA TSB75. Horizontal cabling methodologies are specified for "open-office" environments by means of multi-user telecommunications outlet assemblies and consolidation points. These methodologies are intended to provide increased flexibility and economy for installation with open office work spaces that require frequent configuration.

HORIZONTAL DISTANCES OF COPPER LINKS (OPEN OFFICE)

Copper work area cables connected to a MuTOA, shall meet the requirements of '568-A (sec. 10.5 and 11.5). The maximum length of copper work area cables shall be determined according to:

$$C = (102 - H)/12$$
$$W = C - 7 (<29 \text{ m})$$

Where:

C is the combined length of the work area cable, equipment Cable, and patch cord (m).

W is the length of the work area cable (m).

H is the length of the horizontal cable (m)

The above equations assume that there is a total of 7m (23 ft.) of patch and equipment cables in the telecommunications closet. Table 1 shows the application of these formulae. The length of work area cables shall not exceed 20m (66 ft). The MuTOA shall be marked with the maximum allowable work area cable length.

Length of Horizontal Cable	Maximum Length of Work Area Cable	Maximum Combined Length of Work Area Cables, Patch Cords, and Equipment Cable
H m (ft)	W m (ft)	C m(ft)
90 (295)	3 (10)	10 (33)
85 (279)	7 (23)	14 (46)
80 (262)	11 (36)	18 (59)
75 (246)	15 (49)	22 (72)
70 (230)	20 (66)	27 (89)

Table 1 – Maximum Length of Work Area Cables

5.0 HORIZONTAL DISTANCES OF OPTICAL FIBER LINKS(LONG WORK AREA CABLES)

For optical fiber cables, any length combination or length of the horizontal channel does not exceed 100m (328 ft).

When deploying a centralized fiber cabling topology, the general guidelines of TSB72 shall be followed.

6.0 TELECOMMUNICATIONS CLOSET

Telecommunications closets are generally considered to be floor serving facilities for horizontal cable distribution. They may also be used for intermediate and main cross-connections.

Some specifications related to the telecommunications closet:

- Closets shall be designed and equipped in accordance with ANSI/TIA/EIA-569-A.
- Cable stress from tight bends, cable ties, staples, and tension should be avoided by well-designed cable management.
- Only standards-compliant connecting hardware shall be used.
- Cables and cords used for active equipment connections are outside the scope of the standard (10m total allowed for patch cords, equipment cables, and work area cables for each link).
- Application-specific electrical components shall not be installed as part of the horizontal cabling.
- Horizontal cable terminations shall not be used to administer cabling system changes. Instead, jumpers patch cords, or equipment cords are required for re-configuring cabling connections

The two types of schemes used to connect cabling subsystems to each other and to equipment are known as interconnections and cross-connections.

DEFINITIONS:

Cross-Connection:

A connection scheme using patch cords or jumpers that attach to connecting hardware on each end.

Interconnection:

A connection scheme that provides for direct connections to building cabling from equipment without a patch cord.

7.0 TWISTED-PAIR (BALANCED) CABLING

The six categories of transmission performance specified for cables, connecting hardware and links, both ISO and TIA standardized, are:

Designation	Transmission Characteristics	Description
3	Transmission characteristics are specified up to 16 MHz.	Meets applicable category 3 and Class C requirements of ISO/IEC 11801 (including amendments A.1 & A.2), ANSI/TIA/EIA-568-A (including addenda A-1, A-2, & A.3) and TSB67. Requirements are specified to an upper frequency limit of 16MHz.
4	Transmission characteristics are specified up to 20 MHz	Meets applicable category 4 requirements of ISO/IEC 11801 (including amendments A.1 & A.2), ANSI/TIA/EIA-568-A (including addenda A-1, A-2 & A-3) and TSB67. Requirements are specified to an upper frequency limit of 20 MHz. This classification is a superset of 3
5	Transmission characteristics are specified up to 100 MHz.	Meets applicable Category 5 and class D requirements of ISO/IEC 11801 (including addenda A-1, A-2 & A-3), TSB67 and draft TSB95. Requirements are specified to an upper frequency limit of 100 MHz. This classification is a superset of 4.
5e	Transmission characteristics are specified up to 100 MHz.	Performs to category 5e and additional class D requirements of draft amendment 3 of ISO/IEC 11801, and draft addendum 5 to ANSI/TIA/EIA-568-A. Requirements are specified to an upper frequency limit of 100 MHz. This classification is a superset of 5.
6.	Transmission characteristics are specified up to 250 MHz.	Performs to category 6 and class E requirements by ISO/IEC and TIA, to an

upper frequency limit of at least 250 MHz. This classification is a superset of 5e

6a.	Transmission characteristics are specified up to 500 MHz.	Performs to category 6a (augmented Category 6) requirements by ISO/IEC. Standard - ANSI/TIA-568.2-D (2018)

8.0 UTP TELECOMMUNICATIONS OUTLET/CONNECTOR

- 8-position modular jack per IEC 60603-7 (.568-A states that all pairs must be connected).
- Pin/pair assignment: T568A Optional assignment to accommodate certain systems: T568B.
- Durability rating 750 mating cycles minimum.
- Backward compatibility and interoperability is required.

9.0 FULLY SHIELDED TELECOMMUNICATIONS OUTLET/CONNECTOR.

- Entirely new interface design to support class F cabling.
- Will require a new wiring pin/pair assignment.
- Transmission measurement methods for category 7 are under study.
- Durability rating 1000 mating cycles minimum.

10.0 UTP CONNECTING HARDWARE VS. CABLE NEXT PERFORMANCE.

- Specifications cover all types of connectors used in the cabling system including the telecommunications outlet/connector.
- Does not cover work area adapters, baluns, protection, MAUs, filters, or other application-specific devices.
- Temperature range -10°C (14°F) to 60°C (140°F).
- Outlets shall be securely mounted. Outlet boxes with unterminated cables must be covered and marked.
- Transmission requirements are much more severe than cable of a corresponding category.
- Performance markings should be provided to show the applicable transmission category and should be visible during installation (for example 5e) in addition to safety markings.
- Installed connectors shall be protected from physical damage and moisture.

10.1 UTP LINK PERFORMANCE MARKING AND IDENTIFICATION

- Link category marking should be clearly visible on both ends (component markings are not sufficient).
- Labelling, markings, and color-coding shall be provided in accordance with ANSI/TIA/EIA-606.

11.0 SCREENED CABLING (ScTP)

As a result of the release of TIA/EIA/IS-729 and the maturity of the '568-A and '11801 standards, telecommunications groups recognize the presence of an overall shield over four twisted-pairs; a media hybrid termed Screened Twisted-Pair or ScTP cabling.

11.1 ScTP:

- Color-coding:
 - Pair 1 = White/Blue-Blue
 - Pair 2 = White/Orange-Orange
 - Pair 3 = White/Green-Green.
 - Pair 4 = White/Brown-Brown
- 0.51mm (24 AWG) 100 Ω 4-pair enclosed by a foil shield.
- A copper conductor drain wire of .040mm (26 AWG) or larger shall be provided.
- Should be marked "100 Ω ScTP", in addition to any safety markings required by local or national codes.
- Same mechanical and transmission requirements apply to backbone and horizontal cables.
- Additional performance requirements, including surface transfer impedance, is specified in the IS-729 standard entitled, "Technical Specifications for 100 Ω Screened Twisted-Pair Cabling".

11.2 ScTP Connectors:

- Interface and pair assignments same as IEC 60603-7 ('568-A states that all 4 pairs must be connected).
- Additional transfer impedance and shield mating interface requirements specified in the IS-729 standard entitled, "Technical Specifications for 100 Ω Screened Twisted-pair Cabling".

11.3 ScTP Patch Cords:

- Specifications call for 26 AWG (7 strands @ 0.15mm) or 24 AWG (7 strands @ 0.20mm) stranded conductors.
- Allows for an overall shield.
- Less severe attenuation than horizontal cable.

11.4 ScTP Installation Practices:

- Shield shall be bonded at both ends at the "Telecommunication Grounding Busbar".
- The difference between the two grounds shall be no more than 1.0 V RMS.

12.0 FULLY SHIELDED CABLING (SSTP)

Fully shielded cabling requirements are under development by ISO. Cable and connector specification will extend to at least 600 MHz and are intended to support the pending class F cabling requirements.

12.1 Fully Shielded Cable:

- Color-coding:
 - Pair 1 = White/Blue-Blue
 - Pair 2 = White/Orange-Orange
 - Pair 3 = White/Green-Green Pair
 - 4 = White/Brown-Brown
- Four 0.51mm (24 AWG) or larger 100 Ω twisted-pairs each enclosed by an individual foil shield with an overall shield provided over the four-pairs.

- Mechanical and transmission requirements are under development by ISO.

12.2 Fully Shielded Connectors:

- Interface and pair assignments are under development by ISO and will be entirely different from the T568A and T568B assignments.
- Mechanical and transmission requirements are under development by ISO.

12.3 Fully Shielded Patch Cables.

- Mechanical and transmission requirements are under development by ISO.

12.4 Fully Shielded Installation Practices:

- Installation Practices are under development by ISO.-

12.5 TSB67

Transmission Performance Specifications for Field Testing of UTP Cabling Systems

This bulletin provides users with the opportunity to use comprehensive test methods to validate the transmission performance characteristics of installed category 5 and lower grade UTP cabling systems. The categories of UTP cabling systems in this bulletin also correspond with the UTP cabling categories of ANSI/TIA/EIA-568-A. Additional transmission performance and applicable field test requirements are referenced in TSB95, '568-A-5 and amendment 2 to '11801 (FDAM 2)

12.6 Some points specified for TSB67 transmission field testing for UTP Cabling Systems

- UTP cabling systems are comprised of cables and connecting hardware specified in TIA/EIA-568-A.
- Required test parameters include wire-map, length, attenuation, and crosstalk.
- Two levels of pass or fail are indicated, depending on measured margin compared to minimum specifications. Testing of NEXT loss is required in both directions.
- Level II equipment meets the most stringent requirements for TSB67 measurement accuracy. Level IIe equipment will be required to verify category 5 and FDAM 2 performance.
- Requirements are intended for performance validation and are provided in addition to '568-A requirements on components and installation practices.

13.0 OPTICAL FIBER CABLING

The current '568-A specification on optical fiber cabling consists of one recognized cable type for horizontal subsystems and two cable types for backbone subsystems:

Horizontal – 62.5/125 μm multimode (two fibers per outlet).

Backbone - 62.5/125 μm multimode or single mode.

'568-B will allow the use of 50/125 μm multimode optical fiber in both the horizontal and backbone in addition to the types listed above.

All optical fiber components and installed practices shall meet applicable building and safety codes

13.1 Optical Fiber Patch Cords:

- Shall be a two-fiber (duplex) indoor cable Of the same type as the cables to which they connect.
- Shall allow for easy connection and reconnection and ensure that polarity is maintained (568SC) configuration required).

- Shall perform a pair-wise cross-over of fiber positions A and B. (If provided in simplex form, one connector shall be identified as “A” and the other “B”.)

13.2 Installation of Optical Fiber Connecting Hardware:

- Connectors shall be protected from physical damage and moisture.
- Capacity for 12 or more fibers per rack space [44.5mm (1.75 in.)] should be provided.
- Optical fiber connecting hardware shall be installed:
 - To provide well organized installation with cable management.
 - In accordance with manufacturer’s guidelines.

13.3 Optical Fiber Cabling Installation:

- A minimum of 1m (3.28 ft.) of two-fiber cable (or two buffered fibers) shall be accessible for termination purposes.
- Testing is recommended to assure correct polarity and acceptable link performance. Informative Annex H of ‘568-A is provided for recommended optical fiber link performance testing criteria.

13.4 Optical Fiber Work Area Connector:

- A simplex or duplex SC connector shall be used at the work area.
- Recommended adapter and connector is the 568SC (a duplex SC that is capable of simplex operation).

13.5 Optical Fiber Connections:

- Connector designs shall meet the requirements of the corresponding TIA FOCIS documents.
- Telecommunications outlet/connector boxes shall be securely mounted at planned locations.
- The telecommunications outlet/connector box shall have:
 - The ability to secure optical fibers.
 - Cable management means to assure a minimum bend radius of 25mm (1.00 in.) and should have slack storage capability.
 - Provisions for terminating a minimum of two optical fibers into a 568SC adapter.
- Identification of fiber types:
 - Multimode connectors and adapters shall be identified with the color beige.
 - Single mode connectors and adapters shall be identified with the color blue.
- The two positions in a duplex connector are referred to as “position A” and “position B”.
- The 568SC adapter performs a pair-wise cross-over between position A and position B of two mated connectors.
- Optical fiber runs intended for future connections shall be stored in a telecommunications outlet/connector box.

13.6 Small Form Factor (SFF) Connectors:

- Qualified SFF duplex and multi-fiber connector designs may be used in the main cross connect, intermediate cross-connect, horizontal cross-connect, and consolidation points.
- A TIA Fiber Optic Connect Interconnectability Standard (FOCIS) shall describe each SFF design.
- The SFF design shall satisfy the requirements specified in Annex A of the proposed ‘568-B.3 standard.
- Some advantages of SFF connectors include compact size, modular compatibility with the eight position modular copper interface, and adaptability to high-density network electronics.

13.7 TSB72 Centralized Optical Fiber Cabling Guidelines

This Telecommunications Systems Bulletin (TSB) provides the user with the flexibility of designing an optical fiber cabling systems for centralized electronics typically in single tenant buildings. It contains information and guidelines for centralized optical fiber cabling.

Some points specified in TSB-72 for a centralized optical fiber cabling system include:

- Intended for single-tenant users who desire centralized vs. distributed electronics.
- Implementation allows cables to be spliced or interconnected at the telecommunications closet such that cables can be routed to a centralized distributor for total cable lengths of 300m (984 ft.) or less, including patch cords or jumpers.
- Allows for migration from an interconnection or splice to a cross-connection scheme that can also support distributed electronics.
- Pull-through implementations are allowed when total length between the telecommunications outlet/connector and centralized cross-connect and centralized cross-connect is 90m (295 ft.) or less.
- Connecting hardware required to:
 - join fibers by re-mateable connectors or splices,
 - connectors shall be 568SC interface,
 - provide for simplex or duplex connection of optical fibers,
 - provide means of circuit identification,
 - allow for addition and removal of optical fibers.

Note: Some multi-mode fiber implementations may be limited to an operating range of 220m to support 100BASE-SX.

13.8 TIA/EIA-568-A-1

Propagation Delay and delay Skew

This addendum to '568-A describes propagation delay and delay skew requirements for all '568-A compliant 4-pair 100 Ω cables. Propagation delay and delay skew requirements of multipair cables are subject to additional study.

Propagation delay is equivalent to the amount of time that passes between when a signal is transmitted and when it is received at the other end of a cabling channel. Delay skew is the difference between the pair with the least delay and the pair with the most delay. Transmission errors that are associated with excessive delay and the delay skew include increased jitter and bit error rates.

The maximum propagation delay skew requirement for 4-pair 100 Ω cables is frequency dependent and is specified by the following equation:

$$\text{Delay (ns/100m)} \leq 534 + 36/\sqrt{f} \text{ MHz}$$

Cable delay skew shall not exceed 45 ns/100m between 1 MHz and the highest referenced frequency for a given category.

It is anticipated that the requirements of '568-A-1 will also be applicable to pending category 6 cable propagation delay and delay skew specifications while more stringent performance criteria will be specified for pending category 7 cables.

13.9 TIA/EIA-568-A-2

Corrections and additions to TIA/EIA-568-A

This addendum to '568-A provides modifications and corrections to the content of '568-A as a result of advances in telecommunications research and development. Revisions are as follows:

1. Centralized optical fiber cabling is referenced in two locations (5.2.1 and 7.4.1) as an alternative to the optical cross-connection located in the telecommunications closet when deploying 62.5/125 μ m optical fiber cable in the horizontal. TIA/EIA TSB72 Centralized Optical Fiber Cabling Guidelines are also referenced.
2. The ANSI/ICEA reference in section 10.2.3 was updated to ANSI/ICEA S-90-661- 1994 for specifying the physical and mechanical requirements of '568-A recognized cables.
3. Additional text was incorporated into section 10.4.3.4 specifying that the connecting hardware used for 100 Ω UTP cabling shall not result in or contain any transposed (e.g transposition of pairs 2 or 3) or reversed (also called tip/ring reversals) pairs. It is further noted that applications requiring transposed or reversed pairs shall utilize adapters, work area or equipment cords to swap pairs.
4. A reference to the TSB67 field test methodologies is added to section 10.6.4
5. The 568SC optical fiber connector axial pull off strength requirement was decreased from 22 N (5 lbf) to 19.4 N (4.4 lbf)
6. Globally, the word "polarization" was replaced with "polarity".
7. The initial contact resistance specified in Annex A for connecting hardware was increased from 1 m Ω to 2.5 m Ω and the contact resistance measurement method was re-written to be more user-friendly.
8. A provision for common mode terminations for testing connecting hardware NEXT loss and return loss was incorporated into Annex B. This revision accommodates telecommunications networking implementations that may employ common mode terminations in the active equipment.

13.10 TIA/EIA-568-A-3 Addendum

3 to TIA/EIS-568-A

As a result of the demand for open office architecture and the need to support multiple telecommunications applications in a shared sheath, this addendum to '568-A addresses revised performance specifications for hybrid cables. '568-A-3 also introduces a new term called "bundled cables" to describe 4-pair cable assemblies that are not covered by an overall sheath (as specified for hybrid cables), but by any generic binding method such as "speed-wrap" or "cable-ties"

The new hybrid and bundled cable requirements state that power sum NEXT loss between all non-fiber cable types within that cable shall be 3 dB better than the specified pair-to-pair NEXT loss for each cable type.

13.11 TIA/EIA-568-A-4

Production Modular Cord NEXT Loss Test Method and Requirements for Unshielded Twisted-Pair Cabling

TIA/EIA-568-A-4 defines a generic and non-destructive methodology for NEXT loss testing of modular plug cords. NEXT loss performance requirements for category 5 modular plug cords, when measured with the particular test head specified in the Standard, are provided. Note that, although the methodology may be used as the basis for determining the minimum NEXT loss performance requirements of other categories of modular plug cords, at present, the Standard does not define a test head or specific test limits for category 5e or category 6 patch cords. The methodology described in the Standard contains the detailed NEXT loss calculations (which are based upon patch cable NEXT loss, test head NEXT loss, and cable and connector attenuation contributions) for the determination of the NEXT loss limits for any category patch cord and suitably designed test head.

13.12 TIA/EIA-568-A-5

Transmission Performance Specifications for 4-pair 100 Ω Enhanced Category 5 Cabling.

‘568-A-5 specifies enhanced category 5 (category 5e) performance requirements. These requirements are recommended for new category 5 cabling installations and are expected to become the de facto minimum standard for category 5 cabling. This document addresses the minimum equal level far-end crosstalk (ELFEXT) and return loss requirements necessary to support developments in applications technology and defines the minimum performance needed for a worst case for-connector channel to support applications that utilize full-duplex transmission schemes, such as Gigabit Ethernet. To ensure additional crosstalk headroom for robust applications support, this document also specifies power sum performance requirements for category 5e cables and cabling.

Addendum ‘A-5 is a normative document and, unlike TSB95, it provides mandatory requirements, not recommendations.

13.13 TIA/EIA TSB95

Additional Transmission Performance Guidelines for 100 Ω 4-pair Category 5 Cabling.

TSB95 outlines minimum recommendations for the new channel parameters of return loss and equal level far-end crosstalk (ELFEXT). These return loss and ELFEXT recommendations are specified to ensure the support of Gigabit Ethernet over installed or “legacy” category 5 cabling and were derived from worst case performances of channels with only two connection points. The two-connector channel topology is consistent with the IEEE committee’s assumption that cabling used to support Gigabit Ethernet systems will most likely utilize an interconnect instead of a cross-connect field and will not include a consolidation or transition point connection. Existing installed category 5 cabling should be verified to ensure that performance meets the minimum recommendations of this document. Channel configurations with three or four connectors that meet the specified ELFEXT and return loss recommendations will also support Gigabit Ethernet. Because the specifications of this document are applicable for the qualification of existing, installed cabling only, they are not recommended to be used as the minimum performance criteria for new category 5 cabling.

13.14 TIA/EIA/IS-729

Technical Specifications for 100 Ω Screened Twisted-Pair Cabling.

IS-729 is an interim standard that supplements TIA-568-A and ISO/IEC 11801 screened twisted-pair cabling specifications by describing additional technical requirements on the outlet interface, shield effectiveness, installation practices, and performance relative to SFTP links and components.

13.15 ISO/IEC 11801:1995 FDAM 2

Draft Amendment 2 to ISO/IEC 11801

The performance specifications in ISO amendment 2 provide new requirements for return loss and ELFEXT loss to compliment the existing ISO class D requirements. The new specified return loss and ELFEXT loss requirements are in harmony with the values proposed in '568-A-5, however, the document does not specify additional NEXT loss margin over and above the existing class D requirements. FDAM 2 also includes propagation delay and delay skew requirements for channels and permanent links that are in harmony with the requirements of TIA/EIA-568-A-1

The requirements of amendment 2 to ISO/IES 11801 are normative and this document will become the governing international standard for new class D cabling installations.

14.0 CABLING SPECIFICATION CROSS-REFERENCE CHART (ANSI/TIA/EIA-568-A AND ISO/IEC 11801)

The following chart provides a side-by-side comparison that highlights many of the fundamental similarities and differences between ANSI/TIA/EIA-568-A and ISO/IEC 11801.

ANSI/TIA/EIA-568-A (and addenda)
Commercial Building Telecommunications
Customer
Cabling Standard

ISO/IEC 11801 (and amendments)
Generic Cabling for
Premises

14.1 HORIZONTAL UTP CABLE

- Solid 4-pair 0.51mm (24 AWG) specified (0.64mm (22 AWG) solid also allowed). An overall shield ((ScTP) is optional.
- Performance marking should be provided to show the applicable performance category. These markings do not replace safety markings.
- Colour-coding:

White/blue-blue
White/orange-orange
White/green-green
White/brown-brown.

14.2 HYBRID AND BUNDLED CABLES

Hybrid/Bundled cables:

- Hybrid/bundled cables that contain multiple units of recognized horizontal copper cables are subject to additional NEXT loss requirements between cable units. These requirements assure a minimum of 3 dB additional power sum crosstalk isolation between applications that may operate on adjacent binder groups.
- All detailed specifications for the individual cable units used in the hybrid assembly still apply.
- Hybrid bundled cables shall meet the transmission requirements specified in TIA/EIA-568-A-3.

14.3 UTP PATCH CORDS AND CROSS-CONNECT JUMPERS.

- Patch cords must use stranded cable for adequate flex life

- Standard cables must meet the minimum performance requirements for horizontal cable except that 20 percent more attenuation is allowed by '568-A and 50 percent more attenuation is allowed by '11801.
- Color-code for cross-connect jumpers: One conductor white, the other a visibly distinct color such as red or blue.
- Performance markings should be provided to show the applicable transmission category in addition to safety markings.
- Insulated O.D of stranded wires should be 0.8mm (0.032 in.) to 1mm (0.039 in.) to fit into a modular plug.
- Production performance specifications for plug cord assemblies are addressed in '568-A-4
- Color codes for stranded, 100 $\square$ UTP patch cord:

Option 1	Option 2
White/blue-blue	PAIR 1 green-red
White/orange-orange	PAIR 2 black-yellow
White/green-green	PAIR 3 blue-orange
White/brown-brown	PAIR 4 brown-slate

Note: Because of their identical pair groupings, patch cords terminated with either T568A or T568B pair assignments may be used interchangeably, provided that both ends are terminated with the same pin/pair scheme.

14.4 BACKBONE UTP CABLE

- Performance markings should be provided to show the applicable performance category. These markings do not replace safety markings.
- Services with incompatible signal levels should be partitioned into separate binder groups. Guidelines for shared sheaths are provided in Annex D of '568-A.
- Transmission requirements are equivalent to horizontal cables except that NEXT loss performance is based on power-sum rather than worst-pair characterization to allow for multiple disturbing signals (of the same type) in the same sheath.
- Note: Tip conductors have colored insulation that corresponds to that of the binder group. Ring conductors have colored insulation that corresponds to that of the pair.
- Backbone UTP cables consist of solid 0.51 mm (24 AWG) cables that contain more than four pairs (typically multiples of 25-pairs are used). An overall shield is optional.
- Color-coding (specified by reference to ICEA)

15.0 MODULAR

WIRING REFERENCE

Modular Jack Styles:

There are four basic modular jack styles. The 8-position modular outlets are commonly and incorrectly referred to as "RJ45". The 6-position modular jack is commonly referred to as RJ11. Using these terms can sometimes lead to confusion since the RJ designation actually refer to very specific wiring configurations called Universal Service Order Code (USOC). The designation 'RJ' means Registered Jack. Each of these basic jack styles can be wired for different RJ configurations. For example, the 6-position jack can be 4 wired as an RJ11C (1`-pair), RJ14C (2-pair), or RJ25C (3-pair) configuration. An 8-position jack can be wired for configurations such as RJ61C (4-pair) and RJ48C. The keyed 8- position jack can be wired for RJ46S, and RJ47S. The fourth modular jack style is a modified version of the 6-position jack (modified modular jack or MMJ). It was designed to eliminate the possibility of connecting DEC data equipment to voice lines and vice versa.

15.1 MODULAR PLUG PAIR CONFIGURATIONS

It is important that the pairing of wires in the modular plug match the pairs in the modular jack as well as the horizontal and backbone wiring. If they do not, the data being transmitted may be paired with incompatible signals.

Modular cords wired to the T568A color scheme on both ends are compatible with T568B systems and vice versa.

15.2 STRAIGHT THROUGH OR REVERSED?

Modular cords are used for two basic applications. One application uses them for patching between modular patch panels. When used in this manner modular cords should always be wired “straight through” (pin 1 to pin 1, pin 2 to pin 2, pin 3 to pin 3, etc). The second major application uses modular cords to connect the workstation equipment (PC, phone, FAX etc) to the modular outlet. These modular cords may either be wired “straight-through” or “reversed” (pin 1 to pin 6, pin 2 to pin 5, pin 3 to pin 4, etc.) depending on the system manufacturer’s specifications. This “reversed” wiring is typically used for voice systems. The following is a guide to determine what type of modular cord you have

15.3 HOW TO READ A MODULAR CORD

Align the plugs side-by-side with the contacts facing you and compare the wire colors from left to right. If the colors appear in the same order on both plugs, the cord is wired “straight-through”. If the colors appear reversed on the second plug (from right to left), the cord is wired “reversed”.

15.4 COMMON OUTLET CONFIGURATIONS

Two wiring schemes have been adopted by the ‘568-A and ‘11801 standards. They are nearly identical except that pairs two and three are reversed. T568A is the preferred scheme because it is compatible with 1 or 2-pair USOC systems. Either configuration can be used for Integrated Services Digital Network (ISDN) and high speed data applications. Transmission categories 3, 4, 5, 5e, and 6 are only applicable to this type of pair grouping.

USOC wiring is available for 1-, 2-, 3-, or 4-pair systems. Pair 1 occupies the center conductors, pair 2 occupies the next two contacts out, etc. One advantage to this scheme is that a 6-position plug configured with 1, 2, or 3 pairs can be inserted into an 8-position jack and still maintain pair continuity. A note of warning though, pins 1 and 8 on the jack may become damaged from this practice. A disadvantage is the poor transmission performance associated with this type of pair sequence. None of these pair schemes is cabling standard compliant.

10Base-T wiring specifies an 8-position jack but uses only two pairs. These are pairs two and three of T568A and T568B schemes.

The MMJ is a unique wiring scheme for DEC® equipment.

16.0 RECOMMENDED CABLING PRACTICES

Do’s

- ☐ Terminate each horizontal cable on a dedicated telecommunications outlet.
- ☐ Locate the main cross-connect near the center of the building to limit cable distances.
- ☐ Maintain the twist of horizontal and backbone cable pairs up to the point of termination.

- ❑ Tie and dress horizontal cables neatly and with a minimum bend radius of 4 times the cable diameter.

Dont's:

- ❑ Do not use connecting hardware that is of a lower category than the cable being used.
- ❑ Do not create multiple appearances of the same cable at several distribution points (called bridged taps)
- ❑ Do not over-tighten cable ties, use staples, or make sharp bends with cables.
- ❑ Do not place cable near equipment that may generate high levels of electromagnetic interference.

17.0 UTP CONNECTOR TERMINATIONS

- Pair twists shall be maintained as close as possible to the point of termination.
- Untwisting shall not exceed 25mm (1.0 in) for category 4 links and 13mm (0.5 in) for category 5, category 5e, and category 6 links. Follow manufacturer guidelines for category 3 products, if no guidelines exist, then untwisting shall not exceed 75mm (3.0 in).
- Connecting hardware shall be installed to provide well-organized installation with cable management and in accordance with manufacturer's guidelines.
- Strip back only as much jacket as is required to terminate individual pairs.

17.1 UTP CABLING INSTALLATION PRACTICES.

- To avoid stretching, pulling tension should not exceed 110N (25 lbf) for 4-pair cables.
- Installed bend radii shall not exceed:
 - 4 times the cable diameter for horizontal UTP cables.
 - 10 times the cable diameter for multi-pair backbone UTP cables.
- Horizontal cables should be used with connecting hardware and patch cords (or jumpers) of the same performance category or higher.
- Avoid cable stress, as caused by:
 - cable twist during pulling or installation
 - tension in suspended cable runs
 - tightly cinched cable ties or staples
 - tight bend radii.
- Important Note: Installed UTP cabling shall be classified by the least performing component in the link.

18.0 ANSI/TIA/EIA-569-A

Commercial Building Standard for Telecommunications Pathways and Spaces.

The TIA TR42.3 (formerly TR41.8.3) Working group on Telecommunications Pathways & Spaces published the ANSI/TIA/EIA-569-A ('569-A) Standard in 1998.

Following are highlights of the '569-A Standard:

Purpose

- Standardize design and construction practices.
- Provides a telecommunications support system that is adaptable to change during the life of the facility.

Scope

- Pathways and spaces in which telecommunications media are placed and terminated.
- Telecommunications pathways and spaces within and between buildings.
- Commercial building design for both single and multi-tenant buildings.

Elements

- Horizontal
- Backbone
- Work Area
- Telecommunications Closet
- Equipment Room
- Main Terminal Space.
- Entrance Facility

18.1 HORIZONTAL

Pathways from telecommunications closet to work area.

Includes:

Pathway Types:

- Underfloor-Network of raceways embedded in concrete consisting of distribution and header ducts, trenches, and cellular systems.
- Access Floor-Raised modular floor tile supported by pedestals, with or without lateral bracing or stringers.
- Conduit-Metallic and nonmetallic tubing of rigid or flexible construction permitted by applicable electrical code.
- Tray & Wireway-Prefabricated rigid structures for pulling or placing cable.
- Ceiling-Open environment above accessible ceiling tiles and frame work.
- Perimeter-Surface, recessed, molding, and multichannel raceway systems for wall mounting around rooms or along hallways.

Space Types:

- Pull Boxes-Used in conjunction with conduit pathway systems to assist in the fishing and pulling of cable.
- Splice Boxes-a box, located in a pathway run, intended to hold a cable splice.
- Outlet Boxes-Device for mounting faceplates, housing terminated outlet/connectors, or transition devices.

Design Considerations:

- Grounded per code and ANSI/TIA/EIA-607 ('607)
- Designed to handle recognized media as specified in ANSI/TIA/EIA-568-A ('568-A)
- Not allowed in elevator shafts.
- Accommodate seismic zone requirements
- Installed in dry locations

18.4 BACKBONE

Pathways routed from closet-to-closet.

Building Backbone Types:

- Ceiling
- Conduit
- Sleeves-An opening, usually circular, through the wall, ceiling, or floor.

- Trays

Typically the most convenient and cost effective backbone pathway design in multi-story buildings, is to have stacked closets located one above the other, connected by sleeves or slots.

Design Considerations:

- Grounded per code and '607
- Accommodate seismic zone requirements
- Water should not penetrate the pathway system
- Tray, conduits, sleeves, slots penetrate closets minimum 25mm (1 in.)
- Designed to handle all recognized media (as specified in '568-A)
- Integrity of all fire stop assemblies shall be maintained.

18.3 WORK AREA

Primary location where the building occupants interact with dedicated telecommunications equipment.

Design Considerations:

- At least one telecommunication outlet box location shall be planned for each work area.
- This location should be coordinated with the furniture plan. A power outlet should be nearby.
- Control center, attendant, and reception areas shall have direct and independent pathways to the serving telecommunications closet.
- Furniture System design:
 - Cable access via walls, columns, ceilings, or floors. Fittings that transition between building and furniture pathways require special planning.
 - Furniture pathway fill capacity is effectively reduced by furniture corners, and connectors mounted within the furniture pathway systems.
 - Furniture pathways bend radius shall not force the installed cable to abend radius of less than 25 mm (1 in.)
 - Furniture spaces designed to house slack storage, consolidation points, or multi-user telecommunications outlet assemblies shall provide space for strain relieving, terminating, and storing slack for the horizontal cables.
 - Slack storage and furniture pathway fill, shall not affect the bend radius and termination of the cable to the connector.
 - Furniture pathway openings shall comply with either of two sizes:
 - 1) Standard NEMA opening (NEMA OS 1 (Ref D. 14), WD-6 (Ref D. 15))
 - 2) Alternate opening:

Power/telecommunication separation requirements is governed by applicable electrical code for safety. Minimum separation requirements of Article 800-52 of ANS/NFPA 70 (National Electric Code) shall be applied.

18.4 TELECOMMUNICATIONS CLOSETS

Recognized location of the common access point for backbone and horizontal pathways.

Design:

- Dedicated to telecommunications function.

- Equipment not related to telecommunications shall not be installed, pass through or enter the telecommunications closet.
- Multiple closets on the same floor shall be interconnected by a minimum of one (78 (3) trade size) conduit, or equivalent pathway.
- Minimum floor loading 2.4 kPA (50 lbf/ft²).

Design Considerations:

- Minimum one closet per floor to house telecommunications equipment/cable terminations and associated cross-connect cable and wire.
- Located near the center of the area being served.
- Horizontal pathways shall terminate in the telecommunications closet on the same floor as the area served.
- Accommodate seismic zone requirements.
- Two walls should have 20mm (0.75 in.) A-C plywood 2.4m (8ft.) high.
- Lighting shall be a minimum of 500 lx (50 foot candles) and mounted 2.6m (8.5ft.) above floor.
- False ceilings shall not be provided.
- Minimum door size 910mm (36 in.) wide and 2000mm (80 in.) high without sill, hinged to open outwards, or slide-to-slide or removable, and fitted with a lock.
- Minimum of two dedicated 120V 20A nominal, non-switched, AC duplex electrical outlet receptacles, each on separate branch circuits.
- Additional convenience duplex outlets placed at 1.8m (6 ft.) intervals around perimeter, 150mm (6 in.) above floor.
- Access to the telecommunications grounding system as specified by ANSI/TIA/EIA-607.
- HVAC requirements to maintain temperature the same as adjacent office area. A positive pressure shall be maintained with a minimum of one air change per hour or per code.

18.5 EQUIPMENT ROOM

A centralized space for telecommunications equipment that serves specific occupants of the building.

Any or all of the functions of a telecommunications closet or entrance facility may alternately be provided by an equipment room.

Location

- Site locations should allow for expansion.
- Accessible to the delivery of large equipment.
- Not located below water level.
- Away from sources of EMI
- Safeguards against excessive vibration
- Sizing shall include projected future as well as present requirement.
- Equipment not related to the support of the equipment room shall not be installed in, pass through, or enter the equipment room.

Design Considerations

- Minimum clear height of 2.4m (8 ft.) without obstruction.
- Protected from contaminants and pollutants.
- Access to backbone pathways.
- HVAC provided on a 24 hours-per-day, 365 days-per-year basis.
- Temperature and humidity controlled range 18° C (64° F) to 24° C (75° F) with 30% to 55% relative humidity measured 1.5m (5 ft.) above floor level.

- Separate power supply circuit shall be provided and terminated in its own electrical panel.
- Minimum lighting 500 ix (50 foot candles). Switch location shall be near entrance door to room.
- Minimum door same as telecommunications closet. Double doors without centerpost or sill is recommended.
- Access to ground per ANSI/TIA/EIA-607.

18.6 MAIN TERMINAL SPACE

Centralized space that houses the main cross-connect. Commonly used as a separate space in multi-tenant buildings to serve all tenants.

- Location considerations are as specified for equipment room.
- Provisioning area as specified for telecommunications closets except power is reduced to convenience receptacles.

18.7 ENTRANCE FACILITY

Consists of the telecommunications service entrance to the building and backbone pathways between buildings.

Location

- Providers of all telecommunications services shall be contracted to establish requirements.
- Location of other utilities shall be considered in locating the entrance facility.
- Alternate entrance facility should be provided where security, continuity or other special needs exist.
- Equipment not related to the support of the entrance facility should not be installed in, pass through, or enter the telecommunications entrance facility.
- Dry location not subject to flooding and close as practicable to building entrance point and electrical service room.

Design Considerations.

- Accommodate the applicable seismic zone requirements.
- A service entrance pathway shall be provided via one of the following entrance types: Underground, buried, Aerial, Tunnel.
- Minimum one wall should be covered with rigidly fixed 20mm (0.75 in.) A-C plywood.
- Minimum lighting same as telecommunication closet.
- False ceilings shall not be provided.
- Minimum door same as telecommunications closet.
- Electrical power same as telecommunications closet. No convenience receptacles mentioned.
- Grounding same as telecommunications closet.

18.8 MISCELLANEOUS

- Fire stopping per applicable code
- Horizontal pathway separation from Electromagnetic interference (EMI) sources:
 - Separation between telecommunications and power cables (Article 800.52 of ANSI/NFPA 70)
 - Building protected from lightning (ANSI/NFPA 780 (Ref D.4)
 - Surge protection (Article 280 of ANSI/NFPA 70 and 9.11 of ANSI/IEEE 1100 (Ref D.1)
 - Grounding (ANS/TIA/EIA-607)
 - Corrected faulty wiring (Section 7.5 of ANSI/IEEE 1100)
- Reducing noise coupling:
 - Increase separation from noise sources

- Electrical branch circuit line, neutral, and grounding conductors should be maintained close together.
- Use of surge protectors in branch circuits
- Use fully enclosed grounded metallic raceway or locate cabling near grounded metallic surface.

19.0 TIA/EIA-569-A-1

Perimeter Pathway Addendum

This addendum deals with the construction, applications, premises design and installation of perimeter pathways also known as surface raceway systems.

It describes both single and multi channel systems mounted on walls at a variety of heights and directions. The sizing of such pathways are based on 40% fill for initial installations but allows up to 60% fill for moves, adds or changes to the installed cabling system during its life cycle. Fitting for perimeter raceway systems must allow for the bend radius requirements of the installed cable.

20.0 TIA/EIA-569-A-2

Furniture Pathway Fill Addendum.

The sizing of such pathways are based on 40% fill for initial installations but allows for up to 60% fill for moves, adds and changes to the installed cabling system during its lifecycle. Furniture fittings such as outlets and connectors used to terminate the installed cables need to be considered when determining the percentage of fill. Fish and pull techniques may result in reduced capacity of the pathway as compared to furniture manufacturers which allow placing cables into the pathways.

20.1 SP-4198

Revision to subclause 4.3, “Access Floor”, of TIA/EIA-569-A

Introduces low profile floors as compared to standard height floors. Low profile floors are 6” or lower while standard height floors are 6” or greater. This revision describes the use of access floors as it refers to guidelines and installation.

20.2 SP-4517

Addendum 4 to ANSI/TIA/EIA-569-A Poke-Thru Devices

A poke-thru is a device for routing cables through a floor while maintaining the fire-rating integrity of the floor. These devices are an option for routing horizontal cables when other pathway types are not typical. Types include flush floor mount and those that rise up above floor level, also known as pedestal, raised, tombstone or monument.

PART F
PARTICULAR AND TECHNICAL SPECIFICATIONS FOR CCTV
INSTALLATIONS

ITEM	CONTENT S
1.1	LOCATION OF SITE
1.2	EXTENT OF WORKS
1.3	REGULATION AND STANDARDS
1.4	ELECTRICAL REQUIREMENTS
1.5	TECHNICAL SPECIFICATIONS
1.5.1	FIXED COLOUR TV CAMERA
1.5.2	VIDEO MONITORS
1.5.3	COLOUR VIDEO RECORDERS
1.5.4	CABLES AND CONNECTORS
1.5.5	UNINTERRUPTIBLE POWER SUPPLY

PARTICULAR SPECIFICATIONS OF MATERIALS AND WORKS

I.I Location of site

The location of the proposed works is Barabara Plaza, Nairobi.

1.2 Extent of the Works

The works to be carried out include the supply, delivery, installation, testing, commissioning and leaving in servicing condition the Closed Circuit TV network systems as described in this specification. The works shall include, but not limited to the supply and installation of the following:-

- Digital IP Signal Processing Camera
- Colour TV Monitors
- Colour Digital Video Recorder with software

1.3 Regulation and Standard

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

Electric Power Act

Kenya Bureau of Standards (K.E.B.S)

Institution of Electrical Engineers (I.E.E) Wiring Regulations

Current recommendation of CCITT and CCIR

1.4 ELECTRICAL REQUIREMENTS

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

1.5 TECHNICAL SPECIFICATIONS FOR CLOSED CIRCUIT COLOUR TELEVISION SYSTEM

1.5.1 Fixed Color IP Cameras

Fixed type color television cameras shall be located and installed in selected areas. They shall be linked to the CCTV network via dedicated Cisco switches and CCTV UTP cat 6 cabling.

The mounting height and position of cameras shall be such that the desired coverage shall be achieved as distinctly as possible.

The camera shall be capable of operating at all times, i.e 24 hours a day.

1.5.1.1 Technical Specifications

The works to be carried out include the supply, delivery, installation, testing, commissioning and leaving in servicing condition the Closed Circuit TV network

as herein described in this specification. The works shall include, but not limited to the supply and installation of the following:-

- Fixed Color Digital IP Camera
- Color TV Monitors
- Color Digital Video Recorder

The Digital Surveillance system shall support the following:-

- Digital IP based recording system
- Support analogue cameras through video servers adapters
- Recording resolution: 1280 x 1024 pixels for J-PEG, M-PEG and wavelet images.
- Multi-level password protection and logging facilities
- Integrates with access control, burglar control, burglar alarms and fire alarm system
- Image compression for remote web live and playback viewing in case of IP
- Multi display monitors
- Automatic daily archiving to hard drive or optical drive.
- Fully adjustable digital video motion detection with exclusion /inclusion multi regions per camera.
- Efficient video collection, storage and retrieval.
- Advanced and instant search capability
- Digitally signed recordings, with audit trails of all operator actions and system event.
- At least one Terabyte storage space to provide back up and redundancy
- Infra red illuminators in poor lighting conditions
- Able to interface with other systems on the ground
- Support various alarm and subnet options including VSAT, IP, GSM/GPRS and Radio.

1.5.1.2 DAY/NIGHT, WDR, COLOUR MOTORISED CCD PTZ DOME CAMERA

The **high resolution Camera** shall meet or exceed the following design and performance specifications:-

1. Image Sensor 1/4-inch
2. Scanning System 2:1 interlaced output
3. Effective Pixels PAL – 724 X 582
4. Horizontal Resolution PAL – >550 TVL
5. Lens F1.6 (f=3.6-82.8 mm optical, 23X optical zoom, 10X electronic zoom)
6. Programmable Zoom Speeds 2.9, 4.2, or 5.8 seconds
7. Horizontal Angle of View 54° at 3.6 mm wide zoom – 2.5° at 82.8 mm telephoto zoom
8. Focus Automatic with manual override.
9. Sensitivity at 35 IRE PAL, color: 0.08 lux at 1/1.5 sec shutter speed
B-W: 0.013 lux at 1/1.5 sec shutter speed
W: 0.3 lux at 1/50 sec shutter speed
10. Synchronization System Internal/AC line lock phase adjustable via remote control, V-sync

11. White Balance Automatic with manual override
12. Shutter Speed PAL – 1/1.5-1/30,000
13. Iris Control Automatic with manual override
14. Gain Control Automatic/ off
15. Video Output 1 volt peak to peak, 75 ohms
16. Video Signal-to-Noise >50 dB
17. Type of Lighting Menu selection of indoor or outdoor lighting for optimum camera performance
18. Wide Dynamic Range 80X
19. Motion Detection User-definable motion detection settings for each preset scene; can activate auxiliary outputs; three sensitivity levels per zone

1.5.1.3 Dome type Video color camera

Type:	Varifocal Fixed Dome.
Lens sensor:	1/3"
Signal system:	PAL Standard.
Lens focal length	4-9mm DD F 1.6-2.4
Line resolution	480 TV Lines
Backlight Compensation	on/off switch
Maximum illumination	1.2 Lux
Video output	1 V peak-peak PAL compatible
Shutter speed	Automatic, 1/60 to 1/100,000s
Tolerance	Bright tolerant with minimum blooming and transfer smear
White balance:	Automatic.
Operational temperature	-10°C to -45°C
ATW range	3000K – 9000K
Signal to Noise ratio:	More than 50 dB
Auto Gain Control:	On 32dB, off 8dB
Aperture correction:	Horizontal and vertical

Contrast: Shall feature automatic white balance capable of adjusting for variations in scene lighting for consistent time colors from one scene to the other.

Picture quality: The picture produced shall have minimum lag and image retention.

A continual adjustment feature to facilitate C or CS mount lenses will be incorporated, together with a side mount plug for direct drive Lenses and screw terminals for auto iris lenses. The camera shall be capable of being line locked with phase adjustment.

Contained under a flap will be a bank of switches which will enable the selection of the following features:

- Electronic iris · AGC on/off
- Back light compensation

- Gamma correction select between 0.45 and 1.0

1.5.1.4 External view (EXview) Video color camera

Type:	Solid state color coupled charged device (CCD)
Lens sensor:	1/3" Interline image format
Line resolution	480 TV Lines.
Signal system:	PAL Standard.
Maximum illumination	0.5 Lux
Video output	1 V peak-peak PAL compatible
Shutter speed	Automatic, 1/60 to 1/100,000s
Tolerance:	Bright tolerant with minimum blooming and transfer smear.
Signal to Noise ratio:	More than 50 dB
Auto Gain Control:	On 32dB, off 8dB
Aperture correction:	Horizontal and vertical
Contrast:	Shall feature automatic white balance capable of adjusting for variations in scene lighting for consistent time colors from one scene to the other.
Picture quality:	The picture produced shall have minimum lag and image Retention. A continual adjustment feature to facilitate C or CS mount lenses will be incorporated, together with a side mount plug for direct drive Lenses and screw terminals for auto iris lenses. The camera shall be capable of being line locked with phase adjustment. Contained under a flap will be a bank of switches which will enable the selection of the following features: • Electronic iris · AGC on/off • Back light compensation • Gamma correction select between 0.45 and 1.0

1.5.1.5 Lens

The lens shall be glass optical vertical 1/3" format with direct driver operation.
Have a standard CS mount.
Have variable focal length of between 4mm and 9 mm and aperture of F 1.6 –2.4

1.5.1.6 Mounting Brackets

The Brackets shall:
Be suitable for wall or ceiling mounting of a single camera. Be at least 5.5" length
Have an auto lock facility.

1.5.1.7 Camera Housing

The camera housing shall:

Be IP66 rated with integral cable management. Be

Weatherproof.

Be constructed from aluminium with epoxy coating.

1.5.2 VIDEO MONITORS

The monitor shall be capable of providing high levels of picture quality 10MHz bars visible at low brightness and reliability stable synchronization, black level clamping, low sensitivity and high stability.

The monitors shall be high performance color video monitors for monitoring scenes from the above cameras and viewing playback scenes from the video cassette recorders. The monitors shall be located at places shown on the drawings. The monitor shall give stable and interference free pictures of scenes being viewed.

1.5.3 COLOUR DIGITAL VIDEO RECORDER

The multiplexing recorder shall be used to record events from the Surveillance TV cameras. It shall have the following

- a) a high performance video recorder.
- b) Operate, record, playback and multi-screen viewing with at least 50 PPS.
- c) With a wave reader software.
- d) Provide multi user remote access including remote control of fully functional cameras.

The recorder should be in the form of a computer data base system and shall have the following minimum requirements:-

- Ethernet: 10BaseT/ 100BaseT supplied complete with wave reader software.
- Should be rack mounted for security
- 2.4 GHz Core I5 Processor

- Hard disk capacity of 1TB expandable to 2TB using 250
- ASUS motherboard 533 or Intel
- 8 G.B RAM DDR memory
- Multi screen Display : Full, PIP, Quad, 6, 9, 16 way.
- 1 GB VGA card
- Fully multitasking - simultaneous recording whilst playing back
- DVD RW
- Be capable of running on original CCTV software
- Hard disk capacity of 1TB expandable to 2TB using 250
- Pre-loaded with Windows ® 8
- On board modem, 56K.
- Network Card, 10/100 mbps
- 6 Fans (2 per hard disk)
- Standard keyboard and Mouse/Mouse-pad
- Power supply: 240 V AC, 50 HZ.

1.5.4 CABLES AND CONNECTORS

All the cabling shall be carried out in conduits or trunking. Basically cables carrying video signal between cameras and TV monitoring via video control equipment shall be CAT 6 cables. The positions for connectors and the equipments shall be directed and identified by the Engineer on site.

Bidders shall be required to visit the proposed site to ascertain cable routes and cable lengths before pricing the Bills of Quantities in this document.

It shall be the responsibility of the contractor to provide wiring and connection diagrams for approval by the Consulting Engineer.

1.5.5 UNINTERRUPTIBLE POWER SUPPLY (UPS)

This shall be an on-line Un-interruptible power supply with output rating of 10KVA, 240V, 50HZ single-phase supply. It shall provide power to the security surveillance system in case of power failure and/or maintained power failure for a minimum period of 8 hours.

It shall be microprocessor- based so that both output voltage and frequency are closely regulated and continuously monitored and also provide system diagnostic and shut down protection functions. It shall feature a maintenance by-pass to enable normal routine maintenance operations to be performed without interruptions to the system.

It shall be fitted with both visual and audible alarms to indicate any change in equipment status such as:-

- input power problems
- ups faults
- ups overload
- battery discharging

Other parameters are:

Input supply:	240VAC50HZ
Power factor:	0.9 lag at full load
Current limit:	125% of the normal
Output voltage:	240V AC 50
HzOutput voltage tolerance:	2%
Output frequency tolerance	: 0.05%

**PART G: TECHNICAL
SPECIFICATIONS
FOR
ACCESS CONTROL SYSTEM**

PART G:

TECHNICAL SPECIFICATIONS FOR ACCESS CONTROL SYSTEM

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1.0 GENERAL TENDER REQUIREMENTS

- 1.1** The tenderer shall include for the design, cost estimation, supply and commissioning of a complete, integrated access control and alarm point monitoring system, compliant with the technical and performance criteria setout in this document.

The system shall broadly comprise the following:

- a) A central administration computer (PC) for the system administration, addition and editing of tokens/cards, report generation and acknowledgement of system alarms.
 - b) Door controllers and door functions.
 - c) Readers, door monitoring contacts and exit switches.
 - d) Alarm control functions on fire doors and other auxiliary alarm points.
- 1.2** The tenderer shall supply a complete and functionally working system including all control equipment, hardware and software, cabling and ancillary services. The tenderer is to make himself familiar with all matters related to the system, its requirements and installation.
- 1.3** The tenderer shall seek clarification of any relevant matters (insert a suitable contact name and telephone number).
- 1.4** After the tender has been awarded there shall be no price variation without prior agreement.
- 1.5** A complete clause by clause compliance response is required.
- 1.6** The systems control software and hardware shall be designed, manufactured and originate from reputable manufacturers, who shall comply with BS EN ISO 9002 or such equivalent standard in the country of origin.
- 1.7** The tenderer shall demonstrate his competence with the equipment he is tendering by either:

The tenderer shall obtain a letter signed by a company director or head of training from the original equipment manufacturer. The letter must state the name of tendering company and a statement to the effect that the tenderer is of sufficient competence to install the tendered equipment.

The tenderer shall provide proof in the form of training certificates from the original equipment manufacturer. Certificates will contain named individuals and the course applicable to the equipment being tendered. The named individuals must be employed by the tenderer and play an active part in the installation of equipment.

2.0. GENERAL SYSTEM FUNCTIONALITY

2.1 Electronic Key

- 1.0 The access control system shall be based on a non-contact proximity/biometric reader technology. The method of operation shall be based on electro-magnetic induction/biometrics.
- 1.1 Each electronic key or card (token) shall have a unique pre-programmed code. The code shall be set at the time of manufacture and must not be capable of being reproduced. Programmable tokens are not acceptable. The token shall have a code that produces no less than sixty-eight (68) thousand million different possible combinations.
- 1.2 Any token can be enrolled on to any system in the world. Tokens that contain a facility or site code are not acceptable. Existing tokens must be able to be enrolled on to the system.
- 1.3 The token shall be capable of being attached to a key ring and shall be read when held amongst mechanical metal keys. The token shall carry a minimum of 15 years manufacturer's guarantee against electronic failure.
- 1.4 The token shall be a credit card sized flat card and have a thickness of no greater than 1.3 mm. The card shall have an option of a high coercivity magnetic stripe and shall allow the printing of a photo ID directly on to the surface of the card. The card shall carry a lifetime manufacturer's guarantee against electronic failure.
 - 1.5 The token shall not contain a battery.
- 1.6 If the system uses "Master" or "Editor" then these tokens shall not be different from any of the other tokens. Any token shall be able to be selected and used as a Master or Editor token. If a Master or Editor token is lost then the system must accept a new master or editor from any of the existing tokens.

3.0 READER AND READER HOUSING

3.1 The readers shall be designed for general purpose use and be suitable for interior or exterior installation. They shall be slim units with a pleasing appearance that blend in with most installation requirements. Ideally the units shall be made of flame retardant plastic. All readers will carry a lifetime warranty against electronic failure.

3.2 Two sizes of standard reader are required:

a) Surface mounted to fit a standard UK single gang electrical back box with 60 mm screw spacing. The reader shall have dimensions no greater than:

86 mm (H) x 86 mm (W) x 15 mm (D)

b) A slimline reader to be mounted on door mullions is also required. It shall have dimensions no greater than the following:

130 mm (H) x 40 mm (W) x 15 mm (D)

3.3 The readers shall be capable of internal or external mounting without additional environmental protection and shall operate from - 20 °C to +50 °C. All reader types must be of a fully potted assembly and capable of being mounted on exterior walls without additional weather protection.

3.4 All readers shall be capable of being mounted on a metallic surface or behind non-metallic materials without any adverse effect on the ability to read the token.

3.5 Reading of the token shall be 100% reliable with no misreads. There shall never be a need to present the token to the reader a second time.

3.6 The reader cabling shall use multi-stranded unscreened six core cable and the reader shall be capable of operating up to 1,000 metres from its control unit without the need of an additional power supply. Cable from the reader shall be permitted to run next to mains carrying conductors without adverse effect.

3.7 The reader shall incorporate tamper detection to signal that the connecting wires have been broken. This shall be achieved without the use of a tamper switch.

3.8 The reader shall incorporate an LED(s). The LED(s) will operate in the following manner:

- LED is constant red when door is closed and secure.
- LED turns green on successful access and remains green until the doorlock is re-secured.
- LED(s) flash when an unsuccessful access attempt has been made.

3.9 Vandal resistant readers are to be manufactured from brushed finished stainless steel. The stainless steel shall be of no less than 16 gauge (1.6 mm) and to BS 1449 grade 304.

- 3.10** The reader shall be fixed with a key symbol on its front and its dimensions shall be no greater than the following:

100 mm (H) x 100 mm (W) x 16 mm (D)

- 3.11** It shall be secured with non-standard tamper proof screws.

- 3.12** Vandal resistant readers are to be manufactured from lacquered brushed finished brass. The brass shall be of no less than 12 gauge (2 mm) and of CZ 108 half hardened to BS 2870.

- 3.13** The reader shall be fixed with a key symbol on its front and its dimensions shall be no greater than the following:

100 mm (H) x 100 mm (W) x 16 mm (D)

- 3.14** It shall be secured with non-standard tamper proof screws.

- 3.15** For more sensitive areas a higher security level may be required. In these areas a token and personal identification number (PIN) reader shall be used. The mode of operation shall be such that a token only can be used or token and PIN. This shall be automatic and programmable from the reader's door controller or the administration PC.

- 3.16** The reader shall be finished in stainless steel surround and shall be flush mounted with the following maximum dimensions:

144 mm (H) x 100 mm (W) x 35 mm (D) and protrude no more than 5mm from flush.

- 3.17** The reader shall be finished in lacquered brushed finished brass surround and shall be flush mounted with the following maximum dimensions:

144 mm (H) x 100 mm (W) x 35 mm (D) and protrude no more than 5mm from flush.

- 3.18** The reader shall be finished in stainless steel and shall be surface mounted with the following maximum dimensions:

200 mm (H) x 100 mm (W) x 30 mm (D)

- 3.19** The reader shall be finished in lacquered brushed finished brass and shall be surface mounted with the following maximum dimensions:

200 mm (H) x 100 mm (W) x 30 mm (D)

4.0 DOOR CONTROLLERS

- 4.1** The access control system must be of high integrity and therefore must employ door controllers with fully distributed intelligence with no degraded mode of operation. There shall be no loss of functionality in the event of communications interruption. The relationship of door contact inputs, auxiliary inputs and system alarms to relay outputs must be maintained at all times. Systems that have a degraded mode of access in the event of communications interruption, especially any that will allow access by site code only will not be accepted.
- 4.2** The door controller shall store up to 1000 transactions and have the ability to be connected to a modem via a build in serial port. The door controller shall have the ability to have keys added and deleted by a remote PC over the public telephone network.
- 4.3** The door controller shall unlock the controlled door within 0.3 seconds from the completion of a valid access attempt. It should be possible to lengthen others, or shorten, this time duration through the
- 4.4** The door controller shall report the following to the PC administration system: Access
- Authorised
 - No Access - Level
 - Locked Out
 - Time
 - Unknown ID
 - Visit Time
 - No Entry - Passback
 - No Exit - Passback
 - Entry Authorised (for anti-pass back doors) Exit
 - Authorised (for anti-pass back doors)
 - PIN Reader Duress
 - Incorrect PIN
 - Exit Out of Hours
 - Repeated Key Use
 - Request For Exit
 - Request For Entry
- 4.5** The reader technology offered shall be proximity. The principle of operation shall be electro-magnetic induction. The door controller must also support other reading technologies.
- 4.6** The door controller shall have an option of an in-built user interface comprising of a keyboard, display and administration reader. The keyboard shall have at least 40 individual keys consisting of the ten numeric and 26 alphabetic characters. The display shall be of at least 16 characters and shall be clearly visible in darkness.
- 4.7** The user interface shall display the state of any attached auxiliary inputs and any alarms that occur within the door controller. If communications are interrupted to the controller then an audible sounder will sound and a short

English language description of the alarm displayed. The sounder may be silenced by a nominated editor or master token being presented to its administration reader.

- 4.8** All events must be DATE and TIME stamped at the door controller as they occur.
- 4.9** The system must maintain a system clock and all door controllers must be automatically synchronised for DATE and TIME at least once a day.
- 4.10** To ensure the integrity of the system if power to the door controller is lost (both mains supply and back-up battery) then the controller's data must be maintained in non-volatile memory. If communications are interrupted before power failure then all events must be maintained.
- 4.11** The door controller must have a minimum of a 2,500 event transaction log that stamps the time and date at source and not when received by the central controller.
- 4.12** To increase reliability, the lock outputs shall be a solid state device and not a relay. The solid state device must have a selectable output, capable of sourcing power to its attached lock at 12V DC at 1 Amp or 24V at 0.5 Amps continuous.
- 4.13** The solid state lock output must be protected against short circuit and overload.
- 4.14** The door controller shall control no more than eight doors. When anti-pass back is implemented the controller shall control no more than two doors.
- 4.15** Anti-pass back shall be implemented within the controller. Pass back between the two doors shall not be affected by communication interruptions.
- 4.16** Timed anti-pass back shall be available so that a token holder violating the pass back rules shall be refused access for a minimum of ten minutes after his next attempt to gain access.
- 4.17** When turnstiles are used the door controller set-up shall be selectable so that the IN reader can operate one lock output and the OUT reader another lock output and yet be reported as the same turnstile. Alternatively the door controller set-up shall be selectable so that both readers can operate the same lock output.
- 4.18** The door controller shall include an integral power supply. This power supply shall have sufficient capability to deliver power to the controller and up to four readers. It shall also provide power for up to four locks continuously rated at 12V DC at 1 Amp or 24V DC at 0.5 Amps. The power supply shall in addition provide sufficient charge for two 6.0 Amp hour standby back-up batteries.
- 4.19** The controller shall monitor its readers for cable tamper.
- 4.20** The door controller shall be networked on to a data bus whose maximum length is not less than one thousand metres. The data bus shall be a single unscreened cable of no more than eight multi-stranded conductors.
- 4.21** The door controller shall have a card holder data base of at least 10,000 token holders on systems of up to 32 doors and at least 18,000 token holders on larger systems.

- 4.22** Visitor tokens are required. These shall be the same as personnel tokens but be allocated a start and finish date for their validity on the system.
- 4.23** The door controller shall have a minimum of four auxiliary output relays. These relays shall be programmed via the PC administration system to respond to auxiliary inputs or door controller alarms. Each relay may be operated according to a time profile.
- 4.24** Each of the door controller's four doors shall have a door contact input. This input shall be used to indicate the following:

Unauthorised Access
Door Left Open
Door Closed

The door contact shall also indicate to the system when the door has been opened and closed after an authorised access or request to exit operation. Closing the door shall cancel any unused lock release time.

If anti-pass back is being used on a door, then an authorised access transaction is not reported until the door has actually opened.

- 4.25** The door controller shall be mounted in a secure metal cabinet of sufficient size to enable easy cable handling and room for at least two 6.0 Amp hour back-up batteries. It shall have dimensions no greater than:

450 mm (H) x 450 mm (W) x 100 mm (D)

- 4.26** The door controller shall be programmable so that any controller can be configured to be a network master controller, a network slave controller, a dial-up remote master, or a stand alone door controller. The stand alone door controller shall have a serial RS232 printer output to print transactions and its database set-up. It shall also have a 2,500 event log with time and date stamping with individual token reporting.
- 4.27** The master door controller shall have the ability to be assigned an IP address so that it may function on a TCP/IP network as part of a LAN or WAN.
- 4.28** The door controllers shall have the capacity of being assigned one token as a master and at least 32 other tokens as editor tokens. The editor tokens can have restrictions placed on what functions they can carry out on the door controllers.

4.29 Remote sites with dial-up connection to central network controller

The door controllers shall if required have the ability of being connected to the system by a dial-up connection over public switch telephone network (PSTN) lines. The central network controller shall dial-up remote sites at least twice a day to download any changes to the system set-up and to receive all event information from the door controllers. You should also be able to utilise an X25 network using X28 PADs.

4.30 Alarm dial-back on remote dial-up sites

Sites that are connected by dial-up modem shall have the ability to call the central network controller at any time in the event of an alarm occurring at the remote site.

5.0 ALARM MONITORING

- 5.1** Alarm Event Managers (AEMs) shall be supported and shall be attached to the door controllers from which they derive their power. There shall be at least one AEM per reader channel. The AEM shall manage all auxiliary alarms and auxiliary relay outputs.
- 5.2** The AEM shall have a minimum of eight, four state inputs and eight switchable relay outputs. The relay contacts shall have a rating of no less than 2 Amps at 30 VDC or 0.4 Amps at 125 VAC. The inputs shall be selectable to be normally open or normally closed. The AEM must distinguish four states for each input. The input states are: Normal, Active, Open circuit and Short circuit.
- 5.3** Any of the door controllers 36 possible relay outputs (four AEMs and four onboard relays) can be activated by any event within the door controller.
- 5.4** Each relay output shall be programmed so that it can be operated by at least four separate events.
- 5.5** The AEM shall be fitted with a test button and an LED display so the states of each of the eight inputs can be displayed. The LED display shall indicate if each input is normal, active, short or open circuit. It shall also display the state of the case and reader tampers.
- 5.6** Each input shall have a name field of 45 characters and a description of each input that shall be no less than 300 characters long.
- 5.7** Alarm Inputs shall be able to be grouped according to area and will be able to be manually disabled via the central administration system, or alarms can be automatically activated or de-activated by the use of a time profile.
- 5.8** Alarm Inputs shall be able to be grouped according to area and can be enabled and disabled
- 5.9** An input shall also be able to be configured as a 24 hour input and will always be active.
- 5.10** Each input must have the ability of being configured as normally open or normally closed. Inputs will usually have four states, but may also be required to have two state inputs. Further alarm functions shall include "Acknowledge Required" and "Relay Follows Input". A graphic bit map may also be attached to each input and displayed when the alarm is being accepted.
- 5.11** To prevent the system being flooded by erroneous alarms a re-arm count shall be available. This shall be programmable so that from one to five alarm activations within a time period will be transmitted as an alarm but any alarm activations after that will be ignored and the input described as being in an alarm state. The re-arm count will be reset once the alarm input is disarmed and re-armed either manually or automatically by a time profile.

- 5.12 The AEM shall be housed in a 1.2 mm mild steel enclosure painted with an epoxy coating complete will tamper switch. It shall have dimensions no greater than 184 mm x 148 mm x 38 mm.
- 5.13 The AEM shall have a maximum cable distance from its door controller of no less than 500 metres.

6.0 ACCESS CONTROL / ALARM INTERFACE

- 6.1 Alarm interface managers (AIMs) shall be attached to the door controller and alarm panel. There shall be at least one AIM per two reader channels.
- 6.2 The AIM shall allow assigned security tokens to arm or disarm the linked alarm panel.
- 6.3 Ordinary keyholders shall be able to gain entry at the main entrance to the premises once the security keyholder has disarmed the alarm.
- 6.4 There shall be the facility to disable perimeter doors when the panel is armed by the use of reader inhibitor modules.

7.0 CENTRAL NETWORK CONTROLLER

- 7.1 The Central Network Controller (CNC) shall be located with the PC Administration system. It shall manage all communications to the door controllers. Connection to the local door controllers shall be via a six wire data bus. Remote sites shall use dial-up modems via the PSTN. The CNC shall manage all local and dial-up communications independently of the PC Administration system.
- 7.2 The CNC shall communicate with up to 128 sites. One of the sites shall be local and of at least 128 doors. At least 32 other sites shall be of at least 32 doors. The remaining sites shall be of at least 4 doors. The CNC shall have at least three communications ports each of which may be connected to a dial-up modem.
- 7.3 The CNC shall have a buffer of at least 10,000 events. It shall annunciate all alarms if the PC is off-line. Annunciation of the alarms will be via a scrolling display of at least 16 characters. It shall also have an audible warning alarm.
- 7.4 The time clocks of all controllers on the system, whether local or remote, shall be synchronised by the central network controller automatically at least once a day or manually by an authorised operator as required.
- 7.5 It shall be possible to connect up to twenty CNCs to the system. The system shall have the possibility of expanding to at least 2560 sites with at least 30,640 doors.
- 7.6 It shall be possible to connect door controllers directly via serial RS232 rather than with the use of dial-up PSTN lines. In this case the system shall have a capacity of at least 4,480 doors.
- 7.7 As resilience and integrity of the system are of paramount importance the system shall have a distributed topography so that not more than four CNCs or master door controllers are connected to any work station or file server of the PC administration system. If the PC network fails then CNCs or masters connected

to its associated work station will continue to function, gather transactions and announce alarms.

8.0 PC ADMINISTRATION SYSTEM

- 8.1** The administration system shall be based on PC's running under Windows NT4.0, Microsoft® Windows™ Version 3.11 or Windows 95 operating systems. In general the system shall be simple to use and to operate.
- 8.2** The PC shall not be solely dedicated to running the access control software. It must be possible to run other Windows programs such as word-processing or database programs on the PC at the same time. However any alarms that occur on the access control system must be presented over those other applications without delay. Other programs that are running will be put into the background, but data and information must not be lost.
- 8.3** The PC shall meet the following specification:
- PC Pentium 800 Mhz processor, 128 Mb RAM, 4.0 Gb disk drive, 3.5 inch disk drive, CD Drive, PC sound card and speakers, Colour SuperVGA (800x600) display, with 256 colours, 32,000 colours when used with Photo, parallel, mouse and two serial ports, Windows 3.11, Windows 95 or Windows NT 4.0.
 - One year on-site maintenance agreement for the PC.
- 8.4** The system shall archive all events and transactions to the PC hard disk. The hard disk shall store no less than 18,000 and up to 40,000 transactions per mega byte of hard disk.
- 8.5** The software shall be simple to upgrade and easy to expand from a small single site to a large multi-site, multi-PC system.

8.6 Multiple Workstations

The system shall have the capacity for at least 50 workstations including the main administration PC. These PC's shall be connected by a network.

8.7 System Divisions

The system may be split into 'divisions'. A division shall be a set of one or more sites. Each division will have its own personnel records, token and access information which will be stored in the door controllers on the site. The system shall have between 1 and 128 divisions, to administer independent installations from a central point.

Using divisions will simplify the administration of systems with a large number of sites and token holders. Token holders shall be able to exist in more than one division with the same ID device.

The administrator shall be able to restrict system operators as to which divisions they can edit and view database information. The system shall allow each PC on the system to be configured so as to only display transactions and alarms from designated divisions.

8.8 Detailed on-line Help

The system offered must have an on-line help facility. This shall provide details of all functions that the system can perform. It is considered imperative that the

Help facility is context sensitive in that the Help menu or information given is relevant to the task the operator is performing.

8.9 Editing and Administration reader

Each PC or workstation on the system shall have an administration reader. This shall be provided either as part of the CNC or a PC interface kit. Operators must use their proximity token to log onto the system and to accept alarms. The use of an operator password may also be required. The administration reader shall also be used to enrol new tokens into the system and to identify tokens that are already in the system database.

8.10 Operator Privileges

Operators of the PC administration system must be uniquely identifiable. There shall be a minimum of 128 operators. Each operator shall have independent system privileges. The system shall record which operator is currently logged on. When system alarms require acceptance, regardless of which operator is currently logged on, the system shall ask for the operator's name and password. If authorised the operator should present their token to the administration reader to accept the alarm.

8.11 Personnel Database

The personnel database shall have at least 10,000 token holder records and on larger system configurations at least 18,000 token holder records per division. There shall be a capacity of at least 750 visitor records per division. There shall be up to 128 separate divisions on the system.

8.12 Import and Export

The system shall have a facility for importing or exporting the personnel database. The import and export shall be achieved via an ASCII text file with field separators.

8.13 Card Trace

The system shall have a facility to tag or track the use of a token. This facility shall be able to cause an alarm on PC. Access privileges of the token holder will remain the same and the token holder will be unaware that they are being traced.

8.14 Extra information fields

The personnel database shall have at least twenty extra information fields. The titles of these fields must be user definable. Each information field must be at least 120 characters in length. Each division shall have its own unique extra information fields.

8.15 Departments and Work groups

When adding new token holders it shall be possible to assign a Department and a Work Group to the token holder. Departments restrict the access groups that can be selected for each token holder record. There shall be at least 128 Departments per division. Work Groups are a subset of Departments and further restrict the number for access groups that can be chosen. There shall be at least 128 Work Groups per division. It shall also be possible to generate reports by Department and Work Group.

8.16 ASCII transaction file

The PC security administration system shall provide the facility of a data file that contains all personnel access transactions in ASCII data format. This is separate and additional to the system event log. The format of each record shall consist of personnel identification number, date (DD/MM/YY), door number,

time (HH:MM), site number and transaction type. The file should contain at least 15,000 transactions.

8.17 Start and End Dates

It is required that all ID devices may have the option of a start and end of validity date.

8.18 Alarm Monitoring and Graphics maps

An alarm manager program shall allow the operator to see any alarms that occur easily and clearly. A text message shall be attached to each alarm and shall tell the operator what action should be taken for each individual alarm.

It must be possible to attach a graphic illustration in the form of a bitmap to specific alarms. There shall be the optional facility to record sounds, including spoken messages, which can be linked to specific alarm events.

The alarm manager program shall keep track of all alarm events, which operator acknowledged them and what action was taken.

8.19 Real-time transaction window and real-time printer

The system shall have a window where it is possible to display all transactions. It must also be possible to route transactions to a real-time printer. The types of transactions that are displayed or printed may change throughout the day and on different days of the week. For example, some transactions will be displayed only during normal working hours. Outside normal working hours those same transactions may be required to be displayed and printed. It shall be possible to fix the transaction window so that it is always "on top" of all other windows.

8.20 Time Profiles

The system shall have a minimum of 128 time profiles per division. Each time profile shall consist of at least three time periods. Each time period shall have a start time and end time and the days of the week it will operate. This shall include system holidays.

8.21 Access Groups

The system shall have at least 128 access groups per site and shall have at least 128 divisional access groups per division. An access group shall consist of two lists of access areas each of which may have a time profile for when access is authorised to those areas. An access area is an area of common security, i.e. a door or number of doors that lead in to a physical area.

There shall be an extra access facility to provide for over 128 access groups in each site by assigning individuals their own access privileges.

8.22 Transaction Reporting

The system shall have the capability of extensive transaction searching and reporting. Reports must be able to be generated by, but not limited to the following:

- Area
- Doors
- Department Access
- group Transaction
- typeToken holder

- Start of period date and time

End of period date and time.

- 8.23** There shall be the facility to report on tokens that have not been used over a specified period of time.
- 8.24** There shall be the facility to produce a "Presence" report. This report shall provide information on which cardholders are currently on site.

9.0 OPTIONAL MODULES

- 9.1** The system shall have an attendance report facility. This report shall be flexible and provide the total time a selected cardholder or cardholders have been on site over a selected period.

9.2 DDE Transaction Routing

The system shall have Dynamic Data Exchange (DDE) output that conforms to Microsoft® Windows □ standards for DDE linking. It shall be possible to route system transactions and events to the DDE output. The system shall be able to change which types of transactions are sent to the DDE according to time of day and week.

9.3 Elevator Control

The system shall allow different combinations of relay outputs on Alarm Event Managers to be activated, dependant on the access privileges of individual token holders, when token holders use their tokens at a designated reader. An example would be a reader fitted inside a lift car (elevator). When the relay outputs of the Alarm Event Managers are connected to the floor select buttons of the lift controller, token holders may be restricted to which floors they can select dependent on their access group privileges.

9.4 Photo ID

The system shall have an optional facility that allows a token holder's photograph to be captured, stored and displayed with each personnel record. Identification cards shall also be designed and printed from the same menu.

When a token has been presented to a specified reader the recorded image of the token holder shall appear on the screen. The system shall provide the operator with the ability to either allow or deny access if the token is not valid.

9.5 Audit Trail

A facility shall be available that enables specified operators to conduct searches of previous operator changes to the system. This facility shall allow searches between specified dates for changes made by specified operators or all operators. The system shall also be able to search for specified types or all types of change.

9.6 Pager Interface

An optional facility should be available that enables messages detailing the nature and location of alarm events to be sent from the PC administration system via a paging system to designated hand-held pager units.

9.7 Guard Tour

A facility should be available to monitor security guards as they travel around a building.

9.8 Alarm Graphic Interface (AGI)

The facility should be available that enables alarm points to be deposited as icons onto a bit map of a building. Icons must change state as alarms are received onto the system.

9.9 Alarm Prioritisation

The facility should be available that enables alarms to be prioritised.

10.0 CABLING

- 10.1** All cables connecting slave door controllers, including to the master door controller must utilise multi-stranded unscreened six or eight core cable. The use of screened cable on door controller clusters and specialist cables is not acceptable. For door controller network cable runs of up to 500 metres, 0.22 mm² multi-stranded six core cable (standard intruder alarm cable) is to be used.
- 10.2** Master door controllers shall have the ability to use existing CAT 5 structured cabling so that TCP/IP communications may be used.
- 10.3** For the connection of readers to door controllers then the following sized cables shall be used:

For distances up to 250 metres	-	0.22 mm ²
up to 500 metres	-	0.5 mm ²
up to 1000 metres	-	1.0 mm ²

11.0 WARRANTIES

- 11.1** The access control equipment, including door controllers, readers, central network controllers shall be warranted by the manufacturer against electronic failure for at least five years. The access control tokens shall carry a lifetime warranted against electronic failure. ("Lifetime" means that if the token electronics should fail at any time it will always be replaced).
- 11.2** It is accepted that the security system will require preventative maintenance.

12.0 COMMISSIONING AND TRAINING

- 12.1** The system shall be programmed with the information supplied. The system must be fully working with all system parameters and token holder's information. It is the tenderer's responsibility to ensure that all the necessary information is obtained before commissioning the system.
- 12.2** At least two and up to four members of staff will be nominated as operators of the system. These operators must receive sufficient training on the operation and configuration of the system to enable these operators to train others. The training shall be conducted by the manufacturer's own training staff or by other certified training staff.
- 12.3** A copy of the final database of the PC administration system, held on 3.5" floppy disks, shall be included at the final hand over of the system.
- 12.4** The tenderer shall supply detailed "as installed" drawings of the entire system.

PART H:
TECHNICAL SPECIFICATIONS FOR AUDIO VISUAL EQUIPMENT

PART H: TECHNICAL SPECIFICATIONS FOR AUDIO VISUAL EQUIPMENT

A) Multimedia LCD Projectors

a. should be at least 9600 Lumens of brightness, SXGA (1024 x 768) resolution, Network

Ready Projector

- ☐ At least 9600 Lumens
- ☐ Minimum XGA + (1024 x 768) NATIVE Resolution
- ☐ Network Capable RJ45
- ☐ Multiple interface – 2x RGB, 5x BNC & HDMI, RS232 port, Network RJ45, Video-in, S-video and composite video
- ☐ 3LCD Technology
- ☐ Flexible installation-ceiling; 90 degrees upwards/downward tilts
- ☐ Dynamic detail enhancer – generates high quality images of outstanding clarity.
- ☐ Digital keystone adjustment
- ☐ Easy lamp replacement
- ☐ Whisper quite operation
- ☐ Horizontal/vertical picture shift
- ☐ Include Anti Theft Projector Ceiling Mount
- ☐ Provide 50m VGA Cable with floor box

B) Projection Screen

- ☐ Electric type – Motor Driven
- ☐ Wall/Ceiling mountable
- ☐ Size 7.2m x 5.4m viewing angle
- ☐ Matte white surface
- ☐ Black border
- ☐ Wall mount switch
- ☐ Optional wireless remote control

C) Mixer Amplifier

- ☐ At least 4 microphone inputs
- ☐ 600w Amplifier
- ☐ Individual Volume Controls for each mic/aux input
- ☐ Master volume control

- ☐ Table top type
- ☐ Power surge – AC mains 50/60HZ
- ☐ Frequency response – 50-20,000 Hz
- ☐ 5 input – 4XLR/Jack input
- ☐ 4RCA Pinjack – record speaker- 100V line

D) Loudspeakers

- ☐ Ceiling/Wall recessed
- ☐ 100w Rated input
- ☐ Impedence – 100v//70 Volt Line
- ☐ Sensitivity – 90db
- ☐ Vented 2 way bass reflex type
- ☐ CD-Horn for large directivity angle of 60⁰ x 40⁰
- ☐ Durable low foam polypropylene enclosure with superb acoustics
- ☐ Overload protection circuitry
- ☐ Parallel input push in terminals with ¼” phone jacks

E) Wireless Microphones – Lapel/Handheld

- ☐ UHF type
- ☐ Electric Condenser unit – condenser
- ☐ Frequency range 690 – 750 MHz UHF
- ☐ 16ch selectable channels
- ☐ Battery type – AA

F) Digital Modular Mixer

Fully modular digital mixer featuring a 12 input; 8bus, 8 output ch configuration (12 x 8 matrix) with easy operation that can be expanded as applications require

- ☐ all in one design
- ☐ build in feedback suppressor
- ☐ automatic mixing function
- ☐ sound processing
- ☐ ease of Control from front panel
- ☐ LCD Display
- ☐ Digital buttons for control/operation

G) Power Amplifier

- ☐ 2ch stereo Power Amplifier – rack mountable
- ☐ 2 x 600w Rated input
- ☐ Built in protection circuitry
- ☐ Selectable stereo, bridge or parallel operation
- ☐ Forced air – cooling system with variable speed
- ☐ Rotary volume controls

PART J:
BILLS OF QUANTITIES

PART J1:
BILLS OF QUANTITIESFOR
ELECTRICAL INSTALLATIONS

PART J1: BILLS OF QUANTITIES FOR ELECTRICAL INSTALLATIONS

CONTENTS:

CLAUSE NO.	DESCRIPTION	PAGE NO.
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3.	Bill No. 1: Power Distribution Installations	J1/8
	4. Bill No. 2: Ground Floor Installations	J1/10
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BILLS OF QUANTITIES

1. General Note to Tenderers

- 1.1 The total of the prices in the summary of prices shall include for the whole of the Contract works in accordance with the specifications as defined before and shall be carried forward to Form of Tender.
- 1.2 Any prices omitted from any item, section or part of the price schedule shall be deemed to have included in another item, section or part.
- 1.3 The prices shall include for all obligations under the Contract including and not limited to:
 - a) Supply of any materials, equipment, apparatus, fittings, spares and tools
 - b) Insurance
 - c) Clearing and forwarding
 - d) Delivery, handling and storage at site
 - e) Packing for storage
 - f) Replacing any defective or damaged item
 - g) Installation
 - h) Testing
 - i) Painting
 - j) Commissioning
 - k) Maintenance during the defects liability period
- 1.4 The unit rates shall include import duty and VAT where applicable, and shall be expressed in Kenya Shillings.
- 1.5 Any tenderer whose firm uses the title “Engineer” or “Engineering” must provide evidence of registration of at least one of the directors by the Engineers Board of Kenya to avoid disqualification.
- 1.6 Any tenderer who fails to price the General items will be deemed to have allowed 5% of his tender price to cover these items, i.e. 5% of the total tender price will be deducted as preliminaries, if the tenderer does not enter specific prices against items of preliminary.
- 1.7 The Sub-contractor is instructed to read all the pages, and all the items of the Bills of Quantities very carefully. Should there be an apparent omission of words or figures, or should the sub-contractor be in doubt about the precise meaning of any word or figures, or for any reason whatsoever feel more clarification is necessary, either in the drawings or Bills of Quantities, to facilitate reasonable pricing of the tender document, he should inform the engineer at once so that the correct interpretation or clarification may be given before tendering. No liability will be accepted on mistakes and/or omissions which should have been corrected in the format above.
- 1.8 The specification should be priced in Kenya Currency i.e Shillings and cents.

1.9 The following meanings/interpretations shall be attached:-

- . **Lighting Point:** "Install a lighting point complete with concealed diameter 20mm H.G PVC conduit, conduit couplers, box, wiring in 3x1.5mm² SC-PVC-CU cables and all accessories, but excluding the light switch".
- . **Socket Outlet:** "Install 13A power outlet comprising concealed diameter 20mm H.G PVC conduit, conduit couplers, box, ring main wiring in 6x2.5mm² SC-PVC-CU cables and all accessories including 13A switched socket". All socket outlets must have safety shutters on both live and neutral.
- . **Telephone Point:** "Install telephone cord outlet point complete with telephone jack-plug, concealed diameter 25mm H.G PVC conduit box, and draw wire." All Telephone outlets must have continuous diameter 25mm links throughout respective buildings.
- . **20A DP Outlet:** "Install outlet for 20A DP switch comprising concealed diameter 25mm H.G PVC conduit, wiring in 3x4.0mm² SC-PVC-CU cables, box, 20A DP switch with neon light and all accessories".
- . **Electric Door Lock:** "Install an outlet for electric door lock comprising concealed diameter 20mm H.G PVC conduit box, wiring in 3x2.5mm² SC-PVC-CU cables, and all accessories including flush mounted electric door lock as YALE, or approved equivalent, (supplied with a key for use when power fails) complete with an integral transformer, and wired to, and complete with, a spring-loaded 5A switch marked "press". The two electric door locks in the "Air-lock" shall be wired so that both CAN NOT be opened at the same time.
- . **Fire Alarm Point:** "Install outlet for fire alarm sensor/sounder comprising concealed 20mm H.G PVC conduit, box, wiring in 3x2.5mm² "Firetuff" cables and all accessories". All fire alarm points must be inter-linked with diameter 20mm conduits.
- . **Consumer Unit:** "Supply and install SP/N power consumers unit, complete with SP/N integral isolator".
- . **Distribution Board:** "Supply and install TP/N power distribution board, complete with TP/N integral isolator."
- . **Main Switchboard:** Supply and install main switchboard free standing complete with all switchgear, as per schematics shown.
- . **Meterboards:** Supply and install metal clad meterboards C/W all switchgear.
- . **Earthing:** "Protective multiple earthing to Kenya Power and Lighting Co. standards, comprising 1200mm deep-driven pure electrolytic copper earth electrode, electrode clamps, 16mm² yellow/green earth lead, earth pit complete with cover and all accessories".
- . **Labelling:** "Comprehensive, concise and instructive permanent labelling of all the sub-circuits, complete with identification of the sizes of all the sub-circuit cables, permanent traffolyte identification of the board such as "DB. A" and identification of the sizes of the sub-mains and their origin e.g "Board A: Supply: 4x16mm² SOURCE: DB.1"
- . **Blanking Plates:** "Supply and install blanking plates in all the spare ways."

- . Switched Spur Outlet:** Install 13A fused switched spur outlet with neon light and 5A integral fuse, complete with concealed diameter 20mm H.G PVC conduit, box, wiring in 6x2.5mm² ring main wiring for computer power supply and all accessories."
- . Cooker outlet:** Install 45A DP cooker control unit, complete with twin metal box, concealed 25mm H.G PVC conduit, box, wiring in 3x6.0mm² SC-PVC-CU cables and all accessories including 45A DP cooker control unit, with an integral socket, neon lights, and cooker connector unit.
- 1.10 Unless specifically stated otherwise, all light fittings will be as Philips manufacture. All power accessories, sockets, telephone outlets, TV outlets, distribution boards/consumer units, switches, spur outlets etc must either be Legrand or Schneider. Approved equivalent makes may be accepted subject to the engineer's prior approval.
 - 1.11 The Sub-contract is for supplying, delivering, fixing/installing, testing, commissioning and setting to work to the full satisfaction of the Engineer/Architect and the Sub-contractor's price must include all cost for the entire process.
 - 1.12 All conduits/ducts must be heavy gauge. Where steel pipes are specified, they must be minimum of class B in strength.
 - 1.13 The installation shall be carried out strictly in accordance with the provision of the 17th Edition of Wiring Regulation as published by the Institution of Electrical Engineers, Great Britain, the most current relevant standards issued by the Kenya Bureau of Standards, and with strict adherence to the safety requirements and by-laws of the Kenya Power and Lighting Co. Ltd.
 - 1.14 The Sub-contractor shall ensure that the highest standards of workmanship and highest quality materials are used at all times. Inferior workmanship and low quality materials shall be rejected and replaced at the Sub-contractors own cost.
 - 1.15 The sub-contractors shall be solely responsible for the correct and accurate ordering of materials in accordance with the drawings and Bills of Quantities.
 - 1.16 No claims on advance payment and/or materials off-site will be allowed unless the sub-contractor advances valid reasons acceptable to the employer. Should a claim on advance payment be allowed, the sub-contractor will be required to submit an Advance Payment Bond for the full value claimed.
 - 1.17 The sub-contractor shall strictly follow the Main Contractor's programme of works and (the sub-contractor) must ensure that at no time does his activities cause delays to the Main Contractor.
 - 1.18 This is a fixed price sub-contract, and the sub-contractor is expected to allow (in his unit rates) for generous fore-casts on fluctuations.
 - 1.19 The Bills of Quantities shall be read in conjunction with Notes to All Tenderers, Preliminaries, General Specifications, Particular Specifications and all the relevant drawings.
 - 1.20 A rate or price shall be entered against each item in the priced Bills of Quantities whether quantities are stated or not. The cost of items against which the sub-contractor has failed to enter a rate or price shall be deemed to be covered by other rates and prices entered in the Bills of Quantities.
 - 1.21 The whole cost of complying with provisions of the sub-contract shall be included in the items provided in the Bills of Quantities, and where no items are provided, the cost shall be deemed to be distributed among the rates and prices entered for the related items of work.
 - 1.22 General directions and descriptions of work and materials are not necessarily repeated nor summarized in the Bills of Quantities. Reference to the relevant sections of the sub-contract document shall be made before entering prices against each item in the priced Bills of Quantities.

- 1.23 Provisional sums and contingencies included and so designated in the Bills of Quantities shall be expended in whole or in part at the direction and discretion of the Engineer.
- 1.24 Errors in pricing will be corrected by the Employer for any arithmetic errors in computation or summarization as follows:-
- a) Where there is a discrepancy between amounts in figures and amounts in words, the amount in words will govern.
 - b) Where there is discrepancy between the unit rate and the total amount derived from the multiplication of the unit price and the quantity, the unit rate quoted will govern unless in the opinion of the employer, there is an obviously gross misplacement of the decimal point in the unit prices, in which event the total amount as quoted will govern and the unit rate will be corrected.
- 1.25 Other than ceiling mounted fixtures, accessories, light fittings etc, all the other mounting heights will be re-confirmed with the Engineer/Architect on site.
- 1.26 All light fittings must be complete with appropriate lamps, bulbs, tubes, starters, control gear etc as applicable. Where a light fitting has multiple lamps, tubes, bulbs, each lamp/tube/bulb must have its own separate choke/starter/p.f. correction capacitor/control gear etc.

2 **Statement of Compliance**

- a) I confirm compliance of all clauses of the General Conditions, General Specifications, Particular Specifications, Technical Specifications in this tender.
- b) I confirm I have not made and will not make any payment to any person, which can be perceived as an inducement to win this tender.

Signed..... for and on behalf of the Tenderer

Date:

Official Rubber Stamp:

ENGINEERS BOARD OF KENYA, EBK
PROPOSED EBK OFFICE FIT OUT AT
BARABARA PLAZA
BILLS OF QUANTITIES
BILL No. J1: ELECTRICAL INSTALLATIONS

BILL NO. 1 – Power Distribution

ITEM NO.	DESCRIPTION	QTY	UNIT	RATE	AMOUNT KShs. Cts.
	Supply, install, test, commission and set to work the following.				
1.1a)	45A TP MCCB incorporated within the floor sub-switchboards inside the electrical duct, for the Outdoor AC Units	4	No		
b)	Label the AC MCB, thus: “ SUPPLY TO AC UNIT: DO NOT SWITCH OFF ” in red 10mm or higher permanent traffolyte labels.	4	No.		
1.2.1	12-way TP/N Power Distribution Board as ABB, Schneider Electric, or any other approved equivalent, complete with 100A TP/N integral isolator, MCCB/MCB units as shown in the schematics, blanking plates for unused spareways, and all accessories including lockable cover. (DBs 1, 2, 3 and 4 for Raw/Back-up Generator Power)	4	No.		Existing DBs to be re-used
1.2.2	MCB units of the specified ratings with breaking capacity of 10kA as ABB or approved equivalent.		No.		
i.	10A SP	20	No.		
ii.	20A SP	51	No.		
iii.	32A SP	30	No.		
iv.	45A SP	1	No.		
v.	63A SP	1	No.		
vi.	20A TP MCCB for UPS	4			
vii.	Blanking plates for all un-used spareways	16			
	(Please Note: All MCCBs/MCBs/Isolators to be as ABB, SCHNEIDER ELECTRIC, TERASAKI or equivalent with Engineer's prior approval)		Item		
1.2.3a)	Carry out concise permanent labeling of all the circuits, circuit breakers etc. of the boards above, indicating the areas served, outgoing cable sizes etc.	4	No.		
b)	Label the UPS MCB, thus: “ SUPPLY TO UPS: DO NOT SWITCH OFF ” in red 10mm or higher permanent traffolyte labels.	4	Item		
1.2.4	Carry out Protective Multiple Earthing (PME) for the Distribution Boards above to KPLC/EPRA requirements.	4	m		
1.3.1a)	4C 25mm ² PVC/SWA/PVC copper cables to the boards above	100	No.		Existing cable to be re-used
b)	Cable glands for the above cable.	8	No.		
c)	Cable lugs for the cable above, complete with crimping	32	m		
1.3.2a)	45A TPN Local Isolator for outdoor AC Unit on roof floor level as	4			

	Telemecanique, or approved equivalent, complete with all accessories				
b)	4C 10mm ² PVC/SWA/PVC copper cables to the AC Isolators above complete with lugs, glands etc.	100			
Total C/F to Next Page					

ENGINEERS BOARD OF KENYA, EBK
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BARABARA PLAZA
BILLS OF QUANTITIES
BILL No. J1: ELECTRICAL INSTALLATIONS

BILL NO. 1 – Power Distribution

ITEM NO.	DESCRIPTION	QTY	UNIT	RATE	AMOUNT	
					KShs.	Cts.
	Total B/F from Previous Page					
1.3.3a)	20A TPN Local Isolator for UPS as Telemecanique, or approved equivalent, complete with all accessories	4	No.			
b)	4C 6mm ² PVC/SWA/PVC copper cables to the UPS Isolators above, complete with lugs, glands, etc.	100	m			
1.3.4	300 x 50mm 12 gauge galvanized steel perforated cable tray, complete with supporting frame (provisional)	80	m.			
1.3.5	Dia. 32mm HG PVC conduit links	100	m.			
1.4	Allow for carrying out comprehensive testing and configuration of the entire installation as per IET Wiring Regulation, 17th Edition and EPRA rules/regulations.		Ite m			
Total for Bill No. 1 – Power Distribution C/F to Collection Page for Bill No. J1 Electrical Installations						

ENGINEERS BOARD OF KENYA, EBK
PROPOSED EBK OFFICE FIT OUT AT
BARABARA PLAZA
BILL No. J1: ELECTRICAL INSTALLATIONS

BILL NO. 2 – GROUND FLOOR (Lighting and Power)

ITEM NO.	DESCRIPTION	QTY	UNIT	RATE	AMOUNT KShs. Cts.
	Supply, install, test, commission and set to work the following. All lighting fittings to be complete with lamp, control gear etc as applicable. PLEASE NOTE: ALL LIGHT FITTINGS TO BE RATED 220-240V AC. WHERE LOWER VOLTAGES ARE SPECIFIED, THE LIGHT FITTING TO BE COMPLETE WITH CORRECTLY RATED INTERNAL TRANSFORMER.				
2.1	Lighting				
2.1.1	Lighting point, 1-way switched in 3x1.5 mm ² SC-PVC coper cables inside 20mm diameter HG PVC conduits, complete with all the accessories	386	No.		
2.1.2	Lighting point, 2-way switched in 3x1.5 mm ² SC-PVC coper cables inside 20mm diameter HG PVC conduits, complete with all the accessories	208	No.		
2.1.3	10A Modular Switch Plates as Legrand Arteor or approved equivalent in Client approved color and texture: -				
	(a) 1-gang 1-way	17	No.		
	(b) 1-gang 2-way	2	No.		
	(c) 2-gang 1-way	27	No.		
	(d) 2-gang 2-way	4	No.		
	(e) 3-gang 2-way	2	No.		
	(f) Intermediate	1	No.		
	(g) PIR Motion/Occupancy Sensor Light Switch as Legrand Radiant, ELEGRP, Argus Schnider Electric or any approved equivalent, complete with all the accessories including by-pass switch.	20	No.		
	(h) Dimmer Light Switch as Legrand Radiant, ELEGRP, Schnider Electric or any approved equivalent.	10	No.		
2.1.4	Lighting fittings, complete with lamps of specified wattage and appropriate colour rendering: -				
	(Please Note: All fittings to have High Frequency control gear. All LED fittings to be rated 220-240VAC)				
a)	High Performance 600x600mm LED flat Panel c/w 44W LED lamp, extruded aluminium frame with opal polycarbonate diffuser cat no. JC71277 or approved equivalent	111	No		Existing to be re-used
b)	Dimmable High Performance 600x600mm LED Panel light fitting c/w Power supply unit with DALI interface, wide beam optic type, polystyrene bowl/prismatic optical cover, internal connector, min. power factor of 0.9 and	0	No		

	initial LED luminaire efficacy 110 lm/W as Philips RC160V LED40S 840 W60L60 PSD or approved equivalent.				
c)	As above but emergency version	39	No.		
d)	25W 145mm Dimmable Round LED recessed light fitting with Polycarbonate cover, with DALI control interface, IP 54 as JCC JC54301DIM (Type 2).	2	No		
Total C/F to Next Page					

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BILL NO. 2 – GROUND FLOOR (Lighting and Power)

ITEM NO.	DESCRIPTION	QTY	UNIT	RATE	AMOUNT KShs. Cts.
	Total B/F from Previous Page				
e)	3W 50mm diameter tiltable Round LED recessed light with mild steel body and die-cast aluminium front rim as Philips or approved equivalent (Type D)	434	No		Existing to be re-used
f)	40W dimmable round mirror light complete with dimmer switch as PHILIPS Cat No.915006000000 or approved equivalent. (Type LV)	1	No		
g)	2W maintained Exit Emergency Light as ABB Ovano Cat No. XT230RS/DALI, or approved equivalent. Minimum 3-hour autonomy.	4	No		
h)	11W maintained Exit Emergency Light with vandal resistant, self-extinguishing, UV-stabilized polycarbonate as disano Cat. No.995233-00 , or approved equivalent. Minimum 3-hour autonomy.	3	No		
2.2.0	<u>Communication</u>				
2.2.1	Single data/telephone faceplates in trunking/concealed HG PVC conduit complete with box draw-wire and square blanking cover for RJ45 terminations	110	No		
2.2.3	450 x 450 x 200 mm 14 gauge galvanized compartment telephone/data draw box complete with 3- cover, screws etc.	13	No		
2.3.0	<u>Power</u>				
2.3.1a)	10-way SP/N Power Consumer Unit as ABB, Schneider Electric, or any other approved equivalent, complete with 100A SP/N integral isolator, MCB units, blanking plates for unused spareways, and all accessories including lockable cover. (CUs C1, C2 and C3 for Clean/UPS Power and CU 1 for Raw/Generator Power)	4	No.		
b)	MCB units of the specified ratings with breaking capacity of 10kA as ABB or approved equivalent.				
i.	10A SP	2	No.		
ii.	20A SP	5	No.		
iii.	32A SP	21	No.		
iv.	Blanking plates for all un-used spareways	12	No.		
Total C/F to Next Page					

ENGINEERS BOARD OF KENYA, EBK
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BILLS OF QUANTITIES
BILL No. J1: ELECTRICAL INSTALLATIONS

BILL NO. 2 – GROUND FLOOR (Lighting and Power)

ITEM NO.	DESCRIPTION	QTY	UNIT	RATE	AMOUNT KShs. Cts.
	Total B/F from Previous Page				
2.3.2a)	2C 10mm ² PVC/SWA/PVC copper cable for the CUs above	90	m.		
b)	Cable glands for the above cable	8	No.		
c)	Cable lugs for the above cables, complete with hydraulic crimping	16	No.		
d)	Carry out concise permanent labeling for all the circuits in the CUs above	4	Item		
e)	Carry out Protective Multiple Earthing (PME) for the Consumer Units above to KPLC/EPRA requirements.	4	Item		
2.3.3 a)	300x50mm double compartment trunking in 14 SWG steel powder coating, complete with cover, screws and bonding.	400	m.		
b)	300 x 50mm, factory-made corner-bends for the above trunking, in same material and colour finish.	150	No.		
c)	Carry out bonding throughout the entire length of the above trunking in 6mm ² green PVC insulated copper cable.	1	Item		
d)	Punched outlet plates on the trunking for twin socket outlets.	228	No.		
e)	Punched outlet plates on the trunking for data/telephone outlets.	110	No		
2.3.4	Twin standard 13A-socket outlet for raw power, wired in 6 x 2.5mm ² SC-PVC-CU cables inside trunking, complete with 13A twin switched socket outlet plate as Legrand Arteor or approved equivalent.	118	No		
2.3.5	Twin 13A non-standard Colored socket outlets (to client's preferred color), as Legrand Arteor or any approved equivalent, with safety shutters on both live and neutral and with neon light for computer power supply, complete with wiring in 2.5mm ² twin + Earth PVC/PVC copper cables and unbreakable 13A 3-pin fused non-standard top plugs inside the trunking.	110	No		
2.3.6a)	Twin standard 13A socket outlet for normal power, wired in 6x2.5mm ² PVC-SC CU cables inside concealed conduits, complete with 13A twin switched socket outlet plate as Legrand Arteor or approved equivalent.	13	No.		
b)	Twin socket as (a) above but mounted 150mm above worktop	0	No.		
2.3.7	Outlet point for water heater/ hand drier/ extract fans /air conditioning unit comprising 20mm diameter conduit, wiring in 3 x 4.0 mm ² SC-PVC-CU cables and all accessories including 20A DP switch with neon light as Legrand Arteor or any other approved equivalent.	45	No.		
2.3.8	Outlet for CCTV/ AV points/ security alarm/ fire alarm points	148	No.		

	comprising box, concealed HG PVC conduit, draw wire and square blanking cover as Legrand.				
Total C/F to Next Page					

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BILL NO. 2 – GROUND FLOOR (Lighting and Power)

ITEM NO.	DESCRIPTION	QTY	UNIT	RATE	AMOUNT KShs. Cts.
	Total B/F from Previous Page				
2.3.9	Outlet for Television coaxial cable point, complete with concealed HG PVC conduit, square PVC box, draw wire and TV outlet plate as Legrand or approved equivalent	2	No.		
2.3.10a)	Pop-up Table-top outlet point complete with box, 1 No. normal socket outlet, wiring in 6x2.5mm ² PVC-SC-PVC cables, 1 No. non-standard socket outlet for computer points with neon lights, wiring in ring 6x2.5mm ² PVC-SC-PVC cables, 1No. HDMI outlet, 1No. VGA outlet, and 1 No. data outlet points as approved, for meeting rooms (Please note: The table-top outlet point to be mounted STRICTLY as per the Architect's/Interior Designer's drawings and with <u>written</u> approval of the user/client representative).	12	No.		
b)	As (a) above but without HDMI and VGA outlets for worktops	44	.		
2.3.12	Ceiling outlet point complete with 1No. twin normal socket outlets, box, wiring in 6x2.5mm ² PVC-SC-PVC cables, 1 No. twin non-standard socket outlets for computer points with neon lights wiring in ring 6x2.5mm ² PVC-SC-PVC cables, 1No. HDMI outlet, 1No. VGA outlet, and 1 No. telephone/data outlet points as approved for projector (Provisional) (Please note: All outlets to be complete with box and all fixing accessories. The Ceiling outlet point to be mounted STRICTLY as per the Architect's/Interior Designer's drawings and with <u>written</u> approval of the user/client representative). - Provisional	1	No		
2.3.13	Dia. 32mm HG PVC conduit links in floor slab	300	m.		
2.3.14	300 x 50mm 12 gauge galvanized steel perforated cable tray, complete with supporting frame.	240	m.		
2.4	Allow for carrying out comprehensive testing and configuration of the entire installation as per IET Wiring Regulation, 17th Edition and EPRA rules/regulations.		Item		
Total for Bill No. 2 – Ground Floor C/F to Collection Page for J1, Electrical Installations					

ENGINEERS BOARD OF KENYA, EBK
PROPOSED EBK OFFICE FIT OUT AT
BARABARA PLAZA
BILLS OF QUANTITIES
BILL No. J1: ELECTRICAL INSTALLATIONS

BILL NO. 3 – FIRST FLOOR (Lighting and Power)

ITEM NO.	DESCRIPTION	QTY	UNIT	RATE	AMOUNT KShs. Cts.
	Supply, install, test, commission and set to work the following. All lighting fittings to be complete with lamp, control gear etc as applicable. PLEASE NOTE: ALL LIGHT FITTINGS TO BE RATED 220-240V AC. WHERE LOWER VOLTAGES ARE SPECIFIED, THE LIGHT FITTING TO BE COMPLETE WITH CORRECTLY RATED INTERNAL TRANSFORMER.				
3.1	Lighting				
3.1.1	Lighting point, 1-way switched in 3x1.5 mm ² SC-PVC coper cables inside 20mm diameter HG PVC conduits, complete with all the accessories	100	No.		
3.1.2	Lighting point, 2-way switched in 3x1.5 mm ² SC-PVC coper cables inside 20mm diameter HG PVC conduits, complete with all the accessories	61	No.		
3.1.3	10A Modular Switch Plates as Legrand Arteor or approved equivalent in Client approved color and texture -				
	(a) 1-gang 1-way	7	No.		
	(b) 1-gang 2-way	1	No.		
	(c) 2-gang 1-way	6	No.		
	(d) 2-gang 2-way	8	No.		
	(e) 3-gang 2-way	6	No.		
	(f) Intermediate	1	No.		
	(g) PIR Motion/Occupancy Sensor Light Switch as Legrand Radiant, ELEGRP, Argus Schnider Electric or any approved equivalent, complete with all the accessories including by-pass switch.	5	No.		
	(h) Dimmer Light Switch as Legrand Radiant, ELEGRP, Schnider Electric or any approved equivalent.	5	No.		
3.1.4	Lighting fittings, complete with lamps of specified wattage and appropriate colour rendering: - (Please Note: All fittings to have High Frequency control gear. All LED fittings to be rated 220-240VAC)				
a)	High Performance 600x600mm LED flat Panel c/w 44W LED lamp, extruded aluminium frame with opal polycarbonate diffuser cat no. JC71277 or approved equivalent	10	No		Existing to be re-used
b)	Dimmable High Performance 600x600mm LED Panel light fitting c/w Power supply unit with DALI interface, wide beam optic type, polystyrene bowl/prismatic optical cover, internal connector, min. power factor	23	No		

	of 0.9 and initial LED luminaire efficacy 110 lm/W as Philips RC160V LED40S 840 W60L60 PSD or approved equivalent.				
c)	As above but emergency version	14	No.		
d)	25W 145mm Dimmable Round LED recessed light fitting with Polycarbonate cover, with DALI control interface, IP 54 as JCC JC54301DIM (Type 2).	2	No		
Total C/F to Next Page					

ENGINEERS BOARD OF KENYA, EBK
PROPOSED EBK OFFICE FIT OUT AT
BARABARA PLAZA BILLS OF QUANTITIES
BILL No. J1: ELECTRICAL INSTALLATIONS

BILL NO. 3 – FIRST FLOOR (Lighting and Power)

ITEM NO.	DESCRIPTION	QTY	UNIT	RATE	AMOUNT KShs. Cts.
	Total B/F from Previous Page				
e)	3W 50mm diameter tiltable Round LED recessed light with mild steel body and die-cast aluminium front rim as Philips or approved equivalent (Type D)	108	No		Existing to be re-used
f)	40W dimmable round mirror light complete with dimmer switch as PHILIPS Cat No.915006000000 or approved equivalent. (Type LV)	2	No		
g)	2W maintained Exit Emergency Light as ABB Ovano Cat No. XT230RS/DALI, or approved equivalent. Minimum 3-hour autonomy.	1	No		
h)	11W maintained Exit Emergency Light with vandal resistant, self-extinguishing, UV-stabilized polycarbonate as disano Cat. No.995233-00 , or approved equivalent. Minimum 3-hour autonomy.	1	No		
3.2.0	<u>Communication</u>				
3.2.1	Single data/telephone faceplates in trunking/concealed HG PVC conduit complete with box draw-wire and square blanking cover for RJ45 terminations	16	No		
3.2.3	450 x 450 x 200 mm 14 gauge galvanized compartment telephone/data draw box complete with 3- cover, screws etc.	4	No		
3.3.0	<u>Power Distribution</u>				
3.3.1a)	10-way SP/N Power Power Consumer Unit as ABB, Schneider Electric, or any other approved equivalent, complete with 100A SP/N integral isolator, MCB units, blanking plates for unused spareways, and all accessories including lockable cover. (CUs C4 for Clean/UPS Power)	1	No.		
b)	MCB units of the specified ratings with breaking capacity of 10kA as ABB or approved equivalent.				
i.	32A SP	5	No.		
ii.	Blanking plates for all un-used spareways	5	No.		
Total C/F to Next Page					

ENGINEERS BOARD OF KENYA, EBK
PROPOSED EBK OFFICE FIT OUT AT
BARABARA PLAZA
BILLS OF QUANTITIES
BILL No. J1: ELECTRICAL INSTALLATIONS

BILL NO. 3 – FIRST FLOOR (Lighting and Power)

ITEM NO.	DESCRIPTION	QTY	UNIT	RATE	AMOUNT KShs. Cts.
	Total B/F from Previous Page				
3.3.2a)	2C 10mm ² PVC/SWA/PVC copper cable for the CU above	30	m.		
b)	Cable glands for the above cable	2	No.		
c)	Cable lugs for the above cables, complete with hydraulic crimping	4	No.		
d)	Carry out concise permanent labeling for all the circuits in the CU above	1	Item		
e)	Carry out Protective Multiple Earthing (PME) for the Consumer Unit above to KPLC/EPRA requirements.	1	Item		
3.3.3 a)	300x50mm double compartment trunking in 14 SWG steel powder coating, complete with cover, screws and bonding.	150	m.		
b)	300 x 50mm, factory-made corner-bends for the above trunking, in same material and colour finish.	50	No.		
c)	Carry out bonding throughout the entire length of the above trunking in 6mm ² green PVC insulated copper cable.	1	Item		
d)	Punched outlet plates on the trunking for twin socket outlets.	41	No.		
e)	Punched outlet plates on the trunking for data/telephone outlets.	16	No		
3.3.4	Twin standard 13A-socket outlet for raw power, wired in 6 x 2.5mm ² SC-PVC-CU cables inside trunking, complete with 13A twin switched socket outlet plate as Legrand Arteor or approved equivalent.	25	No		
3.3.5	Twin 13A non-standard Colored socket outlets (to client's preferred color), as Legrand Arteor or any approved equivalent, with safety shutters on both live and neutral and with neon light for computer power supply, complete with wiring in 2.5mm ² twin + Earth PVC/PVC copper cables and unbreakable 13A 3-pin fused non-standard top plugs inside the trunking.	16	No		
3.3.6a)	Twin standard 13A socket outlet for normal power, wired in 6x2.5mm ² PVC-SC CU cables inside concealed conduits, complete with 13A twin switched socket outlet plate as Legrand Arteor or approved equivalent.	1	No.		
b)	Twin socket as (a) above but mounted 150mm above worktop	2	No.		
3.3.7	Outlet point for water heater/ hand drier/ extract fans /air conditioning unit comprising 20mm diameter conduit, wiring in 3 x 4.0 mm ² SC-PVC-CU cables and all accessories including 20A DP switch with neon light as Legrand Arteor or any other approved equivalent.	16	No.		
3.3.8	Outlet for CCTV/ AV points/ security alarm/ fire alarm points	49	No.		

	comprising box, concealed HG PVC conduit, draw wire and square blanking cover as Legrand.				
Total C/F to Next Page					

ENGINEERS BOARD OF KENYA, EBK
PROPOSED EBK OFFICE FIT OUT AT
BARABARA PLAZA
BILLS OF QUANTITIES
BILL No. J1: ELECTRICAL INSTALLATIONS

BILL NO. 3 – FIRST FLOOR (Lighting and Power)

ITEM NO.	DESCRIPTION	QTY	UNIT	RATE	AMOUNT KShs. Cts.
	Total B/F from Previous Page				
3.3.9	Outlet for Television coaxial cable point, complete with concealed HG PVC conduit, square PVC box, draw wire and TV outlet plate as Legrand or approved equivalent	6	No.		
3.3.10a)	Pop-up Table-top outlet point complete with box, 1 No. normal socket outlet, wiring in 6x2.5mm ² PVC-SC-PVC cables, 1 No. non-standard socket outlet for computer points with neon lights, wiring in ring 6x2.5mm ² PVC-SC-PVC cables, 1No. HDMI outlet, 1No. VGA outlet, and 1 No. data outlet points as approved, for meeting rooms (Please note: The table-top outlet point to be mounted STRICTLY as per the Architect's/Interior Designer's drawings and with <u>written</u> approval of the user/client representative).	10	No.		
b)	As (a) above but without HDMI and VGA outlets for worktops	4	.		
3.3.12	Ceiling outlet point complete with 1No. twin normal socket outlets, box, wiring in 6x2.5mm ² PVC-SC-PVC cables, 1 No. twin non-standard socket outlets for computer points with neon lights wiring in ring 6x2.5mm ² PVC-SC-PVC cables, 1No. HDMI outlet, 1No. VGA outlet, and 2 No. telephone/data outlet points as approved for projector (Provisional) (Please note: All outlets to be complete with box and all fixing accessories. The Ceiling outlet point to be mounted STRICTLY as per the Architect's/Interior Designer's drawings and with <u>written</u> approval of the user/client representative).	1	No		
3.3.13a)	Outlet for cooker control unit comprising wiring in 3x6.0mm ² SC-PVC CU cables, twin steel box, Dia. 25mm HG PVC conduit link, and all accessories including 45A DP cooker control unit with neon lamp, and 13A integral socket with neon lamp as Clipsal or approved equivalent	1	No.		
b)	45A DP cooker connector unit with wiring in 3 x 6.0mm ² SC-PVC-CU cables, and Dia. 25mm HG conduit link to the above	1	m.		
3.3.14	Dia. 32mm HG PVC conduit links in floor slab	100	Item		
3.3.15	300 x 50mm 12 gauge galvanized steel perforated cable tray, complete with supporting frame.	90			

	3.4 Allow for carrying out comprehensive testing and configuration of the entire installation as per IET Wiring Regulation, 17th Edition and EPRA rules/regulations.				
Total for Bill No. 3 – First Floor C/F to Collection Page for Electrical Installations					

ENGINEERS BOARD OF KENYA, EBK
PROPOSED EBK OFFICE FIT OUT AT
BARABARA PLAZA BILLS OF QUANTITIES

BILL No. J1: ELECTRICAL INSTALLATIONS

BILL NO. 4 – GENERAL ITEMS

Item No.	Description	Qty	Unit	Rate	Amount	
					KSh	Cts
4.01	Acquire and submit Insurance for the sub-contract work.		Item			
4.02	Allow for presentation of all the required samples as per specifications, Bills of Quantities and Drawings.		Item			
4.03	Prepare and submit Working Drawings as follows:- i) Draft soft copy in Archicad® and Autocad® in CD-RW. ii) Amended soft copy in Archicad® and Autocad® in CD-RW. iii) 5 Final soft copies in Archicad® and Autocad® in CD-RW to Architect, Client, Quantity Surveyor, and Engineer (2 copies) iv) 3 Draft hard-copies of Working Drawings in Ao (Scales 1:50, 1:25) to Engineer, Architect and Main Contractor. v) 2 Amended hard copies of Working Drawings in Ao (Scales 1:50 and 1:25) to Engineer, Architect and Main Contractor. vi) 11 No. Final hard copies of working drawings in Ao (Scales 1:50, 1:25) to Engineer (3 copies), Architect (1 copy), Quantity Surveyor (1 copy), Client (3 copies), Contractor (3 copies). (Note: Full set of drawings to be presented as per drawing list).		Item			
5.04	As item no. 5.03, but for Record (As-Installed) Drawings comprising: i) Fully dimensioned drawings of all plants and apparatus. i) General arrangement drawings of equipment, plant etc. ii) Routes – types and sizes and arrangement of all pipework. iii) System schematics and trunking diagrams showing all salient information relating to control and instrumentation. iv) Grading charts v) Wiring and piping diagrams of plant and apparatus. vi) Schematic diagram of individual plants and switch and control boards. vii) All the required operating instructions for all panels, boards, control panels etc.		Item			
	Total C/F to Next Page					

ENGINEERS BOARD OF KENYA, EBK
PROPOSED EBK OFFICE FIT OUT AT
BARABARA PLAZA BILLS OF QUANTITIES

BILL No. J1: ELECTRICAL INSTALLATIONS

BILL NO. 5 – GENERAL ITEMS

Item No.	Description	Qty	Unit	Rate	Amount	
					KSh	Cts
	Total B/F from Previous Page					
5.05	Prepare and submit Maintenance Manuals for all items installed.		Item			
5.06	Provide a year's (12 months') initial maintenance upon expiry of the Defects Liability Period. The maintenance to be carried out every quarter (3 months) for a period of 12 months. Please include a comprehensive draft Service Level Agreement with your bid.		Item			
5.07	<u>All other items</u> of general preliminary to cover, but not limited to:- i) Attendance on all other sub-contractors, such as for Mechanical Installations, Communications/structured cabling Installations, Security Installations, Generator Installations, etc. ii) Hiring and keeping a Supervisor/Foreman on site iii) Constant supervision of the works. iv) Provision of all the required spares. v) Testing and Inspection of materials/works. vi) Provision of labour camps. vii) Storage of materials. viii) Initial maintenance (During Defects Liability) ix) Providing water/electricity for the works. x) Protection of the works/materials xi) Clearing away on completion. xii) Preparing Final Account. xiii) Providing all Test Certificates, etc.		Item			
Total for Bill No. 5 C/F to Collection Page						

**ENGINEERS BOARD OF KENYA, EBK
PROPOSED EBK OFFICE FIT OUT AT
BARABARA PLAZA
BILLS OF QUANTITIES
BILL No. J1: ELECTRICAL INSTALLATIONS**

COLLECTION PAGE FOR BILL No. J1: ELECTRICAL INSTALLATIONS

ITEM	DESCRIPTION	AMOUNT KSHS. CTS.
1	Bill No. 1: Power Distribution Installations	
2	Bill No. 2: Ground Floor Installations	
3	Bill No. 3: First Floor Installations	
4	Bill No. 4: General Items	
5	Sub-total	
6	Add 10% of Sub-total (Item No. 5 above) as Contingency	
7	Total for Bill No. J1: Electrical Installations C/F to Summary Page for Electrical Installations and Associated Services	

PART J2:
BILLS OF QUANTITIES FOR
FIRE DETECTION AND ALARM INSTALLATIONS

PART J2: BILLS OF QUANTITIES FOR FIRE DETECTION AND ALARM INSTALLATIONS

CONTENTS:

CLAUSE NO.	DESCRIPTION	PAGE NO.
1.	General Notes to Tenderers	J2/3
2.	Statement of Compliance	J2/5
3.	Bill No. 1: Fire Detection and Alarm Installations	J2/6
4.	Bill No. 2: General Items	J2/8
5.	Collection Page	J2/12

BILLS OF QUANTITIES

1. General Note to Tenderers

- 1.1 The total of the prices in the summary of prices shall include for the whole of the Contract works in accordance with the specifications as defined before and shall be carried forward to Form of Tender.
- 1.2 Any prices omitted from any item, section or part of the price schedule shall be deemed to have included in another item, section or part.
- 1.3 The prices shall include for all obligations under the Contract including and not limited to:
 - a) Supply of any materials, equipment, apparatus, fittings, spares and tools
 - b) Insurance
 - c) Clearing and forwarding
 - d) Delivery, handling and storage at site
 - e) Packing for storage
 - f) Replacing any defective or damaged item
 - g) Installation
 - h) Testing
 - i) Painting
 - j) Commissioning
 - k) Maintenance during the defects liability period
- 1.4 The unit rates shall include import duty and VAT where applicable, and shall be expressed in Kenya Shillings.
- 1.5 Any tenderer whose firm uses the title “Engineer” or “Engineering” must provide evidence of registration of at least one of the directors by the Engineers Board of Kenya to avoid disqualification.
- 1.6 Any tenderer who fails to price the General items will be deemed to have allowed 5% of his tender price to cover these items, i.e. 5% of the total tender price will be deducted as preliminaries, if the tenderer does not enter specific prices against items of preliminary.
- 1.7 The Sub-contractor is instructed to read all the pages, and all the items of the Bills of Quantities very carefully. Should there be an apparent omission of words or figures, or should the sub-contractor be in doubt about the precise meaning of any word or figures, or for any reason whatsoever feel more clarification is necessary, either in the drawings or Bills of Quantities, to facilitate reasonable pricing of the tender document, he should inform the engineer at once so that the correct interpretation or clarification may be given before tendering. No liability will be accepted on mistakes and/or omissions which should have been corrected in the format above.
- 1.8 The specification should be priced in Kenya Currency i.e Shillings and cents.

- 1.9 The Sub-contract is for supplying, delivering, fixing/installing, testing, commissioning and setting to work to the full satisfaction of the Engineer/Architect and the Sub-contractor's price must include all cost for the entire process.
- 1.10 The Sub-contractor shall ensure that the highest standards of workmanship and highest quality materials are used at all times. Inferior workmanship and low quality materials shall be rejected and replaced at the Sub-contractors own cost.
- 1.11 The sub-contractors shall be solely responsible for the correct and accurate ordering of materials in accordance with the drawings and Bills of Quantities.
- 1.12 No claims on advance payment and/or materials off-site will be allowed unless the sub-contractor advances valid reasons acceptable to the employer. Should a claim on advance payment be allowed, the sub-contractor will be required to submit an Advance Payment Bond for the full value claimed.
- 1.13 The sub-contractor shall strictly follow the Main Contractor's programme of works and (the sub-contractor) must ensure that at no time does his activities cause delays to the Main Contractor.
- 1.14 This is a fixed price sub-contract, and the sub-contractor is expected to allow (in his unit rates) for generous fore-casts on fluctuations.
- 1.15 The Bills of Quantities shall be read in conjunction with Notes to All Tenderers, Preliminaries, General Specifications, Particular Specifications and all the relevant drawings.
- 1.16 A rate or price shall be entered against each item in the priced Bills of Quantities whether quantities are stated or not. The cost of items against which the sub-contractor has failed to enter a rate or price shall be deemed to be covered by other rates and prices entered in the Bills of Quantities.
- 1.17 The whole cost of complying with provisions of the sub-contract shall be included in the items provided in the Bills of Quantities, and where no items are provided, the cost shall be deemed to be distributed among the rates and prices entered for the related items of work.
- 1.18 Provisional sums and contingencies included and so designated in the Bills of Quantities shall be expended in whole or in part at the direction and discretion of the Engineer.

1 Statement of Compliance

- a) I confirm compliance of all clauses of the General Conditions, General Specifications, Particular Specifications, Technical Specifications in this tender.
- b) I confirm I have not made and will not make any payment to any person, which can be perceived as an inducement to win this tender.

Signed..... for and on behalf of the Tenderer

Date:

Official Rubber Stamp:

ENGINEERS BOARD OF KENYA, EBK
PROPOSED EBK OFFICE FIT OUT AT BARABARA
PLAZABILLS OF QUANTITIES
BILL NO. J2 - FIRE DETECTION AND ALARM SYSTEM

BILL NO. 1: FIRE DETECTION AND ALARM INSTALLATIONS

Item No.	Description	QTY	UNIT	RATE (KShs Cts)	AMOUNT (KShs Cts)
	Supply, install, test, commission and set to work the following:- All fire alarm equipment to be as per relevant KS and BS standards. This fire alarm specification is for a fully addressable analogue system. Supplying a conventional system will lead to automatic disqualification. Due to the sensitivity of this contract, only the specified items to be supplied. Alternatives, will <u>NOT</u> be accepted.				
1.00	Outlet for fire alarm points wired in 3 x 1.5mm ² screened fire-proof cable as FIREPIX or approved equivalent, and all accessories	85	No.		
1.01	Outlet for fire alarm panel comprising 2A fused unswitched spur outlet, concealed PVC conduit, wiring in 3 x 2.5mm ² SC-PVC-CU cables.	1	No.		Existing to be re-used
1.02a)	Analogue addressable photoelectric smoke detector complete with lockable base and alarm indicator LED, as Honeywell or approved equivalent	20	No.		
1.02b)	Analogue addressable photoelectric smoke detector complete with lockable base and alarm indicator LED, as Honeywell or approved equivalent	46	No.		
1.03	Analogue addressable heat detector complete with lockable base and alarm indicator LED as Honeywell or approved equivalent	1	No.		Existing to be re-used
1.04	Addressable manual call points complete with monitoring resistor, protective plastic coating on the glass, test key and polycarbonate flap. (State make and type)	9	No.		
1.05	Addressable electronic loop sounder wired direct onto the detection loop and powered from the loop, suitable for both external and internal application complete with volume control, a choice of 12 different sounds and rated at 85-100 dBA at 1 m. (State make and type). (State make and type).	4	No.		

1.06	Addressable High efficiency xenon beacons with enhanced optical design for maximum light dissipation and 2W xenon discharge lamp rated IP65. (State make and type).	5	No.		
1.07	Addressable standard interface units (using relays) for connecting detectors in voids , and to serve as remote indicators when detector triggers in the void. (State make and type).	1	No.		
	Total C/F to Next Page				

ENGINEERS BOARD OF KENYA, EBK
PROPOSED EBK OFFICE FIT OUT AT BARABARA
PLAZABILLS OF QUANTITIES
BILL NO. J2 - FIRE DETECTION AND ALARM SYSTEM

BILL NO. 1: FIRE DETECTION AND ALARM INSTALLATIONS

Item No.	Description	QTY	UNIT	RATE (KShs Cts)	AMOUNT (KShs Cts)
	Total B/F from Previous Page				
1.08	Short circuit isolator for protecting a fire detection loop by making sure a short-circuit or an open circuit fault in any zone does not affect other zones. (State make and type).	4	No.		
1.09	2-loop Analogue addressable fire detection and alarm control panel complete with printer, 8 lines 80 character LCD. The control panel to be designed to meet fully the requirements of EN54 Pt. 2 and 4: 1998 and BS 5839 Part 1. The panel to be complete with battery pack and automatic charger for minimum 72-hour operation under conditions of sustained power failure. The main panel to be located in the Main Security/Control office. As Honeywell or approved equivalent	1	No.		
1.10a)	Fire Alarm Graphics software complete with a desk top computer (if necessary) and capable of full control of fire alarm system as designed by FIREPIX, or other approved software vendors.	1	No.		
1.10b)	Communications Drive Unit	1	No.		
1.10c)	Serial Communications Interface Unit	1	No.		
1.11	Allow for linking the above fire alarm panel as dedicated zone on the Main Fire Alarm Panel of the Base Building		Item		
1.12	Carry out wiring in 3 x 1.5mm ² in FIRE-RESISTANT, SCREENED cable, all drawn inside the above ducts/conduits. [Note: The cable must be FIRE-RESISTANT and not merely heat resistant. This has to be demonstrated at presentation of sample]	2,000	m.		
Total for Bill No. 1: Fire Detection and Alarm Installations - C/F to Collection page					

ENGINEERS BOARD OF KENYA, EBK
PROPOSED EBK OFFICE FIT OUT AT BARABARA
PLAZABILLS OF QUANTITIES
BILL NO. J2 - FIRE DETECTION AND ALARM SYSTEM

BILL NO. 2 – GENERAL ITEMS

Item No.	Description	QTY	UNIT	RATE (KShs Cts)	AMOUNT (KShs Cts)
2.0 1	Supply, install, test, commission and set to work (To the full satisfaction of all parties to the contract) the following: - Carry out comprehensive Fire Detection and Alarm System installations testing and analysing, after installations. Prior to testing and commissioning conduct comprehensive programming of the system by approved manufacturer's representative to perform as instructed by the Engineer, including ringing patterns The testing and commissioning will be done as detailed below. i) Prior to commencement of the work the contractor shall submit a procedure for the inspection, testing and commissioning of the system. This procedure shall include for the visual and functional check/test of all components of the system - the visual check will cover the standard of workmanship, the functional quality of the equipment and general compliance with the system specification and the functional tests shall check the operation of the system as a whole. ii) Commissioning will be undertaken by a qualified person using the approved inspection, testing and commissioning procedure. iii) On successful commissioning of the system, in terms of the specified requirements, a Taking Over Certificate shall be completed. This is the written notification to the Service Provider/installer that the client has taken over the system in terms of the Agreement. Payment cannot be effected without this certificate iv) The Final Completion date for the system is determined from the Hand over Certificate. The taking over date is also that date on which the warranty period is deemed to have commenced. v) Each equipment in the installations shall be supplied with a complete installation manual and comprehensive operating				

	instructions. In addition, cabling and wiring information, a list of all equipment with associated serial numbers, etc (as specified) and any other information that may be required by the client from time to time and a copy of the taking Over Certificate shall be provided in a A4 hard cover arch lever type file				
Total C/F to Next Page					-

ENGINEERS BOARD OF KENYA, EBK
PROPOSED EBK OFFICE FIT OUT AT BARABARA
PLAZABILLS OF QUANTITIES
BILL NO. J2 - FIRE DETECTION AND ALARM

SYSTEMBILL NO. 2 – GENERAL ITEMS

Item No.	Description	QTY	UNIT	RATE (KShs Cts)	AMOUNT (KShs Cts)
	Total B/F from Previous Page vi) The contractor shall provide basic operating training on the system, using the operating instructions, for client staff prior to the Taking over Certificate being issued. This training shall be sufficient to ensure correct operation of the system. The contractor shall issue certificates to certify that the operators are proficient in the operation of the system on successful completion of the system training. This training MUST be in the manufacturer's representative's presence. vii) The above documentation shall be handed to a selected client representative at the time of commissioning. The documentation to be as detailed below:- viii) System Documentation - all documentation relating to the installation shall be concise, complete and unambiguous. Information shall be provided sufficient to install, test and commission, operate and maintain the system. Operating instructions shall be designed to minimize the possibility of incorrect operation of the system. ix) Component documentation - documentation relating to the components of the installation system shall also be concise, complete and unambiguous. Sufficient information shall be provided to ensure the integration of the component with any other of the system's components. Component documentation shall include the following:- a) Name of manufacturer and / or supplier, including MANUFACTURER's certification of the installation and components, with a written 36-month performance warranty. b) Description of equipment. c) Standard to which component claims compliance. d) Name or mark of the certification body.		Item		-

ENGINEERS BOARD OF KENYA, EBK
PROPOSED EBK OFFICE FIT OUT AT BARABARA
PLAZABILLS OF QUANTITIES
BILL NO. J2 - FIRE DETECTION AND ALARM SYSTEM

BILLS OF QUANTITIES - FIRE ALARM
INSTALLATIONSBILL NO. 2 – GENERAL ITEMS

Item No.	Description	QTY	UNIT	RATE (KShs Cts)	AMOUNT (KShs Cts)
	Total B/F from Previous Page				
2.0 2	Allow for presentation of all the required samples as perspecifications, Bills of Quantities and Drawings.		Item		
2.0 3	Prepare and submit Working Drawings as follows:- i) Draft soft copy in Archicad® and Autocad® 2000 inCD-RW. ii) Amended soft copy in Archicad® and Autocad® 2000in CD-RW. iii) 5 Final soft copies in Archicad® and Autocad® 2000 inCD-RW to Architect, Client, Quantity Surveyor, and Engineer (2 copies) iv) 3 Draft hard copies of Working Drawings in Ao (Scales1:50, 1:25) to Engineer, Architect and Main Contractor. v) 2 Amended hard copies of Working Drawings in Ao(Scales 1:50 and 1:25) to Engineer, Architect and Main Contractor. vi) 11 No. Final hard copies of working drawings in Ao (Scales 1:50, 1:25) to Engineer (3 copies), Architect (1 copy),Quantity Surveyor (1 copy), Client (3 copies), Contractor (3 copies). (Note: Full set of drawings to be presented as per drawing list).		Item		
2.0 4	As item no. 2.03, but for Record (As-Installed) Drawings comprising: - Fully dimensioned drawings of all plants and apparatus. - General arrangement drawings of equipment, plant etc. - Routes – types and sizes and arrangement of all pipework. - System schematics and trunking diagrams showing all salientinformation relating to control and instrumentation. - Grading charts - Wiring and piping diagrams of plant and apparatus. - Schematic diagram of individual plants and switch and controlboards. - All the required operating instructions for all panels, boards,control panels etc.		Item		
Total C/F to Next Page					

**ENGINEERS BOARD OF KENYA, EBK
PROPOSED EBK OFFICE FIT OUT AT BARABARA
PLAZABILLS OF QUANTITIES
BILL NO. J2 - FIRE DETECTION AND ALARM SYSTEM**

BILL NO. 2 – GENERAL ITEMS

Item No.	Description	QTY	UNIT	RATE (KShs Cts)	AMOUNT (KShs Cts)
	Total B/F from Previous Page				
2.0 5	Warranty period for Workmanship and Equipment shall be _____Months (A minimum of 12 months to be given)		Ite		
2.0 6	Provide a year's (12 months') initial maintenance upon expiry of the Defects Liability Period. The maintenance to be carried out every quarter (3 months) for a period of 12 months. (Please submit a comprehensive Service Level Agreement with your bid).		m Ite m		
2.0 7	<u>All other items</u> of general preliminary to cover, but not limited to:- Attendance on all other sub-contractors, such as for UPS Installations, Structured LAN Cabling, PABX Installations, Electrical Installations, Audio Visual Installations, Generator Installations, Lift Services, Solar Water Heating, V-Sat services etc. Hiring and keeping a Supervisor/Foreman on site Constant supervision of the works. Provision of all the required spares. Testing and Inspection of materials/works. Provision of labour camps. Storage of materials. Initial maintenance (During Defects Liability) Protection of the works/materials Clearing away on completion. Preparing Final Account. Providing all Test Certificates, etc.		Item		
Total for Bill No. 2: General Items Carried Forward to Collection Page					

ENGINEERS BOARD OF KENYA, EBK
PROPOSED EBK OFFICE FIT OUT AT BARABARA
PLAZABILLS OF QUANTITIES
BILL NO. J2 - FIRE DETECTION AND ALARM SYSTEM

COLLECTION PAGE

Item No.	DESCRIPTION	AMOUNT	
		KSh.	Cts.
S.01	Bill No. 1: Fire Detection and Alarm Installations		
S.02	Bill No. 2. General Items		
S.03	Sub -total		
S.04	Add 10% of the Sub-total above as Contingency		
Total for Bill No. J2: Fire Alarm C/F to Summary Page for Electrical Installationand Associated Services			

PART J3:
BILLS OF QUANTITIESFOR
UPS EQUIPMENT INSTALLATIONS

PART J3: BILLS OF QUANTITIES FOR UPS EQUIPMENT INSTALLATIONS

CONTENTS:

CLAUSE NO.	DESCRIPTION	PAGE NO.
1.	General Notes to Tenderers	J3/3
2.	Statement of Compliance	J3/5
3.	Bill No. 1: Supply and Installation of UPS Equipment	J3/6
4.	Bill No. 2: General Items	J3/7
5.	Collection Page	J3/9

BILLS OF QUANTITIES

1. General Note to Tenderers

- 1.1 The total of the prices in the summary of prices shall include for the whole of the Contract works in accordance with the specifications as defined before and shall be carried forward to Form of Tender.
- 1.2 Any prices omitted from any item, section or part of the price schedule shall be deemed to have included in another item, section or part.
- 1.3 The prices shall include for all obligations under the Contract including and not limited to:
 - a) Supply of any materials, equipment, apparatus, fittings, spares and tools
 - b) Insurance
 - c) Clearing and forwarding
 - d) Delivery, handling and storage at site
 - e) Packing for storage
 - f) Replacing any defective or damaged item
 - g) Installation
 - h) Testing
 - i) Painting
 - j) Commissioning
 - k) Maintenance during the defects liability period
- 1.4 The unit rates shall include import duty and VAT where applicable, and shall be expressed in Kenya Shillings.
- 1.5 Any tenderer whose firm uses the title “Engineer” or “Engineering” must provide evidence of registration of at least one of the directors by the Engineers Board of Kenya to avoid disqualification.
- 1.6 Any tenderer who fails to price the General items will be deemed to have allowed 5% of his tender price to cover these items, i.e. 5% of the total tender price will be deducted as preliminaries, if the tenderer does not enter specific prices against items of preliminary.
- 1.7 The Sub-contractor is instructed to read all the pages, and all the items of the Bills of Quantities very carefully. Should there be an apparent omission of words or figures, or should the sub-contractor be in doubt about the precise meaning of any word or figures, or for any reason whatsoever feel more clarification is necessary, either in the drawings or Bills of Quantities, to facilitate reasonable pricing of the tender document, he should inform the engineer at once so that the correct interpretation or clarification may be given before tendering. No liability will be accepted on mistakes and/or omissions which should have been corrected in the format above.
- 1.8 The specification should be priced in Kenya Currency i.e Shillings and cents.

- 1.9 The Sub-contract is for supplying, delivering, fixing/installing, testing, commissioning and setting to work to the full satisfaction of the Engineer/Architect and the Sub-contractor's price must include all cost for the entire process.
- 1.10 The Sub-contractor shall ensure that the highest standards of workmanship and highest quality materials are used at all times. Inferior workmanship and low quality materials shall be rejected and replaced at the Sub-contractors own cost.
- 1.11 The sub-contractors shall be solely responsible for the correct and accurate ordering of materials in accordance with the drawings and Bills of Quantities.
- 1.12 No claims on advance payment and/or materials off-site will be allowed unless the sub-contractor advances valid reasons acceptable to the employer. Should a claim on advance payment be allowed, the sub-contractor will be required to submit an Advance Payment Bond for the full value claimed.
- 1.13 The sub-contractor shall strictly follow the Main Contractor's programme of works and (the sub-contractor) must ensure that at no time does his activities cause delays to the Main Contractor.
- 1.14 This is a fixed price sub-contract, and the sub-contractor is expected to allow (in his unit rates) for generous fore-casts on fluctuations.
- 1.15 The Bills of Quantities shall be read in conjunction with Notes to All Tenderers, Preliminaries, General Specifications, Particular Specifications and all the relevant drawings.
- 1.16 A rate or price shall be entered against each item in the priced Bills of Quantities whether quantities are stated or not. The cost of items against which the sub-contractor has failed to enter a rate or price shall be deemed to be covered by other rates and prices entered in the Bills of Quantities.
- 1.17 The whole cost of complying with provisions of the sub-contract shall be included in the items provided in the Bills of Quantities, and where no items are provided, the cost shall be deemed to be distributed among the rates and prices entered for the related items of work.
- 1.18 Provisional sums and contingencies included and so designated in the Bills of Quantities shall be expended in whole or in part at the direction and discretion of the Engineer.

1 Statement of Compliance

- a) I confirm compliance of all clauses of the General Conditions, General Specifications, Particular Specifications, Technical Specifications in this tender.
- b) I confirm I have not made and will not make any payment to any person, which can be perceived as an inducement to win this tender.

Signed..... for and on behalf of the Tenderer

Date:

Official Rubber Stamp:

ENGINEERS BOARD OF KENYA, EBK
PROPOSED EBK OFFICE FIT OUT AT BARABARA
PLAZABILLS OF QUANTITIES
BILL NO. J3 - UPS INSTALLATIONS

BILL NO. 1 – SUPPLY / INSTALLATION OF UPS EQUIPMENT

Item No.	Description	QTY	UNIT	RATE (KShs Cts)	AMOUNT (KShs Cts)
	Supply, install, test, commission and set to work (to the full satisfaction of the Client, including initial training) the following:				
1.01	10 KVA/KW true-on-line, uninterruptible power supply (UPS unit), with a 30-minute autonomy, both Auto/Static by-pass and external manual bypass, external 5000:1 voltage surge/spike protection, and all the other details as per technical specifications, including the options. Note: Bidder to indicate if the battery pack is integrated within the UPS system or is separate. Attach detailed catalogues showing technical specifications and performance characteristics of the UPS unit. Bidder to give dimensions and weight of the UPS and battery pack, if separate and Dealer Authorization Certificate.	4	No.		
1.02	Allow for detailed training, demonstrations, providing technical manuals, users hand-book etc.		Item		
1.03	Liaison with Electrical sub-contractor to ensure proper cabling, phase-sequencing, and terminations are done.		Item		
1.04a)	2C 10mm ² PVC/SWA/PVC copper cables	80	m.		
	b) Cable glands for the above cable	8	No.		
	c) Cable lugs for the above cable, complete with hydraulic crimping	16	No.		
1.05	Allow for the following comprehensive performance testing of the UPS units to the entire satisfaction of the client and all parties to the contract:- i. Full load testing of THE UPS units with 100% (1.00 p. f.) resistive load. ii). Perform CONTINUOUS 100% loading of the UPS units while on resistive load iii). Perform the Autonomy test (30 minutes minimum) while at Full Load. v). Provide cabling, connections, all accessories, instruments, tools and		Items		

	all the required items for above testing on the 'dry' resistive load				
Total C/F to Collection Page for Bill No. J3					

ENGINEERS BOARD OF KENYA, EBK
PROPOSED EBK OFFICE FIT OUT AT BARABARA
PLAZABILLS OF QUANTITIES
BILL NO. J3 - UPS

INSTALLATIONSBILL NO. 2 –

GENERAL ITEMS

Item No.	Description	QTY	UNIT	RATE (KShs Cts)	AMOUNT (KShs Cts)
2	Carry out comprehensive 24-hour power analysis, after installation of UPSUnits and switch-gear, with a digital power meter (with printer) to: i) Record and print all the power system parameters. ii) Submit 3 copies of the printouts. (Note: Parameters must be satisfactory before the UPS Units arepermanently switched on).		Item		
2.01	Allow for presentation of all the required samples as per specifications,Bills of Quantities and Drawings.		Item		
2.02	Acquire and submit a Bank Guarantee for 10% of the sub-contract sum, asa Performance Guarantee.		Item		
2.03	Acquire and submit Insurance for the sub-contract		Item		
2.04	work.Prepare and submit Working Drawings as follows:- i) Draft soft copy in Archicad® and Autocad® in CD-RW. ii) Amended soft copy in Archicad® and Autocad® in CD-RW. iii) 5 Final soft copies in Archicad® and Autocad® in CD-RWto Architect, Client, Quantity Surveyor, and Engineer (2 copies) iv) 3 Draft hard-copies of Working Drawings in Ao (Scales 1:50,1:25) to Engineer, Architect and Main Contractor. v) 2 Amended hard copies of Working Drawings in Ao (Scales1:50 and 1:25) to Engineer, Architect and Main Contractor. vi) 11 No. Final hard copies of working drawings in Ao (Scales1:50, 1:25) to Engineer (3 copies), Architect (1 copy), Quantity Surveyor (1 copy), Client (3 copies), Contractor (3 copies).		Item		
2.05	(Note: Full set of drawings to be presented as per drawing list).				

	As item no. 2.04, but for Record (As-Installed) Drawings comprising:				
	i) Fully dimensioned drawings of all plants and apparatus.				
Total C/F to Next Page					

ENGINEERS BOARD OF KENYA, EBK
PROPOSED EBK OFFICE FIT OUT AT BARABARA
PLAZABILLS OF QUANTITIES
BILL NO. J3 - UPS

INSTALLATIONS BILL NO. 2 –

GENERAL ITEMS

Item No.	Description	QTY	UNIT	RATE (KShs Cts)	AMOUNT (KShs Cts)
	Total B/F from Previous Page				
	ii) General arrangement drawings of equipment, plant etc.				
	iii) Routes – types and sizes and arrangement of all pipework.				
	iv) System schematics and trunking diagrams showing all salient information relating to control and instrumentation.				
	v) Grading charts				
	vi) Wiring and piping diagrams of plant and apparatus.				
	vii) Schematic diagram of individual plants and switch and control boards.				
	viii) All the required operating instructions for all panels, boards, control panels etc.		Item		
2.06	Prepare and submit Maintenance Manuals for all items installed complete with a comprehensive Service Level Agreement.		Item		
2.07	Provide a year's (12 months') initial maintenance upon expiry of the Defects Liability Period. The maintenance to be carried out every quarter (3 months) for a period of 12 months.		Item		
2.08	<u>All other items</u> of general preliminary to cover, but not limited to: - - Attendance on all other sub-contractors, such as for Electrical Installations, Structured LAN Cabling, PABX Installations, Fire Detection and Alarm Installations, Audio Visual Installations, Generator Installations, Lift Services, Solar Water Heating, V-Sat services etc. - Hiring and keeping a Supervisor/Foreman on site - Constant supervision of the works. - Provision of all the required spares. - Testing and Inspection of materials/works. - Provision of labour camps. - Storage of materials. - Initial maintenance (During Defects Liability) - Providing water/electricity for the works. - Protection of the works/materials - Clearing away on completion. - Preparing Final Account. - Providing all Test Certificates, etc.				
2.09	Allow for facilitating all the required workshop tests including making available all the requirement instruments for the tests, transporting client / engineer to and from to test site (for upto 6 NO. trips) preparing test		Item Item		

	sheets and making all required amendments.				
Total for Bill No. 2: General Items C/F to Collection Page					

ENGINEERS BOARD OF KENYA, EBK
 PROPOSED EBK OFFICE FIT OUT AT BARABARA
 PLAZABILLS OF QUANTITIES
 BILL NO. J3 - UPS

INSTALLATIONSCOLLECTION

PAGE

ITEM NO.	DESCRIPTION	AMOUNT	
		KSHS	CTS
S1	Bill No. 1: Supply / Installation of UPS Units		
S2	Bill No. 2: General Items		
S3	Sub -total		
S4	Add 10% of the Sub-total above as Contingency		
Total for Bill No. J3: UPS Installations C/F to Summary Page forElectrical Installations and Associated Services			

PART J4:
BILLS OF QUANTITIESFOR
COMMUNICATION (ICT) SERVICESINSTALLATIONS

PART J4: BILLS OF QUANTITIES FOR COMMUNICATION (ICT) SERVICES INSTALLATIONS

CONTENTS:

CLAUSE NO.	DESCRIPTION	PAGE NO.
1.	General Notes to Tenderers	J4/3
2.	Statement of Compliance	J4/5
3.	Bill No. 1: Structured Cabling Installations	J4/6
4.	Bill No. 2: Structured Cabling for Security Installations	J4/8
5.	Bill No. 3: Telephone Installations	J4/9
6.	Bill No. 4: General Items	J4/10
7.	Collection Page	J4/12

BILLS OF QUANTITIES

1. General Note to Tenderers

- 1.1 The total of the prices in the summary of prices shall include for the whole of the Contract works in accordance with the specifications as defined before and shall be carried forward to Form of Tender.
- 1.2 Any prices omitted from any item, section or part of the price schedule shall be deemed to have included in another item, section or part.
- 1.3 The prices shall include for all obligations under the Contract including and not limited to:
 - a) Supply of any materials, equipment, apparatus, fittings, spares and tools
 - b) Insurance
 - c) Clearing and forwarding
 - d) Delivery, handling and storage at site
 - e) Packing for storage
 - f) Replacing any defective or damaged item
 - g) Installation
 - h) Testing
 - i) Painting
 - j) Commissioning
 - k) Maintenance during the defects liability period
- 1.4 The unit rates shall include import duty and VAT where applicable, and shall be expressed in Kenya Shillings.
- 1.5 Any tenderer whose firm uses the title “Engineer” or “Engineering” must provide evidence of registration of at least one of the directors by the Engineers Board of Kenya to avoid disqualification.
- 1.6 Any tenderer who fails to price the General items will be deemed to have allowed 5% of his tender price to cover these items, i.e. 5% of the total tender price will be deducted as preliminaries, if the tenderer does not enter specific prices against items of preliminary.
- 1.7 The Sub-contractor is instructed to read all the pages, and all the items of the Bills of Quantities very carefully. Should there be an apparent omission of words or figures, or should the sub-contractor be in doubt about the precise meaning of any word or figures, or for any reason whatsoever feel more clarification is necessary, either in the drawings or Bills of Quantities, to facilitate reasonable pricing of the tender document, he should inform the engineer at once so that the correct interpretation or clarification may be given before tendering. No liability will be accepted on mistakes and/or omissions which should have been corrected in the format above.
- 1.8 The specification should be priced in Kenya Currency i.e Shillings and cents.

- 1.9 The Sub-contract is for supplying, delivering, fixing/installing, testing, commissioning and setting to work to the full satisfaction of the Engineer/Architect and the Sub-contractor's price must include all cost for the entire process.
- 1.10 The Sub-contractor shall ensure that the highest standards of workmanship and highest quality materials are used at all times. Inferior workmanship and low quality materials shall be rejected and replaced at the Sub-contractors own cost.
- 1.11 The sub-contractors shall be solely responsible for the correct and accurate ordering of materials in accordance with the drawings and Bills of Quantities.
- 1.12 No claims on advance payment and/or materials off-site will be allowed unless the sub-contractor advances valid reasons acceptable to the employer. Should a claim on advance payment be allowed, the sub-contractor will be required to submit an Advance Payment Bond for the full value claimed.
- 1.13 The sub-contractor shall strictly follow the Main Contractor's programme of works and (the sub-contractor) must ensure that at no time does his activities cause delays to the Main Contractor.
- 1.14 This is a fixed price sub-contract, and the sub-contractor is expected to allow (in his unit rates) for generous fore-casts on fluctuations.
- 1.15 The Bills of Quantities shall be read in conjunction with Notes to All Tenderers, Preliminaries, General Specifications, Particular Specifications and all the relevant drawings.
- 1.16 A rate or price shall be entered against each item in the priced Bills of Quantities whether quantities are stated or not. The cost of items against which the sub-contractor has failed to enter a rate or price shall be deemed to be covered by other rates and prices entered in the Bills of Quantities.
- 1.17 The whole cost of complying with provisions of the sub-contract shall be included in the items provided in the Bills of Quantities, and where no items are provided, the cost shall be deemed to be distributed among the rates and prices entered for the related items of work.
- 1.18 Provisional sums and contingencies included and so designated in the Bills of Quantities shall be expended in whole or in part at the direction and discretion of the Engineer.

1 Statement of Compliance

- a) I confirm compliance of all clauses of the General Conditions, General Specifications, Particular Specifications, Technical Specifications in this tender.
- b) I confirm I have not made and will not make any payment to any person, which can be perceived as an inducement to win this tender.

Signed..... for and on behalf of the Tenderer

Date:

Official Rubber Stamp:

ENGINEERS BOARD OF KENYA, EBK
PROPOSED EBK OFFICE FIT OUT AT
BARABARA PLAZA BILLS OF QUANTITIES
BILL No. J4: COMMUNICATION SERVICES INSTALLATIONS

BILL NO. 1 – STRUCTURED CABLING INSTALLATIONS

ITEM No.	DESCRIPTION	QTY	UNIT	RATE (KShs Cts)	AMOUNT (KShs Cts)
	Supply, install, test, commission and set to work (To the full satisfaction of all parties to the contract) the following: -				
1.01a)	48-port Cisco switch as catalyst C9300-48U-A with cabinet Jumper Power Cord 250 VAC 13A C14-C15 connectors and required software. To also have SMARTNET 24X7X4 support, Network Advantage for an initial 1 year.	4	No.		Existing to be re-used
b)	As above but 24-port Cisco switch as catalyst C9300-24P A	1	No.		
c)	GBIC transceiver modules (LC to LC) multimode CISCO make for the switches above	10	No.		
d)	Cisco Catalyst 93000 4 X 1GE Network Module C9300-NM-4-1G	5	No.		
e)	50CM Type 1 Stacking Cable STACK-T1-50CM	5	No.	Included in Switch	
f)	1100W AC Config 1 Power Supply PWR-C1-1100WAC for 48Port Switch	4	No.	Included in Switch	
g)	715W AC Config 1 Power Supply PWR-C1-715WAC for 24 Port Switch	1	No.	Included in Switch	
1.02	Single Data cable outlets, type RJ45 as siemon, cat 6A complete with face plates.	126	No.		
1.03	Wireless access point as Cisco Business 240AC complete with controller	24	No.		
1.04a)	48 Port patch panel as siemon, type RJ45 Cat. 6A.	4	No.		
b)	as above but 24-port	1	m		
1.05	24 port Fiber optic patch panel, as Siemons or approved equivalent.	5	No.		
1.06a)	8 core armoured multi-mode fibre for Back bone cabling for the switches, in redundant wiring	200	Ite		
b)	LC-LC Multimode patch cords with connectors	5	m		
c)	Splicing, termination, testing and commissioning of the above Fibre connections		No.		
1.07	Purpose-made Free Standing Server cabinet, 22U/42U	4	Rolls		Existing to be re-used
1.08	UTP Cat 6A structured cables as siemon	13			

	or approved		No.		
	equivalent in 305M box		No.		
1.09a)	UTP Cat. 6A patch cord, 3M as siemon or approved equivalent	126	No.		
b)	UTP Cat. 6A patch cord, 1M as siemon or approved equivalent	126	Item		
c)	Allow for structured cable termination at all computer terminals, attendance in power connection, testing and commissioning of the network to TSD-ISN Standards.				
Total C/F to Next Page					

ENGINEERS BOARD OF KENYA, EBK
PROPOSED EBK OFFICE FIT OUT AT
BARABARA PLAZA BILLS OF QUANTITIES
BILL No. J4: COMMUNICATION SERVICES INSTALLATIONS

BILL NO. 1 – STRUCTURED CABLING INSTALLATIONS

ITEM	DESCRIPTION	QTY	UNIT	RATE (KShs Cts)	AMOUNT (KShs Cts)
	Total B/F from Previous Page				
1.1	Cable organizers.	50	No.		
1.11	Allow for integration to the PABX and all other network equipments for receiving, handling, testing and full configuration.		Item		
	NB: All to CISCO Solutions				
1.12	Any other items necessary to complete the data cabling satisfactorily. Please list the items. i) _____ ii) _____				
1.13	Allow for fixing permanent labels on all the equipment and cables.	1	Item		
1.14	Power outlets for the 5No switches above on UPS Supply comprising of the following:	5	No.		
1.15	Supply and install communication wire mesh basket tray in server room for communication cables overhead 450x150mm dimensions complete with all accessories and mounting brackets	15	m		
1.16	300mmx300mmx150mm cable drawboxes complete with covers, screws etc	10	No.		
Total for Bill No. 1 Structured Cabling Installations -C/F to Collection Page					

ENGINEERS BOARD OF KENYA, EBK
PROPOSED EBK OFFICE FIT OUT AT
BARABARA PLAZA BILLS OF QUANTITIES
BILL No. J4: COMMUNICATION SERVICES INSTALLATIONS

BILL NO. 2 – STRUCTURED CABLING FOR SECURITY INSTALLATIONS

ITEM No.	DESCRIPTION	QTY	UNIT	RATE (KShs Cts)	AMOUNT (KShs Cts)
	Supply, install, test, commission and set to work (To the full satisfaction of all parties to the contract) the following: -				
2.01a)	24-port Cisco switch as catalyst C9300-24P-A with cabinet Jumper Power Cord 250 VAC 13A C14-C15 connectors and required software. To also have SMARTINET 24X7X4 support, Network Advantage for an initial 1 year.	1	No.		Existing to be re-used
b)	GBIC transceiver modules (LC to LC) multimode CISCO make for the switches above	2	No.		
c)	Cisco Catalyst 93000 4 X 1GE Network Module C9300-NM-4-1G	1	No.		
d)	50CM Type 1 Stacking Cable STACK-T1-50CM	1	No.	Included in Switch	
e)	715W AC Contig 1 Power Supply PWR-C1-715WAC for 24 Port Switch	1	No.	Included in Switch	
2.02	Single Data cable outlets, type RJ45 as siemon, cat 6E complete with face plates.	9	No		
2.03	24 Port patch panel as siemon, type RJ45 Cat. 6A.	1	.		
2.04	UTP level 6A structured cables as siemon or approved equivalent in 305metre boxes	2	Rol ls		
2.05	UTP Cat, 6A patch cord, 3M as siemon or approved equivalent	9			
2.06	UTP Cat, 6A patch cord, 1M as siemon or approved equivalent	9	No. No.		
2.07	Data cable termination, both ends.	18	No.		
2.08	Cable organizer as Siemon 1 U.	5	No		
2.09	Allow for testing and commissioning of the installations.		.		
2.1	Allow for fixing permanent labels on all the equipment and cables.		Ite		
2.11	Power outlet for the switches, comprising 1 No. twin sockets, wiring in 2.5mm ² ring-main wiring, conduit, box and all accessories.	1	m		
2.12	Allow for structured cable termination at all security		Ite m		

	terminals, attendance in power connection, testing and commissioning of the network to TSD-ISN Standards.		No.		
2.13	300mmx300mmx150mm cable drawboxes complete with covers, screws etc	1	Item		
			No		
Total for Bill No. 2 Structured Cabling For Security Installations C/F to Collection Page					

**ENGINEERS BOARD OF KENYA, EBK
PROPOSED EBK OFFICE FIT OUT AT
BARABARA PLAZABILLS OF QUANTITIES
BILL No. J4: COMMUNICATION SERVICES INSTALLATIONS**

BILL NO. 3 - TELEPHONE INSTALLATIONS

ITEM No.	DESCRIPTION	QTY	UNIT	RATE (KShs Cts)	BQ AMOUNT (KShs Cts)
3.01	Fully programmable, High capacity IP PBX complete with an integral control unit/MDF assembly (if necessary), softwares and all required accessories as described in the Technical Specifications. The set to be fully configured. The IP PBX to have capacity for handling upto 50 direct lines and 300 extensions to be as Cisco Unified Communications or approved equivalent. Minimum warranty for equipment is 24months	1	NO		
3.02	Programmable IP telephone as Cisco 7821 or as	27	NO		Existing to be re-used
(ai)	approved (Existing)				
(aii)	Programmable IP telephone as Cisco 7821 or as	33	NO		Existing to be re-used
	approved (New)				
(bi)	Executive telephone set as Cisco 8851 or as approved, complete with Cisco 8851 Expansion Module (Existing)	3	NO	90,000.00	
(bii)	Executive telephone set as Cisco 8851 or as approved (New)	17	NO		
3.03	30A/240V Solar-tek hi-volt guard	1	NO		
3.04	Allow for termination of all the extention into the telephone sets	1	ITEM		
3.05	Allow for comprehensive programming (for customization of the telephone system to each of thr extensions) other tailor made program to user's needs, including conducting a general demonstration to all users and handling over of a completely operational installation and all manuals	1	ITEM		
3.06	Allow for liaison with CA for certification of the installed equipment and all licensing fees		Item		
3.07	Allow for acquiring of all the required licenses as per tailored client needs		Item		
3.08	Any other items necessary to complete the data cabling satisfactorily. Please list the items.				

	i) _____				
	ii) _____				
	Total for Bill No. 3: Telephone Installations C/F to Collection Page				

ENGINEERS BOARD OF KENYA, EBK
PROPOSED EBK OFFICE FIT OUT AT
BARABARA PLAZA BILLS OF QUANTITIES
BILL No. J4: COMMUNICATION SERVICES INSTALLATIONS

BILL NO. 4 - GENERAL ITEMS

ITEM No.	DESCRIPTION	QTY	UNIT	RATE (KShs Cts)	AMOUNT (KShs Cts)
4.00	Carry out comprehensive communications services tests and analysis, after installations. i) Record and print all the communications services system parameters. ii) Submit 3 copies of the printouts.		Item		
4.01	Allow for presentation of all the required samples as per specifications, Bills of Quantities and Drawings.		Item		
4.02	Prepare and submit Working Drawings as follows:- i) Draft soft copy in Archicad® and Autocad® in CD-RW. ii) Amended soft copy in Archicad® and Autocad® in CD-RW. iii) 5 Final soft copies in Archicad® and Autocad® in CD-RW to Architect, Client, Quantity Surveyor, and Engineer (2 copies) iv) 3 Draft hard-copies of Working Drawings in Ao (Scales 1:50, 1:25) to Engineer, Architect and Main Contractor. v) 2 Amended hard copies of Working Drawings in Ao (Scales 1:50 and 1:25) to Engineer, Architect and Main Contractor. vi) 11 No. Final hard copies of working drawings in Ao (Scales 1:50, 1:25) to Engineer (3 copies), Architect (1 copy), Quantity Surveyor (1 copy), Client (3 copies), Contractor (3 copies). (Note: Full set of drawings to be presented as per drawing list).		Item		
4.03	As item no. 4.02, but for Record (As-Installed) Drawings comprising: i) Fully dimensioned drawings of all plants and apparatus. ii) General arrangement drawings of equipment, plant etc. iii) Routes – types and sizes and arrangement of all pipework. iv) System schematics and trunking diagrams				

	showing all salient information relating to control and instrumentation. v) Grading charts vi) Wiring and piping diagrams of plant and apparatus. vii) Schematic diagram of individual plants and switch and control boards. viii) All the required operating instructions for all panels, boards, control panels etc.		Item		
Total C/F to Next Page					

**ENGINEERS BOARD OF KENYA, EBK
PROPOSED EBK OFFICE FIT OUT AT
BARABARA PLAZA BILLS OF QUANTITIES
BILL No. J4: COMMUNICATION SERVICES INSTALLATIONS**

BILL NO. 3 - GENERAL ITEMS

ITEM	DESCRIPTION	QTY	UNIT	RATE (KShs Cts)	AMOUNT (KShs Cts)
	Total B/F from Previous Page				
4.04	Prepare and submit Maintenance Manuals for all items installed.		Item		
4.05	Provide a year's (12 months') initial maintenance upon expiry of the Defects Liability Period. The maintenance to be carried out every quarter (3 months) for a period of 12 months including a comprehensive draft Service Level Agreement		Item		
4.06	Allow for careful removal of any existing communications installations on site and handing over to the client. This includes any incidental charges by service providers/vendors and liaison involved, filling of forms etc.		Item		
Total for Bill No. 4: General Items C/F to Collection Page					

ENGINEERS BOARD OF KENYA, EBK
PROPOSED EBK OFFICE FIT OUT AT
BARABARA PLAZA BILLS OF QUANTITIES
BILL No. J4: COMMUNICATION SERVICES INSTALLATIONS

COLLECTION PAGE

	DESCRIPTION	AMOUNT (KShs Cts)
S1.	Total for Bill No. 1: Structured Cabling Installations	
S2.	Total for Bill No. 2: Structured Cabling for Security Installations	
S3.	Total for Bill No. 3: Telephone Installations	
S4.	Total for Bill No. 4: General Items	
S5.	Sub -total	
S6.	Add 10% of the Sub-total above as Contingency	
Total for Bill No. J4: Communication Services Installations C/F to Summary Page		

PART J5:
BILLS OF QUANTITIES FOR
CCTV, SECURITY AND ACCESS CONTROL INSTALLATIONS

**PART J5: BILLS OF QUANTITIES FOR CCTV, SECURITY AND ACCESS CONTROL
INSTALLATIONS**

CONTENTS:

CLAUSE NO.	DESCRIPTION	PAGE NO.
1.	General Notes to Tenderers	J5/3
2.	Statement of Compliance	J5/5
3.	Bill No. 1: Access Control systems Installations	J5/6
4.	Bill No. 2: Security Alarm Installations	J5/8
5.	Bill No. 3: CCTV Installations	J5/10
6.	Bill No. 4: General Items	J5/12
7.	Collection Page	J5/14

BILLS OF QUANTITIES

1. General Note to Tenderers

- 1.1 The total of the prices in the summary of prices shall include for the whole of the Contract works in accordance with the specifications as defined before and shall be carried forward to Form of Tender.
- 1.2 Any prices omitted from any item, section or part of the price schedule shall be deemed to have included in another item, section or part.
- 1.3 The prices shall include for all obligations under the Contract including and not limited to:
 - a) Supply of any materials, equipment, apparatus, fittings, spares and tools
 - b) Insurance
 - c) Clearing and forwarding
 - d) Delivery, handling and storage at site
 - e) Packing for storage
 - f) Replacing any defective or damaged item
 - g) Installation
 - h) Testing
 - i) Painting
 - j) Commissioning
 - k) Maintenance during the defects liability period
- 1.4 The unit rates shall include import duty and VAT where applicable, and shall be expressed in Kenya Shillings.
- 1.5 Any tenderer whose firm uses the title “Engineer” or “Engineering” must provide evidence of registration of at least one of the directors by the Engineers Board of Kenya to avoid disqualification.
- 1.6 Any tenderer who fails to price the General items will be deemed to have allowed 5% of his tender price to cover these items, i.e. 5% of the total tender price will be deducted as preliminaries, if the tenderer does not enter specific prices against items of preliminary.
- 1.7 The Sub-contractor is instructed to read all the pages, and all the items of the Bills of Quantities very carefully. Should there be an apparent omission of words or figures, or should the sub-contractor be in doubt about the precise meaning of any word or figures, or for any reason whatsoever feel more clarification is necessary, either in the drawings or Bills of Quantities, to facilitate reasonable pricing of the tender document, he should inform the engineer at once so that the correct interpretation or clarification may be given before tendering. No liability will be accepted on mistakes and/or omissions which should have been corrected in the format above.
- 1.8 The specification should be priced in Kenya Currency i.e Shillings and cents.

- 1.9 The Sub-contract is for supplying, delivering, fixing/installing, testing, commissioning and setting to work to the full satisfaction of the Engineer/Architect and the Sub-contractor's price must include all cost for the entire process.
- 1.10 The Sub-contractor shall ensure that the highest standards of workmanship and highest quality materials are used at all times. Inferior workmanship and low quality materials shall be rejected and replaced at the Sub-contractors own cost.
- 1.11 The sub-contractors shall be solely responsible for the correct and accurate ordering of materials in accordance with the drawings and Bills of Quantities.
- 1.12 No claims on advance payment and/or materials off-site will be allowed unless the sub-contractor advances valid reasons acceptable to the employer. Should a claim on advance payment be allowed, the sub-contractor will be required to submit an Advance Payment Bond for the full value claimed.
- 1.13 The sub-contractor shall strictly follow the Main Contractor's programme of works and (the sub-contractor) must ensure that at no time does his activities cause delays to the Main Contractor.
- 1.14 This is a fixed price sub-contract, and the sub-contractor is expected to allow (in his unit rates) for generous fore-casts on fluctuations.
- 1.15 The Bills of Quantities shall be read in conjunction with Notes to All Tenderers, Preliminaries, General Specifications, Particular Specifications and all the relevant drawings.
- 1.16 A rate or price shall be entered against each item in the priced Bills of Quantities whether quantities are stated or not. The cost of items against which the sub-contractor has failed to enter a rate or price shall be deemed to be covered by other rates and prices entered in the Bills of Quantities.
- 1.17 The whole cost of complying with provisions of the sub-contract shall be included in the items provided in the Bills of Quantities, and where no items are provided, the cost shall be deemed to be distributed among the rates and prices entered for the related items of work.
- 1.18 Provisional sums and contingencies included and so designated in the Bills of Quantities shall be expended in whole or in part at the direction and discretion of the Engineer.

1 Statement of Compliance

- a) I confirm compliance of all clauses of the General Conditions, General Specifications, Particular Specifications, Technical Specifications in this tender.
- b) I confirm I have not made and will not make any payment to any person, which can be perceived as an inducement to win this tender.

Signed..... for and on behalf of the Tenderer

Date:

Official Rubber Stamp:

ENGINEERS BOARD OF KENYA, EBK
PROPOSED EBK OFFICE FIT OUT AT
BARABARA PLAZA BILLS OF QUANTITIES
BILL No. J5: CCTV, SECURITY AND ACCESS CONTROL INSTALLATIONS

BILL NO. 1: ACCESS CONTROL SYSTEM INSTALLATION

ITEM NO.	DESCRIPTION	QTY	UNIT	RATE	AMOUNT KShs. Cts.
	Supply, install, test, commission and set to work (To the full satisfaction of all parties to the contract) the following: -(Note: The entire Access Control System to be wired on UPS Supply)				
1.00 PREAMBLE					
	a) Total No. of double leaf doors.	4	No.		
	b) Total No. of single leaf doors.	8	No.		
	c) Details of doors, door handles, frames etc. to be confirmed with the Project Architects, Makro Consultancy APC.				
	d) Strike : Electric				
	<u>BILLS OF QUANTITIES</u>				
	Supply, install, test, commission and set to work the following: -				
1.01	Combination Biometric (Face and finger print) and proximity card reader system for Access Control (in and out operation). The readers should support both live face and finger detection, user capacity of 50,000 for face authentication and 100,000 for fingerprint, inbuilt reader for dual frequency access cards, 125kHz EM & 13.56MHz MIFARE, MIFARE Plus, DESFire EV1/EV2, FeliCa, 1.8 GHz Dual Core + 1.4 GHz Quad Core CPU, 16GB Flash + 2GB RAM, 7" IPS color LCD, Face recognition distance of 0.5m ~ 1.3m and matching speed of less than 0.5 sec., 500 dpi optical finger print reader with less than 0.0000001% false acceptance rate. Ethernet 10BaseT, RS-232/485, USB 2.0 and Wiegand interfaces. Door open switch and door strike inputs. NO/NC 5A relay for door control. 12V ~ 24V DC power supply complete with power supply cables. As Suprema FSF2-ODB or as approved by engineer, complete with the Slave/Exit terminal.	12	No.		Rate Only
Alt	Combination biometric terminal with face recognition, fingerprint and RFID card reader, EM-marine 125 kHz and Mifare 13.56 MHz readers, WiFi, 3G, 4G, Bluetooth, USB, TCP/IP communication interfaces, Face template memory: 6000, fingerprint pattern memory: 6000, ID card pattern memory: 10000, number of records: 1,000,000. as ZKTeco Horus E1-FP or approved equivalent, complete with Slave/Exit terminal.	12	No.		
1.02	Client Base Station - A dedicated slave computer 64 GB RAM/1TB HDD/17" SVGA non-radiation emitting screen/key board/mouse/ DVD	1	No.		

	RW. The computer to be supplied with all the associated software to run the entire Security network and to be complete with the Biometric/Card enroller for Access Control. Computer to be as Dell Vostro or HP or similar approved models (Provisional)				
1.03	Mortice door lock cylinder, complete with non-duplicatable key for each terminal, capable of operating the lock whether power is available or not.	12	No.		
Total C/F to Next Page					

ENGINEERS BOARD OF KENYA, EBK
PROPOSED EBK OFFICE FIT OUT AT
BARABARA PLAZA
BILLS OF QUANTITIES
BILL No. J5: CCTV, SECURITY AND ACCESS CONTROL INSTALLATIONS

BILL NO. 1: ACCESS CONTROL SYSTEM INSTALLATION

ITEM NO.	DESCRIPTION	QTY	UNIT	RATE	AMOUNT KShs. Cts.
	Total B/F from Previous Page				
1.04a)	Door handle. Please check with Architects first.	12	No.		
1.04b)	Electric door opener	12	No.		
1.04c)	Door MAGNET (500 kg) Res. Force.	12	No.		
1.04d)	Automatic door-closures as Union or approved equivalent	12	No.		
1.05	Supply proximity cards, each bearing photograph of individual staff member. Conduct tailor-made programming of each card as per Client's requirements. The cards to be complete with printing. (provisional to be confirmed by client)	200	No.		
1.06	Allow for associated cabling, installation, testing, commissioning, all accessories, customized programming, training and handing over.	1	Item		
1.07	Any other items necessary to complete the access control system satisfactorily. Please list the items 1. _____ 2. _____ 3. _____	1	Item		
1.08	Allow for 1-week dedicated training of the client nominees (Assume 10 No.) on the operations of the door access control system	1	Item		
Total for Bill No. 1: Access Control System Installations - C/F to Collection Page					

ENGINEERS BOARD OF KENYA, EBK
PROPOSED EBK OFFICE FIT OUT AT
BARABARA PLAZA BILLS OF QUANTITIES
BILL No. J5: CCTV, SECURITY AND ACCESS CONTROL INSTALLATIONS

BILL NO 2. SECURITY ALARM INSTALLATIONS

ITEM NO.	DESCRIPTION	QTY	UNIT	RATE	AMOUNT KShs. Cts.
2.00	Supply, install, test, commission and set to work (To the full satisfaction of all parties to the contract) the following: -				
2.01	Power supply to security alarm panel comprising 2A fused un-switched spur unit, wiring in 3 x 2.5 m ² SC-PVC-CU cables and all accessories.	1	No.		
2.02	48-zone security alarm panel, capable of being used with fixed panic buttons, motion sensors, smoke detectors, and remote panic buttons. (State make and type of the panel).	1	No.		
2.03		1	No.		
2.04	Security Alarm signal transceiver wired to the main security alarm panel	30	No.		
2.05	Long-life sealed battery array to give minimum 72-Hour back-up on sustained power failure. The battery unit to be complete with its own enclosure/ cubicle, and an automatic battery charger.	35	No.		
2.06		65	Points		
2.07	Spring loaded 10A double-knock panic buttons	1	Item		
2.08	wired to the main security alarm panel,	1	Item		
2.09	Peak-infra-red motion sensors, wired to the Control Panel.	1	Item		
2.10	Allow for wiring of all the points above to the main Security Alarm panel in fire-resistant/tamper-proof cables.				
	Installation charges				
	Communications Authority of Kenya Annual License.				
	Allow for providing 3-months, initial back up, prior to signing of back-up agreement.				
	Any other items (please specify)				
	1. _____				
	2. _____				
	3. _____				
Total C/F to Next Page					

**ENGINEERS BOARD OF KENYA, EBK
PROPOSED EBK OFFICE FIT OUT AT
BARABARA PLAZA
BILLS OF QUANTITIES
BILL No. J5: CCTV, SECURITY AND ACCESS CONTROL INSTALLATIONS**

BILL NO 2. SECURITY ALARM INSTALLATIONS

ITEM NO.	DESCRIPTION	QTY	UNIT	RATE	AMOUNT KShs. Cts.
	Total B/F from Previous Page				
2.11	Allow for wiring connection of the main fire alarm panel into the security alarm panel as a dedicated zone, and for the connection of the Security Alarm panel to the Main Building Security Panel.		Item		
2.12	Testing, commissioning, handing over of the installation, including conducting a demonstration to the client, including handing over maintenance/ operations manuals.		Item		
2.13	Remote Hand-held double-knock panic buttons wired to the security alarm panel.	12	No.		
Total for Bill No. 2 : Security Alarm Installations - C/F to Collection Page					

ENGINEERS BOARD OF KENYA, EBK
PROPOSED EBK OFFICE FIT OUT AT
BARABARA PLAZABILLS OF QUANTITIES
BILL No. J5: CCTV, SECURITY AND ACCESS CONTROL INSTALLATIONS

BILL. NO 3. CCTV INSTALLATIONS

Item No.	Description	Qty	Unit	Rate	Amount KSh. Cts.
	Supply, install, test, commission and set to work (To the full satisfaction of all parties to the contract) the following: -(Note: The entire CCTV System to be wired on UPS Supply)				
3.01	48-Channel NVR, Network Video Recorder with the following specs; 1. RAID 5/6, 2. Integrated video management, 3. H.265, MPEG-4 video compression, 4. Rack mount, 5. 4X12 TB storage, 6. remote Access, 7. external DVD/CD writer, USB 2.0, 8. PTZ control, 9. CCTV keyboard support, 10. 2 x Gigabit ethernet, 11. Webclient. 12. PoE Capabilities. This from a reputable make and to be approved.	1	No.		Existing to be re-used
3.02	IP Video Management System/Software client server for over 16 channels per station. To be full VMS. To have Multisite support, over 5 web connections, HD and SD resolution, Support for Windows 7/8/10, alarm management, Integration.		Item		
3.03	Client Base Station -19inch rack mount RAID 5, H.264, MPEG 4 compression, minimum 1080p support, 2x USB 2.0 port, 2x Gigabit LAN, 1TB memory, Remote access, PTZ control, CCTV keyboard support, Manual or automatic back-up, Minimum 8GB RAM	1	No.		
3.04	Cisco Router with support for variety of WAN connections, including xDSL, Ethernet, 3G/4G LTE, and fiber with inbuilt Encryption, VPN, firewall, and URL filtering and to be approved.	1	No.		Existing to be re-used
3.05	Vandal proof polycarbonate indoor/outdoor dome cover/bullet IP PoE digital camera as approved with the following specifications:- 3 axis Mini Dome (360° horizontal x 90° vertical) Powerful MPEG-4 Video compression. Supports up to 30 frames per second at full HD 1080p resolution ▪ Bidirectional G.711 and G.726 audio communication ▪ Synchronized full-duplex one channel audio and video ▪ Intelligent bit rate control (flexible for difficult network environments) ▪ Embedded streaming server and embedded Web Server ▪ Motion-detected and event-triggered alarm	9	No.		

**ENGINEERS BOARD OF KENYA, EBK
PROPOSED EBK OFFICE FIT OUT AT
BARABARA PLAZA BILLS OF QUANTITIES
BILL No. J5: CCTV, SECURITY AND ACCESS CONTROL INSTALLATIONS**

BILL NO. 3 – CCTV INSTALLATIONS

	DESCRIPTION				AMOUNT (KShs Cts)
	Total B/f from previous Page One (1) alarm input One (1) relay output ▪ 1/3 in. (8 mm) Sony Super HAD CCD 410K CCD Day-Night with IR cut filter varifocal lens 410K CCD standard varifocal lens 270K CCD fixed lens ▪ True Day-Night capability, without loss of resolution and/or clarity. User authentication 128-bit encrypted data stream (selectable, for added security)(State make and type, and enclose catalogues)		No.		
3.0 6	Anodized aluminium brackets, minimum 4mm thickness.	9	No.		
3.0 7	65inch LED HD screens as Sony, Samsung, LG and to be approved.	1	Item		
3.0 8	Training: Allow for conducting a 2-week Training on selected staff on the use of the CCTV system, including operational proficiency. Note: The training will only be considered complete after presenting assigned/stamped form from the client's authorized representative		Item		
3.0 9	Installation, Testing, commissioning and handing over Maintenance/Operations Manual for all equipment.				
3.1 0	Any other items to complete the CCTV Installation (please specify) _____ _____ _____ _____				
	Total for CCTV Installations C/F to collection page				

ENGINEERS BOARD OF KENYA, EBK
PROPOSED EBK OFFICE FIT OUT AT
BARABARA PLAZABILLS OF QUANTITIES
BILL No. J5: CCTV, SECURITY AND ACCESS CONTROL INSTALLATIONS

BILL NO. 4 – GENERAL ITEMS

Item No.	Description	Qty	Unit	Rate	Amount KSh. Cts.
4.01	Carry out comprehensive Access Control, security alarm,CCTV and electric fence Installation, tests and analysis after installation and present documentation:		item		
4.02	Allow for presentation of all the required samples as per specifications, Bills of Quantities and Drawings.		Item		
4.03	Prepare and submit Working Drawings as follows:- i) Draft soft copy in Archicad® and Autocad®in CD-RW. ii) Amended soft copy in Archicad® and Autocad® in CD-RW. iii) 5 Final soft copies in Archicad® and Autocad® in CD-RW to Architect, Client, Quantity Surveyor, and Engineer (2 copies) v) 2 Amended hard copies of Working Drawings in Ao (Scales 1:50 and 1:25) to Engineer, Architect and Main Contractor. vi) 11 No. Final hard copies of working drawings in Ao (Scales 1:50, 1:25) to Engineer (3 copies), Architect (1 copy), Quantity Surveyor (1 copy), Client (3 copies), Contractor (3 copies). iv) 3 Draft hard-copies of Working Drawings in Ao (Scales 1:50, 1:25) to Engineer, Architect and Main Contractor. (Note: Full set of drawings to be presented as per drawing list).		Item		
4.04	As item no. 4.03, but for Record (As-Installed) Drawings comprising: i) Fully dimensioned drawings of all plants and apparatus. ii) General arrangement drawings of equipment, plant etc. iii) Routes – types and sizes and arrangement of all pipework. iv) System schematics and trunking diagrams showing all salient information relating to control and instrumentation. v) Grading charts vi) Wiring and piping diagrams of plant and apparatus. vii) Schematic diagram of individual plants and switch and control boards. viii) All the required operating instructions		Item		

	for all panels, boards, control panels etc.				
Total C/F to next Page					

ENGINEERS BOARD OF KENYA, EBK
PROPOSED EBK OFFICE FIT OUT AT
BARABARA PLAZA BILLS OF QUANTITIES
BILL No. J5: CCTV, SECURITY AND ACCESS CONTROL INSTALLATIONS

BILL NO.5 GENERAL ITEMS

Item No.	Description	Qty	Unit	Rate (KSh)	Amount KShs. Cts.
	Total B/F from previous Page				
4.05	Prepare and submit Maintenance Manuals for all items installed.		Item		
4.06	Provide a year's (12 months') initial maintenance upon expiry of the Defects Liability Period. The maintenance to be carried out every quarter (3 months) for a period of 12 months, complete with a comprehensive draft Service Level Agreement.		Item		
4.07	<u>All other items</u> of general preliminary to cover, but not limited to:- i) Attendance on all other sub-contractors, such as for Communication Services, Mechanical Installations, Security Installations, Sound Equipment/ Wiring Installations, services etc. ii) Hiring and keeping a Supervisor/Foreman on site iii) Constant supervision of the works. iv) Provision of all the required spares. v) Testing and Inspection of materials/works. vi) Provision of labour camps. vii) Storage of materials. viii) Initial maintenance (During Defects Liability) ix) Providing water/electricity for the works. x) Protection of the works/materials xi) Clearing away on completion. xii) Preparing Final Account. xiii) Providing all Test Certificates, etc.		Item		
Total for Bill No. 4: General Items C/F to Collection Page					

**ENGINEERS BOARD OF KENYA, EBK
PROPOSED EBK OFFICE FIT OUT AT
BARABARA PLAZABILLS OF QUANTITIES
BILL No. J5: CCTV, SECURITY AND ACCESS CONTROL INSTALLATIONS**

COLLECTION PAGE:

ITEM	DESCRIPTION	AMOUNT KSHS. CTS.
S.01	Bill No. 1: Access Control systems Installations	
S.02	Bill No. 2: Security Alarm Installations	
S.03	Bill No. 3: CCTV Installations	
S.04	Bill No. 4: General Items	
S.05	Sub -total	
S.06	Add 10% of the Sub-total above as Contingency	
Total for Bill No. J5: Security Installations C/F to Summary Page for Electrical Installations and Associated Services		

PART J6:
BILLS OF QUANTITIESFOR
AUDIO VISUAL INSTALLATIONS

PART J6: BILLS OF QUANTITIES FOR AUDIO VISUAL INSTALLATIONS

CONTENTS:

CLAUSE NO.	DESCRIPTION	PAGE NO.
1.	General Notes to Tenderers	J6/3
2.	Statement of Compliance	J6/5
3.	Bill No. 1: Audio Visual Installations	J6/6
4.	Bill No. 2: Video Conferencing	J6/8
5.	Bill No. 3: General Items	J6/9
6.	Collection Page	J6/11

BILLS OF QUANTITIES

1. General Note to Tenderers

- 1.1 The total of the prices in the summary of prices shall include for the whole of the Contract works in accordance with the specifications as defined before and shall be carried forward to Form of Tender.
- 1.2 Any prices omitted from any item, section or part of the price schedule shall be deemed to have included in another item, section or part.
- 1.3 The prices shall include for all obligations under the Contract including and not limited to:
- a) Supply of any materials, equipment, apparatus, fittings, spares and tools
 - b) Insurance
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 - e) Packing for storage
 - f) Replacing any defective or damaged item
 - g) Installation
 - h) Testing
 - i) Painting
 - j) Commissioning
 - k) Maintenance during the defects liability period
- 1.4 The unit rates shall include import duty and VAT where applicable, and shall be expressed in Kenya Shillings.
- 1.5 Any tenderer whose firm uses the title “Engineer” or “Engineering” must provide evidence of registration of at least one of the directors by the Engineers Board of Kenya to avoid disqualification.
- 1.6 Any tenderer who fails to price the General items will be deemed to have allowed 5% of his tender price to cover these items, i.e. 5% of the total tender price will be deducted as preliminaries, if the tenderer does not enter specific prices against items of preliminary.
- 1.7 The Sub-contractor is instructed to read all the pages, and all the items of the Bills of Quantities very carefully. Should there be an apparent omission of words or figures, or should the sub-contractor be in doubt about the precise meaning of any word or figures, or for any reason whatsoever feel more clarification is necessary, either in the drawings or Bills of Quantities, to facilitate reasonable pricing of the tender document, he should inform the engineer at once so that the correct interpretation or clarification may be given before tendering. No liability will be accepted on mistakes and/or omissions which should have been corrected in the format above.
- 1.8 The specification should be priced in Kenya Currency i.e Shillings and cents.

- 1.9 The Sub-contract is for supplying, delivering, fixing/installing, testing, commissioning and setting to work to the full satisfaction of the Engineer/Architect and the Sub-contractor's price must include all cost for the entire process.
- 1.10 The Sub-contractor shall ensure that the highest standards of workmanship and highest quality materials are used at all times. Inferior workmanship and low quality materials shall be rejected and replaced at the Sub-contractors own cost.
- 1.11 The sub-contractors shall be solely responsible for the correct and accurate ordering of materials in accordance with the drawings and Bills of Quantities.
- 1.12 No claims on advance payment and/or materials off-site will be allowed unless the sub-contractor advances valid reasons acceptable to the employer. Should a claim on advance payment be allowed, the sub-contractor will be required to submit an Advance Payment Bond for the full value claimed.
- 1.13 The sub-contractor shall strictly follow the Main Contractor's programme of works and (the sub-contractor) must ensure that at no time does his activities cause delays to the Main Contractor.
- 1.14 This is a fixed price sub-contract, and the sub-contractor is expected to allow (in his unit rates) for generous fore-casts on fluctuations.
- 1.15 The Bills of Quantities shall be read in conjunction with Notes to All Tenderers, Preliminaries, General Specifications, Particular Specifications and all the relevant drawings.
- 1.16 A rate or price shall be entered against each item in the priced Bills of Quantities whether quantities are stated or not. The cost of items against which the sub-contractor has failed to enter a rate or price shall be deemed to be covered by other rates and prices entered in the Bills of Quantities.
- 1.17 The whole cost of complying with provisions of the sub-contract shall be included in the items provided in the Bills of Quantities, and where no items are provided, the cost shall be deemed to be distributed among the rates and prices entered for the related items of work.
- 1.18 Provisional sums and contingencies included and so designated in the Bills of Quantities shall be expended in whole or in part at the direction and discretion of the Engineer.

1 Statement of Compliance

- a) I confirm compliance of all clauses of the General Conditions, General Specifications, Particular Specifications, Technical Specifications in this tender.
- b) I confirm I have not made and will not make any payment to any person, which can be perceived as an inducement to win this tender.

Signed..... for and on behalf of the Tenderer

Date:

Official Rubber Stamp:

ENGINEERS BOARD OF KENYA, EBK
PROPOSED EBK OFFICE FIT OUT AT
BARABARA PLAZA
BILLS OF QUANTITIES
BILL No. J6: AUDIO VISUAL

ITEM NO.	DESCRIPTION	QTY	UNIT	RATE (KShs Cts)	AMOUNT (KShs Cts)
	Supply, install, test, commission and set to work (To the full satisfaction of all the parties to the contract) the following:- (State make and type of all the equipment supplied) Note: Entire AV System to be connected to UPS Power Supply)				
1.01a)	Interactive SMART screen 98 inch with dual pen functionality, smart display, wireless capability and Video Conference ready. To be complete with smart meeting pro software and 24months warranty, 4K UHD resolution (Android installed, Dual OS supported) as Spectron UDX - 98S, Sony, or equivalent and to be approved.	1	No.		
1.01b)	Interactive 65" LED Display, UHD (4k), (Android + Windows installed - Dual OS supported) as Spectron UDX - 65S, Sony or approved equivalent	3	No.		
	Note: Bidder to attach Manufacturer's letter of Authority (Dealer Authorization Certificate) and detailed catalogues showing technical specifications				
1.02	98 inches LED Full HD smart screen as Sony, Samsung, or approved equivalent, suitable for Video conferencing	1	No.		
1.03	Universal TV mount with swivel	5	No.		
1.04	10M HDMI cables	5	no.		
1.05	10M power cables complete in 10m trunking, termination plates	5	No.		
1.06a)	Rack Mount Digital Modular Mixer; 8 Bus, 8 output configuration (912 x 8 matrix)	4	No.		
b)	Stereo Power Amplifier 2 x 600W	4	No.		
1.07	Ceiling/wall recessed 2-way Bass Reflex Loudspeakers 100w rated input complete with brackets	12	No.		
1.08a)	UHF Wireless Microphone System with receiver and Transmitter – Lapel	5	No.		
b)	As (a) above but desktop/table mounted	15	No.		
1.09	UHF Wireless Microphone System with receiver and Transmitter – Handheld	5	No.		
1.10	19" Rack Blue Ray Player with Built-in Wi-Fi + Remote Control + High-Speed HDMI Cable, W/Ethernet, Lens Cleaner as sony or approved equivalent	4	No.		
1.11	19" Equipment Rack	4	No.		
Total C/F to Next Page					

ENGINEERS BOARD OF KENYA, EBK
PROPOSED EBK OFFICE FIT OUT AT
BARABARA PLAZA
BILL No. J6: AUDIO VISUAL INSTALLATIONS

ITEM No.	DESCRIPTION	QTY	UNIT	RATE (KShs Cts)	AMOUNT (KShs Cts)
	Total B/F from Previous Page				
1.12	22" Digital Meeting Room Signage as Janus or approved equivalent, complete with software. To be able to integrate with multiple calendar and timetabling systems For all the above, State:- Make of equipment on offer _____ Country of origin _____ Number of institutions already using this type of equipment in Kenya _____ (A technical brochure and product catalogues must be enclosed)	4	No.		
1.13	End user Training for up to 20 staff members	1	Item		
1.14	30A/240V Sollatek hi-volt guard.	4	No.		
1.15	Allow for all the wiring for the above equipment onto the UPS System		Item		
1.16	Allow for comprehensive testing and commissioning, then tailor made programming to user's needs, including conducting a detailed training and demonstration to all users and handing over of a completely operational installation and all manuals.	1	Item		
1.17	Warranty: The warranty period for the workmanship, all materials and the equipment installed will be ___ months after commissioning. (Note: A minimum of 24 calendar months will be accepted. During warranty, all defective workmanship/materials will be replaced free of cost.	1	Item		
1.18	65 inches LED Full HD smart screen as Sony, Samsung, or approved equivalent, complete with decoder etc	4	No.		
1.19	Any other items to complete the installation satisfactorily. Please state. _____ _____ _____	1	Item		

Total for Bill No. 1: Audio Visual Equipment Installation C/F to Collection Page	

ENGINEERS BOARD OF KENYA, EBK
PROPOSED EBK OFFICE FIT OUT AT
BARABARA PLAZA
BILLS OF QUANTITIES
BILL No. J6: AUDIO VISUAL
INSTALLATIONS BILL NO. 2 - VIDEO

ITEM No.	DESCRIPTION	QTY	UNIT	RATE (KShs Cts)	AMOUNT (KShs Cts)
CONFERRING EQUIPMENT					
	Supply, install, test, commission and set to work (To the full satisfaction of all the parties to the contract) the following:- (State make and type of all the equipment supplied) All display screens are available				
2.01	Poly G7500 4k (Codec + EagleEye IV 12x camera) -Wireless Presentation System, Eagle Eye IV-12x cam, IP Mic, remote, Touch control NTSC/PAL; Cables: 2 HDMI 1.8m, 1 CAT 5E LAN 3.6m, 1 CAT 5E SHLD 25ft, 1 HDCI 6ft, 1 HDCI Mini 3m, As Part No. 7200-85760-102; OR APPROVED EQUIVALENT, complete with Wall Mount kit, any other item necessary to complete the installation and One Year Partner Premier	1	No.		
	Note: Bidder to attach Manufacturer's letter of Authority (Dealer Authorization Certificate) and detailed catalogues showing technical specifications				
2.02	Meeting Owl 3 room kit complete with 360° panoramic fisheye camera, 1080p HD resolution, and all other features as per the attached specifications complete with any other item necessary to complete the installation	3	No.		
2.03	End user Training for up to 20 staff members	1	Item		
Total for Bill No. 2: Video Conferencing Installation C/F to Collection Page					

ENGINEERS BOARD OF KENYA, EBK
PROPOSED EBK OFFICE FIT OUT AT
BARABARA PLAZA
BILLS OF QUANTITIES
BILL No. J6: AUDIO VISUAL
INSTALLATIONS BILL NO. 3 -

ITEM No.	GENERAL ITEMS	DESCRIPTION	QTY	UNIT	RATE (KShs Cts)	AMOUNT (KShs Cts)
3.01		Carry out comprehensive Audio Visual Equipment Installations tests and analysis, after installations. i) Record and print all the Communication services system parameters. ii) Submit 3 copies of the printouts. (Note: Parameters must be satisfactory before power is switched on).		Item		
3.02		Allow for presentation of all the required samples as per specifications, Bills of Quantities and Drawings.		Item		
3.03		Prepare and submit Working Drawings as follows:- i) Draft soft copy in Archicad® and Autocad® in CD-RW. ii) Amended soft copy in Archicad® and Autocad® in CD-RW. iii) 5 Final soft copies in Archicad® and Autocad® in CD-RW to Architect, Client, Quantity Surveyor, and Engineer (2 copies) iv) 3 Draft hard-copies of Working Drawings in Ao (Scales 1:50, 1:25) to Engineer, Architect and Main Contractor. v) 2 Amended hard copies of Working Drawings in Ao (Scales 1:50 and 1:25) to Engineer, Architect and Main Contractor. vi) 11 No. Final hard copies of working drawings in Ao (Scales 1:50, 1:25) to Engineer (3 copies), Architect (1 copy), Quantity Surveyor (1 copy), Client (3 copies), Contractor (3 copies). (Note: Full set of drawings to be presented as per drawing list).		Item		
3.04		As item no 3.03, but for Record (As-Installed) Drawings comprising: i) Fully dimensioned drawings of all plants and apparatus. ii) General arrangement drawings of equipment, plant etc.				
Total C/F to Next Page						

ENGINEERS BOARD OF KENYA, EBK
PROPOSED EBK OFFICE FIT OUT AT
BARABARA PLAZA
BILLS OF QUANTITIES
BILL No. J6: AUDIO VISUAL
INSTALLATIONS BILL NO. 3 -

ITEM No.	GENERAL ITEMS	DESCRIPTION	QTY	UNIT	RATE (KShs Cts)	AMOUNT (KShs Cts)
		Total B/F from Previous Page				
		iii) Routes – types and sizes and arrangement of all pipework.				
		iv) System schematics and trunking diagrams showing all salient information relating to control and instrumentation.				
		v) Grading charts				
		vi) Wiring and piping diagrams of plant and apparatus.				
		vii) Schematic diagram of individual plants and switch and control boards.		Item		
		viii) All the required operating instructions for all panels, boards, control panels etc.		Item		
3.05		Prepare and submit Maintenance Manuals for all items installed.		Item		
3.06		Provide a year's (12 months') initial maintenance upon expiry of the Defects Liability Period. The maintenance to be carried out every quarter (3 months) for a period of 12 months.		Item		
3.07		Allow for full CA inspection, certification and approval of the entire installation.		Item		
Total for Bill No. 3 C/F to Collection Page						

**ENGINEERS BOARD OF KENYA, EBK
PROPOSED EBK OFFICE FIT OUT AT
BARABARA PLAZA
BILLS OF QUANTITIES
BILL No. J6: AUDIO VISUAL INSTALLATIONS**

COLLECTION PAGE:

ITEM	DESCRIPTION	Amount KSh. Cts.
S.01	Bill No. 1: Audio Visual Installations	
S.02	Bill No. 2: Video Conferencing	
S.03	Bill No. 3: General Items	
S.04	Sub -total	
S.05	Add 10% of the Sub-total above as Contingency	
Total for Bill No. J6: Audio Visual Installations C/F to Summary Page for Electrical Installations and Associated Services		

ENGINEERS BOARD OF KENYA, EBK
PROPOSED EBK OFFICE FIT OUT AT BARABARA PLAZA
BILLS OF QUANTITIES
ELECTRICAL INSTALLATIONS AND ASSOCIATED SERVICES

SUMMARY PAGE

ITEM	DESCRIPTION	BQ AMOUNT KSHS. CTS.
1	Electrical Installations, J1	
2	Fire Detection and Alarm Installations, J2	
3	UPS Installations, J3	
4	Communication Installations, J4	
5	CCTV, Security and Access Control Installations, J5	
6	Audio Visual Installations, J6	
	TOTAL FOR ELECTRICAL INSTALLATIONS AND ASSOCIATED SERVICES C/F TO VOLUME 1 PAGE GS1	

J7 - SUMMARY



REPUBLIC OF KENYA

MINISTRY OF ROADS AND TRANSPORT.

**STATE DEPARTMENT OF ROADS.
ENGINEERS BOARD OF KENYA. (EBK)**

HORN OF AFRICA GATEWAY DEVELOPMENT PROJECT (HOAGDP)

OFFICES PARTITIONING AT BARABARA PLAZA

**VOLUME THREE OF THREE, COMPRISING BILL OF QUANTITIES FOR
F: -**

- **Mechanical Ventilation and Air Conditioning Installations**
 - **Plumbing, drainage, and Fire Fighting**

**See volumes: ONE and TWO for, Builders Works &Electrical
Services.**

**RFB NO. : KE-SDOI-213607-CW-RFB
Project No.: P161305
CLOSES ON: 22ND NOVEMBER 2023**

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5. PART C: Particular Specifications for Plumbing & Drainage Installations	C/1-C/4
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8. PART G: Bill of Quantities for Barabara Plaza	G
9. PART G1: Bill of Quantities of Mechanical Ventilation and Airconditioning Installations	G1/1-G1/21
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12. PART H: Schedule of Drawings	H/1-H/3

OCTOBER, 2023

ENGINEERS BOARD OF KENYA (EBK)
PROPOSED OFFICES PARTITIONING AT BARABARA
PLAZA MECHANICAL INSTALLATIONS AND
ASSOCIATED SERVICES

SPECIAL NOTES FOR ALL TENDERERS:

- Important:** **The sites for the proposed works are existing and occupied buildings with a number of existing services. The Sub-contractor will be required to ensure the existing services are not interfered with throughout the entire period of this exercise. The sub-contractor will be required to take all precaution and care so that no damage will occur to the existing installations on site. The sub- contractor is also advised to secure all the necessary insurance policies as he will be solely held responsible for any damages to the existing system, injuries to persons resulting from his activities and/or interference with normal operations of the building that may result from his negligence, actions or otherwise.**
1. These notes shall form part of the specifications.
 2. The tenderer is required to check the number of pages in this document and should any be found to be missing or the figures indistinct, he must inform the Engineers at once and have the same rectified. Should the tenderer be in doubt about the precise meaning of any item, word or figures, or for any reason whatsoever observe any apparent omission of words or figures, he must inform the Engineer in order that the correct meaning may be decided upon before the date for the submission of the tenders.
 3. No liability whatsoever will be admitted nor claim allowed in respect of errors in the completed tender due to mistakes in this document which should have been rectified in the manner described above.
 4. The tenderer shall not alter or otherwise qualify the text of this specification. Any alteration or qualification made without authority will be ignored and the text of the specification as printed will be adhered to.
 5. The tenderer shall be deemed to have made allowances in his unit prices generally to cover items of preliminaries or additions to Prime cost Sums or other items, if those have not been priced against the respective items.
 6. The tenderer's price shall include all government taxes including duties, V.A.T. etc. No claims whatsoever will be allowed in respect of duties, VAT etc if the tenderer fails to include them in his unit prices. It is also to be noted that VAT will be included in the unit rates and NOT worked out as a percentage of the total.
 7. In no case will any expenses incurred by the tenderer in preparation of this tender be reimbursed.
 8. The copyright of this specification is vested in the Engineers and no part thereof may be reproduced without their express permission, given in writing.
 9. The specifications must be priced in Kenya Currency i.e. Shillings and Cents.
 10. The quantities given in the Bill of Quantities are for guidance only. Precise re-measurements will be done at the end of the contract and the sub-contractor will only be paid for the actual work done.
 11. The works shall be carried out in accordance with provisions of the most current Kenya Standards governing such works, and relevant provisions. The sub-contractor is also presumed to be familiar with the standard General Specifications governing such works; a copy can however be obtained from our office any working day. The Particular Specifications have been detailed in the drawings and Bills of Quantities, but the sub- contractor is advised to seek clarification from the Engineers on any matter whatsoever where he has the slightest of

doubts.

12. The proposed domestic sub-contractors **MUST** be approved by the Services Engineers before commencement of Work. In any case the name of the Domestic Sub-contractor submitted does not meet the above qualifications then the bidder will submit another name to the satisfaction of the Services Engineers and the Client. Once the domestic sub-contractor is approved by the Services Engineers then they can only be replaced with the written approval of the Services Engineers and the Client.
13. Prior to accepting any domestic sub-contractor proposed by the Main contractor, the Mechanical Engineer and the Client shall conduct comprehensive due diligence on the proposed firm including physical inspection of their offices, interview with the directors, management and the technical staff of the proposed firm, inspection of their equipment to be used on the project, and visits to at least three (3) successfully completed projects by the proposed firm where confidential reports/comments will be invited from the owners/users of the completed projects.
14. Preliminaries for this sub-contract to be included in the Main-Contract (Volume One)
15. The domestic sub-contractors **MUST** meet the following qualifications:

i) Mechanical Ventilation and Airconditioning Installations

- Show proof of Registration under the Kenya's Company Act.
- Show proof of Registration with the National Construction Authority, NCA 2 and above.
- Show Proof of Technical Competence of key staff. Submit detailed CVs showing names and qualifications and a list of projects handled.
- Proof of at least **Three** projects completed in the last Five years relevant to this sub-contract in both complexity and magnitude. The projects submitted must have minimum sub-contract values of Ksh. 15 Million or more for Mechanical Ventilation and Airconditioning Installations. Include referees (Contact Persons and their telephone contacts)
- Show proof of Tax Compliance with Kenya Revenue Authority.
- Show copies of VAT and PIN Certificates

ii) Plumbing, Drainage and Firefighting Installations

- Show proof of Registration under the Kenya's Company Act.
- Show proof of Registration with the National Construction Authority, NCA 2 and above.
- Show Proof of Technical Competence of key staff. Submit detailed CVs showing names and qualifications and a list of projects handled.
- Proof of at least **Three** projects completed in the last Five years relevant to this sub-contract in both complexity and magnitude. The projects submitted must have minimum sub-contract values of Ksh. 2 Million or more for Plumbing, Drainage and Firefighting Installations. Include referees (Contact Persons and their telephone contacts)
- Show proof of Tax Compliance with Kenya Revenue Authority.
- Show copies of VAT and PIN Certificates

Signed (As in Tender) **Date/Stamp**

DEFINITIONS

The following terms and expressions used in the Sub-Contract document shall have the following meanings:

Employer	Engineers Board of Kenya Fortis Suites, 9th floor, Upper Hill, Hospital Road P.O. Box 30324-00100 NAIROBI.
Architect	Makro Consultancy Ltd., P.O. Box 5461-00506, NAIROBI.
Quantity Surveyor	Beeque Consultants Ltd. P. O. Box 3280-00200, NAIROBI.
Electrical/Mechanical Engineer	Feradon Associates Ltd., Consulting Engineers, P.O. Box 7375-0030, NAIROBI.

PART A:

GENERAL SPECIFICATIONS FORMECHANICAL INSTALLATIONS

PART A: GENERAL SPECIFICATIONS FOR MECHANICAL

	CLAUSE	DESCRIPTION	PAGE
1.	General		A/2
2.	Quality of Materials		A/2
3.	Regulations and Standards		A/2
4.	Electrical Requirements		A/3
5.	Transport and Storage		A/3
6.	Site Supervision		A/3
7.	Installation		A/4
8.	Testing		A/4
9.	Colour Coding		A/5
10.	Welding		A/5

PART A: GENERAL SPECIFICATIONS FOR MECHANICAL

1 General

This section specifies the general requirement for plant, equipment and materials forming part of the Sub-contract Works and shall apply except where specifically stated elsewhere in the Specification or on the Contract Drawings.

2 Quality of Materials

All plant, equipment and materials supplied as part of the Sub-contract Works shall be new and of first class commercial quality, shall be free from defects and imperfections and where indicated shall be of grades and classifications designated herein.

All products or materials not manufactured by the Sub-contractor shall be products of reputable manufacturers and so far as the provisions of the Specification is concerned shall be as if they had been manufactured by the Sub-contractor.

Materials and apparatus required for the complete installation as called for by the Specification and Contract Drawings shall be supplied by the Sub-contractor unless mention is made otherwise.

Materials and apparatus supplied by others for installation and connection by the Sub-contractor shall be carefully examined on receipt. Should any defects be noted, the Sub-contractor shall immediately notify the Engineer.

Defective equipment or that damaged in the course of installation or tests shall be replaced as required to the approval of the Engineer.

3 Regulations and Standards

The Sub-contract Works shall comply with the current editions of the following:

- a) The Kenya Government Regulations.
- b) National Fire Protection Association (NFPA)
- c) The United Kingdom Chartered Institute of Building Services Engineers (CIBSE) Guides.
- d) British Standard and Codes of Practice as published by the British Standards Institution (BSI)
- e) The Local Council By-laws.
- f) American Society of Heating, Refrigeration and Airconditioning Engineers (ASHRAE)
- g) Local Authority By-laws.
- h) The Kenya Building Code Regulations.
- i) The Kenya Bureau of Standards

4 Electrical Requirements

Plant and equipment supplied under this Sub-contract shall be complete with all

necessary motor starters, control boards, and other control apparatus. Where control panels incorporating several starters are supplied they shall be complete with a main isolator.

The supply power up to and including local isolators shall be provided and installed by the Electrical Sub-contractor. All other wiring and connections to equipment shall form part of this Sub-contract and be the responsibility of the Sub-contractor.

The Sub-contractor shall supply three copies of all schematic, cabling and wiring diagrams for the Engineer's approval.

The starting current of all electric motors and equipment shall not exceed the maximum permissible starting currents described in the local power authority by-laws.

All electrical plant and equipment supplied by the Sub-contractor shall be rated for the supply voltage and frequency obtained in Kenya, that is 415 Volts, 50Hz, 3-Phase or 240Volts, 50Hz, 1-phase.

Any equipment that is not rated for the above voltages and frequencies shall be rejected by the Engineer.

5 Transport and Storage

All plant and equipment shall, during transportation be suitably packed, crated and protected to minimize the possibility of damage and to prevent corrosion or other deterioration.

On arrival at site all plant and equipment shall be examined and any damage to parts and protective priming coats made good before storage or installation.

Adequate measures shall be taken by the Sub-contractor to ensure that plant and equipment do not suffer any deterioration during storage.

Prior to installation all piping and equipment shall be thoroughly cleaned.

If, in the opinion of the Engineer any equipment has deteriorated or been damaged to such an extent that it is not suitable for installation, the Sub-contractor shall replace this equipment at his own cost.

6 Site Supervision

The Sub-contractor shall ensure that there is an English-speaking supervisor on the site at all times during normal working hours.

7 Installation

Installation of all special plant and equipment shall be carried out by the Sub-contractor under adequate supervision from skilled staff provided by the plant and equipment manufacturer or his appointed agent in accordance with the best standards of modern practice and to the relevant regulations and standards described under Clause 3 of this Section.

8 Testing

8.1 General

The Sub-contractor's attention is drawn to "Preliminaries and General Conditions".

8.2 Material Tests

All material for plant and equipment to be installed under this Sub-contract shall be tested, unless otherwise directed, in accordance with the relevant BS Specification concerned.

For materials where no BS Specification exists, tests are to be made in accordance with the best modern commercial methods to the approval of the Engineer, having regard to the particular type of the materials concerned.

The Sub-contractor shall prepare specimens and performance tests and analyses to demonstrate conformance of the various materials with the applicable standards.

If stock material, which has not been specially manufactured for the plant and equipment specified is used, then the Sub-contractor shall submit satisfactory evidence to the Engineer that such materials conform to the requirements stated herein in which case tests of material may be partially or completely waived.

Certified mill test reports of plates, piping and other materials shall be deemed acceptable.

8.3 Manufactured Plant and Equipment – Work Tests

The rights of the Engineer relating to the inspection, examination and testing of plant and equipment during manufacture shall be applicable to the Insurance Companies or Inspection Authorities so nominated by the Engineer.

The Sub-contractor shall give two week's notice to the Engineer of the manufacturer's intention to carry out such tests and inspections.

The Engineer or his representative shall be entitled to witness such tests and inspections. The cost of such tests and inspections shall be borne by the Sub-contractor.

Six copies of all test and inspection certificates and performance graphs shall be submitted to the Engineer for his approval as soon as possible after the completion of such tests and inspections.

8.4 Pressure Testing

All pipework installations shall be pressure tested in accordance with the requirements of the various sections of this Specification. The installations may be tested in sections to suit the progress of the works but all tests must be carried out before the work is buried or concealed behind building finishes. All tests must be witnessed by the Engineer or his representative and the Sub-contractor shall give 48 hours notice to the Engineer of his intention to carry out such tests.

Any pipework that is buried or concealed before witnessed pressure tests have been carried out shall be exposed at the expense of the Sub-contractor and the specified tests shall then be applied.

The Sub-contractor shall prepare test certificates for signature by the Engineer and

shall keep a progressive and up-to-date record of the section of the work that has been tested.

9 Colour Coding

Unless stated otherwise in the Particular Specification all pipework shall be colour coded in accordance with the latest edition of BS 1710 and to the approval of the Engineer or Architect.

10.0 Welding

10.1 Preparation

Joints to be made by welding shall be accurately cut to size with edges sheared, flame cut or machined to suit the required type of joint. The prepared surface shall be free from all visible defects such as lamination, surface imperfection due to shearing or flame cutting operation, etc., and shall be free from rust scale, grease and other foreign matter.

10.2 Method

All welding shall be carried out by the electric arc processing using covered electrodes in accordance with BS 639.

Gas welding may be employed in certain circumstances provided that prior approval is obtained from the Engineer.

10.3 Welding Code and Construction

All welded joints shall be carried out in accordance with the following Specifications:

a) Pipe Welding

All pipe welds shall be carried out in accordance with the requirements of BS806.

b) General Welding

All welding of mild steel components other than pipework shall comply with the general requirements of BS 1856.

10.4 Welder's Qualifications

Any welder employed on this Sub-contract shall have passed the trade tests as laid down by the Government of Kenya.

The Engineer may require to see the appropriate certificate obtained by any welder and should it be proved that the welder does not have the necessary qualifications the Engineer may instruct the Sub-contractor to replace him by a qualified welder.

PART B: GENERAL
SPECIFICATIONS
FOR
AIR CONDITIONING & MECHANICAL VENTILATION

PART B: GENERAL SPECIFICATIONS FOR AIR-CONDITIONING & MECHANICAL VENTILATION

CLAUSE	DESCRIPTION	PAGE
1.	General	B/3
2.	Ductwork	B/4 – B/11
3.	Thermometers and Pressure Gauge.	B/12- B/16
4.	Electrical Services	B/16- B/20
5.	Specification for Air Conditioning Units	B/20 – B/22

PART B: GENERAL SPECIFICATIONS FOR AIR-CONDITIONING & MECHANICAL VENTILATION

1.0 General

This section covers the supply and installation of ventilation and air-conditioning equipment and fittings.

The following specification is the General Specification for the Mechanical Ventilation sub-contract, and shall be read in conjunction with the Bills of Quantities, and the Drawings.

Where proprietary materials are specified, the sub-contractor may propose alternatives for the consideration of the Engineer, but the written approval of the Engineer must be obtained prior to the use of such an alternative. The centrifugal fan type shall have blades of die-cast aluminum.

1.1 Supply Centrifugal Fan Unit

The Contractor shall supply, install, test and commission In-line centrifugal supply fan unit as set out in the equipment schedules shown in the end of this Specification.

The unit shall be selected to suit the type of roof structure on which it will be mounted or to the approval of the Engineer.

The unit shall be fully tropicalized for temperatures up to 50°C and relative humidity up to 100%.

A flat square wire guard shall be supplied to close off the opening in the gable where this is required.

Bird's guards shall be provided to prevent entry of birds via air discharge openings.

Motor and fan, and housing shall all be suitably isolated with respect to vibration.

The motor shall be the totally enclosed type, single phase. It shall be metric, ball bearing, squirrel cage induction type, for direct on-line starting. All motors shall have Class F insulation, the motor ratings shall comply generally with B.S. 5000:1973 and IEC 34.1, with protection to IEC 34.5 Group IP54. The motors shall be provided with overheat protection. The motor bearings shall be prefabricated for 30000 hours running or five years' intermittent use.

Where lubricators are fitted, the motors shall be re-lubricated after two years. Then

fan to be as S&P or Systemair.

1.2 Filtration

The extract fan shall be fitted, on its upstream side, suitable filter complete with housing.

Panel or unit filters shall only be used up to air flow of 6m³/sec. Dry replaceable media types shall be used, and shall be sized according to the manufacturers' instructions. Advancement of the media shall be controlled by a pressure differential switch. Sizing of the unit shall be such that the media requires replacement approximately every six months.

2.0 DUCTWORK

2.1 General Requirements

The Mechanical Ventilation and Airconditioning Contractor shall prepare and submit detailed ductwork drawings to the Engineer for approval in accordance with Clause 1B.6 of this Specification.

All duct sizes indicated on the Drawings refer to inside dimensions.

Ductwork joints shall be square with all sharp edges removed.

Sheet metal shall be rigidly supported and braced to prevent vibration.

Ducts and hangers shall be installed straight, plumb and level.

Ductwork shall be routed directly with a minimum of directional changes and abrupt transition.

Adequate space shall be provided around ducts to ensure proper support and to allow the installation of the specified insulation.

Diverting vanes shall be installed at branches connected into the main duct without a neck.

Fairings shall be provided where pipes or structures penetrate ducts. When the fairing is longer than 500mm the original velocity shall be maintained. When the fairing is shorter than 500mm the velocity may be increased by not more than 10 percent.

Turning vanes shall be provided in elbows whose center lines radius is less than 150 percent of the duct width, or where indicated on the Drawings.

Duct bracing and supports indicated are the minimum acceptable.

Additional bracing or supports shall be installed to eliminate any distortion or vibration when the systems are either in operational or under test.

All connections between ductwork, including flexible connections, fittings and equipment, shall be made with gradually tapered transition fittings.

2.2 Ductwork

In general all HVAC ductwork, stack heads, register boots, supply air transitions, plenums etc., shall be galvanized steel metal of the gauges and construction hereinafter specified.

All ductwork shall be installed in compliance with the most recent editions of NFPA 90 and 90A and all relevant codes and ordinances. Transitions shall be fabricated with a combined angle not greater than 2.12.1.5 degrees.

Branch take-off fittings (top, bottom and side) shall be fabricated with a throat area equal to 1.5 times the cross sectional area of the branch duct.

All angular turns shall be made with a duct centre lines radius equal to 1.5 times the cross sectional area of the branch duct.

All angular turns shall be made with a duct centre line radius equal to 1.5 times the width of the duct. Where, due to space limitations, it becomes necessary to make turns with a shorter radius, air foil type turning vanes shall be used.

All ductwork to be used for airconditioning installations shall be externally factory pre- insulated with a 5mm thick aluminum finish closed cell polyethrene insulation as shall be advised by the Engineer.

2.3 Galvanized Sheet Metal Ductwork

Where construction methods, sheet metal gauges, duct fabrication and installation techniques etc., are not specifically detailed herein or indicated on the drawings, such work shall be fabricated in strict accordance with the latest recommendation methods, gauges, procedures, etc., described in the most recent editions of the ASHRAE Guide and Handbook, the SMACNA Standards of Low/High pressure Ductwork and the DW/142.1 standard of HVCA 1982.1.

2.4 Specification

Duct shall be installed in accordance with the Drawings and the following HVAC, ASHRAE and SMACNA Specification.

REFERENCE	TITLE	SCOPE
HVAC Ref. No. DW/142.1	Specification for sheet metal and black medium and high pressure/velocity air systems.	Galvanized steel
DW/161	Code of practice for Recommendations for identification of air distribution systems	Methods of identification of source and destination of air, direction of flows classification by means of standard symbols.
DW/143	Practical guide to ductwork leakage testing	Leakage testing procedure.
SMACNA	Low/and high pressure duct	Construction Specification
ASHRAE	1983 Equipment Volume Duct Chapter 1-Duct Construction.	construction

2.5 Materials:

Galvanized ductwork shall comprise strip mill cold-reduced sheet, continuously hot-dipped galvanized to BS 2.1989: Grade Z2.1 or Z3.

2.6 Protection:

Galvanized ductwork shall be protected by one coat of mordant solution or calcium plumbate primer followed by two coats of bituminous paint.

Galvanized ductwork in contact with aluminum sections (grilles etc.), shall, before fastening to ducts, be protected with one coat of primer and two coats of zinc chromate paint.

All aluminum sections shall be anodized to BS 1615. Mild steel shall be protected by one coat

of red oxide paint followed by two coats of bituminous paint.

All ductwork passing through structural members; masonry walls or concrete walls and slabs, shall be surrounded by a timber frame by others to prevent the contact between the ductwork and the structural members. The space between the timber frame and the ductwork shall be filled with fire resistant expansion foam.

Ductwork: Thickness, stiffening and spacing of supports.

The stiffening of ducts shall be provided by the types of cross joints indicated in the tables plus intermediate stiffeners where necessary to comply with the spacing requirements.

An approved type of sealant shall be used on all cross joints.

Sheet thickness requirements are given in the following tables. In all cases the larger dimension determines the sheet thickness and stiffening. For plant connections, apparatus, casing and special applications (fire dampers etc), the next thickness of sheet up shall be used and additional stiffening shall be provided.

Rectangular - Low Velocity - Steel Duct Work

Maximum spacing between joints/stiffeners.

Minimum angle

section for Intermediate Stiffeners	Length (mm)	Nominal (mm)	Without	With Beading or cross-breaking (mm)	(mm) beading or cross-breaking (mm)
Up to 400		0.6	Unlimited	Unlimited	None
400-600		0.6	1500	Unlimited	2.15 x 2.15 x 3
601-800		0.8	1500	Unlimited	2.15 x 2.15 x 3
801-1000		0.8	12.100	1500	2.15 x 2.15 x 3
1001-1500		1.0	800	12.100	40 x 40 x 4
1501-2000		1.0	800	800	40 x 40 x 4
2001 - 3000		1.2.	600	50 x 50 x 5	

For ducts galvanized after manufacture

Upto 300	1.2	As equivalent sizes above
301 and over	1.6	As equivalent sizes above

2.7 Air Leakage:

The air leakage rate shall not exceed 1.53 liters per second per square metro of surface area for Class A positive, and leaks shall not be audible. The air leakage from a chosen test section shall be the proportion of the length of section under test to the total length of all ducts in the distribution system.

2.8 Air Leakage Test Procedure:

The HVAC Specification DW/143 sets out a method for testing which shall be employed by the Engineer. The Contractor shall be familiar with the testing method employed.

2.9 Protection and Cleaning

During construction all open ends of ductwork shall be covered with one layer of canvas.

All foreign materials shall be removed from the ducts and ductwork shall be cleaned inside and outside.

Ducts shall be cleaned before operating fans and filters. Fans shall not be operated unless filters are installed. After testing all cleanable filters shall be washed and renewable media shall be replaced.

2.10 Testing

After completion of the duct systems and before insulation is installed, the entire system shall be tested under operating conditions for performance and leakage.

Testing shall be carried out in the presence of the Engineer.

2.11 Volume Dampers

Volume control dampers shall be supplied and installed with locking levers and quadrants, indicating their position in main ducts and in all branch ducts supplying three or more air outlets and all fresh air intakes, and where shown on the Drawings.

Volume Control dampers shall be of the splitter, butterfly, or Louvre type. Damper blades shall be not less than eighteen gauge thick, reinforced with 2.15mm angles 3.2.1mm thick along unsupported sides longer than 300mm. Angles shall not interfere with the operation of the damper nor cause additional turbulence. Stops shall be angles of equal dimensions to the reinforcing angles. The maximum dimension of any damper blade shall be 800mm. Duct shall be stiffened at damper locations as necessary.

Door shall be supplied for access to all damper quadrants installed in ducts located in suspended ceilings etc. Location and detailed installation drawings shall be supplied for all access doors. Doors shall be attached to frames with concealed hinges. Locks shall be of the flush type, screw driver operated with bronze cams.

Upon completion of the ductwork, dampers shall be adjusted and set to deliver the amounts of air indicated on the Drawings.

2.12 Fire Dampers

Fire dampers shall be provided and fixed within the thickness of all fire barrier walls with a fire rating equivalent to the barrier. Each fire damper shall be operated by a fusible link set at 72.1 degrees C and fitted with an access door for inspection and replacement.

Details of the construction and operation of all fire dampers shall be submitted to the Engineer for approval before manufacture commences. Operation of all fire dampers shall be tested on Site after installation.

All fire dampers arranged to close by gravity shall be suitably weighted, arranged in the direction of the air flow and provided with an effective stop.

Fire dampers of the fire/shield curtain type, spring operated, shall also be permitted. The damper casing shall be completely airtight and of not less than 1.2.15mm thick galvanized sheet steel. The continuous series of ribbed interlocking blades shall be formed from not less than 0.8mm stainless steel and the spring shall be of not less than 0.2.15mm stainless steel.

The fire dampers shall comply with the Standards for safety UL555:1970, issued by the Underwriter's Laboratories inc., of the U.S.A.

2.14 Fusible Link Attachment

This shall consist of an adjustable, accessible, fusible link designed to melt at 72.1 degrees C, and attached to an opposed blade damper assembly, spring-controlled to close fully when the link melts. The link shall not interfere with normal damper operation.

2.15 Turning Vanes

Turning vanes shall be fabricated of the same material as the ducts in which they are installed.

Turning vanes for low and medium pressure systems shall comprise 1mm (2.10 gauge) galvanized steel.

Turning vanes shall be either double vanes or shop fabricated turning vanes constructed to the same standard. Samples of shop fabricated units shall be submitted to the Engineer for approval.

2.16 Dissimilar Metals

Connections between dissimilar metals shall be avoided by dielectric insulation. Joints between dissimilar metal duct sections shall be formed with companion flanges separated by a compressed asbestos gasket.

All units, bolts, screws and other hardware used in the sheet metal construction shall be fabricated of materials identical or similar to the duct construction, to prevent galvanic corrosion.

2.18 Flexible Ducts

Flexible ducts connecting the low pressure duct system to the linear slot diffusers, square diffusers and any other register, shall consist of a continuous vinyl-coated, spring steel wire helix fused to, and supporting, a continuous layer of vinyl-coated fiberglass mesh. A 13mm thick insulating and sound attenuating blanket of fiberglass wool shall encase the duct, and be sheathed with a moisture barrier consisting of vinyl impregnated and coated fiberglass fabric. The materials shall be incombustible.

Flexible duct connections shall be effected in one continuous length, with a double ply cuff at each end secured to ductwork spigots by a worm drive screw clamp, as supplied by the manufacture to the flexible ducts.

2.19 Plenum Boxes

Plenum boxes shall be constructed from rigid 50mm by 5mm steel angle and 1.2.1mm thick galvanized sheet steel.

A hinged access door, at least 450mm, with quick-release fasteners, shall be provided in the side of each plenum box.

The sides, top and bottom of the plenum box shall be lined with 2.15mm thick rock wool or fiberglass insulation, neoprene coated and suitable for velocities up to 12.1m/sec. The lining shall be secured with an approved adhesive and pinned into place by means of nylon hangers, or similar, at 2.100mm centers.

2.20 Air Outlets

a) General Requirements.

All outlets shall be sealed around the edges to prevent air leakages.

Supply air with a velocity in excess of 0.2.15m or less above finished floor level. Room air shall be mixed with the primary air by induction to effect subsequent equalization of the room temperature without stratification.

Where supply or return outlets are installed in a continuous line, intermediate frames and margins shall be omitted. Guides shall be provided for each element to ensure that adjoining lengths shall be mitered for full alignment.

With outlets used with fan coil units, the Contractor shall co-ordinate the outlet dimensions, arranged and pressure drop with the fan coil unit, to ensure that they will be compatible.

Unless shown otherwise on the Drawings air outlets in ceiling shall be provided with a finish to match the colour of the adjacent false ceiling; other air outlets shall be provided with a natural anodized aluminum finish, all to the approval of the Engineer.

b) Ceiling Mounted Supply/Return Linear Diffusers

The Contractor shall supply and install, in the location shown on the drawings, multi-slot supply and return linear diffusers.

These shall be similar to those manufactured by "WOODS" OF ENGLAND or Systemair. The slot diffusers shall be suitable for horizontal discharge by the adjustment of the blades. The diffusers shall be constructed of extruded aluminum with the from necessary fixings such as splice plates, hugging clips and suspension brackets and care shall be taken to ensure the cross joints between the supply and return air diffusers. The supply diffusers shall be supplied with galvanized mild steel plenum boxes for connection to the ductwork system by way of side entry spigots.

Diffusers shall be of streamlined design, with a complete absence of obstruction in the air stream resulting in a low sound level rating. Diffusers shall be designed such that they may be balanced without the use of dampers, deflectors or return vanes.

The diffusers deflectors shall be fabricated from thermosetting plastic which is nonflammable, directionally stable and has a high resistance to cracking and blemishing. A metal back plate shall be provided for each diffuser.

The inlet spigot sizes shall be as shown on the drawings. The diffusers shall be provided with a hit and miss volume control, grid pattern air straightener and air deflection blades.

The diffusers shall be connected to the ductwork system by flexible ducting sized to suit the

diameter of the entry spigots.

The selection shown on the drawings is for quotation purposes only and the Contractor shall check the air performance of the diffusers prior to placing any orders. The selection shall be based on the ceiling heights shown on the drawings and an air temperature differential (room minus air supply) of 11°C.

The noise rating in NC for a horizontal projection supply linear. Diffusers of one slot and 1800mm long shall not exceed 2.12.1NC when supplying 33 liters per second active metro. The pressure drop with the damper in the 100 percent open position shall not exceed 15 Pa for the supply air.

c) Supply and Extract Air Registers

Each supply air register shall have two sets of separately adjustable louvers, (one set horizontal, and the other vertical) and shall be complete with an opposed blade multi-leaf damper. The louvers and the volume dampers shall be constructed from extruded aluminum sections with a metallic aluminum finish to the approval of the Engineer.

Extract air registers shall be supplied and fitted as shown on the drawings and shall be similar to the supply air registers except that the rear set of blades shall be omitted. Registers shall be as manufactured by "WOODS" OF ENGLAND

d) Transfer Grilles

Transfer grilles shall be supplied and fitted as shown on the drawings. Grilles shall be fabricated from aluminum alloy inverted "V" louver extrusions. They shall be of the non-vision type and of appearance to match the surrounding finishes, all to the satisfaction of the Engineer. The grilles shall be supplied with a telescopic frame permitting installation from 2.18 to 60mm thick. Transfer grilles installed on walls shall be double faced. These shall be manufactured by Trax.

e) Discharge Louvres

Exhaust louvres shall be white anodized aluminum unless indicated otherwise on the Drawings. Louvres shall be weatherproof, with fixed blades set at 30 degrees, and shall have a free area of 85 percent. These shall also be manufactured by Trax.

f) Intakes

Sand trap louvres shall be provided on all air intakes. The sand shall have an efficiency of 80 percent on the 2.10 to 2.100 micron test (AC coarse) dust distribution and 50 percent on the 1 to 70 micron test (AC fine) dust distribution. Louvres shall be of mill finish aluminum with 1.5mm thick blades and 2.1.0mm thick casing. Self emptying sand drain holes shall be provided. The air pressure drop through the louvres shall not exceed 30 Pa. Galvanized wire bird screens shall be provided on all intakes.

g) Accessories - Regulation and Distribution

At each supply diffuser, register and grille, the Contractor shall provide accessories to ensure a positive regulation of the air volume and a uniform distribution of the air flow over the entire outlet. The following shall be supplied as a minimum:

- Supply diffusers

- For distribution : an adjustable frame and blades.
- For regulation : an adjustable splitter or louver blades
- Supply Grilles and Registers

The Contractor shall provide either lever-operated radial blades attached to a pivoting frame and mounting bracket, or individually adjustable blades in a gasketed frame mounted at the outlet, for each outlet, all to the approval of the Engineer.

h) Supply/Extract Square Ceiling Diffusers

The square supply diffusers shall be aluminum louver-faced surface mounted, suitable for 4-way blow with integral opposed blade volume damper.

The Contractor shall check and make sure that the diffusers will fit in with the ceiling construction, particularly as to the edge flanged detail and overall size. They shall be as manufactured by Koolair.

3.0 Thermometers and Pressure Gauge.

3.1 General

Pressure gauges shall be mounted at the sensing point unless otherwise indicated.

The instrument shall be selected such that the normal range of operating temperatures and pressures falls within the middle-third of the instrument range. Compound gauges shall be employed when operating pressure is near or below atmospheric.

Temperature sensing devices shall be located in a portion of the fluid stream where it is possible to measure the average fluid temperature without obstructing the flow. Pipes of 42.1mm diameter and less shall be increased by at least one pipe size at the point of insertion. Extension necks shall be provided where thermometers and pressure gauges are located in insulated piping, vessels, ductwork, casing and equipment.

3.2 Thermometers

Mercury-in-steel type thermometers, with a 100mm dial and a length of copper covered steel capillary tubing to connect the dial with the bulb, shall be supplied and installed as specified. Each thermometer shall be provided with a back flange or arranged for flush mounting.

Mercury-in-glass type thermometers with metal guard shall be supplied and installed as specified and as approved by the Engineer.

Unless otherwise specified, thermometer bulbs shall be of steel type, screwed 2.10mm NB British Standard pipe and supplied with stainless steel separable sockets suitable for screwing, brazing or welding into the pipe carrying the medium to be measured.

A red mark on each thermometer scale shall indicate the working temperature at the point of measurement.

3.3 Pressure gauge

Gauges shall be of the Bourdon tube type with a 115mm diameter cast iron, cast aluminum or steel case with moisture-proof and dustproof blowout discs. Panel mounted gauges shall have steel or aluminum hinged rings; direct mounted gauges shall have black numerals on a white background.

Bourdon Tube	:	Phosphor bronze, beryllium copper or stainless steel.
Socket	:	Stainless Steel.
Accuracy	:	Not less than 1% of scale range.

Gauges for combined pressure and vacuum services shall have a compound seal.

3.4 Sound Attenuation and Vibration Isolation Materials

3.5 Sound Attenuation

Where required by the Specification the supply and return air sheet metal ductwork each airhandling unit and all plenum supply and return ducts, shall be lined internally on all four sides with 2.15mm thick glass fibre of density not less than 48kg/cu.m up to the walls of sound attenuation to reduce the noise emitted by the fans. The interlay clear dimensions of the duct complete with liner shall not less than the sizes indicated on the Drawings. The glass fibre lining shall be fixed to the sides of the duct using an approved adhesive and shall be secured by means of a galvanized perforated plate liner.

The ductwork shall also be thermally insulated on the outside.

The inside surface of the lined sections of ductwork shall be as smooth as possible so that the resistance to air flow is not appreciably greater than the unlined duct. All lined sections of ductwork shall be inspected and approved by the Engineer before erection on Site.

Where attenuators are fitted on the return supply sides of the units acoustic insulation may be omitted, provided that the noise transmitted by the plant does not exceed the space noise levels specified.

The attenuators indicated in the schedules are for quotation purpose only and the Contractor shall check and provide a detailed acoustic design for approval by the Engineer prior to the ordering of any attenuator. The Contractor shall submit an acoustic analysis of the air-conditioning systems based on the proposed equipment and shall make any adjustments to the specified parameters. I.e. systems external resistance etc as may be required.

3.6 Equipment Isolation

All mechanical equipment, piping, duct, etc shall be mounted on or suspended from approved foundations or supports. All floor mounted equipment shall be erected on either a 100mm high reinforced concrete plinth or on steel beams. Where vibration isolation equipment is used the plinths or beams shall be extended to support the isolation system.

Vibration isolation systems shall limit the static deflections as required and indicated on the Drawings with a minimum isolation efficiency of 0.96. The vibration isolation system shall be installed in accordance with the manufacture's instructions. All vibration isolation systems exposed in the following manner; All steel parts shall be hot dipped galvanized; all bolt shall be cadmium plated and springs shall be cadmium plated and neoprene coated.

All of the above equipment, including mounting, hangers, structural steel bases, concrete formwork and flexible pipe connectors, shall be furnished by a single manufacturers of vibration isolation equipment.

3.7 Piping Isolation

All ceiling-suspended and floor-supported piping that is connected to mechanical equipment shall be isolated from the building structure for a distance of 15 metros from the equipment, inthe following manner.

Ceiling-suspended piping shall be isolated by a combination of spring and neoprene-in-shear hangers. The first four hangers located adjacent to mechanical equipment, shall be capable of supporting the piping at a fixed elevation during installation irrespective of load changes. Floor-supported piping shall be located on concrete plinths and shall be isolated by a heavy duty neoprene pad as indicated on the Drawings. Base elbows used to support piping risersshall be isolated by means of heavy duty neoprene pads.

3.8 Duct Isolation

All duct runs shall be isolated from the building structure for a distance of 16 metros from the mechanical equipment in the following manner. Ceiling-suspended duct work shall be isolated by double deflection neoprene-in-shear hangers. Floor-supported ductwork shall be isolated bydouble deflection neoprene-in-shear mountings. Thrust restraints which are similar to spring shall be installed to resist thrust caused by air pressure. The spring shall be selected for the same deflection as the equipment. All air handling equipment with a total static pressure of 750 Pa and above shall be isolated with flexible canvas or rubber duct connections together with thrust restraints.

3.9 Flexible Connectors

Flexible connectors shall be installed at the suction and discharge ends of all rotating mechanical equipment, including pumps, water chillers, and air handling units. The connectors shall be installed horizontally unless otherwise shown on the Drawings or approvedby the Engineer. The pipe connectors shall be of the rubber hose or metal hose type with flanges suitable for the working pressure and temperatures of the respective systems.

3.10 Piping and Duct Penetrations

All piping and ducts which penetrate floor, walls and shafts shall have the gap between sleeves or timber frames sealed with fibrous materials and caulking to the approval of the Engineer, to prevent the transmission of airborne noise.

3.11 Attenuators

Each attenuator shall provide an insertion loss, under operating conditions, of not less than that indicated in the final acoustic design analysis, which is to be produced by the Contractor. Manufacturers shall specify the insertion losses expected from the attenuators offered. Underthe operating conditions, and this information shall be derived from tests carried out in accordance with BS 4718:19971.

Each attenuator shall have a pressure loss at the design flow and temperature of not less greatthan that shown in the Schedules. The manufacture's quoted pressure losses shall be derived from tests carried out in accordance with BS 4718:1971.

Each attenuator shall have a pressure loss at the design flow and temperature of not greater than that shown in the Schedules. The manufacturer's quoted pressure losses shall be derived from tests carried out in accordance with BS 4718:1971. Where the attenuator is known the supplier shall indicate the expected effect of turbulence due to adjacent duct elements on the quoted pressure losses.

Suppliers of attenuators shall provide, with the certified insertion loss data, information relating to the attenuator generated octave band sound power levels (12.15 kHz) at the operating conditions. The outer casing of all duct attenuators shall be constructed in accordance with the current HVAC ductwork specification. Unless otherwise indicated in the Schedule. The casing shall conform to the Medium & Low" pressure code in terms of its thickness, seams and materials.

All attenuators shall be fitted with drilled angle flange connections, unless alternative connections are specified in the Schedules or instructed by the Engineer. Flanges shall conform to the relevant HVCA code or its equivalent.

Account elements in rectangular attenuators of height greater than or equal to 900mm shall incorporate fair leading and trailing edges (not square ends), and the inert, rot-proof and non-combustible mineral wool or glass fibre acoustic medium shall be packed to a density of not less than 48kg/m^3 and retained by a perforated steel sheet facing. The manufacturer shall note any particular requirements, e.g. painting, special materials, etc., that are indicated on the schedules of Drawings. Splitter shall be constructed such that no ingress of acoustic medium shall occur into the gas stream under the operating conditions.

Where acoustic elements from splitters within the attenuator, the usual arrangements shall be with the splitters vertical and half-width splitter fixed to each side wall of the casing. However, it is the responsibility of the supplier to ensure that the parallel splitter elements in the attenuator are located near bends, bifurcations, etc. Horizontal splitters shall be suitable stuffed to prevent flexing and restriction of the airways.

For circular attenuators, all internal acoustic elements shall comprise mineral or glass fibre as the acoustic medium, as specified above for rectangular attenuators, retained by a perforated metal facing.

When attenuators are manufactured in modules, each unit shall be shop assembled and this Specification together with the manufacturer's own guarantee and performance rating, shall apply to the unit as a whole. Attenuator units shall be delivered to site with blocked ends to prevent ingress of rubble, etc. prior to installation, and to reduce the risk of damage the direction of airflow through the attenuator shall be clearly marked on the casing.

Attenuators for high temperature application (e.g. diesel or turbine exhausts, boiler flues, etc) shall have their casing manufactured from an approved gauge of sheet steel, and adequate precautions taken to cater for expansion and thermal shock. The internal elements and non-combustible mineral or glass fibre cloth behind the perforated metal facing. For every high temperatures, steel wool or equivalent materials shall be used as the acoustic medium.

Acoustic and aerodynamic requirements of the Specification re met. It is the Contractor's responsibility to ensure that the Engineer is advised of the actual sizes being offered where these differ from the Schedule.

3.12 Acoustic Weather Louvre

All acoustic weather louvres shall provide an insertion loss, under the operating conditions, of

not less than that indicated in the relevant acoustic hardware schedules. In addition, the static pressure loss, under maximum operating duty, shall not exceed that shown in the Schedules.

The louvres shall be constructed from an appropriate gauge of galvanized mild steel, or aluminum, supporting louver blades of like materials. The acoustic material in the blades shall have a density of 60-100kg/m³ and be inert, rot and vermin proof, non-hygroscopic and incombustible mineral fibre, faced with mineral fibre tissue and retained on the lower blade face by perforated galvanized mild steel or aluminum. When the louvres are manufactured in sections, each unit shall be shop assembled as a whole unit and this specification, together with the manufacturer's own guarantee and performance ratings, shall apply to the unit as a whole.

Acoustic weather louvres shall be supplied with an integral bird screen of galvanized mild steel or aluminum mesh, fixed to its internal face. The mesh pitch shall be a maximum of 25mm. The louvres between the outside of the louver frame and the wall or duct shall be made good and sealed with a heavy duct grade and/or a non-hardening, dense mastic.

4.0 Electrical Services

Suitably rated control panels shall be supplied and installed as part of this sub-contract to meet the starting and operating characteristics of the fan units.

The panels shall be either wall or floor mounted to suit the specific area and requirements. Power supplies to these panels shall be extended from adjacent isolating switches to be provided under the electrical services sub-contract. Complete co-ordination shall be maintained with the electrical services sub-contractor to ensure supply and termination details are satisfactorily carried out to suit the plant and installation requirements.

4.1 Motor Control Panels

All starters, control equipment and the like shall be enclosed in purpose made sheet panels. The panels shall be installed within the plant rooms to suit the dimensions of the actual panels. All details of the panels and layouts within the plant shall be to the approval of the Engineer and shall include:

- Triple pole isolating switch removable neutral link and HRC fuses.
- Control circuits fuses of the HR cartridge type.
- Under voltage release, adjustable and complete tower to allow for voltage associated with the KP & LC supply and motor starting.
- Over voltage protection, details to be agreed.
- Ammeter of the moving iron mounted on panel with selector switch.
- Pilot lamp, green.
- Rotary switch for HAND/OFF/AUTO operation, where required.
- Removable neutral link of heavy section copper.
- Motor winding over-temperature release. The Contractor shall provide this feature in conjunction with the specified thermistor protection.
- Duty selection switches.
- Manual stop-start button units to operate in conjunction with rotary switch.
- Hours run meter/counter.

The sub-contractor shall allow me to present for the contractor to reclose automatically on the restoration of the mains voltage. This requirement shall be subject to further discussion with the Employer to suit the standby Diesel plant and the mode of operation of essential and non-essential supplies.

All starter panels shall include sufficient miniature circuit breaker, with neutral bar, to supply auxiliary or associated equipment. One 30TP and one spare 155P MCBs shall be included as spares.

All starter panels, motor starters and controllers shall comply with BS 587. Enclosures shall be rigid, at least 1.6mm thick, with rolled corners stiffened as necessary, dust-proof, vermin-proof, damp and corrosion protected with a grey colour stone enamel or other approved finish, fully tropicalized, with washable air filters. Instruments, gauge, ammeters, indicator lamps, etc shall be flush mounted. Panel doors shall include isolating switches to prevent them being opened unless the switches are in the off position. Each door shall be provided with a lock, and three sets of keys for all panel door locks shall be handed over to the Engineer.

Terminal for all outgoing main and control cables shall be marked and positioned so that the cables may be carried to the outlet from the panel without crossing or being carried round the panel. Terminal numbers and markings shall correspond to those used on connected equipment and wiring diagrams. All internal interconnecting wiring between individual units and the terminal chamber shall be carried out by the panel manufacturer.

Each panel shall be provided with a main isolator so that the whole panel may be completely isolated.

The sub-contractor shall determine all motor starter requirements and associated auxiliaries and controls prior to manufacture and shall submit the design and circuit diagrams to the Engineer for approval.

Contractor shall determine all motor starter requirements and associated and controls prior to manufacture and shall submit the design and circuit diagrams to the Engineer for approval.

Contractors shall be of air-break type BS 5424 part 1 and/or BS 587, and shall be provided as follows:

- Magnetic blow-outs and air chutes on each pole.
- Renewable hard drawn copper contacts.
- Auxiliary contacts for remote control
- Continuously rated operating coils (Max 240V)
- Thermal overload protection device incorporating single phasing protection.

Starters shall be rated as follows.

Ordinary duty	-	For motors which will run continuously for periods in excess of two hours.

Intermediate duty	-	For motors under automatic control other than time control. When the intervals of operation are greater than two hours.

Starters shall be of the following types:-

- Up to and including 400W motor: Single phase on/off with overload protection.
- Over 3.75 kW and up to 15kW: Star Delta starter.
- For starters incorporating reduced voltages starting the changeover of voltages shall be automatic.

Terminals shall be accessible and shall be provided with adequate clearance between phases and between phases and earth. Where starters are not enclosed in a composite panel, an integral isolating switch as specified for control panels shall be provided. Where electric motors are either not visible from the control panel or are located more than 10m distance they shall be provided with a local lock-off stop control circuit switch, or a main circuit isolator where there is no control circuit. A weatherproof lock-off stop control circuit switch shall be provided for motors located externally or otherwise exposed to the weather.

4.2 Motors

Motors shall comply with BS 816 Part 1 and shall be arranged for conduit entry. Motors shall be fitted with locating type bearings and/or heavy thrust bearings at the non-drive end and collar type at the drive end. Motors shall be of the totally enclosed fan cooled type, tropicalized to BS 5000 Part 99 suitably finished to resist corrosion by fluid or fumes. The rating of all motors shall be chosen to provide continuously the maximum power requirements of the plant. The motors shall be of the standard induction type. They may be of the squirrel cage, horizontal or vertical spindle type of all to the approval of the Engineer.

Vertical spindle type motors shall be provided with substantial canopies of approved design.

The locked motor currents shall be stated on the name plate of each motor and shall be not more than six times the full load current.

Thermistors shall be fitted to all motors above 5kw. They shall be fitted during manufacture and their ends shall be brought out at additional terminals on the connector block of the motor.

All motors shall be rated 3 phases. 415 volt or single phase, 240 volt, high power factor continuous maximum rating complying with BS 5000 Part 99 and Class F insulating complying with BS 2757 unless otherwise specified. All motors larger than 400kw shall be three phase.

All three phase motors shall be supplied with six stud terminals with each end of the stator phase windings connected, terminals shall be of suitable size to accept the cable lugs of the feeding cables. Terminal blocks shall be mounted on the side of the motor case in an approved box complete with lid, gasket and tapped ET entry hole.

Rubber installation shall not be used on coil connections. Each motor shall be fitted with cable terminals and glands to accept the specified types of cable.

No motor shall run at a speed higher than 1500 rpm unless otherwise specified. Motors driving through Vee-belts shall be fitted with slide rails. The power factor shall be less than 0.9 lagging. All motors shall be from the same manufacturer as far as possible.

4.3 Cabling and Wiring

The Contractor shall carry out all power and control wiring including LV and ELV or any other voltage for the control equipment and alarm systems and interconnecting wiring between starter panels, remote control items, and motor units are required.

Cabling shall be carried out in PVC insulated, PVC sheathed, single wire armoured and PVC sheathed overall cable, using compression type glands provided with means of securing armoured wires within the body of the gland, under armour moisture seal and outer sheathseal.

Each core termination shall be fitted with a plastic ferrule engraved with an identification corresponding to the wiring diagrams.

Multicore control cables to the remote stop, start allow water cut-out/alarms shall be 0.62mm² PVC/SWAPVC where external to the pump station and PVC/PVC or similar, where internal. All cables, whether internal or external being suitably protected.

All conductors shall be copper and the installations, both internal and external being carried out in accordance with the regulations and by-laws previously stated. Trenching and the fixing of cables shall be in accordance with locally specified standards details of which have been specified within the sub-contract documents for the electrical services. These details can be made available upon request should the sub-contractor not be familiar with these requirements.

Details of the rating, types and methods for all cables and wiring to be supplied under this sub-contract shall be submitted with the tenders, wiring, PVC single core shall be run in either galvanized conduit or galvanized trunking of suitable sizes where surface in plant rooms and heavy gauge PVC were cast into walls, slabs etc.

4.4 Testing and Commissioning

The sub-contractor shall be responsible for testing and commissioning the air conditioning mechanical ventilation systems to ensure they are in proper working order to the satisfaction of the Engineer, all in accordance with the requirements set out below. A full test shall be carried out, and the following taken.

- (a) Volumes is all major ducts and for all extract diffusers and diffusers and supply grilles.
- (b) Noise rating in the above rooms, and from all mechanical ventilation fans.
- (c) Total flow rates for every mechanical ventilation system installed under this sub-contract.
- (d) Running current for each electric motor in amperes (recorded against the manufacturer's full load current).
- (e) Air static pressure differential across each fan, filter, coil etc.

The operation of all controls, safety devices, alarms and standby equipment shall be demonstrated in liaison with the electrical services sub-contractor.

5. Specification for Air Conditioning Units

5.0 General

This part of the sub-contract comprises the supply, delivery and complete installation of singlesplit direct expansion units and a modular multi-system as outlined in the Bills of quantities. The design parameters for the system are as follows:-

Mean ambient temperature	:	28°C
Altitude	:	1790m above sea level
Room Temperature	:	23°C

5.1 Indoor Units

The indoor units shall incorporate a quiet cross-flow fan, liquid crystal display wired remote controller, air purifying filter employing static electricity to remove particles and Airflow direction louvers. All the controls shall be by use of microprocessor,

The unit shall have the following parameters:-

Cooling capacity: - as specified in the bills of quantities

Air Flow rate (High Speed): - as specified in the bills of quantities

Fan speed: - 7 speeds and Auto

Limiting Noise level 41 dB (A) at high speed.

The units shall be mounted as shown as per tender drawings. Condensate removed from the air shall drain into the drip pan and then drain by gravity through condensate drainpipe to the ground.

All units shall be as specified in the bills of quantities

5.2 Outdoor Unit

The unit shall comprise of several modules interconnected together and shall be running sequentially depending on the cooling load demands. The modules and their arrangement shall be as specified in the bills of quantities and shall be sized to match the indoor units.

The outdoor units shall have the following parameters: -Sound

level (limit) - 49 dB (A) at 1 meter

The modules shall be complete with integral isolator, compressors, condenser fans, LP/HP cut-outs, auto restart after power failure and weather proof.

5.7 Components

a) Compressors

These shall be rotary with three-phase motors having internal current/thermal overload device and pressure relief valve.

b) Condenser

These shall be forced-draught type with acrylic-dipped copper tubes mechanically expanded into aluminum fins spaced at approximately 10 per 25mm.

c) Fans

These shall be of the forward curved centrifugal type and shall be made of aluminum, reinforced fibre or rigid plastic material. The fan shall have variable speeds to enable the user to reduce both air volume and noise levels.

d) Operating Controls

These shall comprise an ON/Off switch, combined with fan speed controller and a compressor selector to give a range of options such as: off; fan only; fan & low cool, fan & high cool.

There shall be a bimetallic, single-pole single-throw (SPST) thermostat with sensing probe clipped in the return air stream behind the air filter. This shall cycle the compressor but the evaporator fan shall be unaffected as long as the unit is switched "ON".

e) Safety Controls

These shall comprise either externally or internally mounted compressor motor overloads, to safeguard against thermal or electrical overloads.

f) Central Remote Controller.

The controller shall be connected to the outdoor unit. The remote shall control the entire indoor units installed and shall be connected to the outdoor unit.

g) Noise Level

Fan and motor assemblies shall be complete with anti-vibration mountings and shall operate quietly, with the noise level at 1 metro not exceeding noise curve NR 49dB(A).

h) Refrigerant piping

The refrigerant piping shall be neatly installed and clipped on the wall. The pipes shall also be neatly boxed or put in a trunking to the approval of the engineer.

i) Installation Requirements

Suitable aperture and supporting frame to be fitted in a wall shall be made. The unit shall be properly balanced and supported in a manner that prevents noise or "drumming" regardless of the type of structure in which it is supported.

j) Mounting Brackets

The air-conditioners shall be held in position by two mounting brackets, fixed to the wall. The sub-contractor shall ensure that any damage to the wall is made good inside and out around the frame, and repaint as necessary. The sub-contractor shall ensure that the unit is perfectly level from side to side and that from front to back it is sloping slightly to the rear of the baseplate.

k) Power Supply

The power point serving the system shall be as close as possible to the modules and slightly lower to the side on which the power cable enters the front of the chassis and of the fused switch type.

With the indoor air filters in place, the power supply shall be switched on to start the unit working steadily through the full operating sequence permitted by the controls. The sub-contractor shall ensure that the control switch operates in every position which can be selected.

l) Testing and Commissioning

The sub-contractor shall test and commission the unit to the entire satisfaction of the Engineer and the Employer. In particular he shall check the full load amperage drawn using a clip-on ammeter to confirm that this does not exceed values shown on the nameplate. The sub-contractor shall adjust the supply air grille to produce effective distribution throughout the room, free from draughts and pockets of stagnant air. Control knobs shall be checked and confirmed to be tight. The differential between the temperatures of the air entering the return grille and that leaving the discharge grille shall be ascertained to be what the manufacturer recommends.

The sub-contractor shall produce operation and maintenance manuals to be given to the Engineer for onward transmission to the Employer.

m) Maintenance Contract

The contractor shall provide all necessary technical brochures and operation manuals to the Client upon completion of works. He shall also quote for maintenance of these units after the 6 months liability period is over.

The scope of maintenance works shall include but not be restricted to all normal servicing of the unit which shall be carried out as stipulated in the maintenance contract agreement to be entered between the Client and the Sub-contractor.

PART C: PARTICULAR SPECIFICATIONS
FOR
PLUMBING AND DRAINAGE INSTALLATIONS

PART C : PARTICULAR SPECIFICATIONS FOR PLUMBING AND DRAINAGE
INSTALLATION
S

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4.	Extent of the Sub-Contractor's Duties	C/3

PART C

PARTICULAR SPECIFICATIONS FOR PLUMBING AND DRAINAGE INSTALLATIONS

1 Introduction

The specifications cover the execution of Plumbing and Drainage installations and should be read in conjunction with other relevant specifications, drawings and contract documents issued to the contractor in conjunction with the sub-contract.

2 Included in the Sub-Contract

The works include, unless otherwise specified, supply delivery, installation, testing and commissioning, cleaning-up and setting to work all the installations described in the specifications and as shown on the contract drawings.

The provisions of all labour, materials, tools instruments testing apparatus and scaffolding necessary to execute the work in a first class manner, even such labour materials instruments or apparatus which are not specifically mentioned in the contract but are necessary for the satisfactory completion of the work, including such elements as:-

- The water supply pipework to the functional and sanitary as shown on the drawing plus the necessary fixing support and jointing materials from the water tapping points.
- The sanitary and operational fittings together with the fixing supports and jointing of the supply and discharge pipes.
- The waste and soil pipework from the sanitary and operational fittings to the existing stack soil pipework including all fixing, supports and jointing materials.
- All cutting away and all making good will if nothing else is specified, be carried out by the main contractor but it will be the responsibility of the sub-contractor to ensure that this work is kept to a minimum, be responsible for the correct marking out of all chasers and holes; and will provide also necessary details to the main contractor.
- The sub-contractor shall also be responsible for ensuring that runs for floor or wall chases, core drilling holes, holes to be cut or left will be marked out at the appropriate stage of installations and should be approved by the consultants before commencement of the works.
- The sub-contractor shall undertake all notifications demanded by the Authorities in order to comply with current regulations and produce all certificates, if any, the authorities without extra charge.
- The sub-contractor shall as part of his tender supply all necessary information such as manufacture, catalogue or type numbers, brochures or copies of catalogue pages, weight and all other relevant information which are necessary to classify the equipment tendered for.
- All other material labour, tools instruments, scaffolding, etc, which are necessary for completion in a first class manner of the plants to the Engineer satisfaction. Excluded are only materials and workmanship especially mentioned herein as “ Excluded from this Sub-contractor”
- The sub-contractor shall include for cables, pipes etc from central facilities to working area.

- Provide the Engineer for his approval complete working and manufacturing drawing as specified.
- Commissioning and testing of the plants as specified.
- Supply of complete operation and maintenance manuals as specified as well as adequate instruction of the client's maintenance personnel as specified.
- The sub-contractor shall include for full maintenance during initial maintenance period as specified.

3 Excluded from the Sub-Contract

- All concrete works, inclusive of necessary holes, plinths etc
- All block work inclusive of necessary holes (to be marked by the Sub-contractor) etc
- All electrical wiring up to and inclusive of isolators and switchboards.

4 Extent of the Sub-Contractor's Duties

At the commencement of the work, 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 others, are available locally. If not available, the subcontractor shall at this stage place orders for the materials in question and copy the orders to Architects and/or the Engineer. Failure to do so shall in no way relieve the sub-contractor from supplying the specified materials and equipment in time.

Any item or material found to be defective shall be replaced by the sub-contractor within seven days of his being notified and any result of defective workmanship shall be repaired including supply of new parts if necessary, immediately upon being notified.

The sub-contractor shall furnish at his own cost any samples of material or workmanship required for the sub-contract works that may be called for by the Engineer for his approval and the Engineer may reject materials or workmanship not in his opinion up to the approved standard. The sub-contractor shall allow in his prices such samples.

The sub-contractor shall when authorized in writing by the Architect or the Engineer, make variations from the specifications and drawing. No profit will be allowed on omitted items or works.

The sub-contractor shall submit to the Architect or to the Engineer claims for any work for which he considers demanding extra payments before the beginning of such work.

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

The sub-contractor shall request any alteration to the building structures within 30 days of the awarding of the sub-contractor. Only such alteration as deemed unavoidable by the Engineer will be considered.

The sub-contractor shall collaborate with the Engineer and the main contractor in planning the installation before work is commenced. Particular care shall be taken to ensure that there is close collaboration with the other sub-contractors when installing services.

The Engineer and Architects shall have full rights to inspect the work in progress and all materials equipment for use in the installation prior to its erection whether these are on site or the sub-contractor's workshop.

The sub-contractor shall allow for all reasonable access to the works for this purpose. Where large items of equipment are to be installed, the sub-contractor shall advise the main contractor in good time so that access is provided for installation before work is commenced on site.

The sub-contractor or his responsible representative shall be in all site meetings as and when required in order to discuss the works, make necessary decisions, receiving relevant instructions and to confirm fulfillment of time schedules.

PART D: PARTICULAR SPECIFICATIONS
FOR
PORTABLE FIRE EXTINGUISHERS

**PART D: PARTICULAR SPECIFICATION FOR PORTABLE FIRE
EXTINGUISHERS**

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PART D

PARTICULAR SPECIFICATION FOR THE SUPPLY AND INSTALLATION OF PORTABLE FIRE EXTINGUISHERS

1. General

The particular specifications details the requirements for the supply, installation and commissioning of the portable fire extinguishers which shall conform to BS 5423:19 77 and NFPA 10.

2. Scope of works

The sub-contractor shall supply, deliver, erect, test and commission all the portable fire extinguishers which are called for in this specification and shown on the contract Drawings and listed in the Bills of Quantities.

3. Water/CO2 Fire Extinguishers

The portable 9-litre Water filled CO2 cartridge operated portable fire extinguishers shall comply with BS 1382: 1977. Unless manufactured with stainless Steel, bodies shall all have internal surfaces completely coated with either a less tin, lead alloy, or zinc applied by hot dipping. There shall be no visibly unallocated areas.

The extinguishers shall be clearly marked with the following: -

- a) Method of operation
- b) The words '**WATER TYPE**' (**GAS PRESSURE**) in prominent letters
- c) Name and address of the manufacturer or responsible vendor.
- d) The nominal charge of the liquid in imperial gallons and litres
- e) The liquid level to which the extinguisher is to be charged
- f) The year of manufacture
- g) A declaration to the effect that the extinguisher has been tested to a pressure of 350lb/sq in (24.1 bar).
- h) The number of the British Standard "BS 1382" or " BS 5423"

4. Portable Carbon Dioxide Fire Extinguishers

The portable carbon dioxide fire extinguishers shall comply with BS 3326: 1960 and BS 5423: 1977

The body of the extinguishers shall be a seamless steel cylinder manufactured to one of the following British Standards, BS 1287 or BS 1288.

The filling ratio shall comply with BS 5355 with Valves fittings for compressed gas cylinder to BS 341. Where a hose is fitted it shall be flexible and have a minimum working pressure of 300 lb/sq in (20.85 bar), the hose is not to be under internal pressure until the extinguisher is operated.

The nozzle shall be manufactured of brass gunmetal, Aluminium or Stainless Steel and may be fitted with a suitable valve for temporarily stopping the discharge if such means are not incorporated in the operation head.

The discharging horn shall be designed and constructed so as to direct the discharge and limit the entrainment for air. It shall be constructed of electrically non-conductive material.

The extinguishers shall be clearly marked with the following:

- a) The words; 5kg carbon dioxide fire extinguishers and to include the appropriate nominal gas content.
- b) Method of operation
- c) The word "Re-charge immediately after use"
- d) Instruction for periodical checking
- e) The number of the British Standard BS 3326: 1960
- f) The manufacturer's name or identification markings.

5. Dry Powder Portable Fire Extinguishers

The portable dry powder fire extinguishers shall comply with BS 3465: 1962 and BS 1449 or aluminium to BS 1470: 1972 and shall be suitably protected against corrosion.

The dry powder charge shall be non-toxic and retain its free flowing properties under normal storage conditions. Any pressurising agent used as an expelling shall be in dry state; in particular compressed air.

The discharge tube and gas tube if either is fitted shall be made of steel, brass, copper or other not less suitable materials. Where a hose is provided it shall not exceed 1.060m and shall be acid and alkali resistant. Provision shall be made for securing the nozzle when not in use.

The extinguisher shall be clearly marked with the following information: -

- a) The words "Powder Spray Fire Extinguisher"
- b) Method of operation in prominent letters
- c) The working pressure and the capacity of the foam charge in litres
- d) Manufacturer's name or identification mark
- e) The words "**RECHARGE AFTER USE**" if rechargeable type
- f) Instructions to regularly check the weight of the pressure container or inspect the pressure indicator on stored pressure type when fitted, and remedy any loss indicated by either.
- g) The year of manufacture

- h) The pressure to which the extinguisher was tested.
- i) The number of this British Standard BS 3465 or BS 5423: 1977.
- j) When appropriate complete instructions for recharging the extinguisher shall be clearly marked on the extinguisher or otherwise be supplied with the refill.

6 Foam Spray Portable Fire Extinguishers

The portable foam spray fire extinguishers shall comply with BS 3465: 1962 and BS 5423. The body shall be constructed of Steel not less than the requirements of BS 1449 or Aluminium to BS 1470: 1972 and shall be suitably protected against corrosion.

The foam spray charge shall be non-toxic and retain its free flowing properties under normal storage conditions. Any pressurizing agent used as an expelling shall be in drystate; in particular compressed air.

The discharge nozzle and gas tube if either is fitted shall be made of Steel, Brass, Copper or other not less suitable material. Provision shall be made for securing the nozzle when not in use.

The extinguisher shall be clearly marked with the following information:-

- a. The words ‘ Foam Spray Fire Extinguisher’
- b. Method of operation in prominent letters
- c. The working pressure and the capacity of the foam charge in letters
- d. Manufacturer’s name or identification mark
- e. The words ‘**RECHARGE AFTER USE**’ if rechargeable type
- f. Instructions to regularly check the weight of the pressure container or inspect the pressure indicator on stored pressure types when fitted, and remedy any loss indicated by either.
- g. The year of manufacture
- h. The pressure to which the extinguisher was tested
- i. The number of this British Standard BS 3465 or BS 5423:1977

Appropriate complete instructions for recharging the extinguisher shall be clearly marked on the extinguisher or otherwise be supplied with the refill.

7 Fire Blanket

The fire blanket shall be made from cloth woven with pre-asbestos yarn or any other fireproof material and to measure 1210 x 1800mm and shall be fitted with specialties folded so as to offer instantaneous single action release blanket from storing jacket.

8 Elide Fire Ball

The 1.3kg Elide Fire Ball should have an effective extinguishing range of 360 degrees and up to 4 meters. It should have an activation mechanism of less than 10 seconds after coming in contact with fire. It should contain environmentally friendly dry powder extinguishing material as Ammonium Phosphate mono (about 94% active material). It must be able to extinguish several classes of fire such as A, B, C, D and E. It has to be placed at most 300 millimeters from the likely source of fire.

PART E:
PARTICULAR
SPECIFICATIONS FOR FIRE SUPPRESSION SYSTEM

PART E: PARTICULAR SPECIFICATIONS FOR FIRE SUPPRESSION SYSTEM

An Inert gas Fire Suppression System shall be furnished. The system shall be capable of protecting all hazard at the Data Centre space at Barabara Plaza.

1.0 GENERAL

1.1 References

1.1.1 Underwriters Laboratories, Inc. (UL)

1.1.1.1 UL Standard 300

1.1.1.2 UL Standard 2092

1.1.2 Underwriters Laboratories of Canada (ULC)

1.1.3 National Fire Protection Association (NFPA)

1.1.3.1 NFPA 96

1.1.3.2 NFPA 17A

1.1.4 International Standards Organization (ISO) *Gaseous Fire Extinguishing Systems.*

1.2 Submittals

1.2.1 Submit two sets of manufacturer's data sheets

1.2.2 Submit two sets of piping design drawings

1.3 System Description

1.3. The system shall be an automatic fire suppression system using inert agent.

1.3.2 The system shall be approved for uniform, overlapping appliance protection.

1.3.3 The system shall be capable of suppressing fires in the Data Centre

1.3.4 The system shall be the pre-engineered type having minimum and maximum guidelines established by the manufacturer and listed by Underwriters Laboratories, Inc. (UL) and Underwriters Laboratories of Canada (ULC).

1.3.5 The system shall be installed and serviced by personnel trained by the manufacturer.

1.4 Quality Control

1.4.1 Manufacturer: The Inert gas Fire Suppression System shall be manufactured by a company with at least forty years' experience in the design and manufacture of pre-engineered fire suppression systems. The manufacturer shall be ISO 9001 registered.

1.5 Warranty, Disclaimer, and Limitations

1.5.1 The pre-engineered fire suppression system components, manufactured shall be warranted for five years from date of delivery against defects in workmanship and materials. Any purchased components, such as electric gas valves, reset relays, solenoids, pressure relief valves, regulators, electric switches, fusible links, etc. shall be warranted for one year from date of installation.

1.6 Delivery

- 1.6.1 Packaging: All system components shall be securely packaged to provide protection during shipment.

1.7 Environmental Conditions

- 1.7.1 The Inert gas system shall be capable of operating in a temperature range of 32 °F to 130 °F (0 °C to 54°C).

2.0 PRODUCT

2.1 Components

- 2.1.1 The basic system shall consist of an AUTOPULSE unit, stainless steel enclosure. The agent storage tank is purchased separately and shall be mounted within the enclosure. Nozzles, blow-off caps, detectors, cartridges, agent, fusible links, and pulley elbows shall be supplied in separate packages in quantities needed for fire suppression system arrangements. Additional equipment shall include remote manual pull station, mechanical and electrical gas valves, pressure switches, and electrical switches for automatic equipment and gas line shut-off.
- 2.1.3 Agent Tank: The agent tank shall be installed in a stainless steel enclosure. The tank shall be deep drawn carbon steel finished in red enamel. The tanks shall have a working pressure of 150 psi (10.3 bar), a test pressure of 450 psi (31.0 bar), and a minimum burst pressure of 900psi (62.1 bar). The tank shall include an adaptor/tube assembly containing a burst disc union.
- 2.2.4 Tank Valve: The tank valve shall be designed to discharge the agent onto the hazards being protected. The valve shall automatically shuttle to switch from wet chemical agent discharge to water discharge.
- 2.1.5 Regulated Release Mechanism: The regulated release mechanism shall be a automatic electric type capable of providing the expellant gas supply via a pressurized cartridge to a single agent tank. It shall contain a factory installed regulator dead-set at 150 psi (10.3 bar) with an internal relief of approximately 190 psi (13.1 bar). The regulated release mechanism shall contain a release assembly, regulator, expellant gas hose, anti-siphonage valve, and agent storage tank housed in a stainless steel enclosure with cover. The enclosure shall contain knock-outs for 15mm. conduit. The cover shall contain an opening for a visual status indicator. It shall be compatible with electric gas shut-off devices.
- 2.1.6 Discharge Nozzles: Discharge nozzles shall be tested and listed with the Inergen system for all applications. One type shall be used for all low and high proximity
- 2.1.7 Distribution Piping: Distribution piping shall be Schedule 40 black iron, chrome-plated, or stainless steel pipe conforming to ASTM A120, A53, or A106.
- 2.1.8 Detectors: The detectors shall be the fusible link type designed to separate

at a specific temperature.

- 2.1.9 Cartridges: The cartridge shall be a sealed steel pressure vessel containing nitrogen gas. The cartridge seal shall be designed to be punctured by the releasing device supplying the required pressure to expel the wet chemical

agent from the storage tank.

3.0 IMPLEMENTATION

3.1 Installation

- 3.1.1 The Inert gas fire suppression system shall be designed, installed, inspected, maintained, and recharged in accordance with the manufacturer's listed instruction manual.

3.2 Training

- 3.2. Employees shall be instructed in personal safety and the operation of the system by authorized distributors who are trained by the manufacturer

PART F: GENERAL CONDITIONS

1.01 Definition of Terms

Throughout these Sub-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) **Employer:** The term “**Employer**” shall mean **EBK**
- ii) **Architect:** The term “**Architect**” shall mean Makro Consultancy
- iii) **Electrical Engineer:** The term “**Electrical Engineer**” shall mean **Feradon Associates Ltd**
- iv) **Mechanical Engineer:** The term “**Mechanical Engineer**” shall mean **Feradon Associates Ltd**
- v) **Quantity Surveyor:** The term “**Quantity Surveyor**” shall mean **Beeque Consultants**
- vi) **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 LS**
 - shall mean **Lump Sum**

mm shall mean
Millimeters No. Shall
mean **Number**
Kg. shall mean **Kilogram**
BS shall mean. **Current standard British Standard**

“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.

1.02 Site Location

The site of the Sub-contract Works is situated **at Barabara Plaza-JKIA Area**

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.

1.03 Duration of 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.

1.04 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

1.05 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 International Standard Specifications and Codes of Practice.

- 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 Employer's Representative

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

Where the Architect 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 Architect 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 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.

1.16 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.

1.17 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.

1.18 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.

1.19 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 Client and shall form the standard for all such materials incorporated.

1.20 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 thereunder 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 Architect so directs, uncover the work to enable the necessary measurements to be taken and afterwards reinstate at his own expense.

1.21 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.

1.22 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.

1.23 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.

1.24 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.

1.25 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 accepted).

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.

1.26 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 trifoliate 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.

1.27 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.

1.28 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 onsite 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 Architect 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.

1.29 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 suitably 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 suitably 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 maybe 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.

1.30 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.

This shall be a volume dealing with Air Conditioning and Mechanical Ventilation installation where such installations are included in this 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.

1.31 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.

1.32 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.

1.33 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 weeks' notice to the Engineer of his intention to carry out any inspection or tests and the Engineer or his representative shall be entitled to witness such tests and inspections.

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.

1.34 Testing and Inspection -Installation

Allow for testing each section of the Sub-contract Works installation as described hereinafter to the satisfaction of the Engineer.

1.35 Storage of Materials

Space for storage will be provided by the Main Contractor but the Sub-contractor will be responsible for the 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 Architect.

1.36 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.

1.37 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 1.41 (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, 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 unitrate 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.

1.38 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.

1.39 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.

1.40 Defects after Completion

The defects liability period will be six months from the date of completion of the Main Contract ascertified by the Engineer.

1.41 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.

1.42 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 Sub-contractor for the execution of the Sub-contract.

1.43 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 Sub-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 Sub-contractor is engaged are similar.

1.44 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 Architect or Engineer.

Any instructions given to the Supervisor on site shall be deemed to have been given to the Sub-contractor.

Depending on the scope of coordination works required onsite, the Engineer shall recommend the appointment of a Resident Electrical Engineer, who will be required to be based on site. The Resident Engineer shall be appointed and paid by the Engineer. Provision to be made for the appointment of the Resident Engineer.

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.

1.45 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.

1.46 Labour

The Sub-contractor shall provide skilled and unskilled labour as may be necessary for completion of the contract.

1.47 Guarantee

The whole of the work will be guaranteed for a period of twelve (12) months from the date of the Architect'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.

PART G:

BILLS OF QUANTITIESFOR

BARABARA PLAZA MECHANICALINSTALLATIONS & ASSOCIATEDSERVICES

BILL No. 1:- BARABARA PLAZA GROUND FLOOR WING A AIR CONDITIONING INSTALLATIONS					
ITEM No.	DESCRIPTION	QTY	UNIT	RATE KShs. Cts.	AMOUNT KShs. Cts.
	Supply, install, test and commission the following VRF system Air-conditioning system comprising of indoor units, VRF outdoor unit, refrigerant piping circuit and other components as described below. Tenderers must allow in their rates prices for all the couplings, connectors, joints, bends, etc. in running lengths of refrigerant pipes and condensate pipes. Jointing & installation methods shall be as per manufacturers' recommendations only. LG MULTI V has been used as a guide to the type and quality expected. Tenderers may submit alternative systems based on Three refrigerant piping circuit. However, these systems must be accompanied by Itemized Bills of Quantities and Manufacturer's catalogue to the approval of the Engineer. Alternative quotations that do not meet this criterion will NOT be considered. <u>INDOOR UNITS</u> 1.01 Concealed Ducted High Static Pressure Type indoor air-conditioning unit with: . Cooling capacity : - 3.6 Kw . External static pressure range 50-75-125-150-175-200 (7 steps) (7 steps) . Condensate drain pipe (32mm diameter MUPVC) from indoor unit(Approximately 60m) . Fan motor . Limiting noise level 40dB (A) at high speed. . Cooling coil . 'Green' Refrigerant charge, Stopper valves on pipework . Condensate drip pan . Neatly boxed or put in trunking Respective Three- pipe Refrigerant piping insulated with 25mm thick Armaflex Insulation upto the Y-Junction as per the manufacturer's specifications (Maximum length for each refrigerant pipe : 20m long), heat recovery unit to control heating and cooling . Include respective Y-shaping joint connectors to the indoor unit from the main refrigerant pipework. . Support brackets. . Allow for Electrical wiring between the indoor unit in manufacturers recommended cables to a D.P switch				

	described in the electrical section by others within the room (approximately 10 Lm) Mandatory Options . Renewal of indoor ambient air with constant fresh air supply through the field installed fresh air intake connection. . High efficiency filter on inlet side . Factory made sunction canvas . Drain pump kit . Flexible ducting to fit the supply side . Plenum box for above supply side The unit to be as LG				
1.02	Ditto but 4.5 kW	2	No.		
1.03	Ditto but 5.6 kW	1	No.		
1.04	Ditto but 8.2 kW	4	No.		
		2	No.		
	Total Carried Forward				

BILL No. 1:- BARABARA PLAZA GROUND FLOOR WING A AIR CONDITIONING INSTALLATIONS					
ITEM No.	DESCRIPTION	QTY	UNIT	RATE KShs. Cts.	AMOUNT KShs. Cts.
1.05	Total Brought Forward				
1.06	Ceiling Cassette air- conditioning unit with: . Cooling capacity : - 3.6 Kw . Fan speed: - 3 steps . Condensate drain pipe (32mm diameter MUPVC) from indoor unit(Approximately 60m) . Fan motor . Limiting noise level 40dB (A) at high speed. . Cooling coil . 'Green' Refrigerant charge . Condensate drip pan . Neatly boxed or put in trunking Respective Three- pipe Refrigerant piping insulated with 25mm thick Armaflex Insulation upto the Y-Junction as per the manufacturer`s specifications (Maximum length for each Refrigerant pipe : 20m long), heat recovery unit to control heating and cooling . Allow for Electrical wiring between the indoor unit in manufacturers recommended cables to a D.P switch descibed in the electrical section by others within the room(approximately 10 Lm) . Include respective Y-shaping joint connectors to the indoor unit from the main refrigerant pipework. . Support brackets etc.	4	No.		
1.07	The unit to be as LG Ditto but 5.6 kW <u>DUCTWORK</u> <u>AND GRILLES</u>	1	No.		
1.08	Supply and install the following ductwork in pre-insulated phonylfoamsheets in approved thickness. Rates to allow for duct support hanger jointing and all other necessary accessories.	2	SM		
		1	SM		
		12	SM		
		4	SM		
		1	SM		
		1	SM		
		1	SM		
		1	SM		
		1	SM		
		3	No.		
		8	NO.		
		6	NO.		
		4	NO.		
		6	NO.		
		2	NO.		

	Straight Lengths	3	No.		
		4	No.		
	1000x250mm straight				
	lengths 300x200 ditto				
	250x250				
	ditto				
	250x200				
	ditto				
	225x150				
	ditto				
	200x200				
	ditto				
	200x150				
	ditto				
	150x150				
	ditto				
	150x100				
	ditto				
	Bends				
	300x200 90 Deg				
	bends 250x250				
	ditto 250x200				
	ditto 225x150				
	ditto 200x200				
	ditto 200x150				
	ditto 150x150				
	ditto 150x100				
	ditto				
	Total Carried Forward				

BILL No. 1:- BARABARA PLAZA GROUND FLOOR WING A AIR CONDITIONING INSTALLATIONS					
ITEM No.	DESCRIPTION	QTY	UNIT	RATE KShs. Cts.	AMOUNT KShs. Cts.
	Total Brought Forward				
1.09	Tee Branch 300x200 Tee Branch 250x250 ditto 250x200 ditto 225x150 ditto 200x200 ditto 200x150 ditto 150x150 ditto 150x100 ditto	3 6 2 1 3 5 1 2	No. NO. NO. NO. NO. NO. NO. NO.		
1.10	Transition Pieces 1000x250mm to 250x250mm 300x250mm to 200x200mm 200x200mm to 150x150mm 250x250mm to 150x150mm	16 3 6 3	NO. NO. NO. NO.		
1.11	Ceiling Extract & Supply Grills a) 1200mm x 150mm Linear grill Ceiling mounted supply and extract diffusers complete with dampers to engineer's approval. Allow for Flexible ducts for connection of extract and supply diffusers/ grilles upto a maximum distance of 2M long as approved by the Mechanical Engineer b) 600x600mm Square Supply and Return Diffusers Complete with Dampers to engineer s approval. Allow for Flexible ducts for connection of extract and supply diffusers/ grilles upto a maximum distance of 2M long as approved by the Mechanical Engineer	8 20	No. No.		
1.12	Supply, install, test and commission Wall mounted wired Simplified Remote Controller complete with: . Control wiring with connection to indoor unit. Allow for control wiring between room remote controller and indoor unit in manufacturers recommended cables (approximately 10 Lm) . Temperature setting function. . Self diagnosis function and any other necessary accessories as per manufacturer's recommendation. Additionally provide an additional wall mounted wireless remotes with holders to Engineer's approval.	14	No.		
1.13	POWER & CONTROL SYSTEM Supply, install test and commission central remote controller with: . Temperature setting function . Integrated setup function . Priority change function between central controller and local controller				

	. Self diagnosis function				
	. Timer function and any other necessary accessories as per manufacturer's recommendation. Allow for control wiring between 14/No. wired room remote controllers and Central Controller in manufacturers recommended cables.	1	Ite m		
BILL No. 1:- BARABARA PLAZA GROUND FLOOR WING A AIR CONDITIONING INSTALLATIONS					

ITEM No.	DESCRIPTION	QTY	UNIT	RATE KShs. Cts.	AMOUNT KShs. Cts.
	Total Brought Forward				
1.1	<u>OUTDOOR UNITS</u>				
4	VRF air Conditioning outdoor unit with a cooling capacity of 66kW Having Heating & Cooling Capabilities complete with: . CFC-free refrigerant R410A . BMS enabled . Local electrical isolator . Two inverter controlled DC twin totary compressors . Energy Efficiency Ratio of cooling (EER) of 3.63 . Coefficient of Performance (COP) of 3.90 . Even spreading of operating hours between compressors . Discharge and suction temperature sensors . Internal overload relay . Compressor over- current relay . Over current sensor . High pressure switch . Low pressure sensor . Connecting port for refrigerant pipe comprising of 34.9mm diameter Gas pipe & 15.88mm diameter liquid pipe both running upto a distance of 40m long . . Neatly boxed or put in trunking Respective Refrigerant piping from indoor y-junction to the roof VRF Outdoor unit insulated with 25mm thick Armaflex Insulation as per the manufacturer`s specifications. T Shape branching joint for connection of outdoor units . Limiting noise level 63 dB . Condenser fan . Support bracket Allow for a sum for hoisting and mounting the outdoor unit from ground level to Roof floor slab level or to the location to be shown on site. Allow for Electrical wiring between the outdoor unit in manufacturers recommended cables to an isolator approximately 10metres away descibed in the electrical section by others The unit to be as LG or any other approved Equivalent	1	No.		
	TOTAL C/F TO SUMMARY PAGE				

BILL No. 2:- BARABARA PLAZA GROUND FLOOR WING B AIR CONDITIONING INSTALLATIONS					
ITEM No.	DESCRIPTION	QTY	UNIT	RATE KShs. Cts.	AMOUNT KShs. Cts.
2.01	Supply, install, test and commission the following VRF system Air-conditioning system comprising of indoor units, VRF outdoor unit, refrigerant piping circuit and other components as described below. Tenderers must allow in their rates prices for all the couplings, connectors, joints, bends, etc. in running lengths of refrigerant pipes and condensate pipes. Jointing & installation methods shall be as per manufacturers' recommendations only. LG MULTI V has been used as a guide to the type and quality expected. Tenderers may submit alternative systems based on Three refrigerant piping circuit. However, these systems must be accompanied by Itemized Bills of Quantities and Manufacturer's catalogue to the approval of the Engineer. Alternative quotations that do not meet this criterion will NOT be considered. <u>INDOOR UNITS</u> Concealed Ducted High Static Pressure Type indoor air-conditioning unit with: . Cooling capacity : - 3.6 Kw . External static pressure range 50-75-125-150-175-200 (7 steps) (7 steps) . Condensate drain pipe (32mm diameter MUPVC) from indoor unit(Approximately 60m) . Fan motor . Limiting noise level 40dB (A) at high speed. . Cooling coil . 'Green' Refrigerant charge, Stopper valves on pipework . Condensate drip pan . Neatly boxed or put in trunking Respective Three- pipe Refrigerant piping insulated with 25mm thick Armaflex Insulation upto the Y-Junction as per the manufacturer's specifications (Maximum length for both pipes : 20m long), heat recovery unit to control heating and cooling . Include y-shaping joint connectors to the indoor unit from the main refrigerant pipework. . Support brackets Allow for Electrical wiring between the indoor unit in manufacturers recommended cables to a D.P switch	2	No		

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BILL No. 2:- BARABARA PLAZA GROUND FLOOR WING B AIR CONDITIONING INSTALLATIONS					
ITEM No.	DESCRIPTION	QTY	UNIT	RATE KShs. Cts.	AMOUNT KShs. Cts.
	Total Brought Forward				
2.0 6	<u>DATA CENTRE-FLOOR STANDING SPLIT AC UNIT</u> Supply & Install Split AC Unit Comprising of 7.1 KW Floor Standing Indoor Air Conditioning unit complete with its respective Outdoor Unit, Refrigerant Pipework, Condensate drain (25mm diameter MUPVC) from indoor unit (Approx.60m), Fan motor .Limiting noise level 40dB (A) at high speed. . Cooling coil . 'Green' Refrigerant charge . Condensate drip pan . Neatly boxed or put in trunking Respective Two-pipe Refrigerant piping insulated with 25mm thick Armaflex Insulation upto the Y- Junction as per the manufacturer`s specifications (Maximum length for both pipes : 20m long) . Support brackets. Allow for Electrical and control wiring including cabling to and from the indoor to outdoor unit in 3x4.0mm ² SC-PVC-CU cables wired in diameter 32mm HG conduit (Approximately 60 meters long). Complete with 30VA Voltage switch as Sollatek AVS 30 complete with wiring.	2	No		
2.0 7	<u>DUCTWORK AND GRILLES</u> Supply and install the following ductwork in pre-insulated phonylfoamsheets in approved thickness. Rates to allow for duct support hanger jointing and all other necessary accessories.	2 1 12 4 1 1 1 1 1	S M S M S M S M S		
2.0 8	Straight Lengths 1000x250mm straight lengths 300x200 ditto 250x250 ditto 250x200 ditto 225x150 ditto	3 8 6 4 6 2 3 4	M S M S M S M S		

2.0 9	200x200		M		
	ditto				
	200x150	3			
	ditto	6	No		
	150x150	2	.		
	ditto	1	No		
	150x100	3	.		
	ditto	5	No		
		1	.		
		2	No		
			.		
	Bends				
	300x200 90 Deg		No		
	bends 250x250		.		
	ditto 250x200		No		
	ditto 225x150		.		
	ditto 200x200		No		
	ditto 200x150		.		
	ditto 150x150		No		
	ditto 150x100		.		
	ditto		No		
			.		
	Tee Branch		No		
	300x200 Tee		.		
	Branch 250x250		No		
	ditto 250x200		.		
	ditto 225x150		No		
	ditto 200x200		.		
	ditto 200x150		No		
	ditto 150x150		.		
	ditto		No		
	150x100 ditto		.		
			No		
			.		
			No		
			.		
Total Carried Forward					

BILL No. 2:- BARABARA PLAZA GROUND FLOOR WING B AIR CONDITIONING INSTALLATIONS					
ITEM No.	DESCRIPTION	QTY	UNIT	RATE KShs. Cts.	AMOUNT KShs. Cts.
	Total Brought Forward				
2.10	Transition Pieces 1000x250mm to 250x250mm 300x250mm to 200x200mm 200x200mm to 150x150mm 250x250mm to 150x150mm	16363	No . No . No . No .		
2.11	Ceiling Extract & Supply Grills a) 1200mm x 150mm Linear grill Ceiling mounted supply and extract diffusers complete with dampers to engineer's approval. Allow for Flexible ducts for connection of extract and supply diffusers/ grilles upto a maximum distance of 2M long as approved by the Mechanical Engineer.	415	No . No .		
2.12	b) 600x600mm Square Supply and Return Diffusers Complete with Dampers to engineer's approval. Allow for Flexible ducts for connection of extract and supply diffusers/ grilles upto a maximum distance of 2M long as approved by the Mechanical Engineer.		No .		
	VRF air Conditioning outdoor unit with a cooling capacity of 66kW Having Heating & Cooling Capabilities complete with: . CFC-free refrigerant R410A . BMS enabled . Local electrical isolator . Two inverter controlled DC twin totary compressors . Energy Efficiency Ratio of cooling (EER) of 3.63 . Coefficient of Perfomance (COP) of 3.90 . Even spreading of operating operating hours between compressors . Discharge and sunction temperature sensors . Internal overload relay . Compressor over- current relay . Over current sensor . High pressure switch . Low pressure sensor				

	. Connecting port for refrigerant pipe comprising of 34.9mm diameter Gas pipe & 15.88mm diameter liquid pipe both running upto a distance of 40m long . . Neatly boxed or put in trunking Respective Refrigerant piping from indoor y-junction to the roof VRF Outdoor unit insulated with 25mm thick Armaflex Insulation as per the manufacturer`s specifications. T Shape branching joint for connection of outdoor units . Limiting noise level 63 dB . Condenser fan . Support bracket Allow for a sum for hoisting and mounting the outdoor unit from ground level to Roof floor slab level or to the location to be shown on site. Allow for Electrical wiring between the outdoor unit in manufacturers recommended cables to an isolator approximately 10metres away descibed in the electrical section by others The unit to be as LG or any other approved Equivalent	1	No		
	Total Carried Forward				

BILL No. 2:- BARABARA PLAZA GROUND FLOOR WING B AIR CONDITIONING INSTALLATIONS					
ITEM No.	DESCRIP TION	QT Y	UN IT	RATE KShs. Cts.	AMOUN T KShs. Cts.
	Total Brought Forward				
2.1 3	<u>POWER & CONTROL SYSTEM</u> Supply, install test and commission central remote controller with: . Temperature setting function . Integrated setup function . Priority change function between central controller and local controller . Self diagnosis function . Timer function and any other necessary accessories as per manufacturer's recommendation . Allow for control wiring between 14No. wired room remote controllers and Central Controller in manufacturers recommended cables.	1	Item		
2.1 4	Supply, install, test and commission Wall mounted wired Simplified Remote Controller complete with: . Control wiring with connection to indoor unit. Allow for control wiring between room remote controller and indoor unit in manufacturers recommended cables (approximately 10 Lm) . Temperature setting function . Self diagnosis function and any other necessary accessories as per manufacturer's recommendation. Additionally provide an additional wall mounted wireless remotes with holders to Engineer's approval	13	No.		
	TOTAL C/F TO SUMMARY PAGE				

**BILL No. 3:- BARABARA PLAZA GROUND FLOOR WING C&D AIR
CONDITIONING INSTALLATIONS**

ITEM No.	DESCRIPTION	QTY	UNIT	RATE KShs. Cts.	AMOUNT KShs. Cts.
3.0 1	Supply, install, test and commission the following VRF system Air-conditioning system comprising of indoor units, VRF outdoor unit, refrigerant piping circuit and other components as described below. Tenderers must allow in their rates prices for all the couplings, connectors, joints, bends, etc. in running lengths of refrigerant pipes and condensate pipes. Jointing & installation methods shall be as per manufacturers' recommendations only. LG MULTI V has been used as a guide to the type and quality expected. Tenderers may submit alternative systems based on Three refrigerant piping circuit. However, these systems must be accompanied by Itemized Bills of Quantities and Manufacturer's catalogue to the approval of the Engineer. Alternative quotations that do not meet this criterion will NOT be considered. <u>INDOOR UNITS</u> Concealed Ducted High Static Pressure Type indoor air-conditioning unit with: . Cooling capacity : - 3.6 Kw . External static pressure range 50-75-125-150-175-200 (7 steps) (7 steps) . Condensate drain pipe (32mm diameter MUPVC) from indoor unit(Approximately 60m) . Fan motor . Limiting noise level 40dB (A) at high speed. . Cooling coil . 'Green' Refrigerant charge, Stopper valves on pipework . Condensate drip pan . Neatly boxed or put in trunking Respective Three- pipe Refrigerant piping insulated with 25mm thick Armaflex Insulation upto the Y-Junction as per the manufacturer's specifications (Maximum length for both pipes : 20m long), heat recovery unit to control heating and cooling Include y-shaping joint connectors to the indoor unit from the main refrigerant pipework. . Support brackets Allow for Electrical wiring between the indoor unit in manufacturers recommended cables to a D.P switch	1	No		

BILL No. 3:- BARABARA PLAZA GROUND FLOOR WING C&D AIR CONDITIONING INSTALLATIONS					
ITE M No.	DESCRIP TION	QT Y	UN IT	RATE KShs. Cts.	AMOUN T KShs. Cts.
	Total Brought Forward				
3.0 6	Ceiling Cassette air- conditioning unit with: . Cooling capacity : - 3.6 Kw . Fan speed: - 3 steps . Condensate drain pipe (32mm diameter MUPVC) from indoor unit(Approximately 60m) . Fan motor . Limiting noise level 40dB (A) at high speed. . Cooling coil . 'Green' Refrigerant charge, Stopper valves on pipework . Condensate drip pan . Neatly boxed or put in trunking Respective Three- pipe Refrigerant piping insulated with 25mm thick Armaflex Insulation upto the Y-Junction as per the manufacturer`s specifications (Maximum length for both pipes : 20m long), heat recovery unit to control heating and cooling Include y-shaping joint connectors to the indoor unit from the main refrigerant pipework. . Support brackets Allow for Electrical wiring between the indoor unit in manufacturers recommended cables to a D.P switch descibed in the electrical section by others within the room(approximately 10 Lm) The unit to be as LG	4 2 1	No . No .		
3.0 7					
3.0 8	Ditto but 4.5 kW Ditto but 5.6 kW		No .		
	<u>DUCTWORK</u>				
	<u>AND GRILLES</u>	2 1 12 4 1 1 1 1 1			
3.0 9	Supply and install the following ductwork in pre-insulated phonyl foamsheets in approved thickness. Rates to allow for duct support hanger jointing and all other necessary accessories.		S M S M S M S		
	Straight Lengths 1000x250mm straight lengths 300x200 ditto	1 5	M S M S		

ENGINEERS BOARD OF KENYA-EBK
THE PROPOSED OFFICES PARTITIONING AT BARABARA PLAZA
MECHANICAL VENTILATION AND AIRCONDITIONING

3.1 0	250x250	10	M		
	ditto	7	S		
	250x200	5	M		
	ditto	8	S		
	225x150	3	M		
	ditto	5	S		
	200x200	3	M		
	ditto		S		
	200x150		M		
	ditto				
	150x150		No		
	ditto		.		
	150x100		No		
	ditto		.		
	Bends		No		
	300x200 90 Deg		.		
	bends 250x250		No		
	ditto 250x200		.		
	ditto 225x150		No		
	ditto 200x200		.		
	ditto 200x150		No		
	ditto 150x150		.		
	ditto 150x100		No		
	ditto		.		
	Total Carried Forward				

**BILL No. 3:- BARABARA PLAZA GROUND FLOOR WING C&D AIR
CONDITIONING INSTALLATIONS**

ITEM No.	DESCRIPTION	QTY	UNIT	RATE KShs. Cts.	AMOUNT KShs. Cts.
	Total Brought Forward				
3.1 1	Tee Branch 300x200 Tee Branch 250x250 ditto 250x200 ditto 225x150 ditto 200x200 ditto 200x150 ditto 150x150 ditto 150x100	47334612	No. .No. .No. .No. .No. .No. .No.		
3.1 2	ditto Transition Pieces 1000x250mm to 250x250mm 300x250mm to 200x200mm	16363	No. .No. .No. .No.		
3.1 3	200x200mm to 150x150mm 250x250mm to 150x150mm Ceiling Extract & Supply Grills a) 1200mm x 150mm Linear grill Ceiling mounted supply and extract diffusers complete with dampers to engineer's approval. Allow for Flexible ducts for connection of extract and supply diffusers/ grilles upto a maximum distance of 2M long as approved by the Mechanical Engineer b) 600x600mm Square Supply and Return Diffusers Complete with Dampers to engineer`s approval. Allow for Flexible ducts for connection of extract and supply diffusers/ grilles upto a maximum distance of 2M long as approved by the Mechanical Engineer	4 15	No. .No. .No. .No. No. .No.		
	Total Carried Forward				

BILL No. 3:- BARABARA PLAZA GROUND FLOOR WING C&D AIR CONDITIONING INSTALLATIONS					
ITEM No.	DESCRIPTION	QTY	UNIT	RATE KShs. Cts.	AMOUNT KShs. Cts.
	Total Brought Forward				
3.1	OUTDOOR UNITS				
4	VRF air Conditioning outdoor unit with a cooling capacity of 74kW Having Heating & Cooling Capabilities complete with: . CFC-free refrigerant R410A . BMS enabled . Local electrical isolator .Two inverter controlled DC twin totary compressors . Energy Efficiency Ratio of cooling (EER) of 3.63 . Coefficient of Perfomance (COP) of 3.90 . Even spreading of operating operating hours between compressors . Discharge and sunction temperature sensors . Internal overload relay . Compressor over- current relay . Over current sensor . High pressure switch . Low pressure sensor . Connecting port for refrigerant pipe comprising of 34.9mm diameter Gas pipe & 15.88mm diameter liquid pipe both running upto a distance of 40m long . . Neatly boxed or put in trunking Respective Refrigerant piping from indoor y-junction to the roof VRF Outdoor unit insulated with 25mm thick Armaflex Insulation as per the manufacturer`s specifications.T Shape branching joint for connection of outdoor units . Limiting noise level 63 dB . Condenser fan . Support bracket Allow for a sum for hoisting and mounting the outdoor unit from ground level to Roof floor slab level or to the location to be shown onsite.	1	No		
3.1	Allow for Electrical wiring between the outdoor unit in manufacturers recommended cables to an isolator approximately 10metres away descibed in the electrical section by others The unit to be as LG or any other approved Equivalent				
5					
	POWER & CONTROL SYSTEM	1	Ite		

3.1 6	Supply, install test and commission central remote controller with: . Temperature setting function . Integrated setup function . Priority change function between central controller and local controller . Self diagnosis function . Timer function and any other necessary accessories as per manufacturer's recommendation Allow for control wiring between 14No. wired room remote controllers and Central Controller in manufacturers recommended cables. Supply, install, test and commission Wall mounted wired Simplified Remote Controller complete with: . Control wiring with connection to indoor unit. Allow for control wiring between room remote controller and indoor unit in manufacturers recommended cables (approximately 10 Lm) . Temperature setting function . Self diagnosis function and any other necessary accessories as per manufacturer's recommendation. Additionally provide an additional wall mounted wireless remotes with holders to Engineer's approval	16	m	No	
	Total Carried Forward				

BILL No. 3:- BARABARA PLAZA GROUND FLOOR WING C&D AIR CONDITIONING INSTALLATIONS					
ITEM No.	DESCRIPTION	QTY	UNIT	RATE KShs. Cts.	AMOUNT KShs. Cts.
	Total Brought Forward				
	<u>WASHROOMS MECHANICAL VENTILATION</u>				
3.17	<u>Ventilation Fans</u> Systemair Extract fan to discharge 169m ³ /hr at a pressure of 250 pa with silencer, external louvre, electrical connection, speed regulator, surge protector and all mounting accessories to Engineer's approval. Allow for the supply and installation of presence detector and intergrating it with the above fans in order to control the start and stopping of the fans .Additionally allow for electrical and control wiring between the fan, presence detector and an d.p switch provided by others approximately 5 metres away.	1	No.		
	<u>Ductwork & Grilles</u>				
3.18	Supply and install the following ductwork in galvanized mild steel sheets with 1.2mm thickness. Rates to allow for duct support hanger jointing and all other necessary accessories.	22	SMSM		
3.19	Straight Lengths	1	No.		
3.20	200x200mm straight lengths 150x150 ditto	2			
3.21	Bends 150x150mm 90° bend	2	No.		
3.22	Tee Branch 200x200mm Tee Branch		No.		
	Transition Pieces 200x200mm to 150x150mm				
3.23	200mm ceiling mounted circular air valve to Engineers approval complete with Flexible ducts for connection of extract diffusers/grills.	1	No.		
	<u>Kitchen Hood</u>				

Supply & Install 610m3/hr Decorative Cooker hood as S & P HA-600 E INOX 600mm x 450mm complete with 2 x 3W lamps, 90W Motor Power, metal fitters, frontal, push button, 3-speed selector, telescopic chimney, back draft shutter, motor voltage 230 and current 0.42A, sound pressure level 56 dBA.		No		
TOTAL C/F TO SUMMARY PAGE				

BILL No. 4:- BARABARA PLAZA FIRST FLOOR AIR CONDITIONING INSTALLATIONS					
ITEM No.	DESCRIPTION	QTY	UNIT	RATE KShs. Cts.	AMOUNT KShs. Cts.
4.0 1	Supply, install, test and commission the following VRF system Air-conditioning system comprising of indoor units, VRF outdoor unit, refrigerant piping circuit and other components as described below. Tenderers must allow in their rates prices for all the couplings, connectors, joints, bends, etc. in running lengths of refrigerant pipes and condensate pipes. Jointing & installation methods shall be as per manufacturers' recommendations only. LG MULTI V has been used as a guide to the type and quality expected. Tenderers may submit alternative systems based on Three refrigerant piping circuit. However, these systems must be accompanied by Itemized Bills of Quantities and Manufacturer's catalogue to the approval of the Engineer. Alternative quotations that do not meet this criterion will NOT be considered. <u>INDOOR UNITS</u> Concealed Ducted High Static Pressure Type indoor air-conditioning unit with: . Cooling capacity : - 3.6 Kw . External static pressure range 50-75-125-150-175-200 (7 steps) (7 steps) . Condensate drain pipe (32mm diameter MUPVC) from indoor unit(Approximately 60m) . Fan motor . Limiting noise level 40dB (A) at high speed. . Cooling coil . 'Green' Refrigerant charge, Stopper valves on pipework . Condensate drip pan . Neatly boxed or put in trunking Respective Three- pipe Refrigerant piping insulated with 25mm thick Armaflex Insulation upto the Y-Junction as per the manufacturer's specifications (Maximum length for both pipes : 20m long), heat recovery unit to control heating and cooling Include y-shaping joint connectors to the indoor unit from the main refrigerant pipework. . Support brackets Allow for Electrical wiring between the indoor unit in	1	No		

BILL No. 4:- BARABARA PLAZA FIRST FLOOR AIR CONDITIONING INSTALLATIONS					
ITEM No.	DESCRIPTION	QTY	UNIT	RATE KShs. Cts.	AMOUNT KShs. Cts.
	Total Brought Forward				
4.06	Ceiling Cassette air- conditioning unit with: . Cooling capacity : - 3.6 Kw . Fan speed: - 3 steps . Condensate drain pipe (32mm diameter MUPVC) from indoor unit(Approximately 60m) . Fan motor . Limiting noise level 40dB (A) at high speed. . Cooling coil . 'Green' Refrigerant charge, Stopper valves on pipework . Condensate drip pan . Neatly boxed or put in trunking Respective Three- pipe Refrigerant piping insulated with 25mm thick Armaflex Insulation upto the Y-Junction as per the manufacturer`s specifications (Maximum length for both pipes : 20m long), heat recovery unit to control heating and cooling Include y-shaping joint connectors to the indoor unit from the main refrigerant pipework. . Support brackets Allow for Electrical wiring between the indoor unit in manufacturers recommended cables to a D.P switch descibed in the electrical section by others within the room(approximately 10 Lm) The unit to be as LG	4	No		
4.07		2	.	No	
		1	.		
4.08			No	.	
	Ditto but 4.5 kW				
	Ditto but 5.6 kW				
	<u>DUCTWORK</u>				
	<u>AND GRILLES</u>	2			
4.09	Supply and install the following ductwork in pre-insulated phonyl foamsheets in approved thickness. Rates to allow for duct support hanger jointing and all other necessary accessories.	12			
		4			
		1	S		
		1	M		
		1	S		
			M		
			S		
	Straight Lengths	5	M		
	1000x250mm straight	10	S		
4.10	lengths 300x200 ditto	7	M		
		5	S		

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	250x250	8	M		
	ditto	3	S		
	250x200	5	M		
	ditto	3			
	200x200				
	ditto		No		
	150x150		.		
	ditto		No		
			.		
	Bends		No		
	300x200 90 Deg		.		
	bends 250x250		No		
	ditto 250x200		.		
	ditto 225x150		No		
	ditto 200x200		.		
	ditto 200x150		No		
	ditto 150x150		.		
	ditto 150x100		No		
	ditto		.		
	Total Carried Forward				

BILL No. 4:- BARABARA PLAZA FIRST FLOOR AIR CONDITIONING INSTALLATIONS					
ITEM No.	DESCRIPTION	QTY	UNIT	RATE KShs. Cts.	AMOUNT KShs. Cts.
	Total Brought Forward				
4.1 1	Tee Branch 300x200 Tee Branch 250x250 ditto 250x200 ditto 225x150 ditto 200x200 ditto 200x150 ditto 150x150 ditto 150x100	4 7 3 3 4 6 1 2	No . No . No . No . No		
4.1 2	ditto	16	No		
	Transition Pieces 1000x250mm to 250x250mm 300x250mm to 200x200mm 200x200mm to 150x150mm 250x250mm to 150x150mm	3 6 3	No . No . No . No .		
4.1 3	Ceiling Extract & Supply Grills a) 1200mm x 150mm Linear grill Ceiling mounted supply and extract diffusers complete with dampers to engineer's approval. Allow for Flexible ducts for connection of extract and supply diffusers/ grilles upto a maximum distance of 2M long as approved by the Mechanical Engineer b) 600x600mm Square Supply and Return Diffusers Complete with Dampers to engineer's approval. Allow for Flexible ducts for connection of extract and supply diffusers/ grilles upto a maximum distance of 2M long as approved by the Mechanical Engineer	4 15	No . No . No . No .		
	Total Carried Forward				

BILL No. 4:- BARABARA PLAZA FIRST FLOOR AIR CONDITIONING INSTALLATIONS

ITEM No.	DESCRIPTION	QTY	UNIT	RATE KShs. Cts.	AMOUNT KShs. Cts.
	Total Brought Forward				
4.1	<u>OUTDOOR UNITS</u>				
4	VRF air Conditioning outdoor unit with a cooling capacity of 53kW Having Heating & Cooling Capabilities complete with: . CFC-free refrigerant R410A . BMS enabled . Local electrical isolator . Two inverter controlled DC twin totary compressors . Energy Efficiency Ratio of cooling (EER) of 3.63 . Coefficient of Perfomance (COP) of 3.90 . Even spreading of operating operating hours between compressors . Discharge and sunction temperature sensors . Internal overload relay . Compressor over- current relay . Over current sensor . High pressure switch . Low pressure sensor . Connecting port for refrigerant pipe comprising of 34.9mm diameter Gas pipe & 15.88mm diameter liquid pipe both running upto a distance of 40m long . . - Neatly boxed or put in trunking Respective Refrigerant piping from indoor y-junction to the roof VRF Outdoor unit insulated with 25mm thick Armaflex Insulation as per the manufacturer`s specifications.T Shape branching joint for connection of outdoor units . Limiting noise level 63 dB . Condenser fan . Support bracket - Allow for a sum for hoisting and mounting the outdoor unit from ground level to Roof floor slab level or to the location to be shown on site. Allow for	1	No		
4.1	Electrical wiring between the outdoor unit in manufacturers recommended cables to an isolator approximately 10 metres away descibed in the electrical section by others				
5	The unit to be as LG or any other approved Equivalent				

		1	Item		
	<u>POWER & CONTROL SYSTEM</u> Supply, install test and commission central remote controller with: . Temperature setting function . Integrated setup function . Priority change function between central controller and local controller . Self diagnosis function . Timer function and any other necessary accessories as per manufacturer's recommendation Allow for control wiring between 14No. wired room remote controllers and Central Controller in manufacturers recommended cables.				
	Total Carried Forward				

BILL No. 4:- BARABARA PLAZA FIRST FLOOR AIR CONDITIONING INSTALLATIONS					
ITEM No.	DESCRIPTION	QTY	UNIT	RATE KShs. Cts.	AMOUNT KShs. Cts.
	Total Brought Forward				
4.16	Supply, install, test and commission Wall mounted wired Simplified Remote Controller complete with: . Control wiring with connection to indoor unit. Allow for control wiring between room remote controller and indoor unit in manufacturers recommended cables (approximately 10 Lm) . Temperature setting function . Self diagnosis function and any other necessary accessories as per manufacturer's recommendation. Additionally provide an additional wall mounted wireless remotes with holders to Engineer's approval	16	No		
4.17	<u>WASHROOMS MECHANICAL VENTILATION</u> <u>Ventilation Fans</u> Systemair Extract fan to discharge 162m ³ /hr at a pressure of 250 pa with silencer, external louvre, electrical connection, speed regulator, surge protector and all mounting accessories to Engineer's approval. Allow for the supply and installation of presence detector and intergrating it with the above fans in order to control the start and stopping of the fans .Additionally allow for electrical and control wiring between the fan, presence detector and an d.p switch provided by others approximately 5 metres away.	1	No		
4.18		2	S		
		2	M		
		2	S		
			M		
4.19	<u>Ductwork & Grilles</u> Supply and install the following ductwork in galvanized mild steel sheets with 1.2mm thickness. Rates to allow for duct support hanger jointing and all other necessary accessories.	1	No		
4.20		2	.		
			No		
4.21	Straight Lengths 200x200mm straight lengths 150x150 ditto	2	.		
			No		

MECHANICAL VENTILATION AND AIRCONDITIONING					
4.2	Bends			.	
2	150x150mm 90° bend				
	Tee Branch			No	
	200x200mm Tee Branch	1		.	
	Transition Pieces				
4.2	200x200mm to 150x150mm				
3	200mm ceiling mounted circular air valve to Engineers approval complete with Flexible ducts for connection of extract diffusers/grills.			No	
	<u>Kitchen Hood</u>			.	
	Supply & Install Decorative Cooker hood as S & P HA-600 E INOX 600mm x 450mm complete with 2 x 3W lamps, metal fitters, frontal,push button, speed selector, telescopic chimney, back draft shutter, motor voltage 230 and current 0.42A, sound pressure level 56 dBA.				
TOTAL C/F TO SUMMARY PAGE					

BILL No. 5:- GENERAL ITEMS &PRELIMINARIES					
ITEM No.	DESCRIPTION	UNIT	QTY	RATE KShs. Cts.	AMOUNT KShs. Cts.
5.0 1	Allow for presentation of all the required samples as per specifications, Bills of Quantities and Drawings.	Item	1		
5.0 2	Prepare and submit Working Drawings comprising the following to the satisfaction of the Engineer both in hard and soft copy. All drawings to be in Autocad® 2000 format or an approved higher version: - i) Fully dimensioned drawings of all plants and apparatus. ii) General arrangement drawings of equipment, plant etc. iii) Routes – types and sizes and arrangement of all pipework. iv) Wiring and piping diagrams of plant and apparatus. v) Schematic diagram of individual plants and switch and control boards. vi) All the required operating instructions for all panels, boards, control panels etc. (Note: Full set of drawings to be presented as per drawing list).	Item	1		
5.0 3	As above, but for Record (As-Installed) Drawings comprising: i) Fully dimensioned drawings of all plants and apparatus. ii) General arrangement drawings of equipment, plant etc. iii) Routes – types and sizes and arrangement of all pipework. iv) Wiring and piping diagrams of plant and apparatus. v) Schematic diagram of individual plants and switch and control boards. vi) All the required operating instructions for all panels, boards, control panels etc.	Item	1		
5.0 4	Prepare and submit Maintenance Manuals for all items installed.	Item	1		
5.0 5	Provide a year's (12 months') initial maintenance	Item	1		
		Sum			

	upon expiry of the Defects Liability Period. The maintenance to be carried out every quarter (3 months) for a period of 12 months and should be complete with a comprehensive draft service level agreement.				
	TOTAL C/F TO SUMMARY PAGE				

MECHANICAL VENTILATION & AIRCONDITIONING INSTALLATIONS SUMMARY PAGE		
ITEM No.	DESCRIPTION	AMOUNT KShs. Cts.
1	BILL 01 BARABARA PLAZA GROUND FLOOR WING A MECHANICAL VENTILATION & AIRCONDITIONING INSTALLATIONS	
2	BILL 02 BARABARA PLAZA GROUND FLOOR WING B MECHANICAL VENTILATION & AIRCONDITIONING INSTALLATIONS	
3	BILL 03 BARABARA PLAZA GROUND FLOOR WING C&D MECHANICAL VENTILATION & AIRCONDITIONING INSTALLATIONS	
4	BILL 04 BARABARA PLAZA FIRST FLOOR MECHANICAL VENTILATION & AIRCONDITIONING INSTALLATIONS	
5	BILL 05 GENERAL ITEMS	
6	Sub-Total	
7	ADD 10% CONTINGENCY FOR ABOVE WORKS (ITEM NO. 06)	

TOTAL FOR BARABARA PLAZA MECHANICAL VENTILATION & AIRCONDITIONING INSTALLATIONS C/F TO BARABARA MECHANICAL WORKS	

BILL No. 1:- BARABARA PLAZA PLUMBING, DRAINAGE & FIREFIGHTING INSTALLATIONS

ITEM No.	DESCRIPTION	UNIT	QTY	RATE KShs. Cts.	AMOUNT KShs. Cts.
	<u>SANITARY FITTINGS INSTALLATIONS</u> Supply, deliver and install the following sanitary fittings including all the necessary fittings and jointings. All Sanitary fittings are to be as "Duravit" or equal & approved.				
1.01	<u>WC Suite</u> a) "DURAVIT D-CODE" 'Vitreous China' Wall mounted back inlet water closet pan in white, Horizontal outlet with soft closing heavy-duty seat and cover complete with Supporting Membrane, metal hinges and any other necessary fittings to make it functional or an approved equivalent. Complete with WC "S" or "P" connector to drain pipe for horizontal outlet WC Pan	No.	2		
	b) Attendance to the Existing and working Washroom on CEO's office complete with WHB, WC, Mirror & Tap. Not limited to rearrangement of the fittings	No.	1		
	c) Geberit Sigma concealed cistern 8 cm, 6 / 3 litres with dual-flush actuator in Matt Plate finish, including flush pipe and pan connector, water supply connection with angle stop valve, protection cover for service opening and protection cover for flush pipe, fixed with included fastening materials in "PreWall" brick. All with Geberit conditional guarantee. Automatic flushing system as Geberit Loop 1 Infrared Electronic Control Panel WC Flush Plate, Chrome Plated, Electronic operation, Dual flush control as 244 x 8 x 165mm. Rate to include ac/dc adapter for sensor flush with cable connection about 1 metre away.	No.	2		
1.02	<u>Toilet Roll Holder</u> Hansgrohe White Wall hung toilet roll holder	No.	3		
1.03	<u>Wash Hand Basin</u> a) 580x480mm DURAVIT D-CODE Wall Hung Wash Hand Basin complete with Pedestal, Hansgrohe Chrome plated waste fitting, 32mm dia chrome plate bottle trap, Fixing nuts and bottles. Or equivalent and Engineer's approved.	No.	2		
1.04	750X600mm wide Plain size bevel Edge glass plated mirror complete with dome headed chrome plated fixing screws.	No.	2		
1.05	Hansgrohe Focus S range CP press action delay basin tap or an				

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	approved equivalent	No.	2		
1.0 6	MEDICLINCS 1 Litre Push type manual operated Soap Dispenser. The dispenser is to be complete with wall mounting brackets, key and initial discharge.	No.	3		
1.0 7	Manual Paper Towel Dispenser as mediclinics.	No.	3		
1.0 8	Cobra angle valves or equal and approved.	No.	6		
1.0 9	Copper connector to Engineers approval.	No.	6		
	Total Carried Forward				

BILL No. 1:- BARABARA PLAZA PLUMBING, DRAINAGE & FIREFIGHTING INSTALLATIONS

ITEM No.	DESCRIPTION	UNIT	QTY	RATE KShs. Cts.	AMOUNT KShs. Cts.
	Total Brought Forward				
1.10	<u>Kitchenette Sink</u>				
	SAMI Single bowl Single drainer stainless steel sink made out of 18 SWG stainless steel sheet and complete with spazio II waste kits cost	No.	2		
1.11	40mm (1 ½ ") waste and stopper with chrome plated chain or approved equivalent.	No.	2		
1.12	Hansgrohe Swan Neck Swivel, Sink mounted Kitchen Sink Mixer complete with its flexible connectors	No.	2		
1.13	Ariston Undersink Heater	No.	2		
1.14	Shower Mixer complete with Rectangular rain water head rose and inbuilt Shower Heater as Hansgrohe	No.	2		
1.15	Recessed Ceramic Soap Dish Towel Rail	No.	2		
	<u>COLD WATER SYSTEM INSTALLATIONS</u>				
	Supply, deliver and install cold water polypropylene PP-R PN-16 pipes and fittings to relevant B.S DIN and local standards.				
	Tenderers must allow in their pipework prices for all the couplings, unions, connectors, joints, bypass bends, loop expansion bends, etc. in running lengths of pipes. Jointing & installation methods shall be as per manufacturers' recommendations only. ALL THE DIAMETERS ARE EXTERNAL DIAMETERS				
1.16	Polypropylene pipes as AGROFLOW as Manufactured by AgroIrrigation has been used as a guide to the type and quality expected. Equal and approved brands shall be accepted only with the Engineers approval.	LM	20		
		LM	13		
		LM	2		
1.17	Tenderers must allow in their prices for all couplings, connectors, holding brackets expansion joints as required in the running lengths of pipes.	No.	39		
		No.	8		
		No.	2		
1.18	Pipes a) 20mm ditto	No.	2		

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1.1 9	b) 25mm ditto	No.	10		
	c) 32mm ditto				
	Elbows	No.	3		
	a) 20mm ditto	No.	1		
	b) 25mm ditto				
	c) 32mm ditto				
	Reducers				
	a) 32x25mm ditto				
	b) 25x20mm ditto				
	Gate Valves as Pegler				
	a) 20mm dia Gate Valve				
	b) 25mm ditto				
	Total Carried Forward				

BILL No. 1:- BARABARA PLAZA PLUMBING, DRAINAGE & FIREFIGHTING INSTALLATIONS

ITEM No.	DESCRIPTION	UNIT	QTY	RATE KShs. Cts.	AMOUNT KShs. Cts.
1.20	Total Brought Forward				
	Female Threaded Adaptors	No.	6		
	a) 20mm dia PP-R Female threaded adaptors	No.	6		
1.21	b) 25mm ditto	No.	4		
	Male Threaded Adaptors	No.	4		
	a) 20mm dia PP-R Male threaded adaptors	No.	2		
1.22	b) 25mm ditto	No.	2		
	Male Threaded Elbows				
1.23	a) 20mm dia PP-R Male threaded elbow				
	b) 25mm ditto	Item	1		
	Connection of the Cold Water Systems to the Nearest Existing and making good				
	<u>INTERNAL DRAINAGE INSTALLATIONS</u>				
1.24	All pipes to be as “Key Terrain” or “Metro” and prices to include connectors, adapters, socket reducers, etc.	LM	6		
	Pipes	LM	12		
	a) 100mm diameter UPVC Grey brown pipe (heavy duty)	LM	4		
1.25	b) 50mm ditto	LM	4		
	c) 40mm ditto	No.	3		
	d) 32mm ditto	No.	6		
	Bends	No.	4		
1.26	a) 100mm diameter UPVC sweep bend	No.	3		
	b) 50mm ditto	No.	4		
	c) 40mm ditto.	No.	2		
	d) 32mm ditto.	No.	2		
	Tees				
1.27	a) 100mm diameter tee	No.	3		
	b) 50mm ditto	No.	1		
	c) 40mm ditto				
1.28	d) 32mm ditto	No.	3		
	Boss Connectors	No.	2		
	a) 100x50mm diameter boss connector	No.	2		
	b) 100x40mm diameter boss connector	No.	3		
1.29	Inspection Plugs/Access caps				

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PLAZA PLUMBING, DRAINAGE AND FIREFIGHTING

130	a) 100mm diameter UPVC End Cap	No.	6		
	b) 50mm ditto	Item	1		
	c) 40mm ditto.				
	d) 32mm ditto.				
	Four-way 100 x 50mm UPVC Floor trap as MetroPlastics Complete with stainless steel floor trap grating.				
	Connection of the Internal Drainage Systems to the Nearest Existing and making good				
	Total Carried Forward				

BILL No. 1:- BARABARA PLAZA PLUMBING, DRAINAGE & FIREFIGHTING INSTALLATIONS

ITEM No.	DESCRIPTION	UNIT	QTY	RATE KShs. Cts.	AMOUNT KShs. Cts.
	Total Brought Forward				
	<u>PORTABLE FIRE EXTINGUISHERS</u>				
1.3 1	9 Litre water/carbon dioxide gas fire extinguishers complete with pressure gauge, initial charge and mounting brackets.	No.	9		
1.3 2	4.5 Kg carbon dioxide gas fire extinguisher complete with pressure gauge, initial charge and mounting brackets.	No.	1		
1.3 3	9 Litre dry chemical powder fire extinguishers complete with pressure gauge, initial charge and mounting brackets.	No.	9		
1.3 4	1200 x 1200mm Fire Blanket	No.	2		
	<u>DATA CENTRE FIRE SUPPRESSION SYSTEM</u>				
	Supply, install, test and commission the following Inert fire suppression system for room area of appr. 45 m2 as per NFPA Standards for inert gas suppression.				
1.3 5	<u>NB: Tenderers may submit alternative inert gas fire suppressants.</u>				
	<u>However, full design, calculations, specifications and Itemized Bills of Quantities must accompany these systems and must reflect the intended scope of works as per the Inert gas suppression system described below for the approval of the Engineer.</u>				
	35Kg NOVEC 1230 cylinder fully charged with fire suppression agent Or any other approved equivalent Complete with the following:				
	-2No. Discharge Hose - 2No. Electric actuators - Manual release valve - Pneumatic Switch - Warning Plates- Inside & Outside - 2No. Discharge Nozzles - 2No. Agent deflector shield - Backframes and support for the 2 No. gas cylinders - Agent release Control unit with Building	No.	2		

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PLAZA PLUMBING, DRAINAGE AND FIREFIGHTING

	management system(BMS) enabled with bacnet/ethernet protocol				
	- Ionization smoke detectors - Photoelectric smoke detectors - Standard detector base - Electric manual release stations - 7AMP Hour battery - 24VDC Alarm horn - 6" Alarm Bell - 24V,DC - Dual colored status flasher units - Maintenance/abort Switch				
	Total Carried Forward				

BILL No. 1:- BARABARA PLAZA PLUMBING, DRAINAGE & FIREFIGHTING INSTALLATIONS

ITEM No.	DESCRIPTION	UNIT	QTY	RATE KShs. Cts.	AMOUNT KShs. Cts.
	Total Brought Forward				
	<u>Pipework</u> <u>Supply and fix seamless black Steel pipes SCH 40 conforming to ASTM A-53A ERW or ASTM A-106A. All piping shall comply with NFPA 2001. Tenderers must allow in their pipework prices for all the couplings, unions, sockets, nipples, tees, caps, connectors, joints, anchoring, support brackets etc in running lengths of pipes. Allow a sum for wire brushing and cleaning followed by painting of the whole pipe-work installation with one coat of epoxy cold cured zinc chromate primer (two pack) and three coats two part epoxy enamel to Architect's colour.</u>				
1.3 6	Pipes				
	a) 20mm diameter seamless black Steel pipe as SCH 40	LM	12		
	b) 25mm ditto	LM	10		
1.3 7	Elbows/Bends				
	a) 20mm diameter elbow	No.	4		
	b) 25mm ditto	No.	2		
1.3 8	Tees				
	25mm Tee	No.	2		
1.3 9	25 x 20 mm diameter reducers	No.	3		
1.4 0	Factory made pressure relief vents 400mm x 400mm - Maximum 10m Long TENDERERS TO NOTE THESE EVENTS WILL HAVE TO BE SOURCED FROM THE SAME SUPPLIER OF THE SUPPRESSION SYSTEM.	Sum	1		
1.4 1					

	Allow sum for Discharge testing and commissioning of the detection system as per the manufacturer's recommendations.	Item	1		
	TOTAL C/F TO PLUMBING, DRAINAGE & FIREFIGHTING SUMMARY PAGE				

BILL No. 2:- GENERAL ITEMS					
ITEM No.	DESCRIPTION	UNIT	QTY	RATE KShs. Cts.	AMOUNT KShs. Cts.
2.0 1	Allow for presentation of all the required samples as per specifications, Bills of Quantities and Drawings.	Item	1		
2.0 2	Prepare and submit Working Drawings comprising the following to the satisfaction of the Engineer both in hard and soft copy. All drawings to be in Autocad® 2000 format or an approved higher version: - i) Fully dimensioned drawings of all plants and apparatus. ii) General arrangement drawings of equipment, plant etc. iii) Routes – types and sizes and arrangement of all pipework. iv) Wiring and piping diagrams of plant and apparatus. v) Schematic diagram of individual plants and switch and control boards. vi) All the required operating instructions for all panels, boards, control panels etc. (Note: Full set of drawings to be presented as per drawing list).	Item	1		
2.0 3	As above, but for Record (As-Installed) Drawings comprising: i) Fully dimensioned drawings of all plants and apparatus. ii) General arrangement drawings of equipment, plant etc. iii) Routes – types and sizes and arrangement of all pipework. iv) Wiring and piping diagrams of plant and apparatus. v) Schematic diagram of individual plants and switch and control boards. vi) All the required operating instructions for all panels, boards, control panels etc.	Item	1		
2.0 4	Prepare and submit Maintenance Manuals for all items installed.	Item	1		
2.0 5	Provide a year's (12 months') initial maintenance upon expiry of the Defects Liability Period. The maintenance to be carried out every quarter (3 months) for a period of 12 months and should be complete with a comprehensive draft service level agreement.				

		Sum	1		
	TOTAL C/F TO PLUMBING, DRAINAGE & FIREFIGHTING SUMMARY PAGE				

PLUMBING, DRAINAGE & FIREFIGHTING INSTALLATIONS SUMMARY PAGE		
ITEM No.	DESCRIPTION	AMOUNT KShs. Cts.
1	BILL 01: BARABARA PLAZA PLUMBING,	
2	DRAINAGE & FIRE FIGHTING BILL 02: GENERAL ITEMS	
3	Sub-Total	
4	10% CONTINGENCY FOR THE ABOVE WORKS (ITEM NO. 3)	

TOTAL FOR BARABARA PLAZA PLUMBING, DRAINAGE & FIREFIGHTING INSTALLATIONS C/F TO BARABARA PLAZA MECHANICAL WORKS	

**ENGINEERS BOARD OF KENYA-EBK
THE PROPOSED OFFICES PARTITIONING
AT BARABARA PLAZA MECHANICAL
INSTALLATIONS AND ASSOCIATED
SERVICES**

BARABARA PLAZA MECHANICAL INSTALLATIONS & ASSOCIATED SERVICES SUMMARY PAGE		
ITEM No.	DESCRIPTION	AMOUNT KShs. Cts.

1	MECHANICAL VENTILATION &	
2	AIRCONDITIONING INSTALLATIONS	
	PLUMBING, DRAINAGE & FIRE FIGHTING	
	INSTALLATIONS	
TOTAL FOR BARABARA PLAZA MECHANICAL INSTALLATIONS & ASSOCIATED SERVICES C/F TO VOLUME ONE GRAND SUMMARY PAGE		