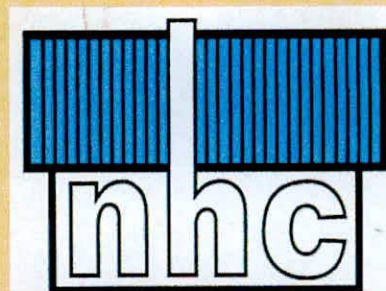


NATIONAL HOUSING CORPORATION



PROPOSED NHC REGIONAL OFFICES AND RESIDENTIAL DEVELOPMENT AT BONDENI, ELDORET MUNICIPALITY BLOCK V/83 AND 84

**PART 'A' –SIGNATURE PAGE & FINANCIAL
PROPOSAL FORM**

**PART 'B' – INSTRUCTIONS TO TENDERERS
& CONDITIONS OF CONTRACT**

PART 'C' – BILLS OF QUANTITIES

NHC/TECH/016/21-22

EMPLOYER

NATIONAL HOUSING CORPORATION,
P.O. BOX 30257-00100,
NAIROBI.

QUANTITY SURVEYOR

CHIEF QUANTITY SURVEYOR,
NATIONAL HOUSING CORPORATION,
P.O. BOX 30257-00100,
NAIROBI.

PROJECT MANAGER/ARCHITECT

CHIEF ARCHITECT,
NATIONAL HOUSING CORPORATION,
P.O. BOX 30257-00100,
NAIROBI.

ENGINEER

CHIEF ENGINEER,
NATIONAL HOUSING CORPORATION,
P.O. BOX 30257-00100,
NAIROBI.

MARCH 2022

**PROPOSED NHC REGIONAL OFFICES AND RESIDENTIAL DEVELOPMENT AT BONDENI –
ELDORET MUNICIPALITY ON PLOT**

L.R. No. ELDORET MUNICIPALITY BLOCK V/83 AND 84

UASIN GISHU COUNTY

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PROPOSED NHC REGIONAL OFFICES AND RESIDENTIAL DEVELOPMENT AT BONDENI

ON PLOT

L.R. No. ELDORET MUNICIPALITY BLOCK V/83 AND 84

UASIN GISHU COUNTY

PART A

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PART 'A'

**SIGNATURE PAGE
AND
FINANCIAL PROPOSALFORM**

SECTION ONE
SIGNATURE PAGE

SIGNATURE PAGE

FOR

**PROPOSED NHC REGIONAL OFFICES AND
RESIDENTIAL DEVELOPMENT AT BONDENI – ELDORET
MUNICIPALITY ON PLOT
L.R. No. ELDORET MUNICIPALITY BLOCK V/83 AND 84
UASIN GISHU COUNTY**

The Contract for the aforementioned works entered on the day of..... 20.....by undersigned parties refers to these documents; Part A being Signatures and Financial Proposal, Part B being Instructions to Tenderers and Conditions of Contract, Part C being Bills of Quantities, the Projects Drawings and Specifications.

.....
CONTRACTOR

.....
EMPLOYER

.....
DATE

.....
DATE

The Contractor is required to check the numbers of pages of these Documents, and should he find any missing, in duplicate or the figures indistinct, he must inform the Project Manager at once and have the same rectified.

Should the Contractor be in doubt about the precise meaning of any item or figure for any reason whatsoever, he must inform the Project Manager, National Housing Corporation, in order that the correct meaning may be decided before the date for submission of tenders.

No liability will be admitted, or claim allowed in respect of errors in the Contractor's Tender due to mistakes in these Documents which should have been rectified in the manner described above.

SECTION TWO

FINANCIAL PROPOSAL FORM

1.0

FORM OF TENDER

PROPOSED NHC REGIONAL OFFICES AND RESIDENTIAL DEVELOPMENT AT BONDENI – ELDORET MUNICIPALITY ON PLOT L.R. No. ELDORET MUNICIPALITY BLOCK V/83 AND 84 UASIN GISHU COUNTY

NOTE: All the Tender Documents, when completed, are to be placed in the enclosed envelope which is to be sealed and sent to the Managing Director, National Housing Corporation, P.O. BOX 30257 -00100, NAIROBI, or placed in the Tender Box on Ground Floor, NHC House, Aga Khan Walk, Harambee Avenue – Nairobi so as to arrive not later thanon 20.....

Tenders will be opened immediately thereafter on the same day and Tenderers are invited to be present.

1. I/We the undersigned, having visited the Site, examined the instructions to Tenderers, Conditions of Contract, Project Drawings, Specifications and Bills of Quantities for the **PROPOSED NHC REGIONAL OFFICES AND RESIDENTIAL DEVELOPMENT AT BONDENI – ELDORET MUNICIPALITY ON PLOT L.R. No. ELDORET MUNICIPALITY BLOCK V/83 AND 84 UASIN GISHU COUNTY** hereby tender and offer to execute, complete and maintain the whole of the said works in conformity with the said Tender and Contract documents for the sum of Kenya Shillings.....

(KShs.....Cts.....)

2. I/We agree to be bound by and submit to the said Tender and Contract documents and agree that the rates set down herein shall form the basis for preparations of the Payment Certificates and for the valuations of variations which may be ordered in accordance with the Contract Conditions.
3. I/We agree to complete the works within a period of **Fifty Two (52) weeks**.....from the date of commencement of the works, or within such extended time as the Conditions of Contract provide.
4. It is hereby understood that the National Housing Corporation is not bound to accept the lowest or any tender.

5. I/We agree that this tender shall remain valid and shall not be withdrawn within one hundred and eighty (180) days from the date of opening of the tender.
6. I/We agree that this tender being our financial proposal together with your written acceptance thereof and the execution of a formal Agreement shall constitute a binding contract between ourselves and the Corporation.

Signed:

Name of Firm:

(IN BLOCK LETTERS AND STAMP)

Address:.....

Date:.....

In the presence of:-

Witness (Name):.....

Signature:.....

Occupation.....

Address:.....

Date.....

2.0 INSTRUCTIONS AND CONDITIONS OF TENDERING.

GENERAL INSTRUCTIONS

- (i) The Contractor is required to check the number of pages of these Documents, and should he find any missing in duplicate or indistinct he must inform the Project Manager at once and have the same rectified.
- (ii) Should the Contractor be in doubt about the precise meaning of any item quantity or figure, for any reason whatsoever, he must inform the Project Manager in order that the correct meaning may be decided before the date for submission of the tenders.
- (iii) No liability will be admitted, or claim allowed in respect of errors in the Contractor's Tender due to mistakes in the Documents which should have been rectified in the manner described above.
- (iv) The Contractor shall not alter or otherwise qualify the text of these Documents. Any alteration or qualification made without the Corporations written authority will be ignored. Alterations or qualifications may also render the tender to be disqualified.
- (v) The Contractor shall be deemed to have made allowance in his prices generally to cover items of preliminaries or other items if these have not been priced against the respective items.
- (vi) All items of measured work shall be priced in detail and tenders containing lump sums to cover trades or groups of works must be broken down to show prices of each item before they will be accepted. Lump sums to cover items of preliminaries and item (or) group of items for builder's work shall likewise be broken down against specific items before acceptance of Tender. All pricings should be **distinct, legible and in ink.**
- (vii) In no case will any expenses incurred by Contractors in preparation and submission of this tender be reimbursed.
- (viii) The copyright of these Documents is vested in National Housing Corporation and no part thereof may be reproduced without their express permission given in writing.
- (ix) No payment for insecticide treatment shall be paid until the Contractor has produced a written guarantee as described in the preamble.

- (x) Any pricing or arithmetical errors will be totalled after corrections, and their percentage to the builder's work calculated. The error will be treated as a percentage of the builder's work spread over all the rates in such a way as to leave the tender sum unaltered. The adjusted rates will apply to interim valuations, valuations of variations and the final account.
- (xi) **It is a condition of this Contract that a Tender Amount with an arithmetical error in excess of 5% will be rejected. Bidders who do not provide reasonable prices on key items whose variation is likely to have the greatest impact on the contract sum during the Comparative Analysis in relation to the Market Prices will be rejected.**
- (xii) The Bills of Quantities shall be read in conjunction with NHC General Specifications and if any discrepancies between the Specifications and the Bills of Quantities occur, then the Bills of Quantities shall prevail.
- (xiii) There will be a **mandatory pre-tender site** visit which the Bidders are required to attend and be issued with the **Certificate of Mandatory Pre-tender Site Visit**. Tenderers who do not attend this site visit shall be disqualified.
- (xiv) **PRELIMINARIES:**

The total amount for preliminaries shall not exceed 5% of the Contract sum and must be broken down and priced against each item. 50% of the amount of money entered in the tender for a preliminary item shall be paid on execution of the relevant item and after commencement of construction works at the site with proof of reasonable diligent and regular progress of the work.

The remaining portion shall be paid and/or become payable in successive Interim Valuations proportional to cumulative progress and actual performance of the contract works on site.

- (xv) **ADVANCE PAYMENT**

No advance or mobilization payments shall be made either for constructional plant, tools and materials or any other purpose in this contract.

2.1 TENDER OPENING & EVALUATION

- 2.1.1 The Tender Documents will be opened on the date and time set for Tender opening. All tenderers who wish to be represented at the tender opening are

invited to attend. Evaluations of the Tenders will begin thereafter with Preliminary evaluations being undertaken first to determine Tender responsiveness as outlined in the Tender invitation notice and in the Instructions to Tenderers.

Non-responsive tenders shall be rejected with the responsive ones subjected to Technical evaluations.

2.2. TECHNICAL PROPOSAL MARKS

2.2.1 Technical evaluations carry a maximum of 100 marks broken down as below:

(I) Qualification Information = 90 marks

(II) Confidential Business Questionnaire = 10 marks

TECHNICAL MARKS (TM) = 100 marks

2.2.2 The evaluations will be based on set criteria in the proposal which includes due diligence on responsive tenders through physical verifications to confirm authenticity of Technical capacity provided in the submitted documents.

2.2.3 Technical Proposals that fail to attain a **Minimum of 70 marks** will be disqualified at this stage and will not proceed to the next stage of the evaluations process. Technical Proposals which score **70 marks and above** will all qualify on the same footing regardless of their ranking for the next stage.

2.3 FINANCIAL PROPOSAL MARKS

2.3.1 This Tender being the Financial Proposal shall be opened and read publicly in the presence of the Tenderers representatives who choose to attend.

2.3.2 The Financial Proposals carry a maximum of 100marks, and evaluations will be done as provided under clause 5 of the Instructions to Tenderers. Tenders with arithmetic errors in excess of 5.0% and whose pricing is unreasonable on key items will be automatically disqualified.

2.3.4 Completion period will be evaluated for the qualified tenders together with the tendered amounts. The absolute figures shall be compared with the project estimates and specific rates for key items.

2.3.5. This Tender being the Financial proposal shall be opened and read publicly in the presence of the Tenderers representatives who choose to attend.

- 2.3.6. The Bidder shall be ranked according to the Financial Proposals i.e the Tender Sum. The Highest Responsive Bidder shall be ranked first, with the rest following accordingly in the Tender ranking. The Tenderer with the Highest Responsive Proposal will be ranked first and may be invited for Negotiations or declared Successful.

2.4. CONTRACT AWARD

- 2.4.1. Negotiations may be held between the Corporation and the Tenderer to reach an agreement on the Technical and Financial proposals. Negotiations' agreement shall form the basis of Award. These negotiations may include change in scope of works and rates of key items of works.
- 2.4.2. Agreement by the Parties shall lead to Contract Award. If negotiations fail, the Corporation will disregard the Tender and invite the Tenderer with the next Lowest Tender Sum (Next Highest Responsive) Proposal to negotiate a Contract.
- 2.4.3. Upon Contract award of the successful Tender, the Corporation will duly notify the other Tenderers and discharge their securities as appropriate.

2.5. TENDER DISQUALIFICATION

The Tender will be deemed unresponsive and subject to automatic disqualification in the following situations: -

- 2.5.1. If the Tenderer is currently involved in two or more running Projects with Corporation or has been awarded two or more tenders by the Corporation. If the Tenderer is involved in projects that are lagging behind in their approved works program. If the Tenderer has projects, most of which are incomplete over a period beyond the stipulated contract period without an approved official extension of time.
- 2.5.2. The Tenderer fails to submit any or the entire mandatory tender requirements stated in the tender notice.
- 2.5.3. The Tenderer gives false information in the tender document.
- 2.5.4. Adverse report on the Tenderer is received after issuance of the tender documents.

2.5.5. Failure to sign the Ethics and Integrity declaration in the Financial Proposal Form.

3.0 ETHICS AND INTEGRITY DECLARATION

We the undersigned commit ourselves to maintain high Ethics and Integrity during the tender process and performance of the contract if successful and declare to comply with all conditions in full and should any Ethics and Integrity questions arise regarding our conduct, then the Employer reserves the right to disqualify our Tender, terminate our contract and debar us from future procurement.

Name of Firm:

.....

(IN BLOCK LETTERS AND STAMPED)

Authorised Signatory:.....

Address:.....

Date:.....

In the presence of:-

Witness (Name).....

Signature.....

Occupation.....

Address:.....

Date.....

PART 'B'

**INSTRUCTIONS TO TENDERERS
AND
CONDITIONS OF CONTRACT**

**PROPOSED NHC REGIONAL OFFICES AND RESIDENTIAL DEVELOPMENT AT BONDENI –
ELDORET MUNICIPALITY ON PLOT**

L.R. No. ELDORET MUNICIPALITY BLOCK V/83 AND 84

UASIN GISHU COUNTY

PART B

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SECTION THREE A
INSTRUCTIONS TO TENDERERS

SECTION A

INSTRUCTIONS TO TENDERERS

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INSTRUCTIONS TO TENDERERS

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

- 1.1 The Employer as defined in the Appendix to Conditions of Contract invites tenders for Works Contract as described in the tender documents. The successful tenderer will be expected to complete the Works by the Intended Completion Date specified in the tender documents.
- 1.2 All tenderers shall provide the Qualification Information, a statement that the tenderer (including all members of a joint venture and subcontractors) is not associated, or has not been associated in the past, directly or indirectly, with the Consultant or any other entity that has prepared the design, specifications, and other documents for the project or being proposed as Project Manager for the Contract. A firm that has been engaged by the Employer to provide consulting services for the preparation or supervision of the Works, and any of its affiliates, shall not be eligible to tender.
- 1.3 All tenderers shall provide in the Form of Tender and Qualification Information, a preliminary description of the proposed work method and schedule, including drawings and charts, as necessary.
- 1.4 In the event that pre-qualification of potential tenderers has been undertaken, only tenders from pre-qualified tenderers will be considered for award of Contract. These qualified tenderers should submit with their tenders any information updating their original pre-qualification applications or, alternatively, confirm in their tenders that the originally submitted pre-qualification information remains essentially correct as of the date of tender submission.
- 1.5 Where no pre-qualification of potential tenderers has been done, all tenderers shall include the following information and documents with their tenders, unless otherwise stated:
 - (a) Copies of original documents defining the constitution or legal status, place of registration, and principal place of business; written power of attorney of the signatory of the tender to commit the tenderer;
 - (b) Total monetary value of construction work performed for each of the last five years;
 - (c) Experience in works of a similar nature and size for each of the last five years, and details of work under way or contractually committed; and names and addresses of clients who may be contacted for further information on these contracts;

- (d) Major items of construction equipment proposed to carry out the Contract and an undertaking that they will be available for the Contract.
 - (e) Qualifications and experience of key site management and technical personnel proposed for the Contract and an undertaking that they shall be available for the Contract.
 - (f) Reports on the financial standing of the tenderer, such as profit and loss statements and auditor's reports for the past five years;
 - (g) Evidence of adequacy of working capital for this Contract (access to line(s) of credit and availability of other financial resources);
 - (h) Authority to seek references from the tenderer's bankers or past employers;
 - (i) Information regarding any litigation, current or during the last five years, in which the tenderer is involved, the parties concerned and disputed amount; and
 - (j) Proposals for subcontracting components of the Works amounting to more than 10 percent of the Contract Price.
- 1.6 Tenders submitted by a joint venture of two or more firms as partners shall comply with the following requirements, unless otherwise stated:
- (a) The tender shall include all the information listed in clause 1.5 above for each joint venture partner;
 - (b) The tender shall be signed so as to be legally binding on all partners;
 - (c) All partners shall be jointly and severally liable for the execution of the Contract in accordance with the Contract terms;
 - (d) One of the partners will be nominated as being in charge, authorised to incur liabilities, and receive instructions for and on behalf of all partners of the joint venture; and
 - (e) The execution of the entire Contract, including payment, shall be done exclusively with the partner in charge.
- 1.7 To qualify for award of the Contract, tenderers shall meet the following minimum qualifying criteria;
- (a) Annual volume of construction work should match the requirements of Technical Information for the Contract;

- (b) Experience as main contractor in the construction of at least two works of a nature and complexity equivalent to the Works over the last 10 years (to comply with this requirement, works cited should be at least 70 percent complete);
 - (c) Proposals for the timely acquisition (own, lease, hire, etc.) of the essential equipment listed as required for the Works;
 - (d) A Contract manager with at least five years' experience in works of an equivalent nature and volume, including no less than three years as Manager; and
 - (e) Liquid assets and/or credit facilities, net of other contractual commitments and exclusive of any advance payments which may be made under the Contract, of no less than 4 months of the estimated payment flow under this Contract.
- 1.8 The figures for each of the partners of a joint venture shall be added together to determine the tenderer's compliance with the minimum qualifying criteria of clause 1.7 (a) and (e); however, for a joint venture to qualify, each of its partners must meet at least 25 percent of minimum criteria 1.7 (a), (b) and (e) for an individual tenderer, and the partner in charge at least 70 percent of those minimum criteria. Failure to comply with this requirement will result in rejection of the joint venture's tender. Subcontractors' experience and resources will not be taken into account in determining the tenderer's compliance with the qualifying criteria, unless otherwise stated.
- 1.9 Each tenderer shall submit only one tender, either individually or as a partner in a joint venture. A tenderer who submits or participates in more than one tender (other than as a subcontractor or in cases of alternatives that have been permitted or requested) will cause all the proposals with the tenderer's participation to be disqualified.
- 1.10 The tenderer shall bear all costs associated with the preparation and submission of his tender, and the Employer will in no case be responsible or liable for those costs.
- 1.11 The tenderer, at the tenderer's own responsibility and risk, is encouraged to visit and examine the Site of the Works and its surroundings and obtain all information that may be necessary for preparing the tender and entering into a contract for construction of the Works. The costs of visiting the Site shall be at the tenderer's own expense.
- 1.12 The procuring entity's employees, committee members, board members and their relative (spouse and children) are not eligible to participate in the tender.
- 1.13 The price to be charged for the tender document shall be KShs.1,000/=

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

2. Tender Documents

- 2.1 The complete set of tender documents comprises the documents listed below and any addenda issued in accordance with Clause 2.4.
- (a) These Instructions to Tenderers
 - (b) Form of Tender and Qualification Information
 - (c) Conditions of Contract
 - (d) Appendix to Conditions of Contract
 - (e) Specifications
 - (f) Drawings
 - (g) Bills of Quantities
 - (h) Forms of Securities
- 2.2 The tenderer shall examine all Instructions, Forms to be filled and Specifications in the tender documents. Failure to furnish all information required by the tender documents, or submission of a tender not substantially responsive to the tendering documents in every respect will be at the tenderer's risk and may result in rejection of his tender.
- 2.3 A prospective tenderer making an inquiry relating to the tender documents may notify the Employer in writing or by cable, telex or facsimile at the address indicated in the letter of invitation to tender. The Employer will only respond to requests for clarification received earlier than seven days prior to the deadline for submission of tenders. Copies of the Employer's response will be forwarded to all persons issued with tendering documents, including a description of the inquiry, but without identifying its source.
- 2.4 Before the deadline for submission of tenders, the Employer may modify the tendering documents by issuing addenda. Any addendum thus issued shall be part of the tendering documents and shall be communicated in writing or by cable, telex or facsimile to all tenderers. Prospective tenderers shall acknowledge receipt of each addendum in writing to the Employer.
- 2.5 To give prospective tenderers reasonable time in which to take an addendum into account in preparing their tenders, the Employer shall extend, as necessary, the deadline for submission of tenders, in accordance with Clause 4.2 here below.

3. Preparation of Tenders

- 3.1 All documents relating to the tender and any correspondence shall be in English language.
- 3.2 The tender submitted by the tenderer shall comprise the following:
- (a) These Instructions to Tenderers, Form of Tender, Conditions of Contract, Appendix to Conditions of Contract and Specifications;
 - (b) Tender Security;
 - (c) Priced Bill of Quantities ;
 - (d) Qualification Information Form and Documents;
 - (e) Alternative offers where invited; and
 - (f) Any other materials required to be completed and submitted by the tenderers.
- 3.3 The tenderer shall fill in rates and prices for all items of the Works described in the Bill of Quantities. Items for which no rate or price is entered by the tenderer will not be paid for when executed and shall be deemed covered by the other rates and prices in the Bill of Quantities. All duties, taxes, and other levies payable by the Contractor under the Contract, or for any other cause relevant to the Contract, as of 30 days prior to the deadline for submission of tenders, shall be included in the tender price submitted by the tenderer.
- 3.4 The rates and prices quoted by the tenderer shall only be subject to adjustment during the performance of the Contract if provided for in the Appendix to Conditions of Contract and provisions made in the Conditions of Contract.
- 3.5 The unit rates and prices shall be in Kenya Shillings.
- 3.6 Tenders shall remain valid for a period of sixty (60) days from the date of submission. However, in exceptional circumstances, the Employer may request that the tenderers extend the period of validity for a specified additional period. The request and the tenderers' responses shall be made in writing. A tenderer may refuse the request without forfeiting the Tender Security. A tenderer agreeing to the request will not be required or permitted to otherwise modify the tender but will be required to extend the validity of Tender Security for the period of the extension, and in compliance with Clause 3.7 - 3.11 in all respects.

- 3.7 The tenderer shall furnish, as part of the tender, a Tender Security in the amount and form specified in the appendix to invitation to tenderers. This shall be in the amount not exceeding 2 percent of the tender price.
- 3.8 The format of the Tender Security should be in accordance with the form of Tender Security included in Section G - Standard forms or any other form acceptable to the Employer. Tender Security shall be valid for 30 days beyond the validity of the tender.
- 3.9 Any tender not accompanied by an acceptable Tender Security shall be rejected. The Tender Security of a joint venture must define as "Tenderer" all joint venture partners and list them in the following manner: a joint venture consisting of ".....", "....." and ".....".
- 3.10 The Tender Securities of unsuccessful tenderers will be returned within 28 days of the end of the tender validity period specified in Clause 3.6.
- 3.11 The Tender Security of the successful tenderer will be discharged when the tenderer has signed the Contract Agreement and furnished the required Performance Security.
- 3.12 The Tender Security may be forfeited
- (a) if the tenderer withdraws the tender after tender opening during the period of tender validity;
 - (b) if the tenderer does not accept the correction of the tender price, pursuant to Clause 5.7;
 - (c) in the case of a successful tenderer, if the tenderer fails within the specified time limit to
 - (i) Sign the Agreement, or
 - (ii) Furnish the required Performance Security.
- 3.13 Tenderers shall submit offers that comply with the requirements of the tendering documents, including the basic technical design as indicated in the Drawings and Specifications. Alternatives will not be considered, unless specifically allowed in the invitation to tender. If so allowed, tenderers wishing to offer technical alternatives to the requirements of the tendering documents must also submit a tender that complies with the requirements of the tendering documents, including the basic technical design as indicated in the Drawings and Specifications. In addition to submitting the basic tender, the tenderer shall provide all information necessary for a complete evaluation of the alternative, including design calculations, technical specifications, breakdown of prices, proposed construction methods and other relevant

details. Only the technical alternatives, if any, of the lowest evaluated tender conforming to the basic technical requirements shall be considered.

- 3.14 The tenderer shall prepare one original of the documents comprising the tender documents as described in Clause 3.2 of these Instructions to Tenderers, bound with the volume containing the Form of Tender, and clearly marked "ORIGINAL". In addition, the tenderer shall submit copies of the tender, in the number specified in the invitation to tender, and clearly marked as "COPIES". In the event of discrepancy between them, the original shall prevail.
- 3.15 The original and all copies of the tender shall be typed or written in indelible ink and shall be signed by a person or persons duly authorised to sign on behalf of the tenderer, pursuant to Clause 1.5 (a) or 1.6 (b), as the case may be. All pages of the tender where alterations or additions have been made shall be initialled by the person or persons signing the tender.
- 3.16 Clarification of tenders shall be requested by the tenderer to be received by the procuring entity not later than 7 days prior to the deadline for submission of tenders.
- 3.17 The procuring entity shall reply to any clarifications sought by the tenderer within 3 days of receiving the request to enable the tenderer to make timely submission of its tender.
- 3.18 The tender security shall be in the amount of 0.5 – 2 per cent of the tender price.

4. Submission of Tenders

- 4.1 The tenderer shall seal the original and all copies of the tender in two inner envelopes and one outer envelope, duly marking the inner envelopes as "**ORIGINAL**" and "**COPIES**" as appropriate. The inner and outer envelopes shall:
 - (a) Be addressed to the Employer at the address provided in the invitation to tender;
 - (b) Bear the name and identification number of the Contract as defined in the invitation to tender; and
 - (c) Provide a warning not to open before the specified time and date for tender opening.
- 4.2 Tenders shall be delivered to the Employer at the address specified above not later than the time and date specified in the invitation to tender. However, the Employer may extend the deadline for submission of tenders by issuing

- 4.3 an amendment in accordance with Sub-Clause 2.5 in which case all rights and obligations of the Employer and the tenderers previously subject to the original deadline will then be subject to the new deadline.
- 4.4 Any tender received after the deadline prescribed in clause 4.2 will be returned to the tenderer un-opened.
- 4.5 Tenderers may modify or withdraw their tenders by giving notice in writing before the deadline prescribed in clause 4.2. Each tenderer's modification or withdrawal notice shall be prepared, sealed, marked, and delivered in accordance with clause 3.13 and 4.1, with the outer and inner envelopes additionally marked "**MODIFICATION**" and "**WITHDRAWAL**", as appropriate. No tender may be modified after the deadline for submission of tenders.
- 4.6 Withdrawal of a tender between the deadline for submission of tenders and the expiration of the period of tender validity specified in the invitation to tender or as extended pursuant to Clause 3.6 may result in the forfeiture of the Tender Security pursuant to Clause 3.11.
- 4.7 Tenderers may only offer discounts to, or otherwise modify the prices of their tenders by submitting tender modifications in accordance with Clause 4.4 or be included in the original tender submission.

5. Tender Opening and Evaluation

- 5.1 The tenders will be opened by the Employer, including modifications made pursuant to Clause 4.4, in the presence of the tenderers' representatives who choose to attend at the time and in the place specified in the invitation to tender. Envelopes marked "**WITHDRAWAL**" shall be opened and read out first. Tenderers' and Employer's representatives who are present during the opening shall sign a register evidencing their attendance.
- 5.2 The tenderers' names, the tender prices, the total amount of each tender and of any alternative tender (if alternatives have been requested or permitted), any discounts, tender modifications and withdrawals, the presence or absence of Tender Security, and such other details as may be considered appropriate, will be announced by the Employer at the opening. Minutes of the tender opening, including the information disclosed to those present will be prepared by the Employer.
- 5.3 Information relating to the examination, clarification, evaluation, and comparison of tenders and recommendations for the award of Contract shall not be disclosed to tenderers or any other persons not officially concerned with such process until the award to the successful tenderer has been announced. Any effort by a tenderer to influence the Employer's officials, processing of tenders or award decisions may result in the rejection of his tender.

- 5.4 To assist in the examination, evaluation, and comparison of tenders, the Employer at his discretion, may ask any tenderer for clarification of the tender, including breakdowns of unit rates. The request for clarification and the response shall be in writing or by cable, telex or facsimile but no change in the price or substance of the tender shall be sought, offered, or permitted except as required to confirm the correction of arithmetic errors discovered in the evaluation of the tenders in accordance with Clause 5.7.
- 5.5 Prior to the detailed evaluation of tenders, the Employer will determine whether each tender;
- (a) Meets the eligibility criteria defined in Clause 1.7;
 - (b) Has been properly signed;
 - (c) Is accompanied by the required securities; and
 - (d) Is substantially responsive to the requirements of the tendering documents.

A substantially responsive tender is one which conforms to all the terms, conditions and specifications of the tendering documents, without material deviation or reservation. A material deviation or reservation is one

- (a) Which affects in any substantial way the scope, quality, or performance of the works;
 - (b) Which limits in any substantial way, inconsistent with the tendering documents, the Employer's rights or the tenderer's obligations under the Contract; or
 - (c) Whose rectification would affect unfairly the competitive position of other tenderers presenting substantially responsive tenders.
- 5.6 If a tender is not substantially responsive, it will be rejected, and may not subsequently be made responsive by correction or withdrawal of the nonconforming deviation or reservation.
- 5.7 Tenders determined to be substantially responsive will be checked for any arithmetic errors. Errors will be corrected as follows:
- (a) Where there is a discrepancy between the amount in figures and the amount in words, the amount in words will prevail; and
 - (b) Where there is a discrepancy between the unit rate and the line-item total resulting from multiplying the unit rate by the quantity, the unit rate as quoted will prevail, unless in the opinion of the Employer, there was obvious typographical error, in which case the adjustment will be made to the entry containing that error.

- (c) In the event of a discrepancy between the tender amount as stated in the Form of Tender and the corrected tender figure in the main summary of the Bill of Quantities, the amount as stated in the Form of Tender shall prevail.
 - (d) The Error Correction Factor shall be computed by expressing the difference between the tender amount and the corrected tender sum as a percentage of the corrected Builder's Work (i.e. Corrected tender sum less P.C. and Provisional Sums)
 - (e) The Error Correction Factor shall be applied to all Builders' Work (as a rebate or addition as the case may be) for the purposes of valuations for Interim Certificates and valuation of variations.
 - (f) The amount stated in the tender will be adjusted in accordance with the above procedure for the correction of errors and, with concurrence of the tenderer, shall be considered as binding upon the tenderer. If the tenderer does not accept the corrected amount, the tender may be rejected and the Tender Security may be forfeited in accordance with clause 3.11.
- 5.8 The Employer will evaluate and compare only the tenders determined to be substantially responsive in accordance with Clause 5.5.
- 5.9 In evaluating the tenders, the Employer will determine for each tender the evaluated tender price by adjusting the tender price as follows:
- (a) Making any correction for errors pursuant to clause 5.7;
 - (b) Excluding provisional sums and the provision, if any, for contingencies in the Bill of Quantities, but including Dayworks where priced competitively.
 - (c) Making an appropriate adjustment for any other acceptable variations, deviations, or alternative offers submitted in accordance with clause 3.12; and
 - (d) Making appropriate adjustments to reflect discounts or other price modifications offered in accordance with clause 4.6
- 5.10** The Employer reserves the right to accept or reject any variation, deviation, or alternative offer. Variations, deviations, and alternative offers and other factors which are in excess of the requirements of the tender documents or otherwise result in unsolicited benefits for the Employer will not be taken into account in tender evaluation.

- 5.11 The tenderer shall not influence the Employer on any matter relating to his tender from the time of the tender opening to the time the Contract is awarded. Any effort by the Tenderer to influence the Employer or his employees in his decision on tender evaluation, tender comparison or Contract award may result in the rejection of the tender.
- 5.12 Firms incorporated in Kenya where indigenous Kenyans own 51% or more of the share capital shall be allowed a 10% preferential bias provided that they do not sub-contract work valued at more than 50% of the Contract Price excluding Provisional Sums to a non-indigenous sub-contractor.

6. Award of Contract

- 6.1 Subject to Clause 6.2, the award of the Contract will be made to the tenderer whose tender has been determined to be substantially responsive to the tendering documents and who has offered the lowest evaluated tender price, provided that such tenderer has been determined to be (a) eligible in accordance with the provision of Clauses 1.2, and (b) qualified in accordance with the provisions of clause 1.7 and 1.8.
- 6.2 Notwithstanding clause 6.1 above, the Employer reserves the right to accept or reject any tender, and to cancel the tendering process and reject all tenders, at any time prior to the award of Contract, without thereby incurring any liability to the affected tenderer or tenderers or any obligation to inform the affected tenderer or tenderers of the grounds for the action.
- 6.3 The tenderer whose tender has been accepted will be notified of the award prior to expiration of the tender validity period in writing or by cable, telex or facsimile. This notification (hereinafter and in all Contract documents called the "Letter of Acceptance") will state the sum (hereinafter and in all Contract documents called the "Contract Price") that the Employer will pay the Contractor in consideration of the execution, completion, and maintenance of the Works by the Contractor as prescribed by the Contract. At the same time the other tenderers shall be informed that their tenders have not been successful.

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

- 6.4 The Agreement will incorporate all agreements between the Employer and the successful tenderer. Within 14 days of receipt the successful tenderer will sign the Agreement and return it to the Employer.
- 6.5 Within 21 days after receipt of the Letter of Acceptance, the successful tenderer shall deliver to the Employer a Performance Security in the amount stipulated in the Appendix to Conditions of Contract and in the form stipulated
- 6.6 in the Tender documents. The Performance Security shall be in the amount and specified form.

- 6.7 Failure of the successful tenderer to comply with the requirements of clause 6.5 shall constitute sufficient grounds for cancellation of the award and forfeiture of the Tender Security.
- 6.8 Upon the furnishing by the successful tenderer of the Performance Security, the Employer will promptly notify the other tenderers that their tenders have been unsuccessful.
- 6.9 Preference where allowed in the evaluation of tenders shall not be allowed for contracts not exceeding one year (12 months)
- 6.10 The tender evaluation committee shall evaluate the tender within 30 days of the validity period from the date of opening the tender.
- 6.11 The parties to the contract shall have it signed within 30 days from the date of notification of contract award unless there is an administrative review request.
- 6.12 Contract price variations shall not be allowed for contracts not exceeding one year (12 months)
- 6.13 Where contract price variation is allowed, the variation shall not exceed 25% of the original contract price.
- 6.14 Price variation request shall be processed by the procuring entity within 30 days of receiving the request.
- 6.15 The procuring entity may at any time terminate procurement proceedings before contract award and shall not be liable to any person for the termination.
- 6.16 The procuring entity shall give prompt notice of the termination to the tenderers and on request give its reasons for termination within 14 days of receiving the request from any tenderer.
- 6.17 A tenderer who gives false information in the tender document about its qualification or who refuses to enter into a contract after notification of contract award shall be considered for debarment from participating in future public procurement.

7. Corrupt and Fraudulent practices

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

APPENDIX 'A'

AMENDMENTS/DELETIONS OF INSTRUCTIONS TO TENDERERS.

SECTION A

1. Clause 1.3 is amended to read: -

All Tenderers shall provide in the Technical Proposal, a preliminary description of the proposed work schedule, including drawings, charts and MS project charts as necessary.

2. Clauses 1.5 and 1.7 are replaced with the Tender notice and Technical Proposal Forms.
3. Clause 2.1. Additional sub clause (j) is the Technical Proposal.
4. Clause 3.20 is replaced as follows: -

The Tenderer shall submit his Tender comprising of the following: -

- (a) **PART "A"**: Consisting of Signature page and Financial Proposal Form.
 - (b) **PART "B"**: Consisting of Instructions to Tenderers, Conditions of Contract, Technical Proposal and Standard forms duly filled.
 - (c) **PART "C"**: Consisting of Priced Bills of Quantities and Specifications of the works.
 - (d) Tender Security in the form and amount stated in the Tender notice from a reputable Bank or Cash equivalent shall be required.
 - (e) The Mandatory documents as stated in the Tender notice.
 - (f) Any other information required to be completed and submitted by the Tenderers.
5. Clause 3.6. The first sentence of the sub-clause is amended to read "The Tenders shall remain valid for a period of 150 days from the date of tender Opening".
 6. Clauses 3.7 is deleted. The Amount and Form of the Tender security is covered elsewhere.
 7. Clause 3.18. The sub-clause is amended to read "The tender security shall be in the amount and form indicated in the appendix to the Conditions of Contract and in the tender notice.

8. Clause 4.1. The clause is amended to include only submission of the Original Tender documents. Copies of the same are excluded.
9. Clause 5.12 is amended as follows: Firms incorporated in Kenya where indigenous Kenyans own 51% or more of the share capital may at the Corporations discretion be allowed a 10% preferential bias provided that they do not sub-contract work valued at more than 50% of the Contract Price excluding Provisional Sums to a non-indigenous Sub-Contractor. This clause shall apply only to evaluations of the Financial Proposals.
10. Clause 6.4. This clause has been amended to read "The Agreement will incorporate all agreements between the Employer and the successful Tenderer. It will be signed by the successful Tenderer in the Employers offices within 30 days of notification of award and thereafter signed by the Employer and a copy of the Agreement will be forwarded to the Contractor after registration is completed."
11. Clause 6.5. The first part of the sentence of the sub-clause is amended to read "Within 14 days after receipt of the Letter of Acceptance".
12. Clauses 6.9 and 6.13 are deleted.

ADDITIONAL CLAUSES TO THE INSTRUCTIONS TO TENDERERS

THE CLAUSES SHALL SUPPLEMENT CLAUSES 5 AND 6

13.0 TENDER OPENING & EVALUATION

- 13.1 The Tender Documents will be opened on the date and time set for Tender opening. Evaluations of the Tenders will begin thereafter with Preliminary evaluations being undertaken first to determine Tender Responsiveness. **Preliminary Evaluation** to determine the responsive tenders will be based on the following criteria: -

1. Valid Tax Compliance Certificate from Kenya Revenue Authority (KRA).
2. Requisite National Construction Authority (NCA) Category Registration in conformity with the advert for tender or letter of invitation for tender.
3. Certificate of pre-tender site Visit acknowledging bidder's knowledge of site prior to tender.
4. Tender Security (Bid Bond) as expressly stipulated in the Invitation to Tender Advert or Invitation to Tender Letter.
5. Any other requirement expressly stipulated in the Invitation to Tender Advert or Letter of Invitation to Tender.

Tenders that fail to meet the **preliminary evaluation** criterion shall be **disqualified** and will not be subject to the next Technical Evaluation Stage.

Upon completion of preliminary evaluation, evaluations of Technical shall precede the Financial. Only those who get a **pass mark from 70%** shall proceed to Financial proposals evaluation.

Technical Proposals carry a maximum of 100marks and will be evaluated based on the mentioned criteria, broken down as below:

(I) Qualification Information = 90 marks

(II) Confidential Business Questionnaire = 10 marks

TECHNICAL MARKS (TM) = 100 marks

Technical Proposals which fail to achieve a Minimum of 70 marks shall be **rejected** at this stage and will not proceed to the next stage of evaluations of the Financial Proposals.

- 13.2 Proposals will be ranked according to the Tender Sums with the lowest being ranked first. The Tenderer achieving the highest responsiveness will be ranked first and invited for negotiations.

TENDER RANKING = FM

The most responsive Tenderer achieving the most competitive price will be ranked first and invited for negotiations.

- 13.3 The Corporation may hold negotiations with first ranked bidder. These negotiations may include a number of aspects of the bid. The negotiations may conclude with the signing of the Contract. If the negotiations fail, then the Employer may invite the Tenderer with the next highest responsive bidder to negotiate a contract.

14.0 CONTRACT AWARD

- 14.1 The Contract will be awarded following negotiations or otherwise and the Corporation will duly notify the other Tenderers accordingly and discharge their Tender securities where applicable appropriately.

15.0 TENDER DISQUALIFICATION

The Tender will be deemed unresponsive and subject to automatic disqualification in the following situations: -

- 15.1 If the Tenderer is currently involved in two or more running Projects with Corporation or has been awarded two or more tenders by the Corporation.
- 15.2 The Tenderer fails to submit any or all of the mandatory tender requirements stated in the tender notice and clause 1.7.
- 15.3 The Tenderer fails to attend mandatory pre-tender site visit prior to submitting their tender.
- 15.4 The Tenderer gives false information in the tender document.
- 15.5 Adverse report on the Tenderer is received after issuance of the tender documents.
- 15.6 Failure to sign the Ethics and Integrity declaration in the financial proposal form.
- 15.7 Ethics and Integrity questions are raised regarding the present and past contractual performance with any procurement entity in the past five years.
- 15.8 Tender whose Financial Proposal has an arithmetic error in excess of 5.00%.
- 15.9 Tender whose pricing on key items are found to be unreasonable and whose effect is significant on the overall contract sum. Key items are those which are price sensitive, critical to the carrying out of works and whose quantum variation (whether increase or decrease) has the greatest effect on the project costings.
- 15.10 No written and signed Agreement among partners where a Joint Venture is submitted.

I/We the undersigned having read and understood the foregoing contents in the Appendix 'A' to the Instructions to Tenderers of the Tender documents offer to comply with and abide by the same in full.

Name of Tenderer

Address

Signature Position

Date

Name of Witness

Address

Occupation

Signature Date.....

SECTION THREE B
CONDITIONS OF CONTRACT

SECTION B

CONDITIONS OF CONTRACT

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CONDITIONS OF CONTRACT

1. Definitions

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

"Project Manager" is the person named in the Appendix to Conditions of Contract (or any other competent person appointed by the Employer and notified to the Contractor, to act in replacement of the Project Manager) who is responsible for supervising the execution of the Works and administering the Contract and shall be an "Architect" or a "Quantity Surveyor" registered under the Architects and Quantity Surveyors Act Cap 525 or an "Engineer" registered under Engineers Registration Act Cap 530. The Project Manager shall carry his duty with input from relevant or specific professional expertise from project team members.

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

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

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

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

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

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

"A Variation" is an instruction issued by the Project Manager with the approval of the Contract Implementation Team (CIT) as per the PPADA 2015, which varies the Works.

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

2. Interpretation

- 2.1 In interpreting these Conditions of Contract, singular also means plural, male also means female or neuter, and the other way around. Headings have no significance. Words have their normal meaning in English Language unless specifically defined. The Project Manager will provide instructions clarifying queries about these Conditions of Contract.
- 2.2 If sectional completion is specified in the Appendix to Conditions of Contract, reference in the Conditions of Contract to the Works, the Completion Date and the Intended Completion Date apply to any section of the Works (other than references to the Intended Completion Date for the whole of the Works).
- 2.3 The following documents shall constitute the Contract documents and shall be interpreted in the following order of priority and subject to the Public Procurement and the Asset Disposal Act 2015 and applicable regulations:-
 - (1) Agreement,
 - (2) Letters of Award and Acceptance,
 - (3) Contractor's Tender,

- (4) Appendix to Conditions of Contract,
- (5) Conditions of Contract,
- (6) Specifications,
- (7) Drawings,
- (8) Bill of Quantities,
- (9) Any other documents listed in the Appendix to Conditions of Contract as forming part of the Contract,

Immediately after the execution of the Contract, the Project Manager shall furnish both the Employer and the Contractor with two copies each of all the Contract documents.

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

3. Language and Law

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

4 Project Manager's Decisions

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

5 Delegation

- 5.1 The Project Manager duties and responsibilities shall be shared amongst respective project officers/project professionals in respective areas of expertise. The Contractor is specifically and expressly notified of this provision.

6 Communications

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

7 Subcontracting

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

8 Other Contractors

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

9 Personnel

- 9.1 The Contractor shall employ the key personnel named in the Qualification Information, to carry out the functions stated in the said Information or other personnel approved by the Project Manager.

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

10 Works

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

11 Safety and Temporary Works

- 11.1 The Contractor shall be responsible for the design of temporary works. However before erecting the same, he shall submit his designs including specifications and drawings to the Project Manager and to any other relevant third parties for their approval. No erection of temporary works shall be done until such approvals are obtained.
- 11.2 The Project Manager's approval shall not alter the Contractor's responsibility for design of the Temporary works and all drawings prepared by the Contractor for the execution of the temporary or permanent Works, shall be subject to prior approval by the Project Manager before they can be used.
- 11.3 The Contractor shall be responsible for the safety of all activities on the Site.

12. Discoveries

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

13. Work Program

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

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

14. Possession of Site

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

15. Access to Site

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

16. Instructions

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

17. Extension or Acceleration of Completion Date

- 17.1 The Project Manager shall extend the Intended Completion Date if a Compensation Event occurs or a variation is issued which makes it impossible for completion to be achieved by the Intended Completion Date without the Contractor taking steps to accelerate the remaining Work, which would cause the Contractor to incur additional cost. The Project Manager shall decide whether and by how much to extend the Intended Completion Date within 21 days of the Contractor asking the Project Manager in writing for a decision upon the effect of a Compensation Event or variation and submitting full supporting information. If the Contractor has failed to give early warning of a delay or has failed to cooperate in dealing with a delay, the delay caused by such failure shall not be considered in assessing the new (extended) Completion Date.
- 17.2 No bonus for early completion of the Works shall be paid to the Contractor by the Employer.

18.Management Meetings

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

19.Early Warning

- 19.1 The Contractor shall warn the Project Manager at the earliest opportunity of specific likely future events or circumstances that may adversely affect the quality of the Work, increase the Contract Price or delay the execution of the Works. The Project Manager may require the Contractor to provide an estimate of the expected effect of the future event or circumstance on the Contract Price and Completion Date. The estimate shall be provided by the Contractor as soon as reasonably possible.
- 19.2 The Contractor shall cooperate with the Project Manager in making and considering proposals on how the effect of such an event or circumstance can be avoided or reduced by anyone involved in the Work and in carrying out any resulting instructions of the Project Manager.

20.Defects

- 20.1 The Project Manager shall inspect the Contractor's work and notify the Contractor of any defects that are found. Such inspection shall not affect the Contractor's responsibilities. The Project Manager may instruct the Contractor to search for a defect and to uncover and test any Work that the Project Manager considers may have a defect. Should the defect be found, the cost of uncovering and making good shall be borne by the Contractor, However, if there is no defect found, the cost of uncovering and making good shall be treated as a variation and added to the Contract Price.
- 20.2 The Project Manager shall give notice to the Contractor of any defects before the end of the Defects Liability Period, which begins at Completion, and is defined in the Appendix to Conditions of Contract. The Defects Liability Period shall be extended for as long as defects remain to be corrected up to a maximum of six months beyond the end of initial defects liability period.

- 20.3 Every time notice of a defect is given, the Contractor shall correct the notified defect within the length of time specified by the Project Manager's notice. If the Contractor has not corrected a defect within the time specified in the Project Manager's notice, the Project Manager will assess the cost of having the defect corrected by other parties and such cost shall be treated as a variation and be deducted from the Contract Price. If the Contractor does not attend to identified defects six months beyond the end of the initial defects liability period, such defects shall be noted and costed by the Quantity Surveyor, brought to the attention of the Contractor within 60 days. If no convincing reasons are given the cost of remedial works for such defects shall be deducted and the Final Accounts shall be closed.

21. Bills of Quantities

- 21.1 The Bills of Quantities shall contain items for the construction, installation, testing and commissioning of the Work to be done by the Contractor. The Contractor will be paid for the quantity of the Work done at the rate in the Bills of Quantities for each item.
- 21.2 If the final quantity of the Work done differs from the quantity in the Bills of Quantities for the particular item by more than 25 percent and provided the change exceeds 1 percent of the Initial Contract price, the Project Manager may adjust the rate to allow for the change.
- 21.3 If requested by the Project Manager, the Contractor shall provide the Project Manager with a detailed cost breakdown of any rate in the Bills of Quantities.

22. Variations

- 22.1 All variations shall be included in updated programs produced by the Contractor.
- 22.2 The Contractor shall provide the Project Manager with a quotation for carrying out the variations when requested to do so. The Project Manager shall assess the quotation, which shall be given within seven days of the request or within any longer period as may be stated by the Project Manager and before the Variation is ordered. The Contract Implementation Team (CIT) will consider and recommend **all** variations for approval by the Accounting Officer as required by law.

- 22.3 If the work in the variation corresponds with an item description in the Bills of Quantities and if in the opinion of the Project Manager, the quantity of work is not above the limit stated in Clause 21.2 or the timing of its execution does not cause the cost per unit of quantity to change, the rate in the Bills of Quantities shall be used to calculate the value of the variation. If the cost per unit of quantity changes, or if the nature or timing of the work in the variation does not correspond with items in the Bills of Quantities, the quotation by the Contractor shall be in the form of new rates for the relevant items of Work.
- 22.4 If the Contractor's quotation is unreasonable, the Project Manager may order the variation and make a change to the Contract price, which shall be based on the Project Manager's own forecast of the effects of the variation on the Contractor's costs.
- 22.5 If the Project Manager decides that the urgency of varying the Work would prevent a quotation being given and considered without delaying the Work, no quotation shall be given and the variation shall be treated as a Compensation Event.
- 22.6 The Contractor shall not be entitled to additional payment for costs that could have been avoided by giving early warning.
- 22.7 When the Program is updated, the Contractor shall provide the Project Manager with an updated cash flow forecast.

23.Payment Certificates, Currency of Payments and Advance Payments

- 23.1 The Contractor shall submit to the Project Manager monthly applications for payment giving sufficient details of the Work done and materials on Site and the amounts which the Contractor considers himself to be entitled to. The Project Manager shall check the monthly application and certify the amount to be paid to the Contractor within 14 days. The Value of Work executed and payable shall be determined by the Project Manager.
- 23.2 The value of Work executed shall comprise the value of the quantities of the items in the Bills of Quantities completed, materials delivered on Site, variations and compensation events. Such materials shall become the property of the Employer once the Employer has paid the Contractor for their value. Thereafter, they shall not be removed from Site without the Project Manager's instructions except for use upon the Works.
- 23.3 Payments shall be adjusted for deductions for retention. The Employer shall pay the Contractor the amounts certified by the Project Manager within 30 days of the date of issue of each certificate. If the Employer makes a late payment, the Contractor shall be paid simple interest on

the late payment in the next payment. Interest shall be calculated on the basis of number of days delayed at a rate three percentage points above the Central Bank of Kenya's average rate for base lending prevailing as of the first day the payment becomes overdue.

- 23.4 If an amount certified is increased in a later certificate or as a result of an award by an Arbitrator, the Contractor shall be paid interest upon the delayed payment as set out in this clause. Interest shall be calculated from the date upon which the increased amount would have been certified in the absence of dispute.
- 23.5 Items of the Works for which no rate or price has been entered in will not be paid for by the Employer and shall be deemed covered by other rates and prices in the Contract.
- 23.6 The Contract Price shall be stated in Kenya Shillings. All payments to the Contractor shall be made in Kenya Shillings and foreign currency in the proportion indicated in the tender or agreed prior to the execution of the Contract Agreement and indicated therein. The rate of exchange for the calculation of the amount of foreign currency payment shall be the rate of exchange indicated in the Appendix to Conditions of Contract. If the Contractor indicated foreign currencies for payment other than the currencies of the countries of origin of related goods and services the Employer reserves the right to pay the equivalent at the time of payment in the currencies of the countries of such goods and services. The Employer and the Project Manager shall be notified promptly by the Contractor of any changes in the expected foreign currency requirements of the Contractor during the execution of the Works as indicated in the Schedule of Foreign Currency Requirements and the foreign and local currency portions of the balance of the Contract Price shall then be amended by agreement between Employer and the Contractor in order to reflect appropriately such changes.
- 23.7 In the event that an advance payment is granted, the following shall apply:-
- a) On signature of the Contract, the Contractor shall at his request, and without furnishing proof of expenditure, be entitled to an advance of 10% (ten percent) of the original amount of the Contract. The advance shall not be subject to retention money.
 - b) No advance payment may be made before the Contractor has submitted proof of the establishment of deposit or a directly liable guarantee satisfactory to the Employer in the amount of the advance payment. The guarantee shall be in the same currency as the advance.

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

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

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

Where:

R = the amount to be reimbursed

A = the amount of the advance which has been granted

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

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

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

24. Compensation Events

24.1 The following issues shall constitute Compensation Events:

- (a) The Employer does not give access to a part of the Site by the Site Possession Date stated in the Appendix to Conditions of Contract.
- (b) The Employer modifies the List of Other Contractors, etc., in a way that affects the Work of the Contractor under the Contract as per officially received and approved work's programme.
- (c) The Project Manager orders a delay or does not issue drawings, specifications or instructions required for execution of the Works on time as per officially received and approved work's programme.

- (d) The Project Manager instructs the Contractor to uncover or to carry out additional tests upon the Work, which is then found to have no defects.
- (e) The Project Manager unreasonably does not approve a subcontract to be let and that delay affects the activities as per officially received and approved work's programme.
- (f) Ground conditions are substantially more adverse than could reasonably have been assumed before issuance of the Letter of Acceptance from the information issued to tenderers (including the Site investigation reports), from information available publicly and from a visual inspection of the Site.
- (g) The Project Manager gives an instruction for dealing with an unforeseen condition, caused by the Employer or additional work required for safety or other reasons.
- (h) Other contractors, public authorities, utilities, or the Employer does not work within the dates and other constraints stated in the Contract, and they cause delay or extra cost to the Contractor.
- (i) The effects on the Contractor of any of the Employer's risks.
- (j) The Project Manager unreasonably delays issuing a Certificate of Completion.
- (k) Other compensation events described in the Contract or determined by the Project Manager shall apply.

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

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

- 24.4 The Contractor shall not be entitled to compensation to the extent that the Employer's interests are adversely affected by the Contractor not having given early warning or not having co-operated with the Project Manager.
- 24.5 Prices shall be adjusted for fluctuations in the cost of inputs only if provided for in the Appendix to Conditions of Contract.
- 24.6 The Contractor shall give written notice to the Project Manager of his intention to make a claim within thirty days after the event giving rise to the claim has first arisen. The claim shall be submitted within thirty days thereafter.

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

25.Price Adjustment

- 25.1 The Project Manager shall adjust the Contract Price if taxes, duties and other levies are changed between the date 30 days before the submission of tenders for the Contract and the date of Completion. The adjustment shall be the change in the amount of tax payable by the Contractor.
- 25.2 The Contract Price shall be deemed to be based on exchange rates current at the date of tender submission in calculating the cost to the Contractor of materials to be specifically imported (by express provisions in the Contract Bills of Quantities or Specifications) for permanent incorporation in the Works. Unless otherwise stated in the Contract, if at any time during the period of the Contract exchange rates shall be varied and this shall affect the cost to the Contractor of such materials, then the Project Manager shall assess the net difference in the cost of such materials. Any amount from time to time so assessed shall be added to or deducted from the Contract Price, as the case may be.
- 25.3 Unless otherwise stated in the Contract, the Contract Price shall be deemed to have been calculated in the manner set out below and in sub-clauses 25.4 and 25.5 and shall be subject to adjustment in the events specified thereunder;
- (i) The prices contained in the Contract Bills of Quantities shall be deemed to be based upon the rates of wages and other emoluments and expenses as determined by the Joint Building Council of Kenya (J.B.C.) and set out in the schedule of basic rates issued 30 days before the date for submission of tenders.

A copy of the schedule used by the Contractor in his pricing shall be attached in the Appendix to Conditions of Contract.

- (ii) Upon J.B.C. determining that any of the said rates of wages or other emoluments and expenses are increased or decreased, then the Contract Price shall be increased or decreased by the amount assessed by the Project Manager based upon the difference, expressed as a percentage, between the rate set out in the schedule of basic rates issued 30 days before the date for submission of tenders and the rate published by the J.B.C. and applied to the quantum of labour incorporated within the amount of Work remaining to be executed at the date of publication of such increase or decrease.
- (iii) No adjustment shall be made in respect of changes in the rates of wages and other emoluments and expenses which occur after the date of Completion except during such other period as may be granted as an extension of time under clause 17.0 of these Conditions.

- 25.4 The prices contained in the Contract Bills of Quantities shall be deemed to be based upon the basic prices of materials to be permanently incorporated in the Works as determined by the J.B.C. and set out in the schedule of basic rates issued 30 days before the date for submission of tenders. A copy of the schedule used by the Contractor in his pricing shall be attached in the Appendix to Conditions of Contract.
- 25.5 Upon the J.B.C. determining that any of the said basic prices are increased or decreased then the Contract Price shall be increased or decreased by the amount to be assessed by the Project Manager based upon the difference between the price set out in the schedule of basic rates issued 30 days before the date for submission of tenders and the rate published by the J.B.C. and applied to the quantum of the relevant materials which have not been taken into account in arriving at the amount of any interim certificate under clause 23 of these Conditions issued before the date of publication of such increase or decrease.
- 25.6 No adjustment shall be made in respect of changes in basic prices of materials which occur after the date for Completion except during such other period as may be granted as an extension of time under clause 17.0 of these Conditions.
- 25.7 The provisions of sub-clause 25.1 to 25.2 herein shall not apply in respect of any materials included in the schedule of basic rates.

26.Retention

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

27.Liquidated Damages

- 27.1 The Contractor shall pay liquidated damages to the Employer at the rate stated in the Appendix to Conditions of Contract for each day that the actual Completion Date is later than the Intended Completion Date. The Employer may deduct liquidated damages from payments due to the Contractor. Payment of liquidated damages shall not alter the Contractor's liabilities.
- 27.2 If the Intended Completion Date is extended after liquidated damages have been paid, the Project Manager shall correct any overpayment of liquidated damages by the Contractor by adjusting the next payment certificate. The Contractor shall be paid interest on the overpayment, calculated from the date of payment to the date of repayment, at the rate specified in Clause 23.30

28.Securities

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

29.Dayworks

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

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

30. Liability and Insurance

- 30.1 From the Start Date until the Defects Correction Certificate has been issued, the following are the Employer's risks:
- (a) The risk of personal injury, death or loss of or damage to property (excluding the Works, Plant, Materials and Equipment), which are due to;
 - (i) Use or occupation of the Site by the Works or for the purpose of the Works, which is the unavoidable result of the Works, or
 - (ii) Negligence, breach of statutory duty or interference with any legal right by the Employer or by any person employed by or contracted to him except the Contractor.
 - (b) The risk of damage to the Works, Plant, Materials, and Equipment to the extent that it is due to a fault of the Employer or in Employer's design, or due to war or radioactive contamination directly affecting the place where the Works are being executed.
- 30.2 From the Completion Date until the Defects Correction Certificate has been issued, the risk of loss of or damage to the Works, Plant, and Materials is the Employer's risk except loss or damage due to;
- (a) A defect which existed on or before the Completion Date.
 - (b) An event occurring before the Completion Date, which was not itself the Employer's risk
 - (c) The activities of the Contractor on the Site after the Completion Date.

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

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

- (a) Loss of or damage to the Works, Plant, and Materials.
- (b) Loss of or damage to Equipment.
- (c) Loss of or damage to property (except the Works, Plant, Materials, and Equipment) in connection with the Contract, and
- (d) Personal injury or death.

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

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

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

31.Completion and Taking Over

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

32.Final Account

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

33.Termination

- 33.1 The Employer or the Contractor may terminate the Contract if the other party causes a fundamental breach of the Contract. These fundamental breaches of Contract shall include, but shall not be limited to, the following;
- (a) The Contractor stops work for 30 days when no stoppage of work is shown on the current program and the stoppage has not been authorised by the Project Manager;
 - (b) The Project Manager instructs the Contractor to delay the progress of the Works, and the instruction is not withdrawn within 30 days;
 - (c) The Contractor is declared bankrupt or goes into liquidation other than for a reconstruction or amalgamation;
 - (d) A payment certified by the Project Manager is not paid by the Employer to the Contractor within 30 days (for Interim Certificate) or 60 days (for Final Certificate) of issue.
 - (e) The Project Manager gives notice that failure to correct a particular defect is a fundamental breach of Contract and the Contractor fails to correct it within a reasonable period of time determined by the Project Manager;

- (f) The Contractor does not maintain a performance security (performance bond), which is required.
- 33.2 When either party to the Contract gives notice of a breach of Contract to the Project Manager for a cause other than those listed under Clause 33.1 above, the Project Manager shall decide whether the breach is fundamental or not.
- 33.3 Notwithstanding the above, the Employer may terminate the Contract for convenience.
- 33.4 If the Contract is terminated, the Contractor shall stop work immediately, make the Site safe and secure, and leave the Site as soon as reasonably possible. The Project Manager shall immediately thereafter arrange for a meeting for the purpose of taking record of the Works executed and materials, goods, equipment and temporary buildings on Site.

34. Payment Upon Termination

- 34.1 If the Contract is terminated because of a fundamental breach of Contract by the Contractor, the Project Manager shall issue a certificate for the value of the Work done and materials ordered and delivered to Site up to the date of the issue of the certificate. Additional liquidated damages shall not apply. If the total amount due to the Employer exceeds any payment due to the Contractor, the difference shall be a debt payable by the Contractor.
- 34.2 If the Contract is terminated for the 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.
- 34.3 The Employer may employ and pay other persons to carry out and complete the Works and to rectify any defects and may enter upon the Works and use all materials on the Site, plant, equipment and temporary works.
- 34.4 The Contractor shall, during the execution or after the completion of the Works under this clause remove from the Site as and when required, within such reasonable time as the Project Manager may in writing specify, any temporary buildings, plant, machinery, appliances, goods or materials belonging to or hired by him, and in default the Employer may (without being responsible for any loss or damage)

remove and sell any such property of the Contractor, holding the proceeds less all costs incurred to the credit of the Contractor.

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

35.Release from Performance

- 35.1 If the Contract is frustrated by the outbreak of war or by any other event entirely outside the control of either 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.

36.Corrupt gifts and payments of commission

The Contractor shall not;

- (a) Offer or give or agree to give to any person in the service of the Employer any gift or consideration of any kind as an inducement or reward for doing or forbearing to do or for having done or forborne to do any act in relation to the obtaining or execution of this or any other Contract for the Employer or for showing or forbearing to show favour or disfavour to any person in relation to this or any other contract for the Employer.
- (b) Enter into this or any other contract with the Employer in connection with which commission has been paid or agreed to be paid by him or on his behalf or to his knowledge, unless before the Contract is made particulars of any such commission and of the terms and conditions of any agreement for the payment thereof have been disclosed in writing to the Employer.

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

37.Settlement of Disputes

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

- (i) Architectural Association of Kenya (with legal or arbitration qualifications)
- (ii) Institute of Quantity Surveyors of Kenya (with legal or arbitration qualifications)
- (iii) Association of Consulting Engineers of Kenya (with legal or arbitration qualifications)
- (iv) Chartered Institute of Arbitrators (Kenya Branch) [A Quantity Surveyor, or An Architect or An Engineer]
- (v) Institution of Engineers of Kenya (with legal or arbitration qualifications)

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

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

- 37.3 Provided that no arbitration proceedings shall be commenced on any dispute or difference where notice of a dispute or difference has not been given by the applying party within ninety days of the occurrence or discovery of the matter or issue giving rise to the dispute.
- 37.4 Notwithstanding the issue of a notice as stated above, the arbitration of such a dispute or difference shall not commence unless an attempt has in the first instance been made by the parties to settle such dispute or difference amicably with or without the assistance of third parties. Proof of such attempt shall be required.
- 37.5 Notwithstanding anything stated herein the following matters may be referred to arbitration before the practical completion of the Works or abandonment of the Works or termination of the Contract by either party:
- 37.5.1.1 The appointment of a replacement Project Manager upon the said person ceasing to act.
 - 37.5.1.2 Whether or not the issue of an instruction by the Project Manager is empowered by these Conditions.
 - 37.5.1.3 Whether or not a certificate has been improperly withheld or is not in accordance with these Conditions.
 - 37.5.1.4 Any dispute or difference arising in respect of war risks or war damage.
- 37.6 All other matters shall only be referred to arbitration after the completion or alleged completion of the Works or termination or alleged termination of the Contract, unless the Employer and the Contractor agree otherwise in writing.
- 37.7 The Arbitrator shall, without prejudice to the generality of his powers, have powers to direct such measurements, computations, tests or valuations as may in his opinion be desirable in order to determine the rights of the parties and assess and award any sums which ought to have been the subject of or included in any certificate.
- 37.8 The Arbitrator shall, without prejudice to the generality of his powers, have powers to open up, review and revise any certificate, opinion, decision, requirement or notice and to determine all matters in dispute which shall be submitted to him in the same manner as if no such certificate, opinion, decision requirement or notice had been given.
- 37.9 The award of such Arbitrator shall be final and binding upon the parties.

APPENDIX 'B'

AMENDMENTS/DELETIONS TO CONDITIONS OF CONTRACT

1. Clause 1. Definitions.

(I) The Contract Price

This shall have the same meaning as Contract Sum.

(II) Employer

The term Employer shall mean National Housing Corporation, P.O. BOX 30257, and NAIROBI.

(III) Project Manager

This term shall mean The Chief Architect, National Housing Corporation, P.O. BOX 30257, and NAIROBI.

(IV) Start Date

This term shall also have the same meaning as commencement date.

(V) The Intended Completion Date

This shall have the same meaning as original completion date.

2. Clause 6. Communications

This clause has been amended to read:-

Communication between parties shall be effective only when in writing. A notice shall be effective only when it is delivered by recorded delivery to the registered office or sent by registered mail.

3. Clause 13. Works programme

This clause is amended in paragraph 2 to read as follows:-

The Contractor shall submit to the Project Manager for approval an Updated/amended programme in Microsoft Project format at intervals no longer than the period stated in the Appendix to the conditions of contract.

If the Contractor does not submit a work programme or an updated programme within the period, a penalty amount as stated in the appendix of the conditions shall apply for the delayed period.

The Project Manager's approval of the programme 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.

4. Clause 14. Possession of Site

This Clause is amended to read:-

The Employer shall give possession of all parts of the site to the Contractor. If possession of a part is not given by the start date stated in the Appendix to Conditions of Contract, the Employer will be deemed to have delayed the start of the relevant activities, and this will be a compensation event, by way of time extension with no financial implications.

5. Clause 18: Management Meetings

This term shall have the same meaning as Site Meeting.

6. Clause 21: Bills of Quantities

Sub-clause 21.2 is amended to read:-

If the final quantity of the work done differs from the quantity in the Bills of Quantities for the particular item by more than 50 % and provided the change exceeds 10 % of the Initial Contract price, the Project Manager may adjust the rate to allow for the change.

7. Clause 22: Variations

An additional Sub-clause 22.8 is introduced to read:-

Where Contract price variations are allowed, the total Variations shall not exceed 25 % of the original Contract price.

8. Clause 23: Payments certificates

- (I) Sub-clause 23.1. An additional paragraph is introduced to read as follows:-

Interim Payments for Materials on Site shall not exceed 50% of the value of materials deposited as certified by the Project Manager.

- (II) Sub-clause 23.3. The fourth sentence is amended to read:-

"Interest shall be calculated on the basis of number of days delayed at a rate three percentage points above the prevailing Kenya Bankers reference rate as of the first day the payment becomes due."

- (III) Sub-clause 23.4 is amended to read:-

If an amount certified is increased in a later certificate or as a result of an award by an Arbitrator, the Contractor shall be paid interest upon the delayed payment as set out in this clause. Interest on the increased amount shall be calculated from the date when the later certificate was due for payment.

- (IV) Sub-clause 23.60 is amended to read:-

The Contract price shall be stated in Kenya Shillings. All payments to the Contractor shall be made in Kenya Shillings.

- (V) Sub-clause 23.7. (a) – (b). This Sub-clause is deleted entirely. No advance payments will be granted.

9. Clause 24: Compensation Events.

Sub-clause 24.1(a) is amended to read:-

The Employer does not give access to a part of the site by the start date stated in the Appendix to Conditions of Contract.

10. Clause 25: Price Adjustment

This is a fixed price contract clause 25 on price adjustment is deleted in its entirety.

11. Clause 27: Liquidated Damages

Sub-clause 27.2 is amended to read as below:-

If the intended Completion date is extended after liquidated damages have been paid, the Project Manager may correct any overpayment of liquidated damages by issuing a certificate for the Employer to reimburse the Contractor. Liquidated damages levied but waived at a later date will not attract any interest.

12. Clause 28. Securities

The last sentence of the Clause is amended to read:-

The Performance Security shall be valid until a date 60 days beyond the date of issue of the Certificate of Completion. The Performance Security shall be provided within 14 days of Contract Award and before taking site possession or commencement of the works.

Failure to provide and maintain the Performance Security as stated shall lead to Contract Termination and the Corporation shall proceed to award the Contract to another Tenderer or Contractor to complete the outstanding works.

13. Clause 30. Liability & Insurance.

(I) Sub-clause 30.2. Plant and materials are omitted from the Employer's risks.

(II) Sub-clause 30.3 paragraph 2 is amended to read: -

The Contractor shall provide insurance cover from the start date to the end of the defects liability period, in the amounts stated in the Appendix to Conditions of Contract for the following events."

(a) Loss or damage to the works.

(b) Loss of or damage to property (except the works, plant, materials and Equipment under public liability.

(c) Personal injury or death under public liability.

14. Clause 33. Termination.

(I) Sub-clause 33.1 is amended to include the following additional fundamental breaches of the Contract: -

- (a) The Contractor without reasonable cause suspends the carrying out of the works before completion thereof for a period exceeding fourteen days.
- (b) The Contractor fails to proceed regularly and diligently with the Works
- (c) The Contractor fails to commence the works within 30 days of the date for commencement.
- (d) If despite previous notices from the Project Manager in writing he persistently or flagrantly neglects to comply with any of his obligations under the contract.
- (e) False information is discovered to have been used in the Tender documents.
- (f) Failure to provide and maintain performance Security (performance bond) for the works.

(II) Sub-clause 33.1(d) is amended to read as follows:-

A payment certified by the Project Manager is not paid by the Employer to the Contractor within 3 months for an Interim certificate or 6 months for a Final certificate.

(III) Additional sub-clause 33.1.1 is included and reads as follows:-

The Project Manager may give the Contractor a notice by registered post or recorded delivery specifying the breach of contract, and if the Contractor either shall continue such breach for fourteen days after receipt of such notice or shall continue at any time thereafter repeat such breach then the Employer may after expiry of the fourteen days notice by registered post or recorded delivery forthwith terminate the contract.

I/We the undersigned having read and understood the foregoing contents in the Appendix 'B' to the Conditions of Contract offer to comply with and abide by the same in full.

Name of Tenderer

Address

Name of Authorised Representative

Position

Signature

Date

Name of Witness

Address.....

Occupation

Signature

Date

SECTION C
APPENDIX TO CONDITIONS
OF CONTRACT

APPENDIX TO CONDITIONS OF CONTRACT

SECTION C

THE EMPLOYER IS: **NATIONAL HOUSING CORPORATION**

ADDRESS: **P.O. BOX 30257-00100, NAIROBI**

NAME OF AUTHORISED REPRESENTATIVE: **MANAGING DIRECTOR**

TELEPHONE: **020-3312147/9**

FACSIMILE: **020-3118318**

E-MAIL: info@nhckeny.go.ke; md@nhckeny.go.ke

THE PROJECT MANAGER IS: **CHIEF ARCHITECT**

ADDRESS: **P.O. BOX 30257-00100, NAIROBI**

TELEPHONE: **020-3312147/9**

FACSIMILE: **020-3118318**

THE NAME AND IDENTIFICATION OF THE CONTRACT IS: **PROPOSED NHC REGIONAL OFFICES AND RESIDENTIAL DEVELOPMENT AT BONDENI – ELDORET MUNICIPALITY ON PLOT L.R. No. ELDORET MUNICIPALITY BLOCK V/83 AND 84 UASIN GISHU COUNTY**

THE WORKS CONSIST OF: **THE CONSTRUCTION ERECTION AND COMPLETION OF 1NO. RESIDENTIAL BLOCK OF FIVE STOREY HOUSING PROJECT WITH ASSOCIATED CIVIL WORKS.**

THE START DATE SHALL BE: **AS GIVEN IN THE LETTER OF ACCEPTANCE.**

THE INTENDED COMPLETION DATE FOR THE WHOLE OF THE WORKS SHALL BE: **AS GIVEN IN THE LETTER OF ACCEPTANCE.**

THE FOLLOWING DOCUMENTS ALSO FORM PART OF THE CONTRACT: **LETTER OF ACCEPTANCE, TRADE PREAMBLES AND CONDITIONS OF CONTRACT, BILL OF QUANTITIES AND DRAWINGS AND APPLICABLE STATUTE LAWS.**

THE CONTRACTOR SHALL SUBMIT A REVISED PROGRAM FOR THE WORKS WITHIN **SEVEN (7) DAYS** OF DATE OF POSSESSION OR COMMENCEMENT OF WORKS, WHICHEVER COMES EARLIER. AN UPDATED/AMMENDED PROGRAMME WILL BE SUBMITTED WITHIN **SEVEN (7) DAYS**.

THE SITE POSSESSION DATE SHALL BE: **STATED IN THE LETTER OF ACCEPTANCE**

THE SITE IS LOCATED AT: **BONDENI, ELDORET MUNICIPALITY OF UASIN GISHU COUNTY** AND AS DEFINED IN DRAWINGS NOS; **AS INDICATED IN SCHEDULE OF DRAWINGS**

THE DEFECTS LIABILITY PERIOD IS **TWELVE (12) MONTHS OR THREE HUNDRED AND SIXTY -FIVE (365) DAYS WHICHEVER IS LONGER.**

OTHER CONTRACTORS, UTILITIES ETC., TO BE ENGAGED BY THE EMPLOYER ON THE SITE INCLUDE: -

1. **KENYA POWER AND LIGHTING COMPANY LTD.**
2. **LOCAL AUTHORITY WATER AND SEWERAGE COMPANY**
3.

THE MINIMUM INSURANCE COVERS SHALL BE;

1. THE MINIMUM COVER FOR INSURANCE OF THE WORKS AND OF PLANT AND MATERIALS IN RESPECT OF THE CONTRACTOR'S FAULTY DESIGN IS **N/A**
2. THE MINIMUM COVER FOR LOSS OR DAMAGE TO WORKS IS..... **(CONTRACT SUM).**
3. THE MINIMUM FOR INSURANCE OF OTHER PROPERTY IS **KShs.10,000,000.00**
4. THE MINIMUM COVER FOR PERSONAL INJURY OR DEATH
 - FOR THE CONTRACTOR'S EMPLOYEES IS **AS PER THE WORK INJURIES AND BENEFITS ACT**
 - AND FOR OTHER PERSONS (THIRD PARTY) IS **KShs. 10,000,000.00**

PENALTY FOR DELAY IN SUBMISSION OF THE WORKS PROGRAMME OR AN AMMENDED/UPDATED PROGRAMME IS **KShs. 2,000.00 PER DAY**

THE PROPORTION OF PAYMENTS RETAINED IS **TEN PERCENT (10%).**

THE PRICE ADJUSTMENT CLAUSE **SHALL NOT** APPLY.

- THE LIQUIDATED DAMAGES FOR LATE COMPLETION FOR THE WORKS IS: **KShs. TWO THOUSAND (2,000) PER 2BEDROOM UNIT PER DAY;**
- **KSHS FIVE THOUSAND (5,000) PER DAY FOR DELAY TO COMPLETE SAMPLE FLAT; AND**
- **100,000.00 (PER WEEK OR PART THEREOF) FOR CIVIL WORKS IF ALL THE UNITS ARE COMPLETE**
- **THE MAXIMUM AMOUNT AND THE LIMIT OF LIQUIDATED AND ASCERTAINED DAMAGES WHICH CAN BE LEVIED IS TEN(10)% PERCENTAGE OF THE CONTRACT SUM BEYOND WHICH THE CONTRACT IS DETERMINED**

THE PERFORMANCE SECURITY SHALL BE FOR A MINIMUM AMOUNT EQUIVALENT TO **TEN PERCENT (10%)** OF THE CONTRACT SUM

THE COMPLETION PERIOD FOR THE WORKS IS **AS STATED IN THE LETTER OF ACCEPTANCE**

THE AMOUNT FOR TENDER SECURITY (BID BOND) IS **KENYA SHILLINGS TWO MILLION ONLY (KShs. 2,000,000.00)**

MINIMUM INTERVAL PERIOD BETWEEN ONE PAYMENT AND THE NEXT IS THIRTY DAYS (ONE MONTH) **PAYMENT TO BE BASED ON VALUATION OF WORKDONE AND 50% OF VALUE OF RELEVANT MATERIALS ON SITE.**

SECTION D
TECHNICAL PROPOSAL FORMS

1.0 **QUALIFICATION INFORMATION (95MARKS)**

(Extend the tables or use a separate paper for large information)

- 1.1 Total annual volume of construction work performed in the period 2015- 2021 years **(5 MARKS)**.

Marks shall be awarded based on an average value of 50Million

[Proof of Evidence will include Letter of Award or LPO/LSO Quotation; Completion Certificate; Certificate of Making Good Defects; Final Account, Occupation Certificate]

Marks will be awarded based on the following annual average volumes;

- Below KShs. 30 million (0 marks)
- Above KShs. 30 million - KShs. 100 million (3 marks)
- From KShs. 100 million and above (5 marks)

<i>Year</i>	<i>Building Project Name and Client</i>	<i>Value (Kshs)</i>

- 1.2 Work performed as Main Contractor on works of a **similar nature (Erection and Completion of a framed Building Block above 3-storey Building residential apartment/office/commercial building/hospital/hotel)** and volume over the period 2015 - 2021. Also list details of work under way or committed, including expected completion date. **(30 MARKS)**

Marks shall be awarded based on an average annual value of 50 million.

[Proof of Evidence will include Letter of Award or LPO/LSO Quotation; Completion Certificate; Certificate of Making Good Defects; Final Account].

<i>Project Name</i>	<i>Name of Client and Contact Person</i>	<i>Type of Work</i>	<i>Value of Contract</i>

- 1.3** Major items of Contractor's Equipment proposed for carrying out the Works (Vehicles, Concrete mixers, Hoists, Dumpers, scaffolding etc). Show evidence of Purchase, Executed Hire Agreement, and Ownership documentation. List all information requested below. **(10 MARKS)**

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

- 1.4** Qualifications and experience of key personnel proposed for administration and execution of the Contract. Attach biographical data including relevant certificates. **(10 MARKS)**

Position	Name	Years of Experience (General)	Qualification
Site Manager			
Site Agent			

- 1.5** Financial reports for the last Three years: balance sheets, profit and loss statements, auditor's reports, etc. List below and attach copies. Auditor's Report must be signed, stamped or on Audits Firm's Letterhead. **(15 MARKS)**

Year	Balance Sheets	Profit and Loss Statements	Auditors

- 1.6** Evidence of access to financial resources to meet the qualification requirements: cash in hand over 10million (20marks), Bank term sheet expressly committing over 10million (15marks), Letter from bank committing lines of credit with no figures (5marks), Evidence of materials supply (3marks), etc. List below and attach copies of supportive documents. [Marks to be a pro-rata based on amount availed as evidence] **(20 MARKS)**

Cash In Hand	Lines of Credit from bank or financial institution	Evidence (Copies of Supportive Documents)

- 1.1** Proposed program (work method, schedule and cashflow projections) for the whole of the Works (Including Microsoft Project Chart). **(5 MARKS)**

2.0 CONFIDENTIAL BUSINESS QUESTIONNAIRE

(5MARKS)

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

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

Part 1 – General (2 MARKS)

Business Name

Location of business premises: Country/Town.....

Plot No..... Street/Road

Postal Address..... Tel No.....

Nature of Business.....

Current Trade License No..... Expiring date.....

Maximum value of business which you can handle at any time: Kshs Shillings.

.....

Name of your bankers.....

Branch.....

Part 2 (2 MARKS)

Part 2 (a) – Sole Proprietor OR

Your name in full..... Age.....

Nationality..... Country of Origin.....

*Citizenship details

Part 2 (b) – Partnership OR

Give details of partners as follows:

	<i>Name in full</i>	<i>Nationality</i>	<i>Citizenship Details</i>	<i>Shares</i>
1.....				
2.....				
3.....				

Part 2(c) – Registered Company:

Private or public.....

State the nominal and issued capital of the Company-

Nominal Kshs.....

Issued Kshs.....

Give details of all directors as follows:

Name in full. Nationality. Citizenship Details*. Shares.

1.
.....

2.
.....

3.
.....

Part 2(d) – Interest in the Firm: (1 MARK)

Is there any person / persons in (Name of Employer) who
has interest in this firm? Yes/No..... (Delete as necessary)

I certify that the information given above is correct.

.....
(Title)

.....
(Signature)

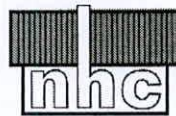
.....
(Date)

Attach proof of citizenship.

SECTION E

STANDARD FORMS

- (a) Certificate of Mandatory Pre-Tender Site Visit**
- (b) Form of Tender Security**
- (c) Performance Bank Guarantee**
- (d) Form of Agreement**
- (e) Form of Letter of Award**
- (f) Sample of Authorized Variation Order**



CERTIFICATE OF PRE-TENDER SITE VISIT

**TENDER PROPOSED NHC REGIONAL OFFICES AND RESIDENTIAL
DEVELOPMENT AT BONDENI – ELDORET MUNICIPALITY ON PLOT
L.R. No. ELDORET MUNICIPALITY BLOCK V/83 AND 84
UASIN GISHU COUNTY**

TENDER NO. NHC/TECH/_____

The Contractor has visited the site and satisfied themselves as to local conditions, water, power lighting services, the accessibility of the site, the full extent and character of operations, the nature of the ground, the supply of and conditions affecting labour services and materials necessary for the execution of the Contract works generally and shall make all necessary allowances and provisions for his tender. The Contractor indemnifies the Employer, and no claim for want of knowledge in this respect will be allowed.

For Contractor:

Name of Contractor_____

Name of Authorized Representative/Agent_____

Address_____

Signature /Stamp_____ **Date** _____

For Official National Housing Corporation /Employer's Agent Use:

Designation_____

Name_____

Signature and Stamp_____ **Date** _____

FORM OF TENDER SECURITY

WHEREAS.....(hereinafter called
"The Tenderer") has submitted his tender
dated..... for the
.....(Name of Contract.)

KNOW ALL PEOPLE by these presents that WE

.....Having our registered office
at.....(hereinafter called "The Guarantor"),
are bound unto National Housing Corporation (hereinafter called "The
Employer") in the sum of KShs

.....
for which payment will truly to be made to the said Employer, the Guarantor
binds itself, its successors and assigns by these presents sealed with the
common seal of the said Guarantor this.....Day
of.....20.....

THE CONDITIONS of this obligation are:

1. If after opening the Tenderer withdraws his tender during the period of Tender validity specified in the instructions to Tenderers.
2. If the Tenderer, having been notified of the acceptance of his tender by The Employer during the Period of tender validity.
 - (a) Fails or refuses to execute the form of Agreement in accordance with the Instructions to Tenderers, if required; or
 - (b) Fails or refuses to furnish the Performance Security, in accordance with the Instructions to Tenderers;

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

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

.....

(Date)

.....

(Signature of Guarantor)

.....

(Witness)

.....

(Seal)

PERFORMANCE BANK GUARANTEE

TO (Name
of Employer)

..... (Address
of Employer) (Date)

Dear Sir,

WHEREAS
(Hereinafter called 'The Contractor') has undertaken, in pursuance of Contract
No.....Dated.....to execute
..... (hereinafter called 'The
works')

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

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

NOW THEREFORE we hereby affirm that we are the Guarantor and
responsible to you, on behalf of the Contractor, up to a total of KShs
..... (Amount of Guarantee in figures) Kenya
Shillings.....

..... (Amount of
Guarantee in words) and we undertake to pay you, upon your first written
demand and without cavil or argument, any sum or sums within the limits of
Kenya Shillings.....

.....(Amount of
Guarantee in words) as aforesaid without your needing to prove or to show
grounds or reasons for your demand for the sum specified therein.

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

We further agree that no change, addition or other modification of the terms
of the Contract or of the Works to be performed thereunder or of any of the
Contract documents which may be made between you and the Contractor

This guarantee shall be valid until a date 60 days beyond the issue of the Certificate of Practical Completion.

.....

.....

.....

Date.....

FORM OF AGREEMENT

THIS AGREEMENT, made the day of 20.....
Between **NATIONAL HOUSING CORPORATION** of P.O.BOX 30257-00100
GPO NAIROBI {whose registered office is situated at} **NHC HOUSE AGA
KHAN WALK NAIROBI** {hereinafter called 'The Employer'} of the one part,

AND

.....
..... of
.....{wh
ose registered office is situated
at}.....{hereinafter
called 'The Contractor '} of the other part.

WHEREAS THE Employer is desirous that the Contractor executes THE
PROPOSED NHC REGIONAL OFFICES AND RESIDENTIAL DEVELOPMENT AT
BONDENI – ELDORET MUNICIPALITY ON PLOT L.R. No. ELDORET
MUNICIPALITY BLOCK V/83 AND 84 UASIN GISHU COUNTY
.....{Name and identification number of Contract} (herein
after called 'The Works') located at.....
.....{place/location of the works} and the
Employer has accepted the tender submitted by the Contractor for the
execution and completion of such Works and the remedying of any defects
therein for the Contract Price of KShs. [Amount in figures],
Kenya Shillings.....
.....
.....[Amount in words].

NOW THIS AGREEMENT WITNESSETH as follows:

1. In this Agreement, words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Contract hereinafter referred to.
2. The following documents shall be deemed to form and shall be read and construed as part of this Agreement and subject to the Public Procurement and the Asset Disposal Act 2015 and applicable regulations, ie:-
 - (a) Letter of Acceptance
 - (b) Form of Tender
 - (c) Conditions of Contract

(d) Appendix to Conditions of Contract

(e) Specifications

(f) Drawings

(g) Priced Bills of Quantities

3. In consideration of the payments to be made by the Employer to the Contractor as hereinafter mentioned, the Contractor hereby covenants with the Employer to execute and complete the works and remedy any defects therein in conformity in all respects with the provisions of the Contract.
4. The Employer hereby covenants to pay the Contractor in consideration of the execution and completion of the works and the remedying of defects therein, the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the contract.

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

The Common seal of **National Housing Corporation** was hereunto affixed in the presence of:-

(a) Managing Director

.....

Signature

ID NO.....PIN NO.....

(b) Chairman

.....

Signature

ID NO.....PIN NO.....

Sealed with the Common Seal of the **Contractor**: -

In the presence of:-

(a) Director/Secretary

.....
ID NO.....PIN NO.....
Address
Signature

(b) Director.....
ID NO.....PIN NO.....
Address
Signature

SAMPLE: LETTER OF AWARD

Office of the Managing Director

**NATIONAL
HOUSING
CORPORATION**



P.O. Box 30257-00100 NAIROBI.

NHC/CONF/GEN/I/I/.....(.....) MD

Date: Day/Month/Year 2020

The Managing Director,

...../
P O Box/
NAIROBI.

Dear Sir,

RE: LETTER OF AWARD

**PROJECT: PROPOSED NHC REGIONAL OFFICES AND RESIDENTIAL
DEVELOPMENT AT BONDENI – ELDORET MUNICIPALITY ON PLOT L.R. No.
ELDORET MUNICIPALITY BLOCK V/83 AND 84 UASIN GISHU COUNTY.**

Please refer to your tender for the above project which was opened on day/month/year.... and our notification of award dated

The Corporation has awarded you the tender at a Contract Sum of **Kshs****figures..... (Read Kenya Shillings-Words.....**

The date for commencement of the works will be**Day...month.....year....** with a contract period of **Fifty Two weeks..... (52.....) weeks [the agreed period]** from the contract start date. Completion date of the contract will not be later than **....day/month/year.....** Possession of the site can be granted prior to the commencement date with the approval of the Project Manager.

The Agreement and Conditions of Contract for the Project is the standard Tender and Contract document for procurement of Building and Civil Engineering Works, with amendments issued by the Public Procurement Oversight Authority. Kindly make arrangements to come and sign the

Contract Documents within 14 days from the date herein at the Corporations Construction Contracts office located on the 8th Floor of NHC House.

You are required to make satisfactory arrangement with
(The Chief Architect) of National Housing Corporation who is hereby named as the Project Manager in connection with this Contract. Please communicate with him on all matters relating to this Contract.

Please note that you are expected to submit a Performance Bond of **Kenya Shillings.....Read Words.....(Kshs.....Figures.....) only** from a reputable Commercial Bank being**10 %** of the Contract Sum. The Bond must be submitted before the commencement date of the works, failure to which the Corporation reserves the right to terminate the Contract.

You are also required to submit the requisite insurance policy covers as stated in the Conditions of Contract prior to commencement of the works.

The Site's environment and Residents safety is paramount in the execution of the contract. You are therefore required to comply with environmental standards set by the National Environmental Management Agency (NEMA) on constructions projects undertaken within Residential areas. Priority should be on reduction of noise and dust emissions, quick disposal of waste materials and free access by the Residents to their flats, laundry lines and designated parking.

Enclosed herewith are the Project Drawings, one set of Blank and priced Bills of Quantities for your use and return after practical completion of the works. Any other document you may require will be obtained from the Project Manager.

This letter is sent to you in duplicate. Please return the original duly signed and witnessed and retain the duplicate.

Yours faithfully

.....
MANAGING DIRECTOR
MD/md's secretary

Enclosures

Declaration of Receipt and Acceptance

DECLARATION

We, the undersigned hereby acknowledge receipt of the above Letter of Award for the **PROPOSED NHC REGIONAL OFFICES AND RESIDENTIAL DEVELOPMENT AT BONDENI – ELDORET MUNICIPALITY ON PLOT L.R. No. ELDORET MUNICIPALITY BLOCK V/83 AND 84 UASIN GISHU COUNTY** and accept that this letter together with our tender shall constitute an intention to enter into a **BINDING CONTRACT** between ourselves and National Housing Corporation subject to execution of the formal Contract Agreement.

We declare that we shall carry out all the works and execute this contract in the sum of **Kshs.** within **.....Fifty Two (...52...) weeks [the agreed period]** and to the directions and reasonable satisfaction of the Project Manager. We also confirm that we shall provide a performance bond of **Kshs.....** failure to which the Corporation reserves the right to terminate the contract.

Signed:

(Contractor).....

Address:.....

Date:.....

In the presence of:

Witness

Name

Signature.....

Address:.....

Date:.....

SAMPLE: VARIATION ORDER



NATIONAL HOUSING CORPORATION

ORDER NO: TWO (02)
DATE OF ISSUE20.....

NAME OF CONTRACT: -.....

NAME OF CONTRACTOR: -.....

You are hereby instructed to execute the following variation on the above contract with respect to our Site Instruction No. 003 of 30th March 2022 (CEN) and Site Meeting No.3

No objection to this order will be permitted unless it is addressed in writing or cable to the Project Manager within seven days from the date of issue to the Contractor.

ITEM	ORDER PARTICULAR	OMISSIONS (KSHS)	ADDITIONS(KSHS)
1.00	<u>FOUNDATION DESIGN REVISION AND REMEASUREMENTS</u>		
	FOUNDATION REDESIGN BLOCK A	123456789	123456789
		123456789	123456789
NETT ADDITIONS TO CONTRACT SUM TO BE CARRIED TO STATEMENT OF FINAL ACCOUNT			KSHS 123456789

PREPARED BY:- Signed
PROJECT QUANTITY SURVEYOR
Date:

Signed:-
PROJECT ARCHITECT
Date:-

SUBMITTED TO CONTRACT IMPLEMENTATION TEAM CONSIDERATION BY:-

Signed:- Signed:-..... Signed.....
CHIEF QUANTITY SURVEYOR CHIEF ARCHITECT GENERAL MANAGER -TECHNICAL
SERVICES

Date:-..... Date:- Date:-

RECOMMENDED FOR APPROVAL BY CONTRACT IMPLEMENTATION TEAM:-

Signed:- Signed:-.....
SECRETARY CIT CHIEF/SENIOR PROCUREMENT OFFICER
Date:-..... Date:-

APPROVED/AUTHORIZED:-

MANAGING DIRECTOR: Signed:-
Date.....

COPY TO:- Contractor (Original), Employer, Contract Office, PE, PA, Project Quantity
Surveyor.

PART 'C'

**TRADE PREAMBLES
AND
BILLS OF QUANTITIES**

PROPOSED NHC REGIONAL OFFICES AND RESIDENTIAL DEVELOPMENT
AT BONDENI – ELDORET MUNICIPALITY ON PLOT L.R. No. ELDORET
MUNICIPALITY BLOCK V/83 AND 84
UASIN GISHU COUNTY

PART C

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SECTION FOUR
GENERAL AND PARTICULAR
PRELIMINARIES

BILL NO. 1

ITEM	DESCRIPTION	SHS	CTS
	<u>GENERAL AND PARTICULAR PRELIMINARIES</u>		
A.	<u>DEFINITION OF TERMS</u> In this contract (as hereinafter defined) the following words and expressions shall have the meanings hereby assigned to them except where the context otherwise requires:- (i) <u>Employer:</u> means the National Housing Corporation, P.O. Box 30257, - 00100 GPO NAIROBI. (ii) <u>Project Manager:</u> The term 'Project Manager' shall mean the Team Leader, the Chief Architect, or Project Officer /Professional /Specialist on whose expertise the subject matter is domiciled communicating on behalf of the Team Leader from National Housing Corporation, from National Housing Corporation, P.O. Box 30257-00100, NAIROBI. (iii) <u>Project Manager's Representative:</u> Means an Architect named in the letter of acceptance for this contract or any person appointed from time to time by the Project Manager or the Employer to perform the duties set forth in the Conditions of contract and whose authority shall be the same as that of the Project Manager or Employer. The term Architect wherever used in this document shall have the same meaning as Project Manager. (iv) <u>Quantity Surveyor:</u> The Term "Quantity Surveyor" shall mean Chief Quantity Surveyor, National Housing Corporation, P.O. Box 30257 - 00100, NAIROBI. (v) <u>Architect:</u> The term "Arhitect" shall mean Chief Architect, National Housing Corporation, P.O. Box 30257 - 00100, NAIROBI. (vi) <u>Engineer:</u> The term "Engineer" shall mean Chief Engineer, National Housing Corporation, P.O. Box 30257 - 00100, NAIROBI. (vii) <u>Contractor:</u> The term "Contractor" shall mean the person or persons, firm or Company whose tender has been accepted by the employer and includes the Contractor's legal personal representatives, successors and permitted assigns. (viii) <u>Approved or Approval:</u> Means approved or approval in writing by the Project Manager unless otherwise specified.		
	<u>CARRIED TO COLLECTION</u>	KShs.	
	<u>GENERAL AND PARTICULAR PRELIMINARIES</u>		

ITEM	DESCRIPTION	SHS	CTS
	<u>Definition of terms (Cont'd)</u> (ix) <u>Architect's Instructions:</u> Means drawings, detail instructions, directions explanations, approval or orders issued in writing by the Engineer or Engineer's representative. (x) <u>Works:</u> The term 'the works' wherever used hereinafter and in all contract documents shall mean all or any portion of the works, materials and articles wherever the same are being manufactured or prepared which are to be used in the execution of this contract and whether the same be on site or not. It shall also be deemed to include of all sub-contractors and of all variations. (xi) <u>"Ditto"</u> shall mean the whole of the preceding description except as qualified in the section in which it occurs. Where it in brackets, it shall mean the whole of the preceding description which which is contained within the appropriate brackets. (xii) <u>Direct or Directions:</u> Means directed or directions by the Project Manager or Project Team Member whose expertise the matter in question. is domiciled or relied upon. (xiii) <u>Contract Drawings:</u> The term "the contract Drawings" wherever used hereinafter and in all contract documents shall be deemed to imply the drawings referred to in this document. (xiv) <u>Provisional:</u> Means that the quantity, description or value of work so described may be varied or executed in whole or in part or omitted entirely from the contract as directed and shall be measured and valued in accordance with the contract. (xv) <u>Site:</u> The term "the site" shall mean the lands and other places on, under, in or through which the works are to be executed or carried out and any other lands or places provided by the employer for the purpose of this contract. "CM" Shall mean Cubic Metre "SM" Shall mean Square Metre "LM" Shall mean Linear Metre "MM" Shall mean Millimetre "NO" Shall mean Number "KG" Shall mean Kilograms "MS" Shall mean measured separately <u>CARRIED TO COLLECTION</u> <u>GENERAL AND PARTICULAR PRELIMINARIES</u>		
	KShs.		

ITEM	DESCRIPTION	SHS	CTS								
A. <u>SITE</u>	The site for the proposed works is situated 2km from the Eldoret Central Business district within Bondeni along Eldoret Kitale Road, Eldoret Municipality - Uasin Gishu County										
B. <u>VISIT THE SITE</u>	Before tendering, the Contractor should visit the site and satisfy himself as to local conditions, water, lighting services, the accessibility of the site, the full extent and character of operations, the nature of the ground, the supply of and conditions affecting labour services and materials necessary for the execution of the Contract works generally and shall make all necessary allowances and provisions for his tender as no claim for want of knowledge in this respect will be allowed. If unable to locate the site, he should apply to the Project Manager for directions to enable him to do so.										
C. <u>SCOPE OF CONTRACT.</u>	<u>1. Regional Offices and Two Bedroom flats and related Civil Works</u> The works to be carried out in this contract comprise the construction of one blocks in a separate. The one block comprise of Regional Offices within the two bedroom flat per block i.e. four flats per floor in 5No. storeys. Total plinth area of all the buildings is Approximately 1,530M² (For General Guidance Only). <u>2. Civil Works</u> These works consist of paved parkings and footpaths, street lighting, boundary wall construction, landscaping, water supply from and foul drainage to Local Authority Water and Sewerage Company water and sewer lines respectively <table> <tr> <th><u>HOUSE TYPE</u></th><th><u>NO. OF BLOCKS</u></th><th><u>TOTAL NO. OF UNITS</u></th><th><u>PLINTH AREA PER UNIT</u></th></tr> <tr> <td>2Bedroom</td><td>1</td><td>16</td><td>75.5 SM (Approx)</td></tr> </table>	<u>HOUSE TYPE</u>	<u>NO. OF BLOCKS</u>	<u>TOTAL NO. OF UNITS</u>	<u>PLINTH AREA PER UNIT</u>	2Bedroom	1	16	75.5 SM (Approx)		
<u>HOUSE TYPE</u>	<u>NO. OF BLOCKS</u>	<u>TOTAL NO. OF UNITS</u>	<u>PLINTH AREA PER UNIT</u>								
2Bedroom	1	16	75.5 SM (Approx)								
D. <u>EQUIPMENT</u>	The Contractor shall make available on site as and when required by the Project Manager a modern and accurate level together with levelling staff, Ranging rods and one 30 metre metallic measuring tape.										
	<u>CARRIED TO COLLECTION</u>	KShs.									
	<u>GENERAL AND PARTICULAR PRELIMINARIES</u>										

ITEM	DESCRIPTION	SHS	CTS
A.	<u>INSERTION TO BE MADE IN APPENDIX TO THE CONDITIONS.CONTRACT</u>		
	Name of Project Manager	Chief Architect.	
	Amount of Surety	10% of Contract Sum	
	Amount of Liquidated damage to be withheld for late submission of work programme or an updated programme	KShs.2,000.00 per day	
	Minimum insurance covers		
	- Loss or damages to the works	------(Contract Sum)	
	- Insurance to cover other property	KShs. 10,000,000.00	
	- Insurance to cover other personal injury and death (public liability)	KShs. 10,000,000.00	
	- Insurance to cover Contractor's employees	As per Work Injuries and Benefits Act	
	Fluctuations Adjustments	Shall not apply in the contract	
	Period for submission of programme	One week from site possession	
	Period of an updated programme	One week	
	Date for possession of site	To be stated in the letter of acceptance	
	Start date	To be stated in the letter of acceptance	
	Contract Period	 (.....) Weeks.	
			
	EMPLOYER	CONTRACTOR	
	DATE:.....	DATE:.....	
	<u>CARRIED TO COLLECTION</u>	KShs.	
	<u>GENERAL AND PARTICULAR PRELIMINARIES</u>		

ITEM	DESCRIPTION	SHS	CTS
	Date for practical completion	To be stated in the letter of acceptance	
	Intervals for payments	Thirty (30) days	
	Minimum amount of value of work done and materials on site to justify a payment certificate	Not Applicable.	
	Percentage of certified value retained	10%	
	Limit of retention fund	10%	
	Period for release of interest on retention money to Contractor.	Not applicable. No interest chargeable.	
	Period of final measurement	Six months from practical completion	
	Defects Liability period	Twelve months from practical completion	
	Damages for delay in completion	At the rate of KShs. 2,000/= per day per 2Bedroom unit. At the rate of KShs. 5,000/= per day for Sample Unit.	
	Maximum Liquidated Damages chargeable / Limit of liquidated and ascertained damages	Ten(10%) percent of the contract sum	
	 EMPLOYER	 CONTRACTOR	
	DATE:.....	DATE:.....	
	<u>CARRIED TO COLLECTION</u>	KShs.	
	<u>GENERAL AND PARTICULAR PRELIMINARIES</u>		

ITEM	DESCRIPTION	SHS	CTS
A.	<u>GENERAL MATTERS</u> The quantities measured in the Bills of Quantities are all provisional and subject to measurement once the works are executed.		
B.	<u>VALUE ADDED TAX (VAT)</u> The Contractor's attention is drawn to the Legal Notice in the Finance Act part 3 Section 21(b) operative from 1 st September, 1993 which requires Payment of VAT on all contracts. The Contractor should therefore include an allowance in his rates and prices for VAT and any other Government taxes and levies currently in force.		
C.	<u>WITHHOLDING INCOME TAX</u> The tender is advised that in accordance with Government regulations withholding Tax will be levied against the total contract sum by the Employer and remitted to the Commissioner of Income Tax; through all interim and final certificates. It should however be noted that this is not an additional Tax; but it is an advance payment of Income Tax which will be refundable once the Contractor has submitted his annual returns to the Commissioner of Income Tax; who will do the refunds when he is satisfied that all the income tax regulations have been complied with.		
D.	<u>SUFFICIENCY OF TENDER</u> The contractor shall be deemed to have satisfied himself before tendering as to the correctness and sufficiency of his tender for the works and of the rates and prices stated in the priced Bills of Quantities which rates and prices shall cover all his obligations under the contract and all matters and things necessary for the proper execution, completion and maintenance of the works.		
B	<u>SAMPLE FLAT</u> The Contractor is required to commence erection and complete within sixteen weeks one Sample Flat as directed by the Architect after commencement of the works. The Contractor shall keep the Sample Flat clean throughout the Contract period and upon completion. The Sample Flat shall not be used for storage of materials by both the Main Contractor and Sub-Contractors. A penalty of Kshs.5,000.00 per day will be imposed for late completion of the sample flat.		
	<u>CARRIED TO COLLECTION</u>	KShs.	
	<u>GENERAL AND PARTICULAR PRELIMINARIES</u>		

ITEM	DESCRIPTION	SHS	CTS
A.	<u>INSURANCE</u> The contractor shall insure as required by clause 30 of the conditions of contract in Tender document "A". No payment on account for the work executed will be made to the Contractor until he has satisfied the Project Manager either by production of an Insurance Policy or an insurance certificate that the provisions of the Insurance Clauses have been complied with in all respect and payment for premiums made as necessary.		
B.	<u>BOND OR SECURITY DEPOSIT</u> The Contractor will be required to furnish a Bond from approved and well reputed Bank in a sum equal to 10% of the Contract sum, using the standard form of Bond provided. Alternatively the Project Manager may at his discretion, accept a security deposit in cash in lieu of the Bond. The deposit is to be of the same amount as the Bond. No payment on account for the work executed will be made to the Contractor until he has submitted the performance Bond to the Engineer duly signed, sealed and stamped from an approved Bank.		
C.	<u>SITE OFFICE AND CLERK OF WORKS ACCOMODATION</u> The site office and Clerk of Works accomodation shall be constructed in accordance with NHC drawing No. 09a in appendix "A". The office shall be completed and ready for use within six (6) weeks from the date of site possession failure to which liquidated damages/penalty of KShs. 5,000/= per day will apply for non-completion The site office shall be equipped with sufficient furniture to permit the Project Manager to hold site meetings in it, and for the Clerk of Works or any other site staff to operate efficiently The Contractor shall pay for all charges for electricity and water bills during the construction and maintenance periods The contractor shall also allow for providing the services of a cleaner for keeping both the office and the closet in a clean and sanitary condition from commencement to completion of the works		
	<u>CARRIED TO COLLECTION</u>	KShs.	
	<u>GENERAL AND PARTICULAR PRELIMINARIES</u>		

ITEM	DESCRIPTION	SHS	CTS
	<u>SITE OFFICE CONTD.....</u> The site office shall be retained by the National Housing Corporation on completion of the contract		
A.	<u>SIGNBOARD</u> The Contractor shall provide, erect and maintain throughout the Contract period and afterwards clear away a signboard in accordance with drawing No. NHC. 110/49 in appendix "A" The height of the lowest board on the signboard not to be lower than 1.20m above the surrounding ground levels The Signboard will comprise of a strong well braced frame set in foundations with a "Title" board and separate boards for all consultants, Main and Sub-contractors. The whole of the supports and boards must be well painted and the lettering, which must not exceed 50mm high on the consultants boards, motifs etc. must be carried out by an experienced sign writer to the approval of the Project Manager. Advertising on the signboard will not be permitted except with the written authority from the Project Manager. The Contractor shall be responsible for paying any charges, fees or taxes demanded by the County of Nairobi in respect of the Signboard installation during the contract period. The signboard shall be erected within Two (2) weeks from the date of site possession. A penalty of KShs. 2,000.00 per day for non-availability of the signboard or delay in erecting the same shall be charged .		
	<u>CARRIED TO COLLECTION</u> KShs.		
	<u>GENERAL AND PARTICULAR PRELIMINARIES</u>		

ITEM	DESCRIPTION	SHS	CTS
A. <u>TELEPHONE</u>	The Contractor shall provide and maintain in the site office a mobile telephone set with adequate airtime for the entire duration of the contract. The telephone shall be available for use by the Project Manager and his representatives during working hours. The telephone set is to revert to the Employer on completion of the contract.		
B. <u>TRAINING LEVY</u>	The Contractor's attention is drawn to The Industrial Training (Amendment) Act, No. 34 of 2011 which requires payment by the Contractor of a Training Levy on all Contracts of more than KShs. 50,000.00 in value and his tender must include for all costs arising or resulting therefrom. Immediately after Contractor is given possession of site, the contractor shall be required to produce receipts as proof that he has complied with this legal notice. Reimbursement shall be upon fulfilment of this requirement. In the event of the Contractor defaulting by not remitting the monies to the Directorate of Industrial Training, Ministry of Labour and Human resources development, the client shall reserve the right to deduct an equivalent amount from monies to become due in payment certificates and remit the said amount to the relevant authority without reference to the Contractor.		
C. <u>STANDARD LEVY</u>	The Contractor's attention is drawn to the standards levy order (1990) which was amended on 26 th November 1999 vide legal notice No. 183 of 1999. The Contractor is required to pay a monthly levy of 0.2% of his ex-factory price of construction works and must allow for this when tendering.		
D. <u>FIXED PRICE CONTRACT</u>	This is a fixed price contract deemed to include all duties, tariffs and taxes imposed by the Government and Statutory/Local Authorities. Fluctuations for labour (Price Adjustments) is not applicable. Clause 25 of the Contract Conditions is deleted in its entirety		
	<u>CARRIED TO COLLECTION</u>	KShs.	
	<u>GENERAL AND PARTICULAR PRELIMINARIES</u>		

ITEM	DESCRIPTION	SHS	CTS
A.	<u>FIGURED DIMENSIONS</u> Figured dimensions are to be followed in preference to dimensions scaled from the drawings but whenever possible dimensions are to be taken on the site. Before any work is commenced by Sub-contractor or specialist firms, dimensions must be checked on the site and/or buildings and agreed with Main Contractor, irrespective of the comparable dimensions shown on the drawings. The Contractor shall be responsible for the accuracy of such dimensions.		
B.	<u>AREA TO BE OCCUPIED BY THE CONTRACTOR</u> The area to be occupied by the Contractor for use as storage or erection of workshops etc shall be defined on the site by the Project Manager and the Contractor must confine his activities to the areas so marked and must ensure his own and Sub-contractor's workmen do not trespass on the adjoining property or cause inconvenience to its occupiers.		
C.	<u>WORK TO BE OPENED UP AT THE REQUEST OF THE PROJECT MANAGER.</u> The Contractor shall, at the request of the Project Manager within such time as the Architect shall name, open for inspection any work covered up, and should the Contractor refuse or neglect to comply with such request, the Project Manager may employ workmen other than those employed by the Contractor to open up the same. If the said work has been covered up in contravention of the Project Manager's instructions, or if, on being opened up, it be found not in accordance with the drawings or Bills of Quantities or the instructions of the Project Manager, the expenses of opening and covering it up again, whether done by the Contractor or by the Project Manager, shall be borne by and be recoverable from the Contractor or may be deducted from any monies due to the Contractor. If the work has not been covered up in contravention of such instructions and be found in accordance with the said drawings and Bills of Quantities, then the expenses aforesaid shall be borne by the Employer and be added to the Contract Sum, provided always that, in the case of foundations or of any other urgent work so opened up, and requiring immediate attention, the Project Manager shall within a reasonable time after the work has been opened, make or cause to be made the inspection thereof, and the expiration of such time, if such inspection shall not have been made the Contractor may cover up the same and shall not be required to open it up again for inspection except at the expense of the Employer.		
	<u>CARRIED TO COLLECTION</u> KShs.		
	<u>GENERAL AND PARTICULAR PRELIMINARIES</u>		

ITEM	DESCRIPTION	SHS	CTS
A.	<u>WORKS PROGRAMME</u> The Contractor shall, upon possession of site draw up a works programme, setting out the order in which the works are to be carried out with the appropriate date thereof. The works programme is to be agreed upon with the Project Manager within a maximum of one (1) week from the date of possession of site and one (1) week for an updated programme. No deviation from the order set out in the programme will be permitted without the written consent of the Project Manager. The Main Contractor will be responsible for arranging the above programme with all Sub-Contractors including nominated Sub-contractors and nominated Suppliers. Payment as stated in the appendix in the conditions of Contract will be held unless the progress schedule is approved and agreed upon within the stipulated time indicated above.		
B.	<u>WATER AND ELECTRICITY SUPPLY FOR THE SITE AND THE WORKS</u> The Contractor shall provide at his own cost and risk all necessary water, electric light and power required for use in the works. The Contractor must make his own arrangements for connections to the nearest suitable water and electricity main and for metering the same. He must also provide temporary storage tanks and meter as required at his own cost and clear away when no longer required and make good on completion to the entire satisfaction of the Engineer. The Contractor shall pay all charges in connection therewith. No guarantee is given that sufficient water will be available from the main and the Contractor, must make his own arrangements for augmenting this supply at his own cost if necessary.		
C.	<u>ACCESS TO SITE AND TEMPORARY ROADS</u> Means of access to the site shall be agreed with the Architect prior to the commencement of the works and the Contractor must allow for building any temporary access roads, culverts, bridges, roadside rainwater drains for the transport of materials, plant and workmen including the provision of any other means of gaining access to the site. Upon completion of the works the Contractor shall remove such temporary access roads, temporary culverts, etc and make good and reinstate all works and services disturbed to the satisfaction of the Project Manager and the Local Authority.		
	<u>CARRIED TO COLLECTION</u> KShs.		
	<u>GENERAL AND PARTICULAR PRELIMINARIES</u>		

ITEM	DESCRIPTION	SHS	CTS
A.	<u>SANITATION OF THE WORKS FOR WORKERS</u> The sanitation of the works shall be arranged and maintained by the Contractor to the satisfaction of the Local Authorities and the Project Manager. The latrines shall be enclosed with timber framing and corrugated iron sheet roof, sides and partitions. The site of the latrine shall be agreed with the Project Manager and the works shall not be commenced before the sanitary accommodation has been approved by the Project Manager and the Local authorities. The Contractor will be required to pay all conservancy charges and employ adequate sweepers on the site to ensure clean maintenance and daily disinfecting of the latrines upon completion of the works. The latrines and any temporary drain shall be removed and all works and surfaces disturbed made good and whole area disinfected and left clean and free from pollution all to the satisfaction of the Project Manager and Local authorities.		
B.	<u>SETTING OUT</u> The Contractor shall set out the works in accordance with the dimensions 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 or discrepancy in the dimensions or levels marked on the drawings, such errors or discrepancies must be reported by the Contractor to the Project Manager for his immediate attention. No work shall be commenced by the Contractor until he has received written instructions from the Project Manager to adjust such discrepancies which may have been proved. Upon receipt of such instructions the contractor shall thereupon be responsible for the accurate setting out of the work giving effect to the adjustments necessary to comply with such instructions, no claim for extra expense or relief may be made thereafter.		
C.	<u>SECURITY OF WORKS</u> The Contractor shall be entirely responsible for the security of the works, stores, materials, personnel, etc., both his own and Sub-contractors and shall provide all necessary watching, lighting and other precautions as necessary to ensure the security and the protection of the public.		
	<u>CARRIED TO COLLECTION</u> KShs.		
	<u>GENERAL AND PARTICULAR PRELIMINARIES</u>		

ITEM	DESCRIPTION	SHS	CTS
A.	<u>MATERIALS AND WORKMANSHIP</u> All materials and workmanship used in the execution of the works shall be of the quality and description herein described unless otherwise stated. Samples of all materials proposed to be permanently incorporated in the works must be submitted to the Project Manager for his approval before the bulk of the materials are delivered to the site. The contractor shall be responsible for ordering all materials as early as necessary to ensure that such materials are on the site as and when required for the works.		
B.	<u>STORAGE OF MATERIALS</u> The Contractor shall provide at his own cost where directed on the site weather proof lock-up sheds for the safe storage and custody of materials for the works including sub-contractor's materials and for the use of workmen engaged thereon and shall remove such sheds and make good damaged or disturbed surfaces upon completion to the satisfaction of the Project Manager. No material shall be stored or stocked on suspended slabs without the prior approval of the Project Manager. Materials stored off-the-site shall not be paid for unless the Project Manager has given a written approval for the storage away from the site.		
C.	<u>LABOUR CAMPS</u> The Contractor will not be permitted to house labour on the site and the Contractor must make all necessary arrangement for transportation of labour to and from the site. A watchman's camp will be permitted.		
D.	<u>LABOUR</u> Unless the Project Manager otherwise agrees, the Contractor is to recruit locally all his unskilled labour and as much as possible of his skilled labour.		
	<u>CARRIED TO COLLECTION</u> KShs.		
	<u>GENERAL AND PARTICULAR PRELIMINARIES</u>		

ITEM	DESCRIPTION	SHS	CTS
A. <u>TESTING</u>	The Contractor shall arrange at the request of the Project Manager for testing of materials and portions of work at his own expense. If the tests fail, the affected materials or work shall be removed and replaced at the Contractor's costs. The tests will be performed in an approved manner and by an approved testing authority.		
B. <u>NOTICES</u>	For notices to be served under the conditions of contract:- The Contractor shall notify the Project Manager an address where notice may be served upon him or in the event of his failing to do so. Notices shall be deemed served upon the Contractor if sent by Registered post to his usual place of business or left at his office on the site.		
C. <u>FAIR WAGES AND GOVERNMENT ACT ETC.</u>	The Contractor shall comply with the regulations of wages (Building and Construction Industry) order and shall be responsible for compliance by Sub-Contractor employed in the execution of the Contract. If required he shall notify the Project Manager of the names and address of all such Sub-Contractors. Should a claim be made to the Employer alleging the contractor's default in payment of fair wages to any workman employed on contract and if proof thereof satisfactory to the Project Manager is furnished by the Labour Department, the Project Manager may, failing payment by the Contractor, pay the claim out of any monies due or which may become due to the Contractor under this contract. The Contractor shall furnish the Project Manager if called upon to do so such particulars of the rates of wages, hours and conditions of labour referred to above as the Project Manager shall direct. The Contractor shall also be required to comply with all other Government Acts, regulations and orders in connection with employment of Labour.		
	<u>CARRIED TO COLLECTION</u>	KShs.	
	<u>GENERAL AND PARTICULAR PRELIMINARIES</u>		

ITEM	DESCRIPTION	SHS	CTS
A.	<u>WORKING HOURS</u> The working hours shall be those generally worked by good employers in the Building and Civil Engineering Trade in Kenya. No work shall be carried at night or on gazetted holidays unless the Project Manager shall direct. No work shall be covered up or shall any correcting be carried out without prior approval of the Project Manager.		
B.	<u>REMOVAL OF RUBBISH</u> The Contractor is to remove all rubbish from the site from time to time and as instructed by the Project Manager and leave the site clean and tidy on completion. Heaped soils, materials etc. Shall on completion of works be spread and levelled properly to the satisfaction of the Project Manager.		
C.	<u>PLANT, TOOLS AND VEHICLES</u> Allow for providing all scaffolding, plant, tools and vehicles required for the proper execution of the works except for such items specifically and only required for the use of nominated sub-contractors as described herein. No timber used for scaffolding, formwork or temporary works of any kind shall be used afterwards in the permanent work.		
D.	<u>METHODS OF MEASUREMENT</u> The works contained in these Bills of Quantities are generally measured on the basis of the current Standard Methods of Measurement of Building Works, published by the Architectural Association of Kenya, Second Edition of June 2008. All work in this contract that is liable to adjustment has been measured as "provisional" in these Bills of Quantities, and no excavation, foundation work so described shall be filled in or covered up until all measurements needed for the adjustments of variations have been made by the Quantity Surveyor. The rates set down by the Contractor against each item in these Bills of Quantities shall, unless otherwise expressly provided to the contrary, or unless there is a separate item for extra labour, cutting or waste, shall be deemed to include for waste on materials, carriage and cartage, carrying in and return of empties, hoisting, setting, fitting and fixing in position making and all other labour and everything else necessary for the proper completion of each item of cutting shall include for consequent waste.		
	<u>CARRIED TO COLLECTION</u> KShs.		
	<u>GENERAL AND PARTICULAR PRELIMINARIES</u>		

ITEM	DESCRIPTION	SHS	CTS
A.	<u>CONTRACTOR'S SUPERINTENDENCE/SITE AGENT.</u> The Contractor shall constantly keep on the works a literate English speaking Agent or Representative competent and experienced in the kind of work involved, who shall give his whole time to the superintendence of the works. Such Agent or Representative shall receive on behalf of the Contractor all directions and instructions from the Project Manager and such directions and instructions shall be deemed to have been given to the Contractor in accordance with the conditions of contract.		
B.	<u>PROVISIONAL SUMS</u> The term "Provisional Sum" wherever used in these Bills of Quantities shall have the meaning stated in Section A item A7(1) of the standard method of measurement. Such sums are net and no addition shall be made to them for profit.		
C.	<u>ADJUSTMENT OF PROVISIONAL SUMS.</u> In the final account all Provisional Sums shall be deducted and the value of the work properly executed in respect of them upon the Project Managers orders, added to the Contract Sum, such works shall be valued as described for variations check clause 30 read "thirty" of the conditions of contract, but should any part of the work be executed by a Nominated Contractor, the value of such work shall be treated as a P.C. sum and profit and attendance items added.		
D.	<u>NOMINATED SUB-CONTRACTOR</u> When any work ordered by the Project Manager is to be executed by nominated sub-contractors, the Contractors shall enter into Sub-contracts as described in the conditions of contract in Tender document A and shall thereafter be responsible for such Sub-contractors in every respect. Unless otherwise described the Contractor is to provide for such Sub-Contractor any or all of the facilities described in these preliminaries. The Contractor will be required to obtain approval of the Project Manager in writing before employing any of his own (i.e. nominated) Sub-contractor for any portion of the works.		
	<u>CARRIED TO COLLECTION</u> KShs.		
	<u>GENERAL AND PARTICULAR PRELIMINARIES</u>		

ITEM	DESCRIPTION	SHS	CTS
A.	<u>ATTENDANCE UPON OTHER TRADESMEN ETC</u> The Contractor shall allow for the attendance of trade upon trade and shall afford any tradesmen or other persons employed for the execution of any work not included in this contract every facility for carrying out their work and also for the use of his ordinary scaffolding. The Contractor, however, shall not be required to erect any special scaffolding for them. The Contractor shall perform such carting away for and making good after the work by 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 in these Bills of Quantities.		
B.	<u>ALTERATIONS TO BILLS, PRICING E.T.C.</u> Any unauthorised alterations or qualifications made to the text of the Bills of Quantities may cause the Tender to be disqualified and will in any case be ignored. The Contractor shall be deemed to have made allowance in his prices generally to cover any items against which no price has been inserted in the priced Bills of Quantities. All items of measured works shall be priced in details and Tenders containing lump sum to cover trades or groups of work must be broken down to show price of each item before they will be accepted. Lump sums to cover any items of Preliminaries shall be likewise broken down if so requires.		
C.	<u>BLASTING OPERATIONS</u> Blasting will only be allowed with the express permission of the Project Manager in writing. All blasting operations shall be carried out at the Contractor's sole cost and risk in accordance with any Government regulation in force for the time being, and any special regulation laid down by the Project Manager governing the use and storage of explosives.		
	<u>CARRIED TO COLLECTION</u> KShs.		
	<u>GENERAL AND PARTICULAR PRELIMINARIES</u>		

ITEM	DESCRIPTION	SHS	CTS
A.	<u>HOISTING</u> Throughout these Bills of Quantities generally no mention is made of heights for hoisting. All prices must include for hoisting and fixing at any level within the limits shown on the drawings or included in the general description of the works. Where a particular level is specified the Contractor shall price accordingly.		
B.	<u>MATERIALS ARISING FROM EXCAVATIONS</u> Materials of any kind obtained from the excavation shall be the property of the Employer. Unless the Project Manager directs otherwise such materials shall be dealt with as provided in the Contract. Such materials shall only be used in the works in substitution of the materials which the contractor would otherwise have had to supply with the written permission of the Project Manager Should such permission be given, the Contractor shall make due allowance for the value of the materials so used at a price to be agreed.		
C.	<u>CLEANING UP</u> On completion and as necessary during the course of the works the Contractor must thoroughly clean by washing all floors, woodwork, steps, glass and sanitary fittings, clean out all gulley and drain and leave the buildings and the entire site in a clean and habitable condition to the satisfaction of the Project Manager.		
D.	<u>COUNTY BY-LAWS AND CHARGES</u> The Contractor shall comply with all County by-laws and pay for all charges in connection therewith. The Contractor should therefore allow in his tender for such expenses.		
E.	<u>EXISTING PROPERTY</u> The Contractor shall take every precaution to avoid damage to the existing property including roads, cables, drains and other services and he will be held responsible for all damages arising from the execution of this contract to the aforementioned and he shall make good any damage when directed at his own expense to the satisfaction of the Project Manager and the Local Authority.		
	<u>CARRIED TO COLLECTION</u> KShs.		
	<u>GENERAL AND PARTICULAR PRELIMINARIES</u>		

ITEM	DESCRIPTION	SHS	CTS
A.	<u>ANTI-CORRUPTION SIGNBOARD</u> Allow a Provisional Sum of Kenya Shillings Fifty Thousand Only for a the Contractor to provide, erect and maintain throughout the contract period, an Anti-Corruption Signboard in accordance with Anti-corruption drawings and afterwards clear away the signboard on completion of the project The height of the lowest board on the sign board should not be lower than 1.20m above the surrounding ground levels The Signboard shall comprise a strong well braced mild steel frame set in foundations with a "Title" board and a separate board Advertising on the board will NOT be permitted		
B.	<u>WHITE ANTS AND TERMITES</u> Allow for destroying any white ants and termites' nests found in the vicinity of the buildings, destroying Queen Ants, depositing cyanide lumps in holes and tunnels and filling with hard-core and murram well rammed and scaled.		
C.	<u>TEMPORARY DISPOSAL OF RAINWATER</u> The Contractor shall provide and maintain all necessary temporary gutters, downpipes, chutes, earth or other drains, etc. for conveying rainwater from the building and site works. Embankment and sides of excavations shall be shaped to such slopes that soil erosion does not take place. The Contractor shall allow for temporary drainage, pumping and piping for keeping the buildings, services and entire site free from accumulation of and flooding with water and soil. The Contractor shall reinstate the existing ground to the satisfaction of the Architect on practical completion of the works.		
D.	<u>PRIME COST (OR P.C.) SUMS</u> The term "Prime Cost Sum" or "P.C. Sum" wherever used in these Bills of Quantities shall have the meaning stated in Section A item A7 (ii) of the standard Method of Measurement.		
	<u>CARRIED TO COLLECTION</u> KShs.		
	<u>GENERAL AND PARTICULAR PRELIMINARIES</u>		

ITEM	DESCRIPTION	SHS	CTS
	<u>PRIME COST (OR P.C.) SUMS CONTD.....</u> Persons or firms nominated by the Architect to execute work or to provide and fix materials or goods are described herein as nominated Sub-Contractor. Persons of firms so nominated to supply goods or materials are described as Nominated suppliers. A. <u>ADJUSTMENT OF P.C. SUMS</u> In the Final account all P.C. sums shall be deducted and the amount properly expended upon the Architect order in respect or each of them added to the contract sum. The Contractor shall produce to the Architect such quotations, invoices or bills properly receipted, as may be necessary to show the actual details of the sums paid by the Contractor. Item of "Attendance" following P.C. sums shall be adjusted pro rata to the amount paid in the Final Account. Should the Contractor be permitted to tender and his tender be accepted for any work for which a P.C. sum is included in these Bills of Quantities, profit will be allowed at the same rate as it would be if works were executed by a Nominated Sub-contractor. B. <u>OBTAINING "OCCUPATION CERTIFICATES"</u> The contractor shall obtain occupation certificates for all the units upon completion of the works from the relevant authorities and submit to the Employer. Release of first moiety upon completion of works will be subject to submission of the occupation certificates to the Employer. C. <u>INSPECTION BY STATUTORY BODIES/LOCAL AUTHORITIES</u> The contractor shall allow for periodic inspections by local authorities/County building inspectors during the currency of the contract		
	<u>CARRIED TO COLLECTION</u> KShs.		
	<u>GENERAL AND PARTICULAR PRELIMINARIES</u>		

ITEM	DESCRIPTION	SHS	CTS
	<u>MEASURING EQUIPMENT</u>		
A.	<u>LASER DISTANCE MEASURER</u> Allow a provisional sum of Kenya Shillings One Hundred Thousand Only for purchase of Leica DISTO S910 Pro Pack 984ft Range Laser Distance Measurer Pro Kit, Point to Point Measuring, Hard Case, TRI70 Tripod, FTA360S Adapter, Red/Black complete with charging capabilities and Bosch 32x Automatic Optical Level GOL 32 complete with tripod and rod. The laser distance measurer shall revert to the Corporation on completion of the contract. The laser distance measurer is to be delivered to the Construction Contracts Office within 60 days of project commencement date. Non-delivery within the set timeline will lead to Employer doing the purchase and omitting the amount from the contractor's payments.	100,000	
B.	<u>ELECTRONIC DISTANCE MEASURING WHEEL</u> Allow a provisional sum of Kenya Shillings Fifty Thousand Only for purchase DigiRoller Plus III 12.5 Inch Estimators Electronic Distance Measuring Wheel with Large Backlit Digital Display; Measure in Feet, Inches, Meters, Yards; FREE Carrying Pack. The distance measuring wheel shall revert to the Corporation on completion of the contract. The electronic distance measuring wheel is to be delivered to the Construction Contracts Office within 60 days of project commencement date. Non-delivery within the set timeline will lead to Employer doing the purchase and omitting the amount from the contractor's payments.	50,000	
C.	<u>MEASURING EQUIPMENT MAINTENANCE</u> Allow for a sum of Twenty Thousand for repairs, general maintenance and servicing including battery replacement of the laser distance measurer and the electronic distance measuring wheel during the construction period.	20,000	
D.	<u>PROJECT MANAGEMENT</u> Allow a provisional sum of Kenya Shillings One Million Five Hundred Thousand Only for Project Management Expenses including engagement of Project Team Training, Clerks of Works and Supervision of the Employer Representatives.	1,500,000	
E.	Allow _____% for profit of the Project Management Expense		
F.	Allow a sum for attendance of the Project Management Expense		
	<u>CARRIED TO COLLECTION</u>	KShs.	
	<u>GENERAL AND PARTICULAR PRELIMINARIES</u>		

ITEM	DESCRIPTION	SHS	CTS
A.	<u>HOARDING</u> The Contractor shall allow for providing and maintaining hoarding and access gates comprising of 30 gauge gci sheets, 2.50 meters high, from ground level nailed on sawn and cured timber posts as may be necessary for the protection of the works, area residents and the public all to the approval of the Architect and Uasin Gishu County Government requirements. (Approximately 400 metres long) The Hoarding shall be erected at various locations on the site and later removed and disturbed surfaces made good to the satisfaction of the Architect on the completion of the contract works. The Hoarding and gates shall be painted as directed by the Architect and advertisements shall not be displayed except with prior written permission of the Architect. The Contractor shall be responsible for paying any charges, fees or taxes demanded by the County Government of Uasin Gishu in respect of the Hoarding installation during the contract period.		
B.	<u>AS BUILT DRAWINGS</u> The contractor shall allow for provision of 'as built' drawings for the project within the defects liability period		
C.	<u>SHOP DRAWINGS</u> The contractor shall allow for provision of 'shop' drawings to the approval of the project manager during the currency of the contract The drawings shall include details for the Expanded Polystyrene (EPS) system and other works to be incorporated		
	<u>CARRIED TO COLLECTION</u>	KShs.	
	<u>GENERAL AND PARTICULAR PRELIMINARIES</u>		

ITEM	DESCRIPTION	SHS	CTS
	<u>BILL NO. 01</u>		
	<u>GENERAL AND PARTICULAR PRELIMINARIES</u>		
	<u>COLLECTION</u>		
	Brought forward from.....4/01		
	Brought forward from.....4/02		
	Brought forward from.....4/03		
	Brought forward from.....4/04		
	Brought forward from.....4/05		
	Brought forward from.....4/06		
	Brought forward from.....4/07		
	Brought forward from.....4/08		
	Brought forward from.....4/09		
	Brought forward from.....4/10		
	Brought forward from.....4/11		
	Brought forward from.....4/12		
	Brought forward from.....4/13		
	Brought forward from.....4/14		
	Brought forward from.....4/15		
	Brought forward from.....4/16		
	Brought forward from.....4/17		
	Brought forward from.....4/18		
	<u>CARRIED TO SUMMARY</u>	KShs.	
	<u>GENERAL AND PARTICULAR PRELIMINARIES</u>		

ITEM	DESCRIPTION	SHS	CTS
	<u>PRELIMINARIES COLLECTION CONTD.....</u>		
	Brought forward from.....4/19		
	Brought forward from.....4/20		
	Brought forward from.....4/21		
	Brought forward from.....4/22		
	Brought forward from.....4/23		
	<u>CARRIED TO SUMMARY</u>	KShs.	
	<u>GENERAL AND PARTICULAR PRELIMINARIES</u>		
	<u>COLLECTION SUMMARY</u>		
	Brought forward from.....4/24		
	Brought down from above.....		
	<u>TOTAL AMOUNT FOR GENERAL AND PARTICULAR PRELIMINARIES</u>		
	<u>CARRIED TO GRAND SUMMARY</u>	KShs.	
	<u>GENERAL AND PARTICULAR PRELIMINARIES</u>		

SECTION FIVE

GENERAL TRADE PREAMBLES

GENERAL PREAMBLES AND PRICING NOTES

A. GENERAL PREAMBLES

The General Specification as prepared by the National Housing Corporation is issued to the Contractor with the Bills of Quantities.

All items in the Bills of Quantities shall conform to the full Specification for similar items in the General Specification.

All materials and workmanship shall conform to relevant standards and requirements stipulated by Kenya Bureau of Standards.

Where the wording "as described" is included in the Bills of Quantities this wording shall be construed as either an abbreviation of a detailed description for similar items in the General Specification or as a reference to the preambles.

Where detailed descriptions in the Bills of Quantities differ in any respect to similar descriptions in the General Preambles, then such descriptions in the Bills of Quantities shall be deemed to take precedence.

B. EXCAVATION

Shall be to the widths and depths indicated on the drawings or to such lesser or greater depth as the Engineer may deem necessary and so instruct the contractor in order to obtain satisfactory foundations.

C. STARTING LEVEL

Unless otherwise described the starting level of all excavations has been measured from the level remaining after completion of reduced level excavation, generally taken as the underside of 200 surface strips.

D. CLASSIFICATION OF EXCAVATED MATERIAL CLASS I ROCK OR HEAD MATERIAL

This class shall consist of all materials which cannot be removed except by blasting, by the use of metal wedges and sledgehammers or by ripper with heavy tractor and rear mounted hydraulic single type heavy -duty ripper.

Boulders greater than 0.5CM; when their nature and size is such that they cannot be removed without recourse to one or more of the methods described above shall also be in class one.

EXCAVATION (CONT'D)

Where the boulders constitute 50% or more of a particular part of the excavation, such part shall be considered as class 1 material throughout.

A. CLASS 2 NORMAL OR SOFT MATERIAL

This class shall constitute all materials which can be removed without recourse to the methods described for class I above, and/or class 3 below.

B. CLASS 3-COMPACTED GRAVEL OR DECOMPOSED ROCK

This class shall constitute of all materials such as consolidated murrum gravel decomposed or stratified rock, stone and boulders less than 0.5CM, harder than class 2, but which can be excavated by ripping or which in confined spaces, requires excavation by hand using compressor tools.

C. EXCAVATION WORK

Excavation work is measured net as before digging and the Contractor must allow for increases in bulk after digging.

D. FILLING

Filling is measured net after consolidation. Filling obtained from surplus excavated materials is to be free from all weeds, roots, vegetable soil or other unsuitable materials and is to be filled in layers each of not more than 225mm finished thickness. Each layer shall be well wetted and consolidated as described hereafter.

E. NO BORROW PITS

No borrow will be allowed to be opened on the site.

F. REMOVAL OF SURPLUS MATERIALS

All surplus excavated material, where so directed, and all rubbish, is to be carried away from the site and the Contractor shall find his own dump and pay all charges.

TRADE PREAMBLES

A FOUNDATIONS NOT TO BE COVERED

No excavations or foundations work shall be filled in or covered up until all measurements necessary for the adjustment of variations have been made by the Surveyor.

B HARDCORE FILLING

Hardcore for filling under floors, etc, shall be hard broken quarry waste to the approval of the Engineer broken to pass not greater than a 150mm ring or to be 75% of the finished thickness of the layers being compacted whichever is the lesser and graded so that it can be easily and thoroughly compacted by rolling. The filling is to be laid in layers each of a consolidated thickness not exceeding 225mm and well watered and rolled with a vibrating roller where rolling is impossible, compaction shall be by hand or mechanical tampers.

The top surface of the hardcore shall be levelled or graded to falls as required and blinded with similar material broken to 25mm gauge and surfaced with 50mm layer of stone dust or murrum, well watered and rolled to receive concrete or paving.

CONCRETE WORK

A. NOTES CONCERNING MEASUREMENT AND PRICING

The Contractor must allow for all costs incurred during progress of the contract for complying with the provisions concerning the preparation and use of graded mixes.

Prices for concrete shall include for mixing and depositing as described or indicated and for hoisting and depositing at the various levels required throughout the building and shall also include for forming or hacking a satisfactory key for all faces receiving asphalt and plaster work. Prices for slabs shall also include for levelling off the surface as described under "Compaction" and all temporary formwork to form construction joints at bay edges.

Prices for reinforced concrete shall, in addition, include for filling into, between or on formwork, and thoroughly compacting between and around rods or fabric reinforcement and for forming all additional construction joints between varying mixes. Where described as 'vibrated', prices must include for fully vibrating as described.

Prices for formwork shall include for extra material at joints, extra labour and waste for narrow widths, small quantities, overlaps, passing at angles straight cutting and waste, splayed edges, notching, etc and for fixing at the various levels including battens, struts, and supports for bolting, wedging, easing, striking and removal. Prices for linear items such as boxing shall include for angles and ends.

Prices for steel rod reinforcement shall include for cutting to lengths and all labour in bending and cranking, forming hooked ends, handling, hoisting and fixing in position and for providing all necessary tying wire and supports. Prices for fabric reinforcement shall include for all straight cutting and waste, handling, hoisting and fixing in position, producing all necessary tying wire supports and all extra material laps.

Prices of all precast concrete shall include for all moulds, finishing as described, handling reinforcement, hoisting and fixing at the required levels, bedding, jointing and pointing in cement and sand (1:5) mortar also for casting or cutting to the exact lengths required and any waste resulting from such cutting.

TRADE PREAMBLES

A. ARCHITECT/ENGINEER

For the purpose of the concrete structure the Structural Engineer shall be deemed invested with the duties and be the representative of the Architect.

B. CODE OF PRACTICE

All workmanship, materials, tests and performance in connection with the reinforced concrete work are to be in conformity with the latest edition of the British Standard Code of Practice (BS 8110 of 1997 "The Structural Use of Reinforced Concrete in Buildings") where not inconsistent with these Preambles.

C. SUPERVISION

A competent person approved by the Engineer shall be employed by the Contractor whose duty will be to supervise all stages in the preparation and placing of the concrete. All cubes shall be made and site tests carried out under his direct supervision, in consultation with the Engineer.

D. CONTRACTOR'S PLANT, EQUIPMENT AND CONSTRUCTION PROCEDURES

Not less than 30 days prior to the installation of the Contractor's plant and equipment for processing, handling, transporting, storing and proportioning ingredients, and for mixing, transporting and placing concrete, the Contractor shall submit drawings for approval by the Engineer, showing proposed general plant arrangement, together with a general description of the equipment he proposes to use.

After completion of installation, the operation of the plant and equipment shall be subject to the approval of the Engineer.

Where these Preambles, the Bills of Quantities or the Drawings require specific procedures to be followed, such requirements are not to be construed as prohibiting the use by the Contractor of alternative procedures if it can be demonstrated to the satisfaction of the Engineer that equal results will be obtained by the use of such alternatives.

**CONTRACOR'S PLANT, EQUIPMENT AND CONSTRUCTION PROCEDURES
(CONT'D)**

Approval of plant and equipment or their operation, or of any construction procedure, shall not operate to waive or modify any provision or requirements contained in these Preambles governing the quality of the materials of the finished work.

A. LEVELS AND FOUNDATIONS

The foundations of the works shall be carried down to depths as directed by the Engineer and they must be cut as nearly to the size of the concrete as possible and the vacant spaces between the concrete and the solid ground, except where otherwise shown, must be carefully filled in as directed by the Engineer.

All temporary timbering shall be removed but should any timber be left in or should any other work be done beyond that specified; it will be at the Contractor's own cost.

B. TOLERANCE

All insitu concrete work shall be dimensionally accurate to within the following tolerances:-

- .01 between the centre line of principal member's columns or beams
 +/- 5mm up to 15 metres c/c
 +/- 10mm over 15 metres c/c
 Note the +/- 10mm tolerance shall not be accumulative.
- .02 In storey height
 +/- 5mm floor to floor
- .03 In plumpness of columns and walls
 +/- 10mm on any storey or overall the structure

TOLERANCE (CONT'D)

- .04 In level of floors
+ 5mm /- 3mm of the true prescribed horizontal surface level
- .05 In cross sectional dimensions of column beams and walls
+ 5mm/- 3mm in any dimensions up to 2 metres overall
+10mm/- 3mm in any dimension over 2 metres.
- .06 Cover to reinforcement
+5mm/5 of the stated covers

The Contractor shall be responsible for the cost of all corrective measures required by the Engineer to rectify work which is not construed within the tolerances set out above.

A. MATERIALS GENERALLY

All materials which have been damaged, contaminated or have deteriorated or do not comply in any way with the requirements of these Preambles shall be rejected and shall be removed immediately from the Site at the Contractor's own expense. No materials shall be stored or stacked on suspended floors without the Engineer's prior approval.

B. SAMPLES AND TESTING

Every facility shall be provided to enable the Engineer to obtain samples and carry out tests on the materials and construction. If these tests show that any of the materials and construction do not comply with the requirements of these Preambles, the Contractor will be responsible for the costs of the tests and the replacement of defective materials and/or construction.

A. CEMENT

Cement unless otherwise specified shall be ordinary Portland Cement of a brand approved by the Engineer and shall comply with the requirements of B.S. 12, with the exceptions that it may contain reactive volcanic ash of not more than 10 per cent of the total weight and the quality of insoluble residue permitted in B.S. 12 may be exceeded on this account only. A manufacturer's Certificate of Test in accordance with B.S. 12 shall be supplied for each consignment delivered to the site.

Cement may be delivered to the site either in bags or in bulk. If delivered in bags, each bag shall be properly sealed and marked with the manufacturer's name and on the site it is to be stored in a weather proof shed of adequate dimensions with a raised floor. Each consignment shall be kept separate and marked so that it may be used in the sequence in which it is received. Any bag found to contain cement which has set or partly set shall be completely discarded and not used in the works. Bags shall not be stored more than 1.5m in height.

B. AGGREGATES

Aggregates shall conform with the requirements of B.S. 882 and the sources and types of all aggregate are to be approved in all respects by the Engineer before work commences.

The grading of aggregates shall be one within the limits set out in B.S.882 and as later specified and the grading, once approved, shall be adhered to throughout the works and not varied without the approval of the Engineer. Fine aggregate shall be clean, coarse, siliceous sand of good, sharp, hard quality and shall be free from lumps of stone, earth, loam, dust, salt, organic matter and any other deleterious substances. It shall be graded within the limits of Zone 1 or 2 of Table 2 of B.S. 882.

Coarse aggregate shall be good, hard, clean, approved black trap or similar stone, free from dust, decomposed stone, clay, and earth matter, foreign substances of friable thin elongated or laminated pieces. It shall be graded within the limits of Table 1 of B.S. 882 for its respective nominal size.

AGGREGATES (CONT'D)

If in the opinion of the Engineer, the aggregate meets with the above requirements but is dirty or adulterated in any manner it shall be screened and/or washed with clean water at the Contractor's expenses.

Aggregates shall be delivered to the site in their prescribed sizes or grading and shall be stocked-piled on paved areas or boarded platforms in separate units to avoid intermixing. **On no account shall aggregates be stock-piled on the ground.**

The Engineer shall be entitled to require a Certificate from an approved testing laboratory in connection with each source of fine and coarse aggregate showing that materials comply with the Specification. All such testing be carried but at the Contractor's expense.

A. WATER

The water used for mixing concrete shall be from an approved source, clean, fresh and free from impurities and comply with the requirements of B.S.3148.

B. EXPANSION JOINT FILLER

Expansion joint filler shall be "Flexcel" as manufactured by Expedite Ltd, "Resilex" as manufactured by Evomastics Ltd or equivalent and approved filler.

C. CONCRETE STRENGTHS

Grade "35", "30", "25" and "20" concrete shall have minimum strengths as given by Works Cube Tests shown on Page 2/9

	MINIMUM CRUSHING STRENGTHS	DITTO	DITTO	DITTO
	Grade 35	Grade 30	Grade 25	Grade 20
7 days	23.5 N/mm2	20.00 N/mm2	16.5N/mm2	13.5 N/mm2
28 days	35.0 N/mm2	30.0 N/mm2	25.0 N/mm2	20.0 N/mm2

CONCRETE STRENGTHS (CONT'D)

The average strength obtained from cube tests shall be 10 percent higher than the minimum strength shown above.

Grades lower than those given shall be of nominal mixes and may be measured by volume or weight. Unless the Engineer directs so, no cube tests will be required for these grades.

Nominal mix by column	-	1:3:6	1:4:8
Cube metres of Fine Aggregate Per 50Kgs bag of cement	-	0.12	0.16
Cubic metres of Fine Aggregate Per 50Kgs bag of cement	-	0.24	0.32
Max size of Coarse Aggregate	-	20mm	20mm

A. CEMENT

The quantity of cement shall be measured by weight or volume. Where delivered in bags, each batch of concrete is to use one or more whole bags of cement.

AGGREGATE

- (i) For grades "35", "30", "25" concrete aggregates shall be measured by weight in a weight batching machine as described hereafter.
- (ii) For lower grade concrete, aggregates may be measured by weight or by volume, where approved gauge boxes of such a size as will give the correct proportions shall be used.

B. WEIGHT BATCHING MACHINES

Weight batching machines shall be of an approved type and shall be properly maintained and checked for accuracy at regular intervals.

A. CONCRETE MIXES

The weights of fine and coarse aggregate to be used in concrete mixes "35", "30" and "20" shall be limited in accordance with the table below. The proportions of fine to coarse aggregate and cement which the contractor proposes to use for each of the mixes specified shall first be approved by the Engineer. The contractor will then be required to prepare Preliminary Test Cubes and have these cubes tested as described for Work Cube Tests.

The test results should be submitted to the Engineer in sufficient time for further tests to be carried out should they prove unsatisfactory. Cube strengths in the preliminary tests must show crushing strengths at least 25 per cent higher than the strengths specified for work cube test. If contractor is unable to produce specified cube strengths he will be required at his own cost to increase the cement contents of the mix until satisfactory results are produce.

The Engineer may require at any time during the Contract the proportions of fine to coarse aggregate to be altered in order to produce a mix of greater strengths or improved workability and providing that the total proportions of aggregate to cement remain unchanged, no claim for additional cost will be considered.

GRADE	Grade 35	Grade 30	Grade 25	Grade 20
Minimum cement Content by weight to Combined total	Design Mix	1:1:2	1:1½:3	1:2:4
Weight of aggregate	1 to 4	1 to 4	1 to 5	1 to 6

Work cubes are to be made at intervals as required by the Engineer and the contractor shall provide a continuous record of the concrete work. The cubes shall be made in approved 150mm moulds in strict accordance with the Code of Practice.

Six cubes shall be made on each occasion, from difference batches, the concrete being taken from the point of deposit.

CONCRETE MIXES (CONT'D)

Each cube shall be marked with a distinguishing number (number to run consecutively) and the date, and a record shall be kept on site, giving the following particulars: -

- (a) Cube No.
- (b) Date made
- (c) Location in work
- (d) 7-day Test

Date:.....

Strength:.....

- (e) 28-day Test

Date:.....

Strength:.....

Cubes shall be forwarded, carriage paid to an approved Testing Authority in time to be tested three at 7-days and three at 28-days. No cube shall be dispatched within three (3) days of casting.

Copies of all Work Cube Test results shall be forwarded to the Engineer and one shall be retained on the site.

If the strengths required above are not attained and maintained throughout the carrying out of the Contract, the Contractor will be required to increase the proportion of cement and/or substitute letter aggregate so as to find concrete which does comply with the requirement of the Contract. The Contractor may be required to remove and replace at his own cost any concrete which fails to attain the required strength as ascertained by Work Cube Tests.

CONCRETE MIXES (CONT'D)

The Contractor must allow in his rates for concrete test cubes for all expenses in connection with the preparation and conveyance to the Testing Laboratory and testing of test cubes and no claim in respect of his failure to do so will be entertained.

A. MAKING AND PLACING OF CONCRETE

The concrete shall be mixed only in approved power-driven mixers of a type and capacity suitable for the work and in any event not smaller than 0.5/0 33 cu.m capacity.

The mixer shall be equipped with an accurate water measuring device. All materials shall be thoroughly **mixed dry** before the water is added and the mixing of each batch shall continue for a period of **not less than three minutes** after the water has been added and until there is a uniform distribution of the materials and the mass is uniform in colour.

The entire contents of the mixed drum shall be discharged before recharging. The volume of mixed materials shall not exceed the rated capacity of the mixer. Whenever the mixer is started, 10 per cent extra cement shall be added to the first batch and no extra payment will be made on this account.

As a check on concrete consistency, slump tests may be carried out and shall be in accordance with BS. 1881. The Contractor shall provide the necessary apparatus and allow for the costs of such tests. The slump of the concrete made with the specified water content, using dry materials shall be determined and the water to be added under wet conditions shall be so reduced as to give approximately the same slump.

The concrete shall be mixed as near to the place where it is required as is practicable, and only as much as is required for a specified section of the work shall be mixed at one time, such section being commenced and finished in one operation without delay.

MAKING AND PLACING OF CONCRETE (CONT'D)

All concrete must be efficiently handled and used in the works within twenty (20) minutes of mixing. It shall be discharged from the mixer direct either into receptacles or barrows and shall be distributed by approved means which do not cause separation or otherwise impair the quality of the concrete. Approved mechanical means of handling will be encouraged, but the use of chutes for placing concrete is subject to the prior approval of the Engineer.

Concrete shall be placed from a height not exceeding 1.500m. directly into its permanent position and shall not be worked along the shutters to that position. Unless otherwise approved, concrete shall be placed in a single operation to the full thickness of slabs, beams and similar members, and shall be placed in horizontal layers not exceeding 1.500m. deep in walls and similar members.

Concrete in columns may be placed to a height of 4.000m. with careful placing and vibration and satisfactory results. Where the height of the column exceeds 4.00m. suitable openings must be left in the shutters so that this maximum lift is not exceeded.

Concrete shall be placed continuously until completion of the part work between construction joints as specified hereinafter or of a part of approved extent. At the completion of a specified or approved part, a construction joint of the form and in the position hereinafter specified shall be made. If stopping of concreting be unavoidable elsewhere, a construction joint shall be made where the work is stopped. **A record of all such joints must be made by the Contractor and a copy supplied to the Engineer.**

Any accumulation of set concrete on the reinforcement shall be removed by wire brushing before further concrete is placed.

The Contractor shall provide runways for concreting to the satisfaction of the Engineer. Under no circumstances will the runway be allowed to rest on the reinforcement.

Care shall be taken that the concrete is not disturbed or subjected to vibrations and shocks during the setting period.

MAKING AND PLACING OF CONCRETE (CONT'D)

Mixing machines, platforms and barrows shall be clean before commencing mixing and be cleaned on every session of work.

Where concrete is laid on hardcore or other absorbent materials, the base shall be suitable and sufficiently wetted before the concrete is deposited.

A. COMPACTION

At all times during which concrete is being placed, the Contractor shall provide adequate trained and experienced labour to ensure that the concrete is compacted in the forms to the satisfaction of the Engineer.

Concrete shall not be placed at a rate greater than will permit satisfactory compaction or to a depth greater than 450mm before it is compacted.

During and immediately after placing the concrete shall be thoroughly compacted by means of continuous tamping, spacing, slicing and vibration. **Vibration is required for concrete of Grades "35", "25" and "20".**

Care shall be taken to fill every part of the forms, to work the concrete under and around reinforcement without displacing it and to avoid disturbing recently placed concrete which has begun to set. Any water accumulating on the surface of newly placed concrete shall be removed and no further concrete shall be placed thereon until such water is removed.

Internal vibrations shall be of a frequency of not less than 7,000 cycles per minute and shall have a rotating eccentric weight of at least 0.75Kg with and eccentricity of not more than 15mm. Such vibrators shall visibly affect the concrete within a radius of 250mm from the vibrator.

Internal vibrators shall not be inserted between layers of reinforcement less than one half times the diameter of the vibrators apart. Contact between vibrators and reinforcement and vibrators and formwork shall be avoided.

Internal vibrators shall be inserted vertically into the concrete wherever possible at not more than 500mm centres and shall constantly be moved from place to place.

COMPACTION (CONT'D)

No internal vibrator shall be permitted to remain in any one position for more than ten seconds and it shall be withdrawn very slowly from the concrete.

In consolidating each layer of concrete, the vibrating head shall be allowed to penetrate and re-vibrate the concrete in the upper portion of the underlying layer. In the area where newly placed concrete in each layer joins previously placed concrete more than usual, vibration shall be performed, the vibrator penetrating deeply at close intervals along these contacts. Layers of concrete shall be placed until layers previously placed have been vibrated thoroughly as specified.

Vibrators shall not be used to move concrete from place to place in the formwork.

At least one internal vibrator shall be operated for every two cubic metres of concrete placed per hour and at least one spare vibrator shall be maintained on site in case of breakdown during concreting operations.

External formwork vibrators shall be of the high frequency low amplitude type applied with the principal direction of vibration in the horizontal plane. They shall be attached directly to the forms at not more than 1.200mm centres.

In addition to internal and external vibration, the upper surface of suspended floor slabs shall be levelled with a tamping or vibrating screed prior to finishing. Vibrating elements shall be of the low frequency high aptitude type operating at a speed of not less than 3.000 r.p.m.

A. CONSTRUCTION JOINTS

Construction joints shall be permitted only at the positions predetermined on the Drawings or as instructed on the sites by the Engineer. In general they shall be perpendicular to the lines of principal stresses and shall be located at points of minimum shear, viz. vertically at, or near mid-spans of slabs, ribs and beams.

CONSTRUCTION JOINTS (CONT'D)

Suspended concrete slabs are generally to be cast using alternate bay construction in bays not exceeding 15.00m in length. No two adjacent bays are to be cast within a minimum period of 48 hours of each other.

The joints between adjacent bays are to be in positions agreed with the Engineer.

Under no circumstances shall concrete be allowed to tail-off, but it shall be deposited against stopping-off boards.

Before placing new concrete against already hardened, the face of the old concrete shall be thoroughly hacked, roughened and cleaned and laitance and loose material removed there from, and immediately before placing the new concrete the surface shall be saturated with water and covered with a coat of mortar at least 25mm in thickness composed of cement and fine aggregate in the proportions used in the concrete.

A. CURING AND PROTECTION

Care must be taken no concrete is allowed to become prematurely dry and the fresh concrete must be carefully protected within two hours of placing from rain, sun and wind by means of hessian sacking, polythene sheeting, or other approved means. This protective layer and the concrete itself must be kept continuously wet for at least seven days after the concrete has been placed. The Contractor must allow for the complete coverage of all fresh concrete for a period of 7 days. Hessian or polythene sheeting shall be in the maximum widths obtainable and shall be secured against wind. **The Contractor will not be permitted to use bags, hessian or other material in small places.**

Concrete in foundations and other underground work shall be protected from admixture with falling earth during and after placing.

Traffic or loading must not be allowed on the concrete until the concrete is sufficiently matured and in no case shall traffic or loading be of such magnitude as to cause deflection or other movement in the formwork or damage to the concrete members. Where directed by the Engineer, props may be required to be left in position under slabs and other members for greater periods than those specified hereafter.

A. FAULTY CONCRETE

Any concrete which fails to comply with these Preambles or which shows signs of setting before it is placed shall be taken out and removed from the site. Where concrete is found to be defective after it has set, the concrete shall be cut out and replaced in accordance with the Engineer's instructions. **On no account shall any faulty, honeycombed, or otherwise defective concrete be repaired or patched until the Engineer has made an inspection and issued instructions for the repair.** The whole of the cost whatever, which may be occasioned by the need to remove faulty concrete, shall be borne by the Contractor.

B. ROD REINFORCEMENT

The steel reinforcement shall comply with the latest requirements of the following British Standards:-

4449:	1988	Specification for bars for the reinforcement of concrete.
4466:	1989	Bending dimensions and scheduling of bars for the reinforcement of concrete
4483:	1985	Steel fabrics for the reinforcement of concrete

The Contractor shall submit a test certificate of the rolling. Reinforcement shall be stored on racks above ground level. All reinforcement shall be free from loose mill scales or rust, grease, paint or other substances likely to reduce the bond between the steel and concrete.

C. FABRIC REINFORCEMENT

Fabric reinforcement shall be electrically cross-welded steel wire mesh reinforcement to B.S. 4483 and of the size and weight specified.

A. FIXING ROD REINFORCEMENT

Reinforcement shall be accurately bent to the shapes and dimensions shown on the Drawings and Schedules and in accordance with B.S. 4466. Reinforcement must cut and bent cold and no welded joints will be permitted unless so detailed.

No concreting shall be commenced until the reinforcement is in position and until his approval has been obtained. The Contractor shall give two clear day's notice of his intention to concrete to the Engineer.

The Contractor is responsible for maintaining the reinforcement in its correct position, according to the Drawings, before and during concreting. During concreting a competent steel fixer must be in attendance on the concretos to adjust and correct the positions of any reinforcement which may be displaced. The vibrators are not to come into contact with the reinforcement.

Irrespective of whether any inspection and/or approval of the fixing of the reinforcement has been carried out as above, it shall be the Contractor's sole responsibility to ensure that the reinforcement complies with the details on the drawings or bending schedules and is fixed exactly in the positions shown therein and in the positions to give the prescribed cover.

B. COVER TO ROD REINFORCEMENT

The Contractor will be held entirely responsible for any failing or defect in any portion of the reinforced concrete structure and including any consequent delay, claims, third party claims, etc., where it is shown that the reinforcement has been incorrectly positioned or is incorrect in size or quantity with respect to the detailed drawings or bending schedules.

Spacing blocks of approved size and shape of concrete similar to that used in the surrounding construction and fixed to the reinforcement on formwork by No.18 S.W.G. wires set into the spacer blocks or other approved means shall be provided where necessary to ensure that the requisite cover is obtained. The Contractor is to include providing sufficient such spacer blocks in his prices for steel reinforcement.

COVER TO ROD REINFORCEMENT (CON'TD)

Unless otherwise directed the concrete cover to rod reinforcement over main bars in any face shall be:-

Foundations against earth face	75mm
Foundations against blinding	50mm
Columns	40mm
Beams	25mm
Slabs	20mm
Walls	25mm

A. FIXING FABRIC REINFORCEMENT

The fabric shall be free from scale, rust, grease or other substance likely to reduce the bond between the steel and the concrete and shall be laid with minimum 300mm laps and bound with No.18 S.W.G. appealed iron wire.

Where reinforcement projects from a concrete section of the structure and this reinforcement is expected to remain exposed for some time, it is to be coated with cement grout to prevent rust staining on the finished concrete. This grout is to be brushed off the reinforcement prior to the continuation of concreting.

B. FIXTURES AND INDENTATIONS IN CONCRETE

No openings, chases, holes or other voids shall be formed in the concrete without the approval of the Engineer. Details of any fixtures to be permanently build into the concrete including the proposed positions of all conduits 25mm and over in diameter shall be submitted to the Engineer for his approval before being placed.

A. CHASES, HOLES ETC IN CONCRETE

The Contractor shall be responsible for the co-ordination with the Electrical and other Sub-Contractors for incorporating electrical conduits, pipes, fixing blocks, chases, holes and the like in concrete members as required and must ensure that adequate notice is given to such Sub-Contractors informing them when concrete members incorporating the above are to be poured. The Contractor shall submit full details of these items to the Engineer for approval before the work is put in hand. All fixing blocks, chases, holes etc. to be left in the concrete shall be accurately set out and cast with the concrete.

Unless otherwise instructed by the Engineer, all electrical conduits to be positioned within the reinforced concrete shall be **fixed inside** the steel cages of beams and columns and **between the top and bottom** steel layers in slabs and similar members.

B. FORMWORK

The method and systems of formwork which the Contractor proposes to use shall be approved by the Engineer before construction commences. Formwork shall be substantially and rigidly constructed of timber or steel or precast concrete or other approved material.

All timber for formwork shall be of good sound, clean, sawn, well seasoned timber, free from warps and loose knots and of scantlings sufficiently strong for their purpose.

C. CONSTRUCTION OF FORMWORK

All formwork shall be of sufficient thickness and with joints close enough to prevent undue leakage of liquid from the concrete and fixed to proper alignment, level and plumb and supported on sufficiently strong bearers, shores, braces, plates, etc. properly held together by bolts or other fastenings to prevent displacement, vibration or movement by the weight of materials, men and plant on same and so wedged and clamped as to permit of casing and removal of the formwork without jarring the concrete.

CONSTRUCTION OF FORMWORK (CONT'D)

Where formwork is supported on previously constructed portions of the reinforced concrete structural frame, the Contractor shall by consultation with the Engineer ensure that the supporting concrete structure is capable of carrying the load and/or sufficiently propped from lower floors or portions of the frame to permit the load to be temporarily carried during construction.

Soffits shall be erected with an upward camber of 10mm for each 4.000m of horizontal span or as directed by the Engineer.

Great care shall be taken to make and maintain all joints in the formwork as tight as possible, to prevent the leakage of grout during vibration. All faulty joints shall be caulked to the Engineer's approval before concreting.

The formwork shall be sufficiently rigid to ensure that no distortion or bulging occurs under the effects of vibration. If at any time the formwork is insufficiently rigid or in any way defective the Contractor shall strengthen or improve such formwork as the Engineer may direct.

The Contractor's attention is drawn to the various surface textures and applied finishes required and the faces of formwork next to the concrete must be of such material and construction and be sufficiently true to provide a concrete surface which will in each particular case permit the specified surface treatment or applied finish.

All surfaces which will be in contact with concrete shall be oiled or greased to prevent adhesion of mortar. Oil or grease shall be of a non-staining mineral type applied as a thin film before the reinforcement is placed. Surplus moisture shall be removed from the forms prior to placing of the concrete.

Temporary openings shall be provided at the base of columns wall and beams and at any other points where necessary to facilitate cleaning and inspection immediately before the pouring of concrete. Before the concrete is placed the shuttering shall be trued-up and any water accumulated therein shall be removed. All sawdust, chips, nails and other debris shall be washed out or otherwise removed from within the formwork.

CONSTRUCTION OF FORMWORK (CONT'D)

The reinforcement shall then be inspected for accuracy of fixing. Immediately before placing the concrete, the formwork shall be well wetted and inspection openings shall be closed.

The erection, casing, striking and removing of all formwork must be done under the personal supervision of competent foremen, and any damage occurring through faulty formwork or its incorrect removal shall be made good by the Contractor at his own expense.

After removal of formwork, all projections, fins etc on the concrete surface shall be chipped off and made good to the requirements of the Engineer at the Contractor's expense. Any voids or honeycombing shall be treated as described under "Faulty concrete".

A. STRIPPING FORMWORK

All formwork shall be removed without undue vibration on shock and without damage to the concrete. No formwork shall be removed without the prior consent of the Engineer and the minimum periods that shall elapse between the placing of the concrete and the striking of the formwork will be as follows:-

Beam sides, wall and columns (unloaded)	-	2 days
Slab soffits (props left under)	-	3 days
Beam soffits (props left under)	-	7 days

Removal of props (partly subject to 7 days concrete cube strength being satisfactory)

Slabs	-	10 days
Beams	-	14 days

If the Contractor wishes to take advantage of the shorter stripping times permitted for beam and slab soffits when props are left in place, he must so design his formwork that sufficient props as agreed with the Engineer can remain in their original position without being moved in any way until expiry of the minimum time for removal of props. Stripping and re-propping will not be permitted.

STRIPPING FORMWORK (CONT'D)

The above times may be reduced in certain circumstances, at the discretion of the Engineer provided an approved method is adapted at the Contractor's expense to ensure that the required concrete strength is attained before the forms are stripped.

The tops of retaining walls shall be adequately supported with stout raking props at intervals required by the Engineer. These props are not to be removed until after 7 days after casting of the floor slab.

A. FAIR FACE FINISHED

Where fair face finish is specified the concrete shall be brought to a perfectly true smooth and even surface by rubbing with carborundum stone dipped in cement grout. Such work must be commenced within one hour of removing the formwork and actively and rapidly pursued until completed, the objective being to complete the finish as soon as possible after removal of shuttering. On no account may such work be postponed to a later stage in the contract. Fair face surfaces shall be clean, smooth, even true, to form and free from all board marks, joints marks, honeycombing, pitting. Etc. The Contractor is permitted at his own expense to provide smooth lining to the forms which will achieve the required finish without rubbing down. All rubbed down work must be lightly washed with plain cold water at the completion of the contract, and not before the cement grout used in the finish is at least four weeks old after initial mixing.

B. PRECAST CONCRETE

Unless otherwise approved by the Engineer, all precast concrete construction shall be carried out on the site and shall conform to requirements given elsewhere in these Preambles.

The minimum size of coarse aggregate in precast concrete shall not exceed 20mm and for thicknesses less than 75mm it shall not exceed 15mm.

PRECAST CONCRETE (CONT'D)

The compacting of precast concrete shall conform with requirements given elsewhere in these preambles except for thin slabs where use of immersion type vibrators is not practicable. The concrete in these slabs may be consolidated on a vibrating table or by any other methods approved by the Engineer.

The precast work shall be made under cover and shall remain under the same for seven days. During this period and for a further seven days the concrete shall be shielded by sacking or other approved material kept constantly wet. It shall then be stacked in the open for at least a further seven days to season before being set into position.

Precast concrete units shall be constructed in individual forms. The method of handling the precast concrete units after casting, during curing and during transport and erection shall be subject to the approval of the Engineer, providing that such approval shall not relieve the Contractor of responsibility for damage to precast concrete units resulting from careless handling.

Repair of damage to the precast concrete units, except for minor abrasions of the edges which will not impair the installation and/or appearance of the units will not be permitted and the damaged unit shall be replaced by the Contractor at his own expense.

Except where precast work is described as "fair face" or as having an "exposed aggregate" or terrazzo finish, the moulds shall be made of suitable strong sawn timber true in form to the shapes required. Unless otherwise described, faces are to be left rough from the moulds.

Where precast concrete work is described as "fair face" the moulds are to be made of metal or are to have metal or plywood linings or are to be other approved moulds which will produce a smooth dense fair face to the finished concrete suitable to receive a painted finish direct and free from all shutter marks, holes, pinnacles etc. In his prices for such precast work the Contractor shall include for all rubbing down to produce the finish required, to the satisfaction and approval of the Engineer.

PRECAST CONCRETE (CONT'D)

Where precast work is to have an "exposed aggregate" or terrazzo finish the moulds shall be constructed to the requirements given for moulds for "finished fair" work. The method of achieving the exposed aggregate finish shall be the "aggregate transfer" or other approved methods.

The precast units shall be installed to the lines, grades and dimensions shown on the Drawings or as directed by the Engineer.

A. CONCRETE SURFACE BEDS

Concrete for surface beds shall be Grade 20.

Before placing concrete and where specified or shown on the drawings a layer of 500 gauge polythene or diothene sheeting shall be laid on the base course. Minimum 300mm laps shall be provided at all joints.

The concrete shall be placed as soon as possible after being mixed. In transporting the concrete, adequate precautions shall be taken to avoid damage to the prepared base. The concrete shall be spread to such a thickness that when compacted it shall be spread to such a thickness that when compacted it shall have the finished thickness as specified or shown on the drawings. A layer of concrete 50mm less than the finished thickness shall first be spread and struck off at the correct level to receive the top fabric reinforcement. The top layer shall then be added. Not more than 30 minutes shall elapse between spreading the bottom layer and the start of compaction of the top layer.

The Contractor shall be responsible for maintaining the reinforcement in its correct position during the placing and compaction of the concrete.

The compaction and finishing of the concrete shall be effected by immersion vibrators and hand or mechanical tamper weighing not less than 10 Kgs per metre run and having a tamping edge shod with a steel strip 75mm wide fixed to the tamper by countersunk screws. Immersion vibrator with "spade" attachment will be permitted. Compaction shall be continued until a dense, scaled surface finish is achieved. Over compaction causing an excessive amount of lines to be brought to the surface shall be avoided.

CONCRETE SURFACE BEDS (CONT'D)

The surface of the concrete shall be finished to the surface texture specified to the levels, falls and cross-falls, as directed or shown on the drawings and shall be subject to the following tolerances:-

The level be within + to - 6mm of the levels specified

The falls shall be within 10% of the falls specified

The smoothness shall be such that departures from a 3.000m straight edge laid in any direction shall not exceed 3mm.

Minor irregularities shall be made good by the use of a steel float but in no circumstances shall mortar be used to make good the surface.

As soon as the surface has been finished, it shall be protected against too rapid drying by means of polythene sheeting or other approved means placed carefully on the surface and kept damp and in position for 7 days and the concrete shall be kept wet for a further 21 days. The most critical period is the first 24 hours after placing or curing during that time shall be very thorough. The Contractor is to obtain the Engineer's approval to the material and method he proposes to use for curing and no concreting will be permitted until sufficient such material is on site.

Forms shall not be removed from freshly placed concrete until it is at least 24 hours old. Care shall be taken that in their removal no damage is done to the concrete, but should any damage occur the Contractor shall be responsible for making it good.

MASONRY AND BLOCKWORK

A. GENERALLY

- (i) Prices for all walling shall include for normal rough and **straight cutting**, plumbing angles, all cutting and waste and split courses necessary for bond, bonding at angles, intersections and junctions of walling of all thicknesses, split courses, cutting and pinning up to columns, beams, slabs, etc., hoisting and building at any level, forming all openings and reveals to same and all cutting and waste to walling in short lengths such as mullions unless specifically measured.
- (ii) Prices for hollow block walling must further include for all necessary solid blocks or fine concrete filling to open ends of blocks at intersections, ends and angles of walling.
- (iii) Prices for damp-proof courses, which are measured the net area covered, shall include for all cutting and waste and extra material in laps at joints, angles, etc.

B. CEMENT

All cement used for making mortar shall be Portland cement as described in "Concrete Work".

C. SAND

All sand used for making mortar shall be clean, well graded siliceous sand of good sharp quality, equal to sample, which shall be approved by the Architect. It shall be free from lumps of stone, earth, loam, dust, salt organic matter and any other deleterious substance, sieved through a fine sieve and washed if so directed by the Architect.

D. LIME

- (i) Lime for mortar shall be non-hydraulic or semi-hydraulic quick lime or hydrated lime in accordance with B.S. 890, Class 'B'.
- (ii) Quick lime shall be run to putty immediate after delivery to the site in a pit dug on the site or in an approved container. The water to be first run into the pit or container and the lime to be added until it is completely submerged and stirred until all lumps are disintegrated and the resulting mild lime shall then be run through a 3mm.square mesh sieve and run into a pit or other container and kept clean and moist for not less than 4 weeks before use.

LIME (CONT'D)

- (iii) Hydrated lime shall be added to water in a clean receptacle thoroughly mixed to the consistency of thick cream and allowed to stand, and be kept clean and moist for not less than 16 hours before use.

A. CEMENT MORTAR

Cement mortar shall be composed of Portland cement and sand in 1:4 ratio by volume, measured in specially prepared gauge boxes and thoroughly mixed in an approved mechanical mixer or mixed dry on a clean and approved mixing platforms, with added afterward until all parts are completely incorporated and brought to a proper consistency. The use of re-tampering of wholly or partially set mortar will not be allowed.

B. CONCRETE BLOCKS

- (i) Concrete blocks shall be solid, hard, true to size and shape with sharp arises in accordance with B.S 2028 type 'A', and approved by the Architect.
- (ii) They shall be obtained from an approved manufacturer or manufactured on site in approved block making machines. The cement aggregate mix used shall be not less than 1:9 by volume and the maximum size of aggregate shall not exceed 12mm.
- (iii) All solid and hollow concrete blocks used in walling must be capable of withstanding a crushing pressure of not less than 2.80 N/mm² after 28 days.
- (iv) The blocks on removal from the machine shall be carefully deposited on edge on racks under sheds erected by the Contractor and left for 3 days during which period they shall be kept constantly wet after which they shall be placed on edge in the open on racks and protected by sacking or other approved covering and kept wet for further 5 days. Thereafter the blocks shall be left in the same position without wetting for a further 20 days.
- (v) No blocks will be allowed to be used in the work until 28 days old and until samples have been taken and approved by the Architect.

CONCRETE BLOCKS (CONT'D)

- (vi) They shall be laid dry except for the top surface which shall be wetted immediately before mortar is spread on. After laying no further water shall be applied.
- (vii) The concrete blocks shall be 200mm. high to bond satisfactory with all other walling.

A. STONE WALLING

- (i) The stone for walling shall be sound and hard throughout, free from all defects, and shall be obtained from a quarry approved by the Architect. It shall be chisel dressed into true rectangular blocks, with each surface even and at right angles to all adjoining surfaces.
- (ii) The contractor shall if necessary re-dress the beds of stones on the site to the minimum extent required to obtain uniformity of coursing, and his Tender shall be deemed to include for such re-dressing.
- (iii) Stone block for general walling shall nominally be 200mm. high, 90mm. 140mm or 190mm. thick as required for the works, the maximum permissible variations of any of the foregoing dimensions being 12mm.
- (iv) Stone shall not be less than 400mm. long but a proportion of 20% will be permissible in lengths between 300mm. and 400mm long. Samples shall be submitted to the Architect for approval and when so approved shall become the standard for the works.

B. STABILIZED EARTH

These shall consist of cement mixed with selected approved red soil in a proportion not less than 1:20 by volume.

The manufacture and curing of the blocks shall generally be as described for concrete block above.

C. BEDDING AND JOINTING

The blocks shall be bedded and joined in cement and sand mortar as described with beds and joints not more than 12mm. or less than 6mm. thick, all flushed up and grouted solid as the work proceeds.

A. REINFORCED WALLING

Walls of less than 225mm. thickness shall be reinforced with one row of 20 gauge hoop iron 20mm. wide, built into every third course, well lapped at junctions and joints and carried at least 100mm. into abutting walls at intersections.

B. PROTECTION

All walling shall be properly protected while mortar is setting, as the Architect shall direct.

C. SETTING OUT RODS

The contractor shall provide proper setting out rods and set out all work on the same for courses, opening heights, etc., and shall built the walls, piers, etc., to widths, depths and heights indicated on the Drawings. Setting out rods to be gauged to allow an average height of 200mm. for each course.

D. CURING OF WORK

All walls shall be maintained in a damp condition for at least 24 hours after laying. Wall under construction shall be damped by applying water with a brush and no hoisting directly on the wall shall be permitted. When the work ceases on any section of the wall, polythene or hessian shall be draped over the wall, for at least 24 hours. If hessian is used it shall be maintained continuously wet.

E. WALL TIES

Wall ties shall be provided to connect walls to steel or concrete columns and beams to connect two unborded leaves of wall.

Wall ties shall be provided at 450mm centres both vertically and 900mm centres horizontally. Wall ties shall be provided at 450 centres both vertically and 900mm centres horizontally. Wall ties shall be staggered when used to connect two leaves of unbonded walls.

ROOFING

A. GENERALLY

Bituminous felt, flashing, etc., have been measured the net area covered. Prices shall include for all straight cutting and waste and laps and in case of flashing, aprons, covering to kerbs, etc., where the net covered girth is measured and necessary overlaps for bond with adjoining areas.

BITUMINOUS FELT ROOFING

B. BUILT-UP ROOFING

The built-up roofing shall be in accordance with B.S 747 (classes 1,2, and 5) applied to a screeded base and shall comprise the following applications (see Clause 'E' below), laid strictly in accordance with the manufacturer's printed instructions and the Code of Practice 144.101.

C. STORAGE

Rolls must be transported and stored on end, one roll high, and adequately protected from the sun.

D. SCREED

The minimum fall for the screed on flat roofs be 1 in 30. The screed must be thoroughly dry and swept clean before commencing laying operations.

E. SEQUENCE

- | | | |
|-------|-----------------------------------|--|
| (i) | <u>Jointing Compound: -</u> | One application of hot bituminous compound weighing not less than 16.3 Kgs per 10 square metres. |
| (ii) | <u>First Layer:</u>
(class 1A) | One layer of self finished felt weighing not less than 13.6 Kgs per Sq. m. |
| (iii) | <u>Jointing Compound:</u> | As described in (i) above. |

ROOFING (CONT'D)

- | | | |
|------|------------------------------------|---|
| (iv) | <u>Second Layer:</u>
(class 1A) | One layer of self finished felt weighing not less than 13.6 Kgs per Sq. m. |
| (v) | <u>Jointing Compound:</u> | As described in (i) above. |
| (vi) | <u>Third Layer:</u>
(Class E) | One layer of mineral surfaced roofing felt weighing not less than 36.2 Kgs per 10 Sq m. (Colour to be decided by the Architect) |

RESINCOT PROFILED OR CORRUGATED GALVANISED SHEETS

A. MATERIALS:

Resincot galvanised corrugated sheeting and accessories shall be of approved manufacture in accordance with B.S 3083 and of an approved colour. The thickness of the sheeting shall be as specified and shall be laid and fixed strictly in accordance with the manufacturer's printed instructions.

Resin cot galvanized profiled sheeting and accessories shall be approved manufacture in accordance with BS 3083 and of an approved colour. The thickness of the sheeting shall be as specified and shall be laid and fixed strictly in accordance with manufacturer printed instructions.

B. LAPS:

Sheeting shall be laid with ends laps of 150mm. and side laps of one corrugation on the side away from the prevailing wind.

C. FIXING TO PURLINS:

The sheets shall be fixed to 150 x 50mm timber purlins with 8mm. galvanised gimlet pointed screws 114mm. long. All screws and bolt fixings shall have "Selawasher" plastic washers or other equal and approved.

D. HOLES:

Holes shall be drilled through the ridges of corrugations, not in the hollows.

E. RIDGES ETC.

Ridges and other accessories shall be supplied as shown on the Drawing and shall be fixed to purlins as above described.

CAPENTRY

A. TIMBER FOR STRUCTURAL WORKS

All timber for structural works to be grade GS or SS cypress, seasoned to moisture content of almost 15%; and cell-cured or treated with approved preservative.

B. GENERALLY

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

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

C. SPECIES OF TIMBER

The following timber shall be used: -

<u>Standard Common Name</u>	<u>Botanical Names</u>
Podocarpus	<i>Podocarpus spp.</i>
Cypress	<i>Cypress</i>
Cedar	<i>Juniperus Procera</i>
African Mahogany (munyama)	<i>Khay Anthotheca</i>

D. TOLERANCES IN THICKNESS

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

(i) Hardwood Grading (First and Second Grades)

The following tolerances in thickness will be omitted:-

- (a) 1 ½ mm oversize on pieces up to 25mm in thickness
- (b) 3mm oversize on pieces over 25mm and up to 50mm in thickness
- (c) 6mm oversize on piece over 50mm in thickness.

TOLERANCES IN THICKNESS (CONT'D)

- (ii) Softwood grading: Strength Grades (for Carpentry) first and second Grades. Undersize not allowed.

Oversize. All timber to be sawn oversize by 1 ½ mm per 25mm thickness and width. Not more than 3mm in thickness and not more than 6mm in width.

- (iii) Softwood Grading Appearance, Grades (for Joinery) First and Second Grades. All as for Strength Grades above.

All timber shall be free of live 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 this own cost all work necessary to eradicate insect attack of timber which becomes evident including the replacement of timber attack or suspected of being attacked, notwithstanding that the timber concerned may have already been inspected and passed as fit for use.

A. SEASONING OF TIMBER

All timber shall be seasoned to a moisture content of not more than 15% for Carpentry.

B. PRESSURE IMPREGNATION TREATMENT

All carpentry timber, sawn joinery and timber groups for fixing shall be treated with pressure impregnated "Celcure" or "Tanalith" solution with a minimum net retention of 5.6 Kg of dry salt per cubic meter. 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" B or "Wolmanol" solution brushed on. The contractor's prices for such timber hereinafter must allow for the above treatment.

C. 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 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, species strength, etc., such test will be carried out by the Forestry Department.

A. CLEARING UP

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

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

B. WORKMANSHIP

All carpenter's work shall be accurately set out strictly in accordance with the drawings and shall be framed together and securely fixed in the best responsible manner with properly made joints, all brands nails and screws shall be provided as necessary, directed, and approved, the contractor's prices shall allow for all the foregoing.

All workmanship shall be of the best quality.

C. 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.

D. JOINTING

All timber shall be as long as possible and practicable 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. If splitting is likely, or is encountered in the course of the work, holes for nails are to be prebored at diameter not exceeding $\frac{4}{5}$ th of the diameter of the nails. Nails must be bent at right angles to the grain.

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 $D/16$ 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.

JOINERY

A. ALL TIME TIMBER

All timber shall be First (OR PRIME) Grade. Species of timber tolerance shall be as defined under "Carpentry".

B. GENERALLY

All joiners' work shall be accurately set out on boards to full size for the information and guidance of the artisans before commencing the respective works, with all joints iron work and others connected therewith fully delineated. Such setting out must be submitted to the Architect and approved before such respective works are commenced.

All joiners' work shall be cut out and framed together as soon after the commencement of the building as is practicable, but not wedged up or glued until the building is ready for fixing same. Any portions that warp, wind or develop shakes or other defects within six months after completion of the works shall be removed and new fixed in their place together with all other work which may be affected thereby all at the contractor's own expense.

All work shall be properly mortised, tenoned, housed shouldered, dovetailed, notched, pinned branded, etc., as directed and to the satisfaction of the Architect and all properly glued up with the best quality glue.

Joints in joinery must be as specified or detailed, and so designed and secured as to resist or compensate for any stresses to which they may be subjected. All nails, sprig etc., are to be punched and puttied. Loose joints are to be made where provision must be made for shrinkage, glued joints where shrinkage need not be considered and where scaled joints are required. Glued for load bearing joints or where conditions may be guaranteed casein or organic glues may be used.

All exposed surfaces of joinery work shall be wrought and all arises "cased off" by planing and sandpapering an approved finish suitable to the specified treatment.

C. INSECT DAMAGE

All timber shall be free of insect damage as defined under "Carpentry".

D. SEASONING OF TIMBER

All timber shall be seasoned to a moisture content of not more than 15%.

A. DIMENSIONS

3mm reduction of specified sizes will be allowed to each wrought face except where described as finished size in which joinery shall hold up to the full dimensions.

The contractor is to note that all joinery timber size nominal unless otherwise stated as finished sizes. The nominal sizes have been calculated in accordance with Standard method of Measurement of Building works for East Africa 1st Edition metric and no regard has been taken of metre sizes of timber at present being sold.

B. 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 screw shall be used for fixing of all hardwoods, the heads let in and pelleted over with wood pellets to match the grain.

C. BEDDING FRAMES ETC.

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

D. PLUGGING CONCRETE AND WALLS

Round wood plugs shall not be used, all work described a plugged shall be fixed with screws to plugs formed by drilling concrete walls, etc., with a proper tool of suitable size at 750mm spacings and filling the holes completely with "Philplug" rawl plastic or Rawlplugs in accordance with the manufacturer's instructions. Alternatively, and where so agreed by the Architect hardwood dovetailed fixing slips dipped in "Wolmanol" or "Celcure" solution and cut and pinned or bedded in cement (1:3) mortar may be used.

E. FIBREBOARD

Shall be 12mm "Celotex" or equal and approved.

F. PLYWOOD

Shall comply with B.S 145S (First Quality "interior type unless otherwise specified).

G. BLOCKBOARD

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

JOINERY (CONT'D)

A. PLASTIC SHEETING

Shall be "Formica" sheeting 1.5mm thick and securely fixed with approved type waterproof adhesive and in the colours approved by the Architects.

B. CHIPBOARD

Shall be resin bonded and shall comply with BS 2604.

C. PROTECT JOINERY

Any 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.

D. FLUSH DOORS

All flush doors shall be manufactured to the thickness specified and consists of 100mm. Wide fixing all around with horizontal core battens not more than 75mm. Centre pressure impregnated as described and bored with 12mm diameter ventilation holes at 300mm centres. Doors shall have two lock blocks and be faced both sides with 6mm ply and have 25mm mahogany twice rebated lipping all round or otherwise be equal to an approved sample. External flush doors shall be as described above but faced both sides with marine quality plywood, same should be for kitchen and bathroom.

E. PRICES TO INCLUDE

Prices of items hereafter shall included 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 the lengths.

F. BOTTOM EDGES

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

G. IRONMONGERY

All locks ironmongery shall be fixed with screws etc. to match. Before the woodwork is painted, handles shall be removed. Carefully stored and refixed after completion of painting and locks oiled and left in project working order. All keys shall be labelled with the door reference marked on labels before handling to the Architect on completion.

IRONMONGERY

A. GENERALLY

All ironmongery shall be fitted and fixed in accordance with the manufacturer's printed instructions. Rates for fixing are to include for all cutting, sinking, boring, noticing and fitting in hardwood or softwood and for supplying all necessary and matching screws.

All locks shall be provided with a master key system and prices shall include for this. The requirement must be obtained by the contractor before ordering. The keys of all locks shall have labels attached with door reference marked on before handing to the Architect.

B. MOVABLE PARTS

All locks, springs and other items of ironmongery with moveable parts shall be properly tested, cleaned and adjusted where necessary to ensure proper working order at the completion of the works and left in perfect working order by the Contractor.

C. SAMPLES

- (i) Samples of all ironmongery specified shall be submitted to the Architect for approval and the approved samples shall thereafter be regarded as the standard for the work. Ironmongery which in the opinion of the Architect does not conform to this standard shall be removed from the site.
- (ii) Alternatively, ironmongery of an equal standard will be acceptable providing samples are submitted to and approved by the Architect before orders for such ironmongery are placed.

METAL WORK

A. 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 injury from breaking, bending and distortion prevented.

B. NAILS, SCREWS AND BOLTS

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

C. 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 wherever possible, the minimum of site welding being employed.

All screwed work shall have full internal and external threads and holes shall have been cleaned off. Counter sinkings must be concentric.

D. NACO LOUVRES

Shall be of steel, aluminium-lacquered, single control type, unless otherwise described, carefully screwed into timber sub-frames or plugged and screwed to walling. Louvers of equal quality of other manufacture may be substituted on approval.

Prices shall include for oiling and adjusting and leaving clean and undamaged on completion.

E. MILD STEEL

For burglar bars and reinforcement shall comply with B.S. 19 No. work shall be fabricated until the site dimensions have been checked and no additional claim will be accepted should final dimension differ from these on the drawings.

All welds shall be ground smooth and the contractor shall ensure that the metalwork 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 fixings.

A. PAINTING

All steel is to be wire brushed and any loose scale, dirt or grease shall be removed before any painting is commenced. One coat of red oxide primer type A to B.S 2523 shall be applied at the shop.

Any damage to the priming paint shall be made good to the Architect's satisfaction.

B. MATERIALS GENERALLY

(i) MATERIALS

Specified in this section may be applicable to any or all the subsequent sub trades in metalwork.

(ii) SUPPLIERS

Obtain all materials from suppliers approved by the Engineers.

(iii) STANDARDS

Produce the manufacturer's certificate of compliance with the standards specified if so requested by the Engineer.

(iv) FINISHES

Metal commodities for making components must be either pre-finished or suitable to receive the finishes specified.

C. SECTION ETC.

(i) HOT ROLLED STEEL SECTIONS

Except equal and unequal angles: to B.S. 4: part 1, made from steel to B.S. 4360 part 2.

(ii) HOT ROLLED EQUAL AND UNEQUAL ANGLES

Part 1 (metric converted from imperial dimensions) or to B.S 4848: part 4 accordinated metric dimensions. Do not substitute sections or dimensions other than those specified without the prior approval of the Engineer.

SECTION ETC., (CONT'D)

(iii) HOT ROLLED HOLLOW STEEL SECTIONS

Part 2, made from steel to B.S 4360: part 2.

(iv) HOT ROLLED STEEL BARS

To B.S. 4449.

(v) COLD ROLLED STEEL SECTION

To B.S 2994, made from steel to B.S. 1449: part 1 B (HR, CR, HS, OR CS quality unless otherwise specified or shown on the drawings).

(vi) STEEL TUBES AND TUBULARS

To B.S. 1387 medium thickness unless otherwise specified. If steel tubes to B.S. 1775 are required they will be specified or shown on the drawings.

(vii) STAINLESS STEEL TUBES

To B.S. 3014, welded unless otherwise specified.

(viii) COPPER AND ALUMINUM ALLOYS

If the alloy is not specified or stated on the drawings, it is to be suitable for the application.

(ix) ALUMINUM ALLOY BARS, TUBES AND SECTIONS

To B.S. 1161 AND B.S 1474.

(x) COPPER AND COPPER ALOY RODS AND SECTIONS

To B.S. 2874

(xi) COPPER AND COPPEY ALLOY TUBES

To B.S. 2871: part 2

TRADE PREAMBLES

(xii) TIMBER FOR CORES OF DRAWN SECTIONS

To B.S. 1186: part 1, concealed surfaces class, straight grained of mahogany or other approved hardwood.

A. MESH

(i) STEEL MESH FABRIC

To B.S. welded type, and square, structural or long mesh as specified or shown on the drawing.

(ii) MOSQUITO MESH

Approved fine wire mesh or gauze of non-corroding metal, for example aluminium.

B. PLATE SHEET AND STRIP

(i) STEEL PLATE

For welding to B.S. 4360, section 2 unless otherwise specified. Steel to this standard is equally suitable for bolting and riveting, and may be used unless steel plate to B.S. 1449 is specified.

PAVINGS AND PLASTERWORK

A. GENERALLY.

- (i) Prices for paving shall include for preparation of concrete floor and painting with cement grout as described, and any extra thickness consequent upon the floor not being finished to the true levels and also for all temporary rules and for all formwork to stop pavings at openings or edges as required. Prices for tile and similar paving shall include for any pointing to exposed edges.
- (ii) Plastering to walls has been measured over concrete columns, lintols, etc., flush with wall face, and prices for plastering shall include for hacking concrete or for raking out joints to form key, and for any necessary rubbing out.
- (iii) Prices of superficial items of paving and plastering are to include for narrow widths and small quantities, fair edges and arises, rounded external angles up to 10mm. radius, making good to metal windows or door frames and making good around pipes, holder bats, and other metalwork and for all similar incidental labours unless specifically measured.
- (iv) Prices of lineal items are to include for all short lengths', angles, arises, mitres, ends and the like and for all necessary rubbing out.
- (v) Prices for floor or wall tiling shall include for all straight cutting and waste, small quantities and narrow widths.

B. CEMENT

Cement shall be described in "Concrete Work".

C. SAND

Sand shall be as described in "Masonry and Block work".

D. LIME

Lime and treatment before use shall be as described in "Masonry and Block work" except that it shall comply with B.S. 890, Class 'A'.

E. WATERPROOFING COMPOUNDS

All waterproofing compounds are to be to the Architects' approval and used strictly in accordance with the manufacturer's printed directions.

A. PAVING

All materials for paving and plastering must be measured in proper gauge boxes in the proportions specified and mixed on clean wood or iron platforms and turned over at least three times dry until the mix is of a uniform colour. Water shall then be added by means of a rose nozzle and the materials again turned over until the mass is thoroughly mixed with water. Alternatively, mechanical mixing methods may be used to obtain the same result as approved by the Architect.

B. PREPARATION FOR PAVING AND SCREEDS

As soon as the paving has set sufficiently, it is to be covered with a well wetted layer of sawdust, hessian or other approved material and this layer is to be kept damp for at least seven days during which period no traffic is to be allowed over paving. When no longer required as a protection to the surface, the materials is to be removed the paving left clean and perfect.

All paving shall be laid with joints coinciding with the construction joints in the concrete beds upon which they are laid and the pattern set out accordingly.

C. VERMICULITE ROOF SCREEDS

Vermiculite screeds are to be mixed in the proportions of 250 kgs. Pozzolana cement to 1 cubic metre Vermiculite Grade 5, all in strict accordance with the Manufacturer's printed instructions. The screed is to be finished with 10 mm cement and sand (1:3), trowelled smooth to receive roof finish as previously specified. No vermiculite is to be laid in rainy weather and screeds are not to be walked on for three days after lying.

D. SCREEDS TO RECEIVE FLOOR AND WALL FINISHES

There are to be laid true and level, particular care being taken to obtain a perfectly smooth surface to receive P.V.C and similar floor finishings.

E. CEMENT AND SAND PAVINGS

To be in cement and sand (1:4) and finished perfectly smooth with a steel trowel.

E. SKIRTINGS

Skirtings to cement paved floors shall be in cement and sand (1:4) to match the paving, with rounded arries and 38 mm radius cove at junction with paving.

PAVINGS AND PLASTERWORK (CONT'D)

A. JUNCTION STRIPS

At the junction of differing floor finishings fix in position 3mm x 25mm plastic jointing strips cut to lengths, bedded in and finished flush with pavings. All plastic jointing strips shall be black in colour.

B. FLOOR HARDENER

Treat the surface where specified with three coats of sodium silicate or other equal and approved hardener in accordance with the manufacturer's instructions.

C. P.V.C. FLOORING

Dunlop Vinylex asbestos floor tiles to B.S 3261 of thickness specified and colours selected by the Architect and executed by approved sub-contractor. Upon completion the flooring is to receive two coats of approved polish.

D. GRANOLITHIC AND TERRAZZO PAVING AND WALL FINISHES

(a) GENERALLY

- (i) Construction joints between bays of paving are to be straight and vertical and are to coincide as far as possible, with those in the concrete under.
- (ii) After spreading and before finally striking to screen levels the pavings etc., are to be lightly tamped each stage of laying operation is to be properly carried out at the optimum degree of stiffness of the mix so that the aggregate remains correctly distributed throughout the pavings etc., and so finished that the surface is true to level, dense, smooth and free of laitance and other defects and blemishes. The use of dry cement or sand to absorb surplus moisture will not be allowed.
- (iii) The thickness of the pavings etc., in these Bills of Quantities include for the combine screed or backing and granolithic or terrazzo finish.
- (iv) All granolithic and terrazzo finishings shall be divided into areas not exceeding 3 square metres with dividing strips as specified.

GRANOLITHIC AND TERRAZZO PAVING AND WALL FINISHES (CONT'D)

(b) SCREED AND BACKING

To be in cement and sand (1:4).

(c) GRANOLITHIC

- (i) To be composed by volume of one part of cement, one part of sand and two parts 6mm blackstrap chippings free of dust, laid or applied to screeds or backings whilst they are still green.
- (ii) Paving shall be 25mm minimum combined thickness comprising 15mm thick cement and sand (1:4) backing and 10mm. thick granolithic.
- (iii) Dadoes shall be 20mm minimum combined thickness comprising 12mm thick cement and sand (1:4) backing and 8mm thick granolithic.
- (iv) Polished granolithic to be finished with a metal roller and all surplus cement lightly brushed off when surface is sufficiently hard to resist dislodgement of aggregate, when the surface is hard enough it shall be wet ground, using a machine, until the aggregate is uniformly revealed and then well washed with clean water. Any small voids or holes left in the surface are to be filled with cement grout rubbed down-by hand. Mouldings etc. not accessible to machines are to be hand rubbed and polished with carborundum. After an interval of 1 to 3 days the surface is to be finally machine ground using the fine abrasive.

(d) TERRAZZO

- (i) To be composed of one part of "Snowcrete" "Colourcrete" or other equal and approved white or coloured cement to two parts of clean imported marble chippings well washed and free from dust. The marble chipping may vary in colour and from 3mm to 9mm dependent on the effect required and sample areas must be prepared for Architects' approval.
- (ii) Pavings to be 25mm minimum thickness overall. As for granolithic (ii) preceding.
- (iii) Polished terrazzo to be finished as granolithic (iv) preceding.

TRADE PREAMBLES

A. PLASTIC DIVIDING STRIP

To be 3mm x 25mm strip set in position before paving is commenced, and embedded straight and true.

B. PLASTERING GENERALLY

- (i) All surfaces to be plastered or rendered shall be brushed clean and be well wetted before plaster is applied. All plaster and rendering shall be kept continuously damp for seven days after application.

All arises shall be finished true and slightly rounded except where otherwise stated, and shall be run at the same time as the adjoining plaster.

No partially or wholly set plaster or rendering will be allowed to be used or re-mixed.

- (ii) The contractor shall prepare samples of the plastering and rendering as directed until the quality texture and finish required is obtained and approved by the Architect, after which all plastering executed in the work, shall conform to the respective approved samples.
- (iii) The contractor shall cut out and make good all cracks, blisters and other defects and leave the whole of the work perfect on completion. When making good defects, the plaster or rendering shall be cut out to a rectangular shape with edges undercut to form dove-tailed key, and all finished flush with face of surrounding plaster or rendering.

C. INTERNAL OR EXTERNAL CEMENT AND SAND RENDER

Plaster described as internal cement and sand (1:4) render or external cement and sand (1:4) render shall be executed in two coats and be composed of one part cement to four parts sand. The first coat shall be laid to a uniform surface finished with wood float well scored and allowed to dry out for at least 7 days before applying the finishing coat. The second or finishing coat shall be thoroughly worked and finished hard and true with a steel trowel or wood float as specified hereinafter. The total finished thickness of plaster shall be not less than 12mm thick.

A. INTERNAL GAUGED PLASTER

Plaster described as "Internal gauged plaster in two coats" shall consist of a first or rendering coat composed of one part cement, two parts lime and nine parts sand and a finishing coat composed of one part cement, three parts lime and six parts sand. Application and thickness will be as for last item.

B. GLAZED WALL TILING

- (i) Glazed wall tiles shall be 150 x 150 x 6mm thick cushion and tiles with matching fittings, all conforming to B.S 1281 in colours specified by the Architects.
- (ii) Tiles are to be bedded in "Richafix" or other equal and approved tile fixing compound applied strictly in accordance with the manufacturer's printed instructions.
- (iii) Walls are to be dry before tiles are fixed and tiles are not to be soaked in water before use. Tiling is to be set and closely straight jointed with 1.5mm joints. If non-lu tiles are used, cardboard or plastic spacer pieces are to be used to obtain constant joint width. On completion tiling is to be pointed in white or coloured cement and cleaned down.

C. EXPANDED POLYSTYRENE PANELS

- (i) All Expanded Polystyrene Panels (EPS) to floors and walls together with steel meshes for the works to be sourced from the National Housing Corporation factory located in Mavoko-Machakos County

Specifications for shotcrete application (1:2:4) to the EPS panels consists of 1 part cement, 2 parts sand and 4 parts rock sand/quarry dust. The shotcrete shall be applied to the panels using a spray gun or similar equipment for uniform application.

GLAZING

A. GENERALLY

- (i) Glass for glazing and mirrors shall be of approved manufacture and is to comply with B.S. 952 in all respects, free from flaws, bubbles, specks and other imperfections.
- (ii) Each pane of glass where its dimensions contain fractions of centimetre above both in width and height. Louver blades have been similarly measured in regard to length.
- (iii) Prices for glazing shall include for back-puttying, fixing glazing clips of springing as required, cutting glass to sizes, cleaning all glass inside and out, removing all paint and putty marks, replacing any broken, scratched or cracked panes and leaving all glazing sound and perfect at completion.

B. CLEAR SHEET GLASS

Clear sheet glass shall be Ordinary Glazing (Q.Q) quality.

C. POLISHED PLATE GLASS

Polished plate and Georgian wired polished plate to be General Glazing (G.Q) quality.

D. OBSCURED GLASS

To be of the types described and as approved by the Architects.

E. MIRRORS

To be S.Q quality plate glass mirrors of approved manufacture with bevelled edges and fixed at all corners to walls with rawlplugs and brass screws with removable chromium-plate dome heads.

F. PUTTY

- (i) The putty for glazing to metal windows is to be gold size metal window putty specially designed for tropical use, all as B.S 544 (Type 2 putty) or patent mastic putty as approved by the Architect.
- (ii) All putty shall be delivered on site in the original manufacturer's sealed cans or drums and used direct there from, with the addition only of pure linseed oil if necessary. No mineral or other oils may be used in the putties except genuine linseed oil.

A. GLAZING

- (i) Glass panes shall be cut to sizes to fit the openings with more than 1.5mm play round.
- (ii) The rebates of all windows shall be painted one coat before puttying.
- (iii) All glass, where fixed with putty, is to be back and front puttied and care must be taken to ensure that putty does not project beyond the sight lines of panes and is to be neatly mitred at angles.
- (iv) Putty which has not set hard within seven days must be removed and the glass re-putted at the contractor's expense.
- (v) Allow for removing all cracked or broken panes of glass, cleaning rebates and re-glazing with new glass throughout the progress of the works and for cleaning all glass on both sides and leaving perfect upon completion.

B. BEDDING STRIPS

Wash-leather, velvet, etc., bedding strip to edges of glass is to be sufficient width to be turned over 6mm to each side of pane and shall be trimmed to the sight lines of the pane.

PAINTING

A. GENERALLY

- (i) Prices must include for rubbing down with glass paper between successive coats and all cutting in at edge.
- (ii) Prices shall include for all work in parti-colours and all cuttings to line.

B. MATERIALS

- (i) Paints shall be obtained from M/s Crown Berger Kenya Ltd., Basco Products Kenya Ltd or any other manufacturers approved by the Architect.
- (ii) The materials for all other finishes shall be of the best quality available of approved manufacture.
- (iii) Before commencing painting, the Contractor shall submit to the Architect for approval a list of all the brands of paints and finishings including the necessary primers and undercoats he intends to use and immediately upon being so approved, orders shall be placed and total requirements obtained for the works.
- (iv) Once approved, no other brand of material shall be used without the express permission of the Architect, in writing.

C. MORDANT SOLUTION

All galvanised metal work to be painted shall first receive a coat of a propriety mordant solution, approved by the Architect as suitable for this purpose.

D. KNOTTING

To be 'Shellack' knotting to B.S 1336.

E. STOPPING

To be composed of linseed oil putty, white lead, red lead and gold size suitable proportioned and mixed.

F. POLYURETHENE

To be "Ronseal" polyurethane or other equal approved by the Architect.

G. WAX POLISH

Wash polish is to be furniture polish of an approved proprietary brand.

A. DELIVERY OF PAINTS TO SITE

- (i) All paints etc., shall be delivered on site in the original drums or tins, and shall be mixed and applied strictly in accordance with the manufacturer's printed directions. The only addition which will be allowed to be made will be liquid thinners, driers etc., supplied by the makers for the purpose. No paint, distemper, etc., shall be thinned more than approved by the Architect.
- (ii) Paint for external work shall be of the special quality recommended by the manufacturers for external use.

B. GENERAL WORKMANSHIP

- (i) The priming, undercoats and finishing coats shall each one be of different tints and the priming and undercoats shall be the correct brands and tints to suit the respective finishing coats, all in accordance with the manufacturer's directions.
- (ii) All surfaces must be thoroughly cleaned down previous to painting and decoration work and no external painting may be done in rainy weather. All paint must be thoroughly well worked on and excess of paint in any coat must be avoided.
- (iii) All brushes, tools and receptacles are to be kept clean and free from dirt or old paint and are to be thoroughly cleaned each time after use.
- (iv) Each coat is to be well brushed into the surface so that every part, including joints, angles etc., is adequately covered, but care is to be taken to avoid excessive or uneven thickness of paint film, particularly at edges and in angles, etc.
- (v) Each coat of paint etc., shall be properly dry and shall be well rubbed down with fine sandpaper and be brushed clean before the next coat is applied. The paintwork shall be finished smooth and free from brush marks.
- (vi) Where so required or directed, painting shall be in parti-coloured and picked out and cut in and the prices shall include for this.

GENERAL WORKMANSHIP (CONT'D)

- (vii) All ironmongery, metal or plastic plates and electrical outlet plates and fitting and the like shall be removed before painting is commenced, and re-fixed on the completion of the work.
- (viii) No sprays or roller painting will be allowed unless permission is give by the Architect.
- (ix) The contractor shall so arrange his programme of work that all other trades are completed and away from the area to be painted when painting begins.

A. SAMPLES AND COLOURS

All colours will be selected by he Architect from the B.S range of colours. Samples and colour cards of all paints, distemper, and materials shall be submitted for approval of the Architect before the same are applied and sample panels shall be executed for the Architect's approval where directed. Such samples when approved shall become the standard for the work.

B. PREPARATION AND PRIMING OF PAINTED SURFACES

(a) PLASTERED AND RENDERED SURFACES

- (i) Plastered surfaces are to be perfectly smooth, free from defect and ready for decorations. All such surfaces shall be allowed to dry for a minimum period of four weeks and rubbed down with No.2 grade sandpaper to remove trowel marks stains, etc. After the priming coat, all cracks and imperfections are to be made good with 'Polyfilla' (or a similar approved hard filler), well rubbed down and then touched up with the priming coat.
- (ii) Priming for plastic emulsion paint shall be the paint thinned with 25 percent water.
- (iii) Priming for oil paint shall be with alkali-resistant primer.

(b) HARDBOARD SURFACES

- (i) Priming for plastic emulsion paint shall be the paint thinned with 25 per cent water.
- (ii) Priming for oil paint shall be with a thin oil primer.

PREPARATION AND PRIMING OF PAINTED SURFACES (CONT'D)

(c) FERROUS METALWORK

All surfaces shall be thoroughly brushed down with wire brushes to remove all scale, rust, etc., and rubbed down with No.2 Grade sandpaper and brushed and left perfectly clean immediately prior to decoration

- (i) Shop-Primed: Surface to receive oil paint shall have all bare places touched up with approved metal zinc chromate primer.
- (ii) Unprimed: Surface shall be given one coat of primer as last.
- (iii) Galvanised: Surface shall be treated before painting with mordant solution. The surfaces shall then be thoroughly washed down with clean water, allowed to dry and primed as last.
- (iv) Coated: Surfaces already treated with bituminous solution shall receive an insulating coat of anti-bitumen primer or 'Shellac' knotting.

(d) WOOD SURFACES TO RECEIVE PAINT

- (i) The woodwork shall have all knots or resinous parts carefully treated with self-knotting aluminium primer. All cracks, nails, or other holes shall be thoroughly cleaned out and after priming all such cracks etc., are to be filled with matching hard stopping which is to be rubbed down flush with the adjoining surface.
- (ii) Priming for oil paint shall be self-knotting aluminium primer.
- (iii) The back of all joinery work is to be primed before fixing.

PAINTING (CONT'D)

A. PREPARATION, PRIMING ETC., OF CLEAR TREATED WOOD SURFACE

All wood surfaces to receive clear treatment shall be rubbed down to a stain finish with fine sandpaper immediately prior to application.

B. COVERING UP

All floors etc., shall be covered up with dust sheets when executing all painting and decorating work.

C. DELIVER UP CLEAN

Paint splashes, spots and stains, shall be removed from floors, woodwork, etc. Any damaged surfaces shall be toughed up and the whole of the work left clean and perfect upon completion.

ROAD WORKS

A GENERALLY

The Specification of work and materials in this section, which repeat similar work in proceeding sections, shall be deemed to the full specification of work and materials contained in the preceding Bills.

ACCESS ROADS AND CAR PARKS

B EXCAVATION

Excavation shall be to levels approved by the Architect. All soft spots are to be excavated and filled with approved filling thoroughly compacted.

C FALLS

Roads and car parks shall have a minimum fall of 1 in 40. The actual falls will be decided by the Architects on Site.

D COMPACTION OF FORMATION

The maximum dry density of the soils to be compacted shall be determined by Test 9 as described in B.S. 1377/49.

The dry density of the soil in the filed shall be determined by Test 10 as described in B.S. 1377/49.

The relative compaction of the formation shall be determined by the percentage rates of the dry density in the field (Test 10) to the maximum dry density (Test 9).

The relative compaction of the formation is to be not less than 100% when compacted at optimum moisture content plus a minus 2%. Water shall be used as necessary to achieve the desired moisture content.

E. COMPACTION ON SUB-BASE

The murrum sub-base shall be built up in layers as described hereafter, each layer shall be compacted at B.S. optimum moisture content plus or minus 2% until relative compaction is obtained of 95% for the lower layer and 102% for the top layer. Water shall be used as necessary to achieve the desired moisture content.

EXTERNAL WORKS (CONT'D)

A MURRAM SUB-BASE

The murram shall be approved clean, hard, dark coloured; Imported murram free from all vegetable matter, clay or other deleterious substances and obtained from an approved source.

The murram sub-base shall be 150mm, Thick (finished) laid in two layers to the required compaction as described herein to form on completion a firm dense surface.

The material shall meet the following specification: -

- (i) Maximum size 63mm
- (ii) Plasticity index maximum 15%
- (iii) CBR at 95% MDD [AASHTO T180] and 4 days soak minimum 30%

B. HAND PACKED STONE BASE MATERIAL

The rock from which the stone and screenings are to be produced shall comply with the following:-

- ACV: not greater than 40%
- LAA: not greater than 60%
- SSS: loss on 5 cycles to be not more than 12%

The stones shall be free from an excess of flat or elongated particles, soft and less durable rock, clays, loam, top soil and other deleterious matter. The larger stones shall have a maximum dimension slightly greater than the thickness of the required compacted layer and be of a shape acceptable to the Engineer. The smaller stones shall have a reasonably uniform grading and be of a nominal size suitable, in the opinion of the Engineer, for filling the surface voids of the as placed larger stones. The nominal size will be of the order of 50 mm (2").

The screenings shall consist of tough durable crushed rock, free from an excess of flat, elongated, soft or disintegrated pieces and harmful material, such as loam, clay, organic matter, or other deleterious substances and shall be to the Engineer's approval. The grading of the screenings shall form a smooth curve and shall be within, and approximately parallel to, the following grading limits: -

BS Sieve Size	Percentage by Weight Passing BS Sieves
3/8 "	100
3/16"	85 – 100
No. 36	30 – 50
No. 100	10 – 30
No. 200	0 – 20

Sandy soil which may, with the approval of the Engineer, be added to the screenings or used in lieu of the screenings, shall comply with the following requirements:-

- (i) It shall consist mainly of sand sizes and have a reasonable smooth grading.
- (ii) The fraction passing No. 200 sieve shall be less than half the weight passing No. 36 sieve.
- (iii) PI shall not be greater than 5%.

STOCKPILING MATERIAL

The site of the stockpile shall be levelled, graded and drained, all vegetation removed and if necessary, the area shall be surfaced with murrum or other material as directed by the Engineer. Each category of material shall be stockpiled separately and not intermingled with each other or any other material.

PLACEMENT OF STONE FOR HANDPACKED STONE BASE

On the prepared area, the pitching stone shall first be laid, each individual stone being positioned by hand, closely packed with the greatest dimension vertical, and the largest and flattest and downwards. The majority of the stones will be slightly higher than the final thickness of layer required. When an area has been covered in this way a second placing of stones of smaller size, keystone, shall be positioned in the spaces between those first placed and shall be wedged home by hammering. The points of pitching stone projecting beyond the required height shall then be knapped, and a third placing of stone shall follow the second and so on until in the opinion of the Engineer the voids are sufficiently filled to permit compaction. No handpicked stone layer of greater compaction thickness than 230 mm shall be laid.

COMPACTION AND SLUSHING

After placement of the stone in the specified manner the material shall be initially compacted with a heavy smooth steel-wheeled roller, weighing not less than 12 tonne and/or vibratory roller, and shall continue until the layer is thoroughly keyed, showing virtually no movement under or ahead of the roller.

All rolling shall be longitudinal and shall commence at the outer edges of the road, and progress towards the centre of the road except that on super-elevated curves, rolling may progress from the lower to the higher edge.

The irregularities that may show up during compaction shall be corrected by loosening the surface removing or adding material as may be required, and recompacting.

After the stone has been rolled and keyed, binder material, where necessary, shall be spread dry in thin layers and broomed into the interstices and dry rolling continued with approved vibratory and smooth swivel-wheeled rollers until no more binding material will go in.

The layer shall then be saturated with water slashed and compacted with a smooth-steel-wheeled roller weighing not less than 12 tonnes. This rolling and slashing, with the addition of more binder material where necessary shall continue until all surface voids are filled and there is no visible movement under the roller.

All surplus fines shall be brushed off to expose a closely knit compact mosaic of stones as the finished surface of the layer.

TOLERANCES FOR HANDPACKED STONE BASE

The following tolerances shall apply to the hand packed stone base course:-

Thickness	3m Straight Edge	Width
+ 10 mm - 0 mm	+ 6 mm - 6 mm	+ 150 mm - 0 mm

**MEASUREMENT AND PAYMENT FOR HANDPACKED
STONE BASE**

The hand packed stone base material will be paid for per cubic metre of material measured in place upon the road. The volume of material shall be calculated as the product of the compacted thickness specified or ordered by the Engineer and the net area requiring to be laid. The rate shall be the full inclusive price for providing spreading and compacting the material.

A. PRIMING COAT

The priming coat shall consist of Grade MC 30. Medium curing cutback bitumen or emulsion as directed by the Engineer.

Priming shall not commence until all loose fines, superficial films and foreign material have been removed from the surface of the base by sweeping with mechanical or hard hand broom. The prepared base shall be watered, if necessary, in order to ensure that the surface is damp when the prime coat is being applied. Care shall be taken not to cause free water to lie on the surface.

On the properly cleaned and prepared base, the MC 30 cut back bitumen shall be applied at a temperature of 43°C, and at a rate of 1 litre per square metre by means of a pressure distributor. The prime coat shall be applied over the full width of the base and shall be left undisturbed for a period of not less than two (2) days and preferably until complete absorption has taken place and the applied prime coat has dried off thoroughly. Any excess prime remaining on the surface shall be blotted with crusher fines or sand.

After the primer has been applied the surface of the base shall be checked for smoothness and accuracy of elevation, grade and cross-section and any irregularities or inaccuracies shall be corrected by filling in or surfacing with premixed bituminous material and compacting until specified requirements are obtained to the satisfaction of the Architect, all at the Contractor's expense.

PREMIX SURFACING

A. PREMIX WEARING COURSE

- .01 The Term "Premix" shall mean mixture of dried, hot aggregate of pre-determined grading and hot straight run bitumen in pre-determined quantity to give adequate strength and stability and shall apply both to the mix and the compacted layer on the road.
- .02 The actual quantity of binder and the aggregate used in various proportions shall be determined by laboratory tests and trial mixes.
- .03 The Contractor shall be responsible for the design of the mix and shall provide the design information to the Engineer together with sample sections on the site based on the designed proportions of the aggregate and binder to the Engineer's approval.
- .04 Once the design mix has been approved it shall not be varied by the Contractor without written authority of the Engineer.
- .05 Notwithstanding the Engineer's approval the Contractor shall be responsible for compliance with the provisions of this Specification.
- .06 The Materials used shall comply with the following requirements: -

.01 BITUMEN GRADE 80/100

.02 COARSE AGGREGATE

- .01 Los Angeles Abrasion – Max. 35
- .02 Aggregate Crushing Value – Max 28
- .03 Sodium Sulphate Soundness – Max 12

.03 FINE AGGREGATE

- .01 Sand equivalent min. 40.
- .02 Sodium Sulphate Soundness max 12.

.04 MINERAL FILLER

- .01 Shall be cement, lime, limestone or other mineral matter and shall be NON-PLASTIC

.05 GRADING

- .01 Passing 0.425mm 100%
.02 Passing 0.075mm 75%

.06 GRADING

The mix grading shall comply with the table below:-

Sieve Size	Percentage by Weight Passing
14	100
10	90 – 100
6.3	62 – 92
4	50 – 80
2	35 – 65
1	25 – 50
0.425	14 – 33
0.300	11 – 27
0.150	6 – 17
0.075	3 – 8

.07 PREMIX WEARING COURSE

- .07 Asphalt Mix

The mix shall comply with the following table: -

Test	Result Required
.01 Crushing Ratio	60 – 100%
.02 Marshall Stability (N) (Test ASTM, D 1559)	5000 – 9000
.03 Flow (mm)	2 – 5
.04 Voids in total mix (%)	3 – 5

.08 Mixing shall be carried out in an approved stationary plant at controlled temperatures (125-165°C) as follows:-

.01 The materials shall be mixed in such a manner that on discharge from the mixer the mixture is uniform in composition and all particles of the aggregate are completely coated. The mixing time shall be the minimum to ensure such coating and shall not exceed 90 secs. From the addition of the bitumen.

.09 When permitted by the Engineer, soil binder material may be added to screenings or used in lieu of screenings, provided it complies with the following requirements:-

.01 The fraction passing BS sieve No. 200 shall be less than half that passing No. 36 sieve.
.02 The plasticity index shall be not greater than 8 and preferably not greater than 5.

.10 **MURRAM (GRAVEL) FOR SUB-BASE MATERIAL**

.01 Where murram is specified for sub-base construction, naturally occurring lateritic gravel or decomposed stone and coral shall be used. The material may be in either a loose or cemented to an acceptable size on the roadbed during consolidation. The proportion of clay in the material must not be excessive and test results for the grading of the material and the Attenburg Limits must be produced by the Contractor prior to any material being delivered to site.

A. MANUFACTURE AND LAYING

The premix shall be manufactured in an approved plant and shall, where required by the Architect be laid by means of an approved paving machine such as a Bylaw-Knox or Barber-Green type paver, or otherwise shall be laid in an approved manner.

B. BITUMEN

The bitumen used in the premix shall be straight-run bitumen as follows: -

Base Course	-	80 - 100 Penetration
Wearing Course	-	80 - 100 Penetration

The bitumen shall be from an approved source delivered in sealed drums and opened with care to ensure cleanliness.

.10 BITUMEN AND BITUMEN EMULSIONS

.01 Before any bitumen or bitumen emulsion is delivered to the site, the Contractor shall provide the Engineer with a certificate from the manufacturer that the material to be supplied complies in all respects to the relevant specification given or referred to hereinafter.

.02 Any bitumen or bitumen emulsion delivered in leaking containers or deteriorated containers may be rejected. The types of bitumen binders required will normally be as follows:-

.01 Prime Coat

On stone base course	(R.C. 30 or MC 30)
On stabilized base course	(Alternatively R.C. Or MC 1)

TRADE PREAMBLES

A. AGGREGATE

The aggregate shall be blackstrap, hard, dense stone free from dust, impurities or a mixture of softer stone. Before commencing manufacture the Contractor must submit to the Architect samples of all sizes of stone he proposes to use and these, when approved, shall form the standard for the work. If the samples are rejected, the Contractor shall be responsible for providing samples from alternative sources.

B. BASE COURSE

The base course premix shall be of the specified thickness after consolidation of crushed blackstrap aggregate with 80 – 100 penetration straight run bitumen and approved filler.

The grading shall comply with Table 2 of B.S. 1621. The soluble bitumen binder minimum shall be raised from 3.0% to 3.5%.

C. WEARING COURSE

The wearing course premix shall be of the specified thickness after consolidation of crushed black trap aggregate with 80 – 100 penetration straight run bitumen and approved filler.

The grading complies with Table 5 of B.S. 1621.

The finish surface shall be to the required gradients and cambers and shall be well rolled and neatly finished off at all curbs, walls, drainage galleys etc., to the approval of the Architect.

D. CONCRETE KERBS

The rates entered by the Tenderer in Bills of Quantities for the provision and placing of precast concrete kerbs shall include for all necessary concrete bedding and haunching, and all necessary shuttering all in accordance with the specification and the drawings.

Concrete kerbs shall comply with B.S. 340 (Figure 7) for 250 x 125mm splayed, plain or circled kerbs.

TRADE PREAMBLES

Kerbs will be set on concrete (1:3:6) foundations size 225mm wide x 100mm thick and a 100mm thick x 200mm high haunching behind.

Kerbs to be bedded, jointed and pointed in cement mortar (1:3) and to be laid true to line, perfectly level or to even gradients and to be free from all chips, cracks, blemishes and cement stains at joints.

A. WORKMANSHIP

Excavation in Trench for Pipe Culverts, Headwalls and Wing walls

- .01 Trenches for culverts, headwalls, wing walls shall be excavated to line and depths shown on the drawings or as directed by the Engineer and shall be of sufficient width to give working clearance in the trench but for the purpose of measurement and payment, the width of the trench shall be taken as 1.5D where D is the outside measurement of the pipe. Backfilling of trenches around culverts shall be done to a density of 100% BS Compaction. Excavation for inlet and outfall drains, catch water drains and trench or subsoil drains shall be to the dimensions ordered by the Engineer.

B. GROUTED STONE PITCHING

- .01 The stones used for the grouted pitching shall be hard angular rock, roughly cubical in shape and of dimensions such that they can be laid with a minimum thickness equal to that specified.
- .02 The interstices of the grouted pitching shall not be filled with fill material but may be choked with large rock spalls. The pitching shall be thoroughly soaked with water and grout of 1:4 cement: sand mortar shall be rammed into the interstices and smoothed off flush with the pitched face.
- .03 Grouted pitching to embankments and around structures shall be constructed as soon as possible after the embankments have been built. The surface of the filling to receive the pitching shall be compacted and trimmed to slope and the stone hand laid interlocked and rammed.

CONCRETE PAVING BLOCK

A. SCOPE

Concrete paving blocks shall comply with the requirements of the Specification for precast concrete paving blocks published jointly by the Cement and Concrete Association, the County Surveyor's Society and Interpave, September 190 (or as amended by subsequent British Standards).

B. CONSTRUCTIONAL DETAILS

LAYING PATTERN

The laying pattern shall be that specified for vehicular traffic or the herringbone type.

SURFACE LEVELS OF PAVEMENTS

The following levels shall apply to the various layers of concrete block pavements.

Layer	Tolerance
Formation	+20 mm – 30 mm
Sub-base	+20 mm
Road base (where required)	+15 mm
Pavement Surface (except adjacent to gullies)	+6 mm

Surface levels of Paving Blocks Adjacent to Drainage Installations

The surface levels of paving blocks immediately adjacent to gullies, surface drainage channels and outlets shall not deviate from the design level by more than +6mm, -0mm and on the upper level of drainage installation +0mm, -10mm.

C. DEVIATION FROM DESIGN PROFILE

The deviation from the design profile measured under a 3m straight edge shall not exceed 10 mm.

A. LEVELS OF ADJACENT BLOCKS

Levels of any two adjacent blocks shall not differ by more than 2 mm.

B. CROSSFALLS AND GRADIENTS

A minimum cross fall of 2.5% shall be adopted where practicable. Longitudinal gradients shall not be less than 1%.

C. PAVEMENT CONSTRUCTION

Preparation of Sub-grade

The sub grade shall be prepared to the required formation and shall be sufficiently wide to extend to the near face of the proposed edge restraint and around existing structures. The sub-grade shall be drained and protected against inundation and ground water by piped or channelled storm water drainage and sub soil drainage. All drainage works located beneath the

Pavement shall be completed in conjunction with sub-grade preparation before commencement of sub-base construction. Any unsuitable material shall be removed from the sub-grade and treated or replaced with suitable material properly compacted.

D. PREPARATION OF SUB-BASE

New Sub-base

Sub-bases shall be constructed by following construction requirements and using one or other of the materials complying with Department of Transport Specification for Road and Bridge Works as listed below: -

- Granular sub-base materials type 1
- Soil-Cement
- Cement-bound granular material
- Lean Concrete
- Wet mix macadam
- Wet lean concrete.

When no road base is to be laid, the surface of the sub-base shall be close-knit to prevent laying course material from sinking.

A. EXISTING SUB-BASE

Where an existing sub-base is to be used, it shall be inspected to ensure that it is suitable for the purpose. Any unsuitable material shall be removed and replaced by sub-base material complying with the requirements of Clause 1201.2.1.

B. PREPARATION OF ROAD-BASE

When a road base is required, it shall be formed with materials described in the Department of Transport Specification for Road and Bridge Works and constructed in accordance with that Specification, e.g.

Soil-cement
Cement bound granular material
Lean concrete
Wet mix macadam
Wet lean concrete

C. LAYING COURSE MATERIAL

The laying course shall be of uniform thickness and shall be made up of naturally occurring sand or crushed rock fines. The material shall be free from deleterious salts or contaminants. The grading shall be within and approximately parallel to the following grading limits.

BS Sieve Size	Percentage of Weight Passing
5.00 mm	90 – 100
2.36 mm	75 – 100
1.18 mm	55 – 90
0.60 mm	35 – 59
0.30 mm	8 – 30
0.15 mm	0 – 10

D. MOISTURE CONTENT OF LAYING COURSE

The moisture content of the laying course material shall not deviate by more than 1% from its optimum moisture content as determined in accordance with test 12 of BS 1377.

A. SCREEDING THE LAYING COURSE

The laying course shall be such that after compaction it forms a uniform layer 25 mm below the blocks. It may be screed in accordance with the following two methods:-

Either

- (a) The material shall be spread loose in a uniform layer and screed to a thickness required to give a nominal 25 mm layer after completion of the paving.

Or

The material shall be spread in loose uncompacted layer approximately two thirds of the required final thickness. This layer shall be lightly compacted by means of a vibrating plate compactor. A further layer of loose material shall be spread and screeded to create a loose surface on to which the blocks can be placed.

Where closer tolerance than those quoted in Clause 1201.2 for the level of the sub-base materials have been achieved, or road base has been used, a thinner laying course can be used.

SURFACE COURSE

B. EDGE RESTRAINTS

Edge Restraints shall be provided along the perimeter of all paved areas and shall be adequate to support traffic loads and to prevent the escape of laying course material from beneath the paved surface. Edge restraints shall be formed before compacting adjacent blocks and the restraint together with any concrete haunching shall be mature before vibration of the surface course is undertaken. Haunching to an edge restraint on the paving face shall be vertical down to the level of the underside of the laying course.

(A) LAYING BLOCK PAVING

The blocks shall be laid hand-tight in the design pattern working from an existing laying face edge or edge restraint wherever possible. Mechanical forces shall not be used to obtain tight joints. Block shapes designed to assist with formation of boundaries and with changes in direction may be incorporated as appropriate. Full blocks shall be laid first; closure units shall then be laid. The area to be laid shall be completed as far as it is possible in entire block units. Infilling to boundaries and obstructions shall proceed as the laying of the surface course proceeds and in any case, infilling shall be completed before compaction commences.

PLUMBING AND DRAINAGE SPECIFICATION

A. GENERAL

This section specifies the general requirements for plant, equipment, and materials.

B. AUTHORITATIVE STANDARDS AND CODES OF PRACTICE

The authoritative standard referred to in this Specification are B.S or B.S codes of practice. Should the contractor wish to substitute any other authoritative standard or code of practice for any referred to in the specification, he must submit details of any such standard or code of practice with two copies of the document for approval by the Architect. Approval will only be given to use an alternative standard or code of practice if the Architect considers the proposed standard or code of practice will produce work of a standard equal or better than that of the specified standard or code of practice.

The whole of the plumbing works is to be executed by a registered plumber and drain layer in strict accordance with the Regulations of the Local Authorities and to the satisfaction of the Architect.

C. MATERIALS GALVANIZED STEEL PIPEWORK

Galvanized steel pipe work shall be manufactured to comply in all respects with the standards described for black steel pipe work.

Galvanizing shall be carried out in accordance with the requirements of B.S.1387 and BS.143 respectively.

D. COPPER TUBING

All copper tubing shall be manufactured in accordance with B.S.2871 from C.160 'Phosphorus De-oxidized Non-arsenical Copper' in accordance with B.S.1172.

Pipe joints shall be made with soldered capillary fittings and connections to equipment shall be with compression fittings manufactured in accordance with B.S.864.

PLUMBING AND DRAINAGE (CONT'D)

Short copper connections tubes between galvanized pipe work and sanitary fittings shall not be used because of the risk of galvanic action.

If, as may occur in certain circumstances, it is not possible to make the connections in any other way than by the use of copper tubing, then a brass straight connector shall be positioned between the galvanized pipe and the copper tube in order to prevent direct contact.

A. CAST IRON PIPEWORK

Internal iron pipe work and fittings for use above ground in connection with internal buildings services, shall be manufactured with spigot and socket joints of the weight required by the Local Authority and shall comply fully with the requirements of B.S 416.

All joints on cast iron spigot and socket pipes shall be made with an approved cold caulking compound and contraction which may take place.

All cast iron pipe work, branches, tees, bends and other fittings shall be supplied complete with inspection covers for cleaning purposes. These inspection covers shall be included as part of the fittings and shall comply with the requirements of B.S 416.

B. EXTERNAL SERVICES

Cast iron pipe work which is used in connection with buried external services, shall be manufactured, coated and tested in accordance with the requirements of B.S 1211.

All buried cast iron bends, elbows swept tees and other fittings, and shall comply with the requirements of B.S.1130.

Jointing on external cast iron pipes shall be carried out in accordance with one of the methods described in B.S Code of Practice 301, Clause 505c (v) to the approval of the Engineer.

PLUMBING AND DRAINAGE (CONT'D)

A. CONCRETE PIPE

Where concrete pipe and fittings are used in connection with the conveyance of surface water or sewage under atmospheric pressure, they shall be manufactured in accordance with the requirements of B.S 556 Class 1 except where otherwise stated.

The joints of concrete pipe and fittings may be one of the following depending upon application and conditions:

1. Flexible spigot and socket type
2. Flexible rebated type (storm water drainage only)
3. Ordinary spigot and socket type
4. Ordinary rebated type (storm water drainage only)

Joints (1) and (2) shall be sealed with suitable rubber gaskets manufactured in accordance with B.S 2494 except where they are likely to be contaminated by oil products in which case the gaskets shall be manufactured in accordance with B.S 3514. Joints (3) and (4) shall be made with an approved cement mortar mix.

B. P.V.C (HEAD) PRESSURE PIPE AND FITTINGS

All PVC pipes and fittings shall be manufactured in accordance with B.S 3505 1968.

C. JOINTING

The method of jointing to be employed shall be that of Solvent Welding, using the pipe and manufacturers approved cement. Seal ring joints shall be introduced where it is necessary to accommodate thermal expansion.

PLUMBING AND DRAINAGE (CONT'D)

A. ANCHORING

All bends, valves and hydrant tees etc., in the line of the water main shall be adequately anchored to resist thrust due to internal water pressure. A concrete block shall be cast under and around the pipe and between it and sides of the trench. Well rammed material shall be used to support the pipe and either side of the concrete.

B. PIPE BED

Pipe shall be uniformly laid on a 75mm thick bed, (the full width of trench) of fine grained material (sand or red soil) and must not be allowed to rest on the joint or on stones etc.

C. SUPPORTS TO FITTINGS

In underground installations care shall be taken to ensure that heavy components such as valves are fully supported so that no weight is carried by the pipeline.

D. BACKFILLING

For the protection of the pipe initial backfilling shall be carried out as soon as possible after laying.

The initial backfill shall be fine grained material thoroughly compacted around the pipe and consolidated to a depth of 6" above the crown of the pipe at no time shall heavy rocks, stones or other objects be included in the balance of the backfill that might protrude through the initial backfill layer and come into contact with the pipe.

E. TESTING

Pipelines shall be tested in sections under the internal water pressure – normally one and half times the maximum allowable working pressure for the class of pipe used. Testing shall be carried out as soon as practicable after laying and when the pipeline is adequately anchored. Precautions shall be taken to eliminate all air from the test section and to fill the pipeline slowly to avoid risk of damage due to surge.

PLUMBING AND DRAINAGE (CONT'D)

VALVES

A. DRAW-OFF TAPS AND STOP VALVES (UP TO 50MM NOMINAL BORE)

Draw off taps and valves up to 50mm nominal bore, unless otherwise stated or specified, for attachment or connection to sanitary fittings shall be manufactured in accordance with the requirements of B.S.1010.

B. GATE VALVES

All gate valves 80mm nominal bore and above, other than those required for fitting to buried water mains shall be of cast iron construction, in accordance with the requirement of B.S 3464. All gate valves required for fitting to buried water mains shall be of cast iron construction in accordance with the requirements of B.S.1218.

All gate valves up to and including 65mm nominal bore shall be of bronze construction in accordance with the requirements of B.S 1952.

The pressure classification of all gate valves shall depend upon the pressure conditions pertaining to the Site of Works.

C. GLOBE VALVES

All globe valves up to and including 65mm nominal bore shall be of bronze construction with the requirements of B.S 3961.

The pressure classification of all globe valves shall depend upon the pressure conditions pertaining to the Site of Works.

D. CHECK OR NON-RETURN VALVES

All check or non-return valves 80mm nominal bore and above shall be of the swing check type of cast iron construction in accordance with the requirements of B.S 4090.

The pressure classification of all check or non-return valve shall depend upon the pressure conditions pertaining to the Site of the works.

PLUMBING AND DRAINAGE (CONT'D)

A. BALL VALVES

All ball valves for use in connection with hot and cold-water services shall be of the ports mount type in accordance with the requirements of B.S 1212, constructed from bronze or other corrosion resistant materials. These valves fall into three pressure classifications as follows:

- | | | | |
|-------|-----------------|---|-----------------|
| (i) | Low Pressure | - | 3.58 b maximum |
| (ii) | Medium Pressure | - | 7.72 b maximum |
| (iii) | High Pressure | - | 12.62 b maximum |

The pressure classification required for each ball valve will be designated in the description of its associated equipment contained in section IV of the Specification.

B MANUALLY OPERATED MIXING VALVES

Mixing valves for shower fittings and other appliances being provided under the Sub-Contract Works shall be manufactured in accordance with the requirements of B.S. 1415 from bronze or other corrosion resistant materials.

WASTE FITMENT TRAPS

C. STANDARD AND DEEP SEAL P & S TRAPS

Where standard or deep traps are specified, they shall be manufactured in suitable non-ferrous materials in accordance with the full requirements of B.S 1184.

In certain circumstances, cast iron traps may be required for cast iron baths and in these instances bath traps shall be provided which are manufactured in accordance with the full requirements of B.S 1291.

D. ANTI SYPHON TRAPS

Where anti-syphon traps are specified, these shall be similar or equal to the range of traps manufactured by Terrain – their self-resealing traps or by Marley Extrusions Ltd. – their Anti-syphon Traps.

PLUMBING AND DRAINAGE (CONT'D)

PIPE SUPPORTS

A. GENERAL

This Sub-Clause deals with pipe supports securing pipes to the structure of buildings for above ground application.

The variety and type of supports shall be kept to a minimum and their design shall as such as to facilitate quick and secure fixing to metal, concrete, masonry or wood.

Consideration shall be given when designing supports, to the maintenance of desired pipe falls and the restraining or pipe movement to a longitudinal axial direction only.

The Sub-Contractor shall supply and install all steelwork forming part of the pipe support assemblies and shall be responsible for making good any damage to builders work associated with the pipe support installation.

The Sub-Contractor shall submit all his proposals for pipe supports to the Engineer for approval before any erection work commences.

B. STEEL AND COPPER PIPES AND TUBES

Pipe runs shall be secured by pipe clips connected to pipe hangers, wall brackets, or trapeze type supports. 'U' bolts shall not be used as a substitute for pipe clips without the prior approval of the Engineer. An approximate guide to the maximum permissible supports spacings in metres for steel and copper pipe and tube is given in the following table for horizontal runs.

PLUMBING AND DRAINAGE (CONT'D)

SIZE MINIMAL BORES	COPPER TUBE TO B.S 659	STEEL TUBE TO B.S. 1237
15mm	1.25m	2.0m
20mm	2.0m	2.5m
25mm	2.0m	3.0m
40mm	2.5m	3.0m
50mm	2.5m	3.5m
65mm	3.0m	3.5m
80mm	3.0m	3.5m
100mm	3.0m	4.0m
125mm	3.0m	4.5m
150mm	3.5m	4.5m

The support spacing for vertical runs shall not exceed one and a half times the distances for horizontal runs.

A. EXPANSION JOINTS AND ANCHORS

Where practicable, cold pipe work systems shall be arranged with sufficient bends and changes of direction to absorb pipe expansion providing that the pipe stresses are contained within the limits prescribed in the relevant B.S. Specification.

The Sub-Contractor shall pay particular care when supporting cast iron and asbestos cement pipes in order to ensure that settlement and building movement do not break the pipe joints.

Where piping anchors are supplied, they shall be fixed to the main structure only. Details of all anchor design proposals shall be submitted to the Engineer for approval before erection commences.

The Sub-Contractor when arranging his piping shall ensure that no expansion movements being transmitted from pumps to piping systems or vice versa.

PLUMBING AND DRAINAGE (CONT'D)

A. JOINTING PIPES

Joints shall be made strictly in accordance with the manufacturer's instructions. The Sub-Contractor shall make use of the technical advisory services offered by manufacturers for instructing pipe jointers in the methods of assembling joints.

Where manufacturers recommend the use of special jointing tackles, the Sub-Contractor shall use these for the assembly of all joints to pipes. Sockets shall be laid looking uphill unless otherwise approved.

Before making any joints, all jointing surfaces shall be thoroughly cleaned and dried and maintained in such condition until the joints have been completely made or assembled. Notwithstanding any flexibility provided in the pipe joints, pipes must be securely positioned to prevent avoidable movement during and after the making of the joint.

The space between the end of the spigot and the shoulders of the socket of flexibility jointed piped when jointed shall be as recommended by the manufacturer or order by the Engineer.

After flexibly jointed pipes, other than PVC pipes have been jointed the gaps between the barrel of the pipes and internal face of the socket shall be sealed with puddle clay, rope yarn or other approved material. The rope yarn or other material must have been treated so as not to support bacterial growth.

Where loose collars are used to join the pipes cut for closers, special tools shall be employed to keep the inside of the pipes flush and the collar concentric with the pipe while the joint is being made.

Pipes provided with spigot and socket joints of the self-centering, instantaneous joint type, such as the rubber ring push fit joint, shall be laid and jointed strictly in accordance with the maker's instructions. Generally, the joint ring shall be cleaned and inspected for cuts and defects, and socket and spigot examined to ensure freedom from oil, grease, tar and grit. The makers recommended lubricant will be used.

PLUMBING AND DRAINAGE (CONT'D)

B. SOLVENT WELDED JOINTS

Only the solvent cement recommended by the manufacturer for his pipe joint system shall be used and his instruction on the making of the joint shall be closely followed.

Excess solvent cement shall not be applied to the insides of the pipe socket and all surplus solvent shall be removed from the joint and the pipe.

Any solvent falling on the trench formation shall be removed by excavating the contaminated soil.

Solvent welded pipes jointed outside the trench shall not be lowered into the place until the elapse of time recommended by the manufacturer. The time allowed for curing shall be increased with lower temperatures.

A. CONNECTION OF TUBING TO STORAGE TANKS, HOT WATER CYLINDERS AND SANITARY FITTINGS

Each connection of tubing to cold water storage tanks shall be made by drilling a hole in the tank side and using a long screw, union and two back nuts all well screwed up in red lead. Joints of tubing to flanged and bossed connections of hot water cylinders shall be made with a boiler screw, union and back nut screwed up in red lead.

Connections to sanitary fittings shall be made with 450mm lengths of copper tubing bent to shape as required with copper to iron couplings at each end, and red lead joint to joint union of fittings and tubing.

All sanitary-ware fittings shall be left in a clean and good condition to the satisfaction of the Engineer.

All fittings shall be fixed in accordance with the manufacturer's instructions and shall comply with the general requirements of B.S Code of Practice 305 and the Particular requirements of the latest applicable B.S Specification.

Lavatory basin brackets shall be cut and pinned to walls in cement mortar including making good rendering, tiling or plastering etc.

PLUMBING AND DRAINAGE (CONT'D)

B. PIPE SLEEVES

Main runs of pipe work are to be fitted with sleeves where they pass through walls and floors. Generally, the sleeves shall be of P.V.C except where they pass through the structure, where they shall be mild steel. The sleeves shall have 6mm – 12mm clearance all around the pipe, or for insulated pipe work all around the insulation. The sleeve will then be packed with slag wood or similar.

C. CUTTING PIPES

Iron pipes shall be cut by a method and with apparatus which provides a clean square cut of the pipe and of the lining, if any, without damage to pipe or lining.

All cut or trimmed ends, and the parts of any pipe on which the coating may have suffered damage shall be recoated with bitumen before the pipes are laid. The external area at cut spigot ends of ductile iron pipes shall be ground for a distance of at least 125mm.

Asbestos-cement pipes shall be cut by hacksaw or other approved means to a square and even finish without splitting or fracturing the wall of the pipe. A percentage of the pipes ordered shall be supplied with fully turned barrels and these pipes will be set aside for use in cutting specific lengths. When no fully turned pipes are available a hand operated turning machine shall be used to prepare the ends of cut pipes for Johnson Couplings, barrel joints or collar joints.

Pitch-impregnated fibre pipes shall be cut by saw and where necessary the end shall be filled or machined to the required 2 degrees taper.

Concrete pipes shall be cut to a square and even finish without splitting or fracturing the wall of the pipe. Reinforcement shall be cut back flush with the concrete and bare metal protected with bituminous paint or cement grout as directed.

Only steel pipes supplied rounded throughout their length shall be used as cut pipes to form closures. The cutting shall be done by an approved method and apparatus which provides a clean square cut, without separation of the lining from the pipe wall. Minor damage to the lining may, if permitted be repaired on site in accordance with the manufacturer's instructions. Where in the opinion of the Engineer the damage is serious the pipe or special shall be returned to the manufacturer for reconditioning.

PLUMBING AND DRAINAGE (CONT'D)

A. PIPES BUILT INTO STRUCTURES

The outside surface of all pipes and special castings to be built into structures shall be thoroughly cleaned immediately before installation. Where ordered protective coatings to metal pipes shall be removed from the sections to be built in, while the external surfaces of fireclay and concrete pipes shall be roughened to form a key or concrete or mortar. Sheathing to steel pipes shall be cut away from the sections to be built-in and after erection the protection shall be completed by applying approved bituminous material around the barrels of pipes at the junctions with structures.

Pipes passing through water retaining walls and floors shall, where possible, be built into the structure in-situ. Shuttering shall be formed closely to the outside of the pipes, and concrete shall be placed and compacted thoroughly round pipe and puddle flange, if any.

Where fixing in the course of construction if not possible, temporary opening in structures, formed to the dimensions shown by the Engineer shall be left where indicated or directed to accommodate the subsequent erection of pipes and special castings. In water retaining structures, they shall taper to a smaller dimension towards the external faces of structures and shall include where indicated a water stop. In basements, dry chambers at pumping stations etc., temporary openings shall taper to a smaller dimension towards the internal faces of structures and shall also include, where indicated a water stop. Prior to in-filling, all surfaces against which fresh concrete is to be placed shall be prepared as specified, while the external surfaces of pipe work shall be prepared as described in this clause.

B. SETTING VALVES

Care must be taken to prevent damage to all valves, fire hydrants and the like, and their ancillary equipment. Valves etc. and ancillary apparatus shall be stored in clean conditions and in a manner that excludes all water. Where directed, head-stock, motors, gearing or indicators shall be removed, adequately labelled for identification, stored carefully in weather-proof premises and be reconnected after erection of the valves. Frost cocks shall be kept clean and free from obstruction. Electrical equipment shall be protected from damp and the damp-proofing seals shall remain intact until the electrician is ready to connect up the equipment.

PLUMBING AND DRAINAGE (CONT'D)

The gun metal faces, and seats of all valves must be kept clean. No valve shall be closed without first wiping the faces with a clean cloth. The cavity beneath the valve door shall be thoroughly cleaned by hand. In the event of accident, fouling matter shall be either dissolved or carefully removed by methods that do not involve scraping or gunmetal faces.

All valves shall be set so that operating spindles are truly vertical unless otherwise detailed or directed.

Every stuffing box shall be examined when the main is charged with water and leaking boxes shall be adjusted or replaced with square plaited lubricated hemp packing or approved manufacture. The stuffing box shall not be so tightly packed as to materially affect the friction of the packing on the spindle.

No air valve shall be stored before erection in the open in sunlight, or upside down to expose the balls and air cavities. Air valves shall be checked before the main is charged to ensure that the balls and faces are not scored or split and that there are no direct or other deleterious materials in the cavities of the body. All air nozzles shall be probed to see that they are clean.

Fire hydrants, frost plugs and similar fittings shall be checked before being incorporated in the line and before the main is charged to ensure that all passageways are clean.

The installation of special types of valve and metering equipment must be strictly in accordance with the manufacturer's instructions.

The direction of opening of the valve shall be indicated on the headstock and on the underside of hydrant covers.

INSTALLATION

A. GENERAL

Installation of all pipe work, valves, fittings and equipment shall be carried out under adequate supervision from skilled staff to the relevant codes and standards as specified herein. The Sub-Contractor shall be responsible to the Main Contractor for ensuring that all builders work associated with his piping installation is carried out in a satisfactory manner to the approval of the Engineer.

PLUMBING AND DRAINAGE (CONT'D)

ABOVE GROUND INSTALLATION

A. WATER SERVICES

Before any joint is made, the pipes shall be hung in their supports and adjusted to ensure that the joining faces are parallel and any falls which shall be required are achieved without springing the pipe.

Where falls are not shown on the Contract Drawings or stated elsewhere in the specification, pipe work shall be installed parallel to the lines of the buildings and as close to the walls, ceilings, columns etc., as is practicable.

All water systems shall be provided with sufficient drain points and automatic air vents to enable them to function correctly. Valves and other user equipment shall be installed with adequate access for operation and maintenance where valves and other operational equipment are unavoidably installed beyond normal reach or in such position as to be difficult to reach from a short step ladder, extension spindles with floor or wall pedestals shall be provided.

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

Full screwed joints to piping and fittings shall be made with P.T.F.E Tape in accordance with B.S 4375.

The test pressure shall be maintained by the pump for about one hour and if there is any leakage, it shall be measured by the quantity of water pumped into the main in that time. A general leakage of one gallon per 25mm of diameter, per 1.6 kilometres per 24 hours per 30 metres head, may be considered reasonable but any visible individual leak shall be repaired.

A. SANITARY SERVICES

Soil, waste and vent pipe systems shall be installed in accordance with the best standards of modern practice as described in B.S. 5572 to the approval of the Engineer.

The Sub-Contractor shall be responsible for ensuring that all ground floor waste fittings are discharged to a gulley trap before passing to the sewer via a manhole.

The Sub-Contractor shall provide all necessary roding and inspecting facilities within the draining system in position where easy accessibility is available.

Where a branch requires roding facilities in a position to which normal access is unobtainable, then that branch shall be extended so as to provide a suitable purpose made roding eye in the nearest adjacent wall or floor to which easy access is available.

The vent stacks shall terminate above roof level and where stack passes through roof, a weather skirt shall be provided. The Sub-Contractor shall be responsible for sealing the roof after installation of the stacks.

The open end of each stack shall be fitted with plastic coated or galvanized steel, wire guard.

Access for roding and testing shall be provided at the foot of each stack.

B. SANITARY APPLIANCES

All sanitary appliances associated with the Sub-Contract Works shall be installed in accordance with the best standard of modern practice as described in C.P 305 to the approval of the Engineer.

UNDERGROUND INSTALLATION

A. GENERAL

All underground water and drainage service installation shall be installed in accordance with the best standard of modern practice as described C.P. 301 and C.P 305 respectively and the following clause.

BEDDING

B. GRANULAR BEDDING MATERIAL – TYPE A

Granular bedding Type A shall comprise broken stone or gravel, crushed brick or concrete to pass a 25mm sieve and be retained on 5mm sieve thoroughly mixed with free draining coarse sand in the ratio of one part sand to two parts stone or gravel; or aggregate to B.S. 882 Table 3 or other material which in the opinion of the Engineer has similar characteristics.

Particles shall be rounded or angular but not flaky or elongated and of adequate crushing strength to produce when tested in accordance with B.S 812 a 10 percent fines value, greater than 5 tonnes.

C. SELECTED FILL – TYPE B

Type B selected fill shall be uniform readily compatible material from tree roots, vegetable matter and building rubbish. All clays lumps retained on a 75mm sieve and all stones retained on a 25mm sieve shall be excluded.

D. GRANULAR BEDDING MATERIAL – TYPE C

Granular bedding Type C shall be as Type A bedding material but with all material passing a 10mm sieve. In addition, where used to be flexible not exceeding 0.1. The **compaction factor test** shall be carried out as follows:

E. EQUIPMENT

1. An open-ended cylinder 225mm long and 150mm internal diameter, (a pitch) fibre of PVC pipe is suitable).

PLUMBING AND DRAINAGE (CONT'D)

2. A metal rammer with a skirting face 40mm diameter weighing 0.9 to 1.1 Kg.
3. A measuring rule.

A. METHOD

A representative sample more than sufficient to fill the cylinder is obtained, (about 12 kg). It is important that the moisture content of the sample should not differ significantly from that of the material from which the sample was obtained at the time of the use of the trench.

The cylinder is placed on a firm surface and the material sample poured into it loosely and without tamping. The top surface of the material is struck off level with the top of the cylinder and all surplus material removed. The cylinder is then lifted clear of its contents and placed on a clean area of the flat surface. About one quarter of the material is then placed back in the cylinder and tamped thoroughly until no further compaction can be obtained. This procedure is repeated until with the second, third and final quarter tamping each successive surface as level as possible.

The height from the material surface to the top of the cylinder is then measured with the rule and this distance divided by the height of the cylinder, (225mm), is referred to as the Compaction Factor. For each batch of material three (3) Compaction Factor Tests will be made and if the average value is greater than 0.1 then the batch of material will be deemed to be unsuitable for use as Type C bedding material. Material sufficient for the bed and surround of 200 linear metres of pipe will be considered to comprise a batch.

B. BEDDING AND SURROUND FOR CONCRETE PIPES

The material to be used for bedding and surround for concrete pipes shall not contain more than 0.3 per cent sulphate expressed as sulphur trioxide nor shall it be obtained from a site where the ground water contains more than 0.1 per sulphate.

A. FIELD OR FRENCH DRAINS

Pipes for French drains shall be either British Standard Surface pipes glazed or unglazed manufactured to B.S 65 and 540, with Type 2 sockets or plain ended supplied with sleeve couplings or Type 1 perforated socketed and sleeve coupled pipes porous concrete pipes to B.S 1194.

B. DEFINITIONS

For the purpose of underground piped services the following definitions shall apply:

- (a) Top soil shall mean the top layer of soil that can support vegetation.
- (b) Suitable material shall mean all material capable of being compacted, forming a stable fill and approved as such by the Engineer.
- (c) Unsuitable material shall mean material other than suitable material and shall include material from swamps, marshes or bogs, peat, logs, stumps, or other perishable material, clay of liquid limit exceeding 80 and/or plasticity index exceeding 55, or materials having greater moisture content than approved for use.
- (d) Rock in excavation shall mean such material which cannot be excavated by hand methods and individual solid boulders exceeding 0.2 cu.m.
- (e) 'Rigid pipes' shall mean pipes of cast or spun iron, concrete asbestos cement, clay or similar materials.
- (f) 'Flexible pipes' shall mean pipes of steel, PVC or other plastic, pitch fibre, ductile iron or similar materials.
- (g) 'Rigid joints' shall mean joints made of bolting together flanges integral with the barrels of the pipes, by welding together the barrels of the pipes, by caulking sockets with non-deformable material, such as cement mortar, run lead or by similar techniques.
- (h) 'Flexible joints' shall mean joints made with factory-made jointing materials, loose collars, rubber rings etc., and which allow some degree of flexing, however small, between adjacent pipes.

A. TYPES OF PIPE

The Contractor shall construct the pipeline using the designs of pipe, bed, haunch and surround detailed on the Drawings.

Where the Contractor wishes to use a type of pipe not manufactured in the minimum internal diameter indicated in the Contract, he may substitute the next larger diameter manufactured, subject to compliance with the design requirements, clearance and cover. The Contractor shall not use pipes and fittings supplied by more than one manufacturer without approval.

B. SETTING OUT

The Contractor shall set out the underground services to the lines shown on the Drawings. Where the service is required laid to falls these shall be set by means of proper sight rails and boning rods.

Sight rails shall be of the following minimum standard. They shall be adjustable sight rails of 150mm x 30mm wrought softwood of length 1m painted black and white as directed secured to strong uprights embedded in the ground at distances not exceeding 60 metres.

Care shall be taken to ensure that these sight rails are not obscured by spoil from the excavation.

C. EXCAVATION

The Contractor shall carry out the excavation in accordance with the Drawings and shall comply with the slopes, levels, depths and heights shown thereon.

Unless otherwise directed topsoil shall be striped, laid aside and kept separate from other excavated materials for reuse. Road bottoming and surfacing material which is approved as suitable for re-use shall be laid aside and kept separate from other excavated materials.

Where shown in the Contract or directed topsoil shall be striped over the full width of the working area before any other operation is carried out and soil deposited in dumps. On completion of the other operations the soil shall be evenly spread over the stripped surface.

PLUMBING AND DRAINAGE (CONT'D)

Excavation shall be carried out the dry and both trenches and general areas shall be kept free from water by pumping, provision of temporary drains, sumps and

Excavations shall be taken out to the least dimensions required to accommodate the service and the working space necessary for its installation subject to the following restrictions. All excavations shall be carried so that the soil beneath receives the maximum amount of disturbance.

Unless otherwise directed the overall width of pipe trench excavation from the trench bottom to a level 300mm above crown of the pipe shall be in accordance with the following table:

Table 40.1 – Pipe Trench Widths

Nominal Internal Diameter (mm)	Minimum overall Trench width (mm)	Maximum overall Trench width (mm)
100	430	630
150	500	700
200	550	750
225	580	780
300	680	880
375	950	1150
400	1000	1200
450	1330	1230
525	1120	1320
600	1240	1440
675	1330	1530
750	1400	1600
825	1490	1690
900	1920	2120
1050	2100	2300
1200	2290	2490
Above 1200	Outside diameter of Pipe plus 800mm	Outside diameter of Pipe plus 1000mm

Battering or stepping of the sides of trenches, if approved, will only be permitted from 300mm above the crown of the pipe to the original ground level.

PLUMBING AND DRAINAGE (CONT'D)

The maximum trench width given above shall be measured to the earth face of any sheeting or trench supports.

Excavation shall be taken to the depth required for the class of bedding shown on the drawings. Any excavation greater than this depth shall be filled with the same material as required for bedding to the Engineer's satisfaction and at the Contractor's expense.

When concrete is directed to be cast directly against existing soil the excavation shall be neatly executed to the shape required.

Excavation shall be timbered, sheet piled or otherwise supported to ensure the stability of the surrounding ground, the Works and adjacent structures and to ensure the safety of all persons.

The sides of excavation will be battered only where approved or directed.

All over-excavation due to slips, over break and the like shall be remedied at the Contractor's expenses, by infilling with suitable material as directed by the Engineer.

Should the Engineer regard the Contractor's support of any excavations as inadequate then the Contractor shall comply with any instruction by the Engineer to alter or increase the support. Any instruction so given by the Engineer will in no way relieve the Contractor of his responsibilities under the Contract.

Material from excavations other than unsuitable material shall be set aside clear of the sides of excavation for reuse. Unsuitable material shall be removed to the Contractor's tip.

When the final level of the foundation, as shown on the Drawing or directed by the Engineer, has been reached the Engineer will inspect and approve the foundation prior to the commencement of concreting or other work thereon. The bottoms of all excavations shall be carefully shaped for slop as shown or directed. Any pockets of soft or loose material shall be removed and any cavities or fixtures filled as directed.

The Contractor shall at his own expense make good with mass concrete or as directed excavation greater than required for the complete work. Material which the Contractor has allowed to become unsuitable shall be removed and replaced with mass concrete or as directed, at the Contractor's expense.

PLUMBING AND DRAINAGE (CONT'D)

The Contractor shall provide whatever additional pipe protection is directed specified maximum width be exceeded due to his method of working.

Where rock or boulders are present in pipe trenches specified to have Class C or FD bedding the sides of the trenches shall be so trimmed that when the pipe is laid to the correct level and alignment no projection of the rock comes within 100mm of the outside of the pipe barrel at any point.

Where rock is found in the bottom of trenches for pipes specified to have Class C or FD bedding, the trenches shall be excavated to the additional depth necessary to allow for Class B or FC bedding respectively.

The Contractor shall avoid unduly disturbing the finished trench formation and shall make good, disturbed areas and excavate any wet or puddled material which might result from his failure to do so.

Where directed trenches close to existing structures shall be opened in short lengths and refilled or partly filled with mass concrete or other approved material.

Trenches for pipes carrying water under pressure, except where otherwise required by the Contract, shall be excavated to a sufficient depth to ensure, after consolidation of the refilling, a normal minimum depth of cover of 800mm from the ground surface to the top of the pipe. Under roads a normal minimum depth of cover of 900mm shall be provided. Where the pipeline is required to be laid to a depth which does not permit this condition to be fulfilled the ground surface shall be made up locally with banking as directed.

A. Pipe laying General

On arrival at the Site, pipes shall be carefully inspected for damaged ends, cracks or other defects and any found to be faulty shall be marked and set aside for a decision from the Engineer as to their acceptability.

Pipes with damaged ends may be either completely replaced or have the ends cut off and trimmed as directed by the Engineer.

PLUMBING AND DRAINAGE (CONT'D)

The Contractor shall ensure that all pipes are properly handled both by his staff and by any cartage Contractor employed by him. During transport, pipes shall not be allowed to rest on narrow cross-members of vehicles or anything else that might give concentrated loads due to the weight of the pipe or bumping of the vehicle but shall be properly supported on soft material. Sufficient labour and equipment shall be on hand before loading and unloading is commenced and under no circumstances shall any pipes be dropped or thrown from a vehicle.

The Engineer will have the right to reject consignments or stock of piping from which failed pipes have been drawn, or order them to be pressure tested to works pressures outside the pipelines at the Contractor's expense even though no defects are apparent, if there is reason to believe that mishandling has taken place.

Flat braided wire slings shall be used for slinging all pipes except externally coated pipes and plastic pipes for which only special band slings not less than 300mm wide shall be used. Chain or rope slings, hooks, or other devices working on scissor or grab principles shall not be used. Subject to the requirements of inspection before acceptance, protective bolster, caps or discs on the ends of flanges of pipes, specials or fittings shall not be removed until the pipes, specials, or fittings are about to be lowered into the trench.

Before a pipe is lowered into the trench, it shall be thoroughly examined to ensure that the internal coating or lining and the outer coating or sheathing are undamaged.

A. Laying of Pipes

Every pipeline shall be accurately laid to correct line and level perfectly true from joint to joint.

Whenever work is suspended, the open ends of all pipes and junctions shall be adequately plugged to prevent the ingress of any soil or rubbish etc. Care shall be taken at all joints to prevent ingress of any material.

Immediately after laying, the open end of a pipe shall be sealed with a wooden plug or approved stopper of appropriate size to prevent the entry of material which might contaminate the pipeline, damage the linings, obstruct the waterway or affect the working of valves, meter etc. Plugs shall be unperforated and shall be shaped to fit exactly so that water from the trench excavations cannot gain access to the pipeline.

PLUMBING AND DRAINAGE (CONT'D)

Water pipes and fittings 150mm and under in diameter shall have a brush equal in diameter to the internal bore of the pipe drawn through them as the work proceeds. The brush shall not be removed from the pipeline from commencement until completion.

The plugs in sewers may, with the Engineer's approval, be provided with small holes for drainage purposes, but water from the trench excavation which is heavily charged with silt shall not be allowed to gain access to the pipe.

Where work is interrupted for a period, the plugs left in position shall be regularly inspected for their fixing to ensure that there has been no tampering by unauthorised persons. Whenever any plug is removed, the immediate length of pipe shall be examined for dirt or obstructions and shall be cleaned as required.

Adequate precautions shall be taken by way of backfilling or other means to anchor each pipe securely to prevent floatation of the pipeline in the event of trench being flooded.

No equipment, clothing or apparel shall be left or stored inside pipeline.

If the normal continuity of construction would otherwise be interrupted pending the delivery of valves or specials, the exact extent of the temporary gaps to be left shall be pre-determined after reference to the Engineer. The Contractor shall submit dimensioned sketches, to the Engineer for approval, showing details of the pipes and jointing arrangements to be adopted to effect ultimate closures.

Care shall be taken to preserve the accurate alignment of the pipeline across all such temporary gaps.

MANHOLES

A. GENERAL

All manholes provided under the Sub-Contract Works shall be constructed of approved materials and in an approved manner.

All manholes shall be water-tight and if constructed of brickwork, solid block work or stonework, they shall be rendered internally with a cement mortar of at least 12mm thickness and finished with a smooth surface.

PLUMBING AND DRAINAGE (CONT'D)

The sides of all channels in every manhole shall be brought up vertically to a height of not less than the diameter of the drain and shall be benched in good concrete from the top of the channels at an angle of 30° to the horizontal and floated to a smooth hard surface with a coat of 1:1 cement mortar.

In all other respects, manholes shall be constructed in accordance with B.S Code of Practice 301.

B. RECTANGULAR AND SQUARE MANHOLES

Rectangular and square straight through manholes shall be constructed from solid block work, stonework or concrete to comply with the following minimum internal dimensions (millimetres).

PLUMBING AND DRAINAGE (CONT'D)

Depth below ground of outgoing invert	Internal access shaft dimensions L X W	Size of main channel diameter	Internal chamber dimensions L X W	Height of chamber above benching	Wall thickness
Up to 740	-	100 to 150	610 x 450	-	150
Up to 740	-	200 to 460	760 x 760	-	150
Up to 1200	-	100 to 150	760 x 760	-	150
160 to 1200	-	230 to 460	910 x 910	-	150
1220 to 1800	-	100 to 150	910 x 910	-	150
1220 to 1800	-	230 to 460	1070 x 910	-	150
1830 to 4550	760 x 760	100 to 150	1370 x 910	1370	230

When branches are connected into the manhole, the length and width dimensions of the chamber shall be increased as follows:

PLUMBING AND DRAINAGE (CONT'D)

Length

Branch Diameter

100mm 300mm/branch on the side with most branches

150mm 380mm/branch on the side with most branches

230mm and 300mm 460mm/branch on the side with most branches

460mm 610mm branch on the side with most branches

Width

Branch Diameter

100mm to 300mm for each side with branches plus 160mm 460mm of the diameter of the main drain which ever is the greater.

A. PRECAST CONCRETE CIRCULAR MANHOLES

Where specified straight through precast concrete manholes shall be manufactured and constructed to comply with B.S 556 and the following dimensional requirements. (Dimensions in millimetres).

Ground depth of outgoing invert	Internal access shaft diameter	Size main channel diameter	Chamber diameter	Height chamber above benching
Up to 740	-	100 to 460	910	-
760 to 2410	-	100 to 460	1070	-
2440 to 4550	760	100 to 460	1200	1370
4570 and over	760	100 to 460	1370	2680

When branches are connected into manholes the internal diameter of the chamber shall be increased as necessary, up to a maximum chamber diameter 1830 mm.

PLUMBING AND DRAINAGE (CONT'D)

B. STEP IRONS AND COVERS

Access shaft to manholes of depths greater than 760mm shall be provided with approved step irons at suitable intervals.

Every manhole or manhole access shaft shall be fitted with a removable air-tight cast iron cover to adequate size and strength, fixed in a manner which prevents surface water gaining access into the drainage system.

Cast manhole covers and frames shall be manufactured in accordance with the requirements of B.S 497 and shall generally fall into the following categories:

Heavy duty	:	1 For Carriage ways
Medium Duty	:	For Footpaths
Light Duty	:	For domestic premises or other places where they do not have to carry wheeled traffic.

A. BACK DROP CONNECTIONS

Where the level of the branch drain entering the manhole is higher than can be suitably accommodated by the normal type benching, then the branch drain shall be connected to the manhole by means of a backdrop connection.

Back drop connections shall be made in accordance with the details shown on the relevant Sub-Contract Drawings and the requirements of B.C Code of Practice 301.

B. CHANNELS

Where the branch channel connects to the main channel in the manhole, the invert of the branch channel shall be a minimum of 38mm higher than the main channel.

PLUMBING AND DRAINAGE (CONT'D)

A. TESTING OF PIPELINES

After pipelines are connected up and joints have been sealed, the pipeline shall be tested before pipes are, if required, haunched or surrounded in concrete.

Methods of testing and inspection shall be in accordance with Clause 4 of the Specification.

B. CONCRETE BEDDING, HAUNCHING AND SURROUND

Concrete bedding, haunching and surround shall be provided as necessary or where called for by the Engineer in accordance with the requirements laid down in B.S Code of Practice 301, Clause 310.

C. BACKFILLING

Backfilling of trenches, heading and around manholes shall be carried out in accordance with the methods described in B.S Code of Practice 301, Clause 508.

D. REINSTATEMENT OF SURFACES

Following the final backfilling of all trenches, headings and manhole surrounds, the surface of the excavated areas shall be fully reinstated to the approval of the Engineer.

Where excavations have been carried out in public highways or other areas not forming part of the site, the Sub-Contractor shall be deemed to have allowed in his price for all charges associated with the temporary and final reinstatement requirements of the Local or Highway Authority, whether this is carried out by the Sub-Contractor or by the Authority concerned.

No claims for extras in this respect will be accepted.

PLUMBING AND DRAINAGE (CONT'D)

A. SEWER CONNECTIONS

The Sub-Contractor shall pay all charges associated with the connection by Local Authority of the drainage for the Main Sewer, including necessary reinstatement.

TESTING AND INSPECTION

SITE TESTS – PIPEWORK SYSTEMS

B. UNDERGROUND WATER MAINS

After laying, jointing and anchoring, the main shall be slowly and carefully charged with water, so that all air is expelled and allowed to stand full for three days before testing under pressure. A long main shall be tested in sections as the work of laying proceeds and all joints shall be exposed for inspection during the testing.

The open end of the main may be temporarily closed for testing under moderate pressure by fitting a water pipe expanding plug, of which several types are available. The end of the main and the plug should be secured by struts or otherwise, to resist the end thrust of the water pressure in the main. If the section of main terminates with a sluice valve, the wedge of the valve shall not be used to retain the water, instead the valve shall be fitted temporarily with a blank flange, or if a socket valve with a plug and the wedge shall be placed in the open position while testing. The Sub-Contractor shall provide suitable end supports to withstand the end thrust of the water pressure in the main.

C. ABOVE GROUND INTERNAL WATER SERVICE INSTALLATION

All water service pipe system installed above ground shall be tested hydraulically for a period of one hour to not less than one and a half times the design working pressure.

If preferred, the Sub-Contractor may test the pipelines in sections. Any such section found to be satisfactory need not be subject of a further test when the system has been completed, unless specifically requested by the Engineer.

PLUMBING AND DRAINAGE (CONT'D)

During the test, each branch and joint shall be examined carefully for leaks and any defects revealed shall be made good by the Sub-Contractor and the section re-tested.

The Sub-Contractor shall take all necessary precautions to prevent damage occurring to special valves and fittings during the tests. Any items damaged shall be repaired or replaced at the Sub-Contractor's expenses.

A. UNDER GROUND DRAINAGE SYSTEM

A site test shall be carried out on all drainage pipes before concrete haunching or surrounds are applied. These tests shall be carried out preferably from manhole to manhole.

Short branch drains connected to a main drain between manholes shall be tested as one system with the main drain. In long branches, a testing junction shall be inserted next to the junction with the main drain and the branch tested separately. After the test has been passed, the testing junction shall be effectively sealed.

All tests on underground drains shall be permitted on cast iron drains at the discretion and to the approval of the Engineer.

Water tests shall be carried out in accordance with the methods described under B.S Code of Practice 301. Clause 601(b) and (c) and the test pressure shall not be less than 1,520mm head at the highest point in the pipe section and not more than 10.360mm head at any point in the section.

The test pressure shall be maintained for a period of one hour during which time the pipe and joints shall be inspected for sweating and leakage. Any leak discovered during the tests shall be made good by the Sub-Contractor and the section re-tested.

In addition to pressure tests, drainpipe runs shall also be tested for straightness where applicable. This test shall be carried out in accordance with one of the two methods described in B.S Code of Practice 301. Clause 601 (e).

Testing of manholes shall be carried out in accordance with the methods described under B.S Code of Practice 301. Clause 601 f).

PLUMBING AND DRAINAGE (CONT'D)

A. ABOVE GROUND SOIL WASTE AND VENTILATION PIPE SYSTEM

All soil, waste and ventilating pipe system forming part of the above ground installation, shall be given a smoke test to a pressure of 38mm of water gauge and this pressure shall remain constant for a period of not less than three minutes.

Water tests on above ground soil, waste and ventilating pipe systems shall not be permitted.

Pressure tests shall be carried out before any work which is to be concealed is finally enclosed.

Any defects revealed by the tests shall be made good by the Sub-Contractor and the test repeated to the approval of the Engineer.

In all other aspects, tests shall comply with the requirement of B.S 5572

SITE TEST - PERFORMANCE

B. GENERALLY

Following satisfactory pressure tests on the pipe work systems, operational tests shall be carried out in accordance with the relevant B.S Code of Practice on the systems as a whole to establish that special valves, gauges, controls, fittings, equipment and plant are functioning correctly to the satisfaction of the Engineer.

All hot water pipe work shall be insulated with preformed fibre glass sectional lagging to a thickness of 25mm.

Cold water pipe work shall be installed with preformed fibre glass lagging to a thickness of 25mm where the pipe runs above a false ceiling or in areas where the ambient temperature is higher than normal with the result that pipe "sweating", due to condensation will cause nuisance.

All lagged pipes which run in a visible position after erection shall be given a canvas cover and prepared for painting as follows:

- (i) Apply a coating of a suitable filler until the canvas weave disappears and allow to dry.

PLUMBING AND DRAINAGE (CONT'D)

- (ii) Apply two undercoats of an approved paint and finish in suitable gloss enamel to colours approved by the Engineer.

All laggings for cold and hot water pipes erected crawl ways, ducts and above false ceiling which, after erection are not visible from the corridors or rooms, shall be covered with a reinforced aluminium foil finish and banded in colours to be approved by the Engineer.

In all respects, unless otherwise stated, the hot and cold water installation shall be carried out in accordance with the best methods of modern practice as described in C.P 342 and C.P 310 respectively, to the approval of the Engineer.

The test pressure shall be applied by means of a manually operated test pump or, in the case of long main or mains or larger diameter, by a power-driven test pump which shall not be left unattended. In either case precautions shall be taken to ensure that the required pressure is not exceeded. Pressure gauges should be recalibrated before the tests.

The Sub-Contractor shall be deemed to have included in his price for all test pumps, and other equipment required under this Clause of the Specification.

The test pressure shall be one and a half times the maximum working pressure except where a pipe is manufactured from a material for which the relevant B.S Specification designates a maximum test pressure as in the case of cast or spun iron pipes, where the test pressures should not exceed 120, 180 and 240 metres/head of Clause B, C, or D pipes.

A. STERILIZATION OF HOT AND COLD WATER SYSTEMS

All under ground water mains and above ground water distribution systems, cisterns, tanks, calorifiers, pumps etc shall be thoroughly sterilized and flushed out after the completion of all tests and before being fully commissioned for hand over.

The sterilization procedures shall be carried out by the Sub-Contractor or specialist employed by the Sub-Contractor in accordance with the requirements of B.S Code of Practice 310. Clause 409, to the approval of the Engineer.

ELECTRICAL MATERIALS AND WORKS

A. REGULATIONS

This specification covers the requirements of lighting and power installations in Kenya.

All apparatus and materials supplied for and all work carried out shall comply with Kenya Government Electrical Specifications, GES 1 and 2 local statutory Regulations and the Supply Authority Bye Laws.

Installations should also be in accordance with the requirements of the 16th Edition of the "Regulations of the Electrical Equipment of Buildings" issued by the Institute of Electrical Engineers of Great Britain, which should be used as a "Code of Practice", except where they conflict with Kenya Government Legislation regarding electrical installations and local amendments.

B. STANDARDS

Except where otherwise indicated in this specification, the Contract works and all manufactures items shall comply with the relevant specifications of the British Standards Institution. Such specifications are hereinafter referred to as B.S. In each case, the latest editions of such specifications shall apply.

Should it be desired to offer equipment covered by other National or international standards, the approval of the Engineer must be obtained in writing before completion of the tender documents.

C. RECORD DRAWINGS

The sub-contractor shall mark accurately on one set of drawings the conduit laid during the progress of the work. This information must be made available on site for inspection by Engineer.

At the completion of the Contract. The contractor shall supply the Engineer with one set of transparent originals and two complete sets of prints showing the complete installation. The drawings shall included the location of all apparatus conduits and cable routes, and a schematic diagram of mains distribution indicating the phasing of the system.

ELECTRICAL MATERIALS AND WORKS (CONT'D)

A. CONTRACT DRAWINGS

These drawings forming part of this specification are to be read in conjunction with this specification to enable the Contractor to prepare a tender.

These drawings are not intended to be used as working drawings unless they are released for that purpose.

Circular or square boxes shall be provided at all outlet points, unless otherwise specified and lighting fittings, ceiling switched and other accessories will be screwed to the internal lugs of the boxes. Care must always be taken when considering the use of totally enclosed fitting with polyvinyl chloride circular boxes where the temperature within the box is likely to rise above 60 C(140 F) special steel insert clip should be used in conjunction with circular boxes where this problem can arise and also in situations where heavy pendants are used.

Looping in boxes of circular polyvinyl chloride pattern to sheet 63 B.S. 4607 part 2 may be used in such work as dictated by the structure of the buildings. Conduit entry shall be made by means polyvinyl chloride socket adaptors and polyvinyl chloride bushes.

Adaptable boxes shall be of moulded or fabricated polyvinyl chloride of square or oblong long shape complete with polyvinyl chloride lids secured by 2 BA brass or steel plated round headed screws. All adaptable boxes and lids for the same size shall be interchangeable. No adaptable box smaller than 75mmx50mm or larger than 300mm x 300mm shall be employed. Boxes shall be of adequate depth in relations to the size of the conduit entering them.

Conduits shall be terminated at adaptable boxes, fuse boards, switches, sockets or other equipment not possessing push-in or threaded spouts; by means of appropriate size female adaptor and polyvinyl chloride Hexagonal headed Bare Bush. All cemented joints to be made to a depth of not less than the diameter of the conduit being used.

Earth continuity shall be provided by a separate insulated conductor drawn into the plastic conduit and related in accordance with circuit loadings and appropriate regulations, or as mentioned on the drawings.

Where required under the regulations, an earth continuity conductor shall be provided for lighting fittings in which case the control switches shall be equipped with an appropriate earth terminal.

A. ARRANGEMENT OF CONDUIT LAYOUT

The conduit system shall be carefully planned and erected to avoid all unnecessary bends or changes in directions. Conduits shall be laid in straight horizontal or vertical lines with easy sets. Where several conduits follow similar routes, they shall be neatly grouped in multiple runs. Where multiple runs change direction, the radii of the sets shall be laid out from a common centre. Where draw-in boxes for right angled change of direction are required in multiple runs, adaptable boxes shall be used for such sizes as to allow all conduits to enter the box without sets.

The cables shall be coloured in accordance with Table B4 of Institute of Electrical Engineer Regulations. Cables used on extra low voltage circuits shall have distinctive colours other than these colours.

No reduction of the strands forming the conductors shall be allowed at switch or other terminals, but all strands shall be effectively secured by screws, nuts and washers or other approved means.

CEILING

B. TYPE

Ceiling roses, ivory or white, shall be of the 3-plate pattern and fitted at all pendant points. An earthing terminal shall be provided and connected to the earth continuity conductor of the final sub-circuit where applicable.

Ceiling roses of the white porcelain semi-recessed pattern shall be used for surface installation and shall be of the all-insulated type for a flush installation.

LAMPHOLDERS

C. TYPE

Lamp holders shall generally be of plastic construction with porcelain interiors, and bayonet fitting.

Lamp holders for lamps rated 200 watts and above shall be of Edison Screw type.

Batten type lamp holders shall be of the all-insulated bayonet type.

LIGHTING FITTINGS

A. GENERAL

The Contractor shall supply and fit all lighting fittings of the type indicated on the drawings and in the schedules. All fittings shall be suitable for operation on a 240 V. 50 cycles supply. Lighting fittings rated other than 240 volts will not be supplied with lamps.

B. FLUORESCENT FITTINGS

Fluorescent fittings shall generally be of the batten type, with control gear contained within the supporting channel. All fittings shall be supported from conduits boxes and shall be suspended by two 20mm conduits to give a clearance of 25mm between the top the fitting and the ceiling. In the ceiling, the conduit boxes, to B.S. 31, shall be fitted with dome covers, to which the suspension conduit shall be joined, so that the lighting fitting hangs vertically below the conduit boxes. Fittings shall comply with B.S. 3820 or class 1, indoor normal atmosphere.

All fluorescent fittings shall be fitted with radio interference suppression capacitors and power factor correction capacitors and shall be earthed.

C. LAMPS

All fittings shall be supplied complete with lamps of the type and rating specified. Fluorescent tubes shall be of the "White" type, except where otherwise stated. Pearly type tungsten lamps shall be fitted in open fittings.

FLEXIBLE CORDS

D. TYPE

These shall be of 250 volt grade polyvinyl chloride insulated and shall comply with B.S. 7 Flexible cords shall not be less than 24/.20 (23/.0076). Flexible cords for pendant fittings shall be circular type, heat resistant and white in colour.

ELECTRICAL MATERIALS AND WORKS (CONT'D)

A. EARTHING

Earth electrodes shall be minimum 2 metres long by 15mm diameter hard drawn copper rod, and shall be located not less than 3 metres apart at a convenient position 6 metres away from the building. The terminal head of each electrode shall be in a concrete inspection pit, with cover. If the resistance to earth is not satisfactory with the electrode, then additional electrodes or an earth mat shall be provided, as directed by the Engineer.

B. DISTRIBUTION SYSTEM EARTHING

All distribution boards shall be earthed in accordance with the institute of Electrical Engineer regulations. All metal work associated with the installation shall be earthed to comply with the regulations currently in force.

C. TESTING OF EARTHING SYSTEM

The resistance of continuity system, when measured between the main earthing point and any other point in the installation, including all conduit and other metal work which may provide a path to earth, shall not exceed 0.5 ohm where steel conduit forms part of the system, or 1.0 ohm, if the earth continuity system is composed entirely of copper, copper alloy or aluminium.

When the installation is complete, the sub-contractor shall carry out tests for earth loop impedance, polarity, insulation resistance, in the presence of, and to the satisfaction of the Engineer and the Kenya Power & Lighting Company. The Contractor shall rectify all work not giving test results within the limits prescribed.

Four copies of all test results shall be forwarded to the Engineer and a Certificate of completion will not be issued until such tests have been approved.

ELECTRICAL MATERIALS AND WORKS (CONT'D)

A. WORKING DRAWINGS

The Contractor shall prepare working drawings as may be necessary. These shall be submitted to the Engineer for approval before the execution of the works.

Working drawings to be prepared by the Contractor shall be detailed as below but not restricted only to these: -

- (a) General arrangement drawings showing plants, M.V. Switchboards, distribution boards, consumer units, fittings, switch sockets, etc.,
- (b) Layout drawings of concealed and surface conduits, ducts, trunking etc.
- (c) Any other drawings that are not called for in the specification.

Two copies of all working drawings shall be submitted to the Engineer for approval.

Thereafter, the Contractor shall submit copies of approved working drawings for distribution to all parties concerned.

The Contractor shall not be relieved of any of his obligations under the contract or from correcting any errors on site or elsewhere found consequently in the approved working drawings by the Engineer.

B. LABELS

All switchgear, switch fuses, distribution boards etc., shall be clearly labelled with white on Red background engraved labels to indicate the name, purpose and position of the gear. All circuits in distribution boards shall be clearly identified in respect of the number and location of the M.C.B. The chart shall be securely fixed inside the cover of the distribution boards.

ELECTRICAL MATERIALS AND WORKS (CONT'D)

A. GALVANIZING

Galvanizing shall be applied by the hot process and shall consist of a smooth clean zinc coating free from defects and be uniform in thickness. The thickness shall not be less than 610gms. of zinc per square metre of surface and tested in accordance with the requirements of B.S. 729 where applicable. Sheradizing or other alternative processes shall not be used without approval in writing of the Engineer.

The preparation of galvanizing and the galvanizing itself shall not adversely affect the mechanical properties of the coated material. Surfaces which are normally in contact with oil shall not be galvanized or cadmium plated.

All out-door structures, access ladders, platforms, equipment cubicles shall be galvanized.

B. NON-METALIC CONDUIT

STANDARD AND INSTALLATION

All non-metallic conduits shall be class "A" heavy gauge, high impact, P.V.C. complying with B.S. 4606 part 2, type AH. The minimum size to be used on the Contract is 20mm external diameter. All conduit installation shall be concealed in the walls and floors or in structural slab.

C. JOINTS

Conduit will be joined and terminated utilizing the appropriate rigid P.V.C. compounds as detailed below or standard conduit entry electrical equipment. Jointing will conform to one of the following techniques:-

- No. 1 - Permanent Adhesives – The solvent cement supplied by the conduit manufacturers will be used to produce a rigid sealed connection.
- No. 2 - Flexible Adhesives – A non-hardening adhesive supplied by the conduit manufacturers will be used to produce a flexible sealed joint where allowance is necessary for longitudinal movement (e.g. expansion couplers).

JOINTS (CONT'D)

Conduits will be joined and terminated utilizing the appropriate rigid polyvinyl chloride compounds as detailed below or standard conduit entry electrical equipment. Jointing will conform to one of the following techniques:-

(a) PERMANENT ADHESIVES

The solvent cement supplied by the conduit manufacturers will be used to produce a rigid sealed connection.

(b) FLEXIBLE ADHESIVE

A non-hardening adhesive supplied by the conduit manufacturers will be used to produce a flexible sealed joint where allowance is necessary for longitudinal movement (e.g. expansion couplers)

A. BENDS

Bends and sets in the conduit will be made in accordance with the manufacturer's instructions. The radius of the bend shall not be less than 2.5 times the outside diameter of the conduit, or such greater radius which will facilitate easy drawing into cables.

B. EXPANSION

Adequate allowance shall be made for longitudinal expansion and contraction of the conduit under normal working temperatures variations as follows: -

- (a) Expansion couplers should be used in straight runs exceeding 6 metres with a loose or flexible type of joints, (D. above item)
- (b) At the long spout end of the couplers

Where conduits are concealed or laid on structural floors, they shall be secured by a fixed method to be approved by the Engineer. Where it is essential that conduits cross one another in floors, the chases shall be deepened, and the conduits set to create the minimum desirable diversion.

Care shall be taken to ensure that there is no obstruction to cables within the conduits caused by the ingress of plaster, concrete, or other matter. Conduit ends must be cut square and cleaned of burrs.

A. CLEANING AND PAINTING

Having due regard to the destination and climatic conditions under which the plant is to operate, extreme care shall be exercised in the manufacture of the equipment to prevent the formation of any corrosion.

All equipments shall be cleaned of all dust, oil, grease, dirt, scale and rust by power tool operated metal brush or preferably by shot or grit blasting and then ground smooth where necessary.

Unless otherwise approved, they shall then immediately have applied to them two coats of approved primer paint. After inspection, any rough surfaces shall be filled in and smoothed over and further painting in the factory shall be as follows: -

- (a) All interior surfaces of cubicles, kiosks, boxes and the like, containing wiring or other apparatus and internal components of the plant which are despatched to site in an assembled condition, shall be finish painted with at least two coats of white enamel. The final coat shall be white anti-condezzation finish, where so specified.
- (b) The external surface of the panels shall be finished in grey stove enamel to B.S. 381 C shade 631 or other shade as may be approved by the Engineer.
- (c) All interior surface of tanks and other oil filled chambers and external surfaces of piping therein shall be painted finally with an oil resisting coating to the approval of the Engineer.
- (d) All wall and floor mounted junction boxes, loose starter etc., throughout the work shall be finished in grey stove enamel or painted to B.S. 381 C shade 631 or other shade as may be approved by the Engineer.

After all erection has been completed at site the Contractor shall make good all defects in painting and galvanizing which have arisen during transport, storage and erection on site and shall apply one undercoat and one finished coat of gloss paint to B.S. 311 C shad 631 or other shade as may be approved by the Engineer to the external surface of all equipment.

Where galvanized metalwork has been damaged it shall either be repaired by cold galvanizing at site or alternatively, at the discretion of the Engineer, be returned to the manufacturer for re-galvanizing by the process.

DISTRIBUTION BOARDS

A. TYPE AND RATING

General lighting and power distribution boards shall comply with B.S. 3817, B.S. 5861 and B.S. 214 and shall be of the metal clad pattern, flush mounted, except where otherwise specified on the drawings.

B. CONSTRUCTION

Enclosures shall be substantially constructed from 16 S.W.G. minimum thickness sheet steel having hinged front cover, and Miniature Circuit Breakers and shall be supplied complete with bus-bars, earthing terminal, neutral bars, circuit chart, and blanking plate for any spare ways. The incoming isolator switch shall be integral with the distribution board in consumer's unit only.

C. MINIATURE CIRCUIT BREAKERS

All distribution boards shall be supplied with M.C.B. manufactured to B.S. 3871 and of a rating as specified on the drawings. The circuit breakers shall incorporate both terminal overload and magnetic short circuit tripping, with a trip free mechanism.

Three phase circuits shall be controlled by integrally manufactured three pole breakers, with one common operating lever. An outer-tripping mechanism shall ensure isolation of all three poles in the event of an overload or short circuit on any one phase.

D. EARTH LEAKAGE CIRCUIT BREAKERS

If specified or indicated on the Contract drawings, the use of E.L.C.B. for isolation of incoming supply in the distribution board, it shall be an approved type for flush mounting.

The general requirements of E.L.C.B. are as follows:-

- (a) It shall be high sensitivity i.e. it shall operate in 30 milliseconds for a leakage current of 30 milliamphere.
- (b) Its operation shall not rely on the mains supply for tripping under fault conditions. For example, in the event of a leakage from the live to each conductor occurring at the same time as a break in the neutral supply wire, the breaker shall trip.

ELECTRICAL MATERIALS AND WORKS (CONT'D)

A. LABELLING

A circuit chart with each board shall show the name, location and current loading of each circuit connected. Each board shall be fitted with an engraved identification label in black and white, such as distribution board D.I. etc., and all three phase boards shall be labelled in white or red, DANGER 415 VOLTS.

B. ERECTION

Conduits for each circuit shall be completely erected before any cable is drawn in. Adequate draw-in points shall be provided.

Straight runs shall have draw-in facilities at distance not exceeding 12 metres. Runs incorporating sets or bends shall have draw-in facilities at a distance not exceeding 9 metres. These distances may need to be reduced in difficult situations or with particular cable complexes.

Not more than four easy sets, or two right angle bends or sets may be installed between draw-in points. Solid elbows or tees shall not be accepted.

FINAL SUB CIRCUIT WIRING

C. TYPE

All power and lighting wiring cables shall be 600/1000 Volt grade, single core polyvinyl chloride, insulated, with stranded copper conductors, manufactured in accordance with B.S.6004. The minimum sizes on lighting circuits shall be 1.5sq.mm sizes on power spur circuits shall be 4.0 sq. mm and on ring main circuits 2.5 sq.mm.

D. INSTALLATION

Cables forming sub-circuits connected to different sub-distribution boards shall not be drawn into the same conduit or draw-in box.

Saddles as supplied by the manufacturers shall include a sliding support tolerance for longitudinal expansion.

Special consideration may need to be given to the fixing of accessories where this prevent natural conduit movements. Oversize or slotted fixing holes may be necessary or introduction of expansion couplers.

ELECTRICAL MATERIALS AND WORKS (CONT'D)

A. SUPPORT

Conduit should be supported by sandles at not less than 900mm intervals. Where working temperature tend to be high this should be reduced to 600mm.

B. CONDUIT BOXES AND FITTINGS

All conduit boxes shall be circular or square pattern of rigid polyvinyl chloride suitable for plain connections conforming to sheet 62 B.S. 4607 part. Boxes for supporting at fitting or accessory shall be fitted with a polyvinyl chloride lid held in position by means of two 2 BA round headed screws. Boxes shall have metallic screwed inserts.

C. P.M.E. SYSTEM

Provision shall be made for the P.M.E system at supply intake (where applicable)

"P.M.E." means that system whereby the neutral conductor of the supply network is earthed at a prescribed number of points along its routes, together with the installation earth continuity conductor, at each consumer's installation, so providing a metallic path for the flow of earth fault currents. The connections between the neutral conductors of the installation shall be made by the Supply Authority at the point of intake only. The connection at the isolators will be made by the Contractor in the presence of the Engineer after completion of all tests.

D. COMMISSIONING

The whole installation shall be tested to the statutory requirements of the Electricity Authority, Institute of Electrical Engineer Regulations and commissioned in the presence of and to the satisfaction of the Engineer.

Four copies of test reports shall be provided within seven days of carrying out the tests, and the reports shall include full details of how each test was carried out, and a copy of all reading taken.

SOCKETS OUTLETS

A. GENERAL

In all areas, general power outlets shall be of the 13 amps pin fused plug type complying with B.S. 1363. They shall be flush pattern, with white or ivory cover plates unless otherwise specified on the drawings. Where the circuits are supplied from a common feed, two outlets shall form a twin unit in a common box. The earthing terminal of every socket outlet shall be connected to the earth continuity conductor of the final sub-circuit by an appropriately sized insulated copper conductor. Unless otherwise stated they shall be mounted at 300mm above the finished floor level.

B. FUSES

All fused connection units shall be fitted with 12 amp. Fuses, unless otherwise specified.

C. LABELLING

The front plate of each fused connection unit shall, unless otherwise specified be engraved with the name of the appliance connected to it.

LIGHTING SWITCHES

D. TYPE

Lighting switches shall be of the all-insulated rocker operating plate-switch type to B.S. 3676 of ample rating. Switch inserts shall be white, set in white or ivory cover plates.

Switches controlling points in bathroom shall be placed outside the bathroom or consist of a ceiling switch operated by a non-conducting cord, as specified switches mounted outdoors shall be of a weather tight pattern.

Switches shall be one way, two ways or intermediate as specified and where a number of switches are mounted together, they shall be fitted in common box.

Ceiling switches shall be white or ivory semi recessed pattern and shall only be used where specified. Pull cords shall be fitted with shock absorbing springs.

STEEL LIGHTING

A. KENYA POWER AND LIGHTING SUPPLY

The Electrical supply shall be derived from Kenya Power and Lighting Company Limited at 240 volts x single phase 50 HZ.

The Electrical Contractor shall submit commencement and completion certificates and application for electrical supply to Kenya Power and Lighting Company Limited and make all the arrangement for the supply to each control pillar.

Provisional Sum is allowed in the Bill for the Kenya Power and Lighting Company Limited's service line charges.

The Electrical Contractor shall allow for all the necessary attendance to Kenya Power and Lighting Company Limited's work.

B. STREET LIGHTING COLUMNS

Street Lighting Columns shall be steel columns conforming to B.S. 1840/1952 having amounting height of 6.00 metres and shall be as shown on the drawings. The columns shall be installed at a minimum depth of 825mm in the ground on a 75mm thick concrete foundation.

After manufacture and before erection the columns shall be treated with an approved mordant solution which shall be washed off and the whole allowed to dry. Thereafter the columns shall be painted with one coat of Leylac enamel and two coats of gloss paint to an approved colour.

C. LANTERNS

Lanterns shall be of the completely enclosed type with antivandal bowl designed for side entry mounting on brackets with a 37mm diameter plain tube. They shall be capable of accommodating one single 125-watt M.B.F./U lamp 3-slot lamp holder connected with heat resisting cable. The lanterns shall be of semi-cut-off type with height output ratio not less than 70% and with incorporated control gear, complete with lamp. Lantern shall be as "THORNBETA 79" or equivalent approval by the City Engineer and the Consulting Engineer. If any alternative, make is to the used the details shall be given at the time of submission of tenders.

A. CABLES

Polyvinyl chloride armoured copper conductors' cable shall be 250/440 volt grade conforming to B.S. 3346/61

4mm² x 2-core P.V.C. wapvc cables shall be used for street lighting installation as indicated on the drawings.

B. DUCTS

Ducts for roads crossing shall be concrete pipes joined in an approved manner, with an internal diameter of not less than 100mm. The ducts shall be laid at least 0.5 metres below the finished road level on a compacted bed of concrete mix 1:3:6 at least 150mm concrete surround.

C. CONTROL PILLAR

The control pillar shall be metal pillar conforming to drawings.

The control pillar shall be erected on 300mm thick bed of concrete mix 1:2:4 and a minimum of 225mm above the ground level in the position indicated on the drawings. The control pillar shall be complete with time switchgear, cut-outs, earth leakage current operated circuit breakers and all associated wiring. The Control Pillar shall be adequately earthed.

D. SYSTEM OF WIRING

Cables shall be 4mm² x 2-core, 3-core pvc wapvc laid with a layer of soft sand underneath and over in a trench 500mm deep along the road approximately 600mm away from the road kerbs. The loop-in and loop-out arrangement shall be through a cut-out mounted in pole windows. Galvanized armoured wires shall be properly earthed and to maintain earth continuity earth clips and connectors to be used. From the cut-out to the lantern 1.5m² pvc insulated by sheathed twin and earth cables shall be used protected by 5A carriage fuse. The lantern shall be earthed separately with otherwise taken from the main point. Cable crossing the road shall be laid in ducts previously specified. The cables laid in trench shall be protected with "HATARI" cable tiles.

No underground joints will be allowed.

A. EARTHING

All poles lanterns and other metal parts shall properly earthed. Electrical and Mechanical continuity shall be preserved throughout the whole systems from the control pillar to the remotest pole and the earth resistance must be efficiently earthed through earth electrodes by means of substantial copper clamps secured by non-rusting bolts. The lead must be visible and adequately protected. No earthing lead shall be less than 6mm² with earth wire may be used.

B. EARTH LEAKAGE CIRCUIT BREAKER

The earth leakage circuit breaker shall be current operated as manufactured by 'CRABTREE' Cat No. 13030/1 with over-current and short circuit protection and shall conform to B.S. 4293.68 rated at 240 volts 50 HZ alternating current.

C. CONSUMER UNITS

These shall be surface mounted 6-way SPN MCB consumer unit as manufactured by 'CRABTREE' Cat No. 206/1 or equivalent with MCB ratings as shown on the drawing.

D. TESTING

The installation when complete shall pass the following tests: -

- (a) Insulation resistance between lines and line/neutral
- (b) Insulation resistance between lines and earth and neutral
- (c) Earth continuity resistance including all fittings
- (d) Polarity check. Contractor shall submit a completion certificate to Kenya Power and Lighting Company Ltd., for electricity connection.

E. RESISTANCE

Test on earth electrode when carried out with earth (null balance) at any point within the network must not exceed 3 ohms.

F. MAINTENANCE

The Contractor shall be responsible for maintenance of equipment for 12 months after substantial completion. He should allow in his price for replacement of defective or burnt out lamps and other equipment.

All works to be carried out to the satisfaction of the Engineer. The Contractor shall be required to carry out all adjustments and improvements to meet the Architect's requirements

TRADE PREAMBLES

SECTION A:

GENERAL MECHANICAL SPECIFICATIONS

SECTION A

GENERAL MECHANICAL SPECIFICATION

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GENERAL MECHANICAL SPECIFICATION

2.01 General

This section specifies the general requirement for plant, equipment and materials forming part of the Sub-contract Works and shall apply except where specifically stated elsewhere in the Specification or on the Contract Drawings.

2.02 Quality of Materials

All plant, equipment and materials supplied as part of the Sub-contract Works shall be new and of first class commercial quality, shall be free from defects and imperfections and where indicated shall be of grades and classifications designated herein.

All products or materials not manufactured by the Sub-contractor shall be products of reputable manufacturers and so far as the provisions of the Specification is concerned shall be as if they had been manufactured by the Sub-contractor.

Materials and apparatus required for the complete installation as called for by the Specification and Contract Drawings shall be supplied by the Sub-contractor unless mention is made otherwise.

Materials and apparatus supplied by others for installation and connection by the Sub-contractor shall be carefully examined on receipt. Should any defects be noted, the Sub-contractor shall immediately notify the Engineer.

Defective equipment or that damaged in the course of installation or tests shall be replaced as required to the approval of the Engineer.

2.03 Regulations and Standards

The Sub-contract Works shall comply with the current editions of the following:

- a) The Kenya Government Regulations.
- a) The United Kingdom Institution of Electrical Engineers (IEE) Regulations for the Electrical Equipment of Buildings.
- b) The United Kingdom Chartered Institute of Building Services Engineers (CIBSE) Guides.
- c) British Standard and Codes of Practice as published by the British Standards Institution (BSI)
- e) The Local Council By-laws.
- f) The Electricity Supply Authority By-laws.
- g) Local Authority By-laws.
- h) The Kenya Building Code Regulations.
- i) The Kenya Bureau of Standards

TRADE PREAMBLES

2.04 Electrical Requirements

Plant and equipment supplied under this Sub-contract shall be complete with all necessary motor starters, control boards, and other control apparatus. Where control panels incorporating several starters are supplied they shall be complete with a main isolator.

The supply power up to and including local isolators shall be provided and installed by the Electrical Sub-contractor. All other wiring and connections to equipment shall form part of this Sub-contract and be the responsibility of the Sub-contractor.

The Sub-contractor shall supply three copies of all schematic, cabling and wiring diagrams for the Engineer's approval.

The starting current of all electric motors and equipment shall not exceed the maximum permissible starting currents described in the Kenya Power and Lighting Company (KPLC) By-laws.

All electrical plant and equipment supplied by the Sub-contractor shall be rated for the supply voltage and frequency obtained in Kenya, that is 415 Volts, 50Hz, 3-Phase or 240Volts, 50Hz, 1-phase.

Any equipment that is not rated for the above voltages and frequencies shall be rejected by the Engineer.

2.05 Transport and Storage

All plant and equipment shall, during transportation be suitably packed, crated and protected to minimise the possibility of damage and to prevent corrosion or other deterioration.

On arrival at site all plant and equipment shall be examined and any damage to parts and protective priming coats made good before storage or installation.

Adequate measures shall be taken by the Sub-contractor to ensure that plant and equipment do not suffer any deterioration during storage.

Prior to installation all piping and equipment shall be thoroughly cleaned.

If, in the opinion of the Engineer any equipment has deteriorated or been damaged to such an extent that it is not suitable for installation, the Sub-contractor shall replace this equipment at his own cost.

2.06 Site Supervision

The Sub-contractor shall ensure that there is an English-speaking supervisor on the site at all times during normal working hours.

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2.07 Installation

Installation of all special plant and equipment shall be carried out by the Sub-contractor under adequate supervision from skilled staff provided by the plant and equipment manufacturer or his appointed agent in accordance with the best standards of modern practice and to the relevant regulations and standards described under Clause 2.03 of this Section.

2.08 Testing

2.08.1 General

The Sub-contractor's attention is drawn to Part 'C' Clause 1.38 of the "Preliminaries and General Conditions".

2.08.2 Material Tests

All material for plant and equipment to be installed under this Sub-contract shall be tested, unless otherwise directed, in accordance with the relevant B.S Specification concerned.

For materials where no B.S. Specification exists, tests are to be made in accordance with the best modern commercial methods to the approval of the Engineer, having regard to the particular type of the materials concerned.

The Sub-contractor shall prepare specimens and performance tests and analyses to demonstrate conformance of the various materials with the applicable standards.

If stock material, which has not been specially manufactured for the plant and equipment specified is used, then the Sub-contractor shall submit satisfactory evidence to the Engineer that such materials conform to the requirements stated herein in which case tests of material may be partially or completely waived.

Certified mill test reports of plates, piping and other materials shall be deemed acceptable.

2.08.3 Manufactured Plant and Equipment – Work Tests

The rights of the Engineer relating to the inspection, examination and testing of plant and equipment during manufacture shall be applicable to the Insurance Companies or Inspection Authorities so nominated by the Engineer.

The Sub-contractor shall give two week's notice to the Engineer of the manufacturer's intention to carry out such tests and inspections.

The Engineer or his representative shall be entitled to witness such tests and inspections. The cost of such tests and inspections shall be borne by the Sub-contractor.

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Six copies of all test and inspection certificates and performance graphs shall be submitted to the Engineer for his approval as soon as possible after the completion of such tests and inspections.

Plant and equipment which is shipped before the relevant test certificate has been approved by the Engineer shall be shipped at the Sub-contractor's own risk and should the test and inspection certificates not be approved, new tests may be ordered by the Engineer at the Sub-contractor's expense.

2.08.4 Pressure Testing

All pipe work installations shall be pressure tested in accordance with the requirements of the various sections of this Specification. The installations may be tested in sections to suit the progress of the works but all tests must be carried out before the work is buried or concealed behind building finishes. All tests must be witnessed by the Engineer or his representative and the Sub-contractor shall give 48 hours notice to the Engineer of his intention to carry out such tests.

Any pipe work that is buried or concealed before witnessed pressure tests have been carried out shall be exposed at the expense of the Sub-contractor and the specified tests shall then be applied.

The Sub-contractor shall prepare test certificates for signature by the Engineer and shall keep a progressive and up-to-date record of the section of the work that has been tested.

2.09 Colour Coding

Unless stated otherwise in the Particular Specification all pipe work shall be color coded in accordance with the latest edition of B.S 1710 and to the approval of the Engineer or Architect.

2.10 Welding

2.10.1 Preparation

Joints to be made by welding shall be accurately cut to size with edges sheared, flame cut or machined to suit the required type of joint. The prepared surface shall be free from all visible defects such as lamination, surface imperfection due to shearing or flame cutting operation, etc., and shall be free from rust scale, grease and other foreign matter.

2.10.2 Method

All welding shall be carried out by the electric arc processing using covered electrodes in accordance with B.S. 639.

Gas welding may be employed in certain circumstances provided that prior approval is obtained from the Engineer.

2.10.3 Welding Code and Construction

All welded joints shall be carried out in accordance with the following Specifications:

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a) Pipe Welding

All pipe welds shall be carried out in accordance with the requirements of B.S.806.

b) General Welding

All welding of mild steel components other than pipework shall comply with the general requirements of B.S. 1856.

2.10.4 Welders Qualifications

Any welder employed on this Sub-contractor shall have passed the trade tests as laid down by the Government of Kenya.

The Engineer may require to see the appropriate to see the appropriate certificate obtained by any welder and should it be proved that the welder does not have the necessary qualifications the Engineer may instruct the Sub- contractor to replace him by a qualified welder.

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SECTION B:

**PARTICULAR SPECIFICATIONS
FOR
PLUMBING AND DRAINAGE**

MECHANICAL INSTALLATIONS
TRADE PREAMBLES

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PARTICULAR PLUMBING AND DRAINAGE SPECIFICATIONS

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PARTICULAR SPECIFICATIONS FOR PLUMBING AND DRAINAGE

3.1 GENERAL

This section specifies the general requirements for plant, equipment and materials forming part of the plumbing and drainage installations.

3.2 MATERIALS AND STANDARDS

3.2.1 Pipe work and Fittings

Pipe work materials are to be used as follows:

a) PP-R Pipe-work

PP-R pipe-work upto 63mm bore shall be manufactured in accordance with the current British Standards i.e. DIN 8077 and DIN 8078 for PN 20 tubing, with metallic joints to DIN 8076, joints and fittings for tubings to DIN 16962. All threaded inserts in the fittings and joints shall be made of nickel brass OT58 and are turned from bars and manufactured in accordance with DVGW 534E.

Pipe joints shall be screwed and socketed and sufficient coupling unions shall be allowed so that fittings can be disconnected without cutting pipe. Running nipples long screws shall not be permitted unless exceptionally approved by the Engineer.

b) Galvanized Steel Pipe work

Galvanized steel pipe work up to 65mm nominal bore shall be manufactured in accordance with B.S. 1387 Medium Grade, with tapered pipe threads in accordance with B.S. 21. All fittings shall be malleable iron and manufactured in accordance with B.S. 143.

Pipe joints shall be screwed and socketed and sufficient coupling unions shall be allowed so that fittings can be disconnected without cutting the pipe. Running nipples and long screws shall not be permitted unless exceptionally approved by the Engineer.

Galvanized steel pipe work, 80mm nominal bore up to 150mm nominal bore shall be manufactured to comply in all respects with the specification for 65mm pipe, except that screwed and bolted flanges shall replace unions and couplings for the jointing of pipes to valves and other items of plant. All flanges shall comply with the requirements of B.S. 10 to the relevant classifications contained hereinafter under Section 'C' of the Specification.

Galvanizing shall be carried out in accordance with the requirements of B.S. 1387 and B.S. 143 respectively.

c) Copper Tubing

All copper tubing shall be manufactured in accordance with B.S. 2871 from C.160 'Phosphorous De-oxidized Non-Arsenical Copper' in accordance with B.S. 1172.

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Pipe joints shall be made with soldered capillary fittings and connections to equipment shall be with compression fittings manufactured in accordance with B.S. 864.

Short copper connection tubes between galvanized pipe work and sanitary fittings shall not be used because of the risk of galvanic action.

If, as may occur in certain circumstances, it is not possible to make the connection in any way than the use of copper tubing, then a brass straight connector shall be positioned between the galvanized pipe and the copper tube in order to prevent direct contact.

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

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

Jointing

The method of jointing to be employed shall be that of solvent welding, using the pipe and manufacturer's approved cement. Seal ring joint shall be introduced where it is necessary to accommodate thermal expansion.

Testing

Pipelines shall be tested in sections under an internal water pressure normally one and a half times the maximum allowable working pressure of the class of pipe used. Testing shall be carried out as soon as practical after laying and when the pipeline is adequately anchored. Precautions shall be taken to eliminate all air from the test section and to fill the pipe slowly to avoid risk of damage due to surge.

e) A.B.S. Waste System

Where indicated on the Drawings and Schedules, the Sub-contractor shall supply and fix A.B.S. waste pipes and fittings.

The pipes, traps and fittings shall be in accordance with the relevant British Standards, including B.S. 3943, and fixed generally in accordance with manufacturer's instructions and B.S. 5572: 1978.

Jointing of pipes shall be carried out by means of solvent welding, the manufacturer's instructions and B.S. 5572: 1978.

Jointing of pipes shall be carried out by means of solvent welding. The manufacturer's recommended method of joint preparation and fixing shall be followed.

Standard brackets, as supplied for use with this system, shall be used wherever possible. Where the building structure renders this impracticable the Sub-contractor shall provide purpose made supports, centres of which shall not exceed one meter.

Expansion joints shall be provided as indicated. Supporting brackets and pipe clips shall be fixed on each side of these joints.

f) PVC Soil System

The Sub-contractor shall supply and fix PVC soil pipes and fittings as indicated on the Drawings and Schedules. Pipes and fittings shall be in accordance with relevant British Standards, including B.S. 4514 and fixed to the manufacturer's instructions and B.S. 5572.

The soil system shall incorporate synthetic rubber gaskets as provided by the manufacturer whose fixing instructions shall be strictly adhere to.

Connections to WC pans shall be effected by the use of a WC connector, gasket and cover, fixed to suit pan outlet.

Suitable supporting brackets and pipe clips shall be provided at maximum of one metre centres. The Sub-contractor shall be responsible for the joint into the Gully Trap on Drain as indicated on the Drawings.

3.2.2 Valves

a) Draw-off Taps and Stop Valves (Up to 50mm Nominal Bore)

Draw-off taps and valves up to 50mm nominal bore, unless otherwise stated or specified for attachment or connection to sanitary fitment shall be manufactured in accordance with the requirements of B.S.1010.

a) Gate Valves

All gate valves 80mm nominal bore and above, other than those required for fitting to buried water mains shall be of cast iron construction, in accordance with the requirements of B.S. 3464. All gate valves required for fitting to buried water mains shall be of cast iron construction in accordance with the requirements of B.S.1218.

All gate valves up to and including 65mm nominal bore shall be of bronze construction in accordance with the requirements of B.S. 1952.

The pressure classification of all valves shall depend upon the pressure conditions pertaining to the site of works.

c) Globe Valves

All globe valves up to and including 65mm nominal bore shall be of bronze construction in accordance with the requirements of B.S.3061.

The pressure classification of all globe valves shall depend upon the pressure conditions pertaining to the site of works.

3.2.3 Waste Fitment Traps

a) Standard and Deep Seal P & S Traps

Where standard or deep seal traps are specified they shall be manufactured in suitable non-ferrous materials in accordance with the full requirements of B.S. 1184.

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In certain circumstances, cast iron traps may be required for cast iron baths and in these instances bath traps shall be provided which are manufactured in accordance with the full requirements of B.S.1291.

b) Anti-Syphon Traps

Where anti-syphon traps are specified, these shall be similar or equal to the range of traps manufactured by Greenwood and Hughes Limited, Deacon Works Littlehampton, Sussex, England.

The trade name for traps manufactured by this company is 'Grevak'.

3.2.4 Pipe Supports

a) General

This sub-clause deals with pipe supports securing pipes to the structure of buildings for above ground application.

The variety and type of support shall be kept to a minimum and their design shall be such as to facilitate quick and secure fixings to metal, concrete, masonry or wood.

Consideration shall be given, when designing supports, to the maintenance of desired pipe falls and the restraining of pipe movements to a longitudinal axial direction only.

The Sub-contractor shall supply and install all steelwork forming part of the pipe support assemblies and shall be responsible for making good damage to builders work associated with the pipe support installation.

The Sub-contractor shall submit all his proposals for pipe supports to the Engineer for approval before any erection works commence.

b) PP-R Pipe-work

PP-R pipe-work upto 63mm bore shall be manufactured in accordance with the current British Standards i.e. DIN 8077 and DIN 8078 for PN 20 tubing, with metallic joints to DIN 8076, joints and fittings for tubings to DIN 16962. All threaded inserts in the fittings and joints shall be made of nickel brass OT58 and are turned from bars and manufactured in accordance with DVGW 534E.

Pipe joints shall be screwed and socketed and sufficient coupling unions shall be allowed so that fittings can be disconnected without cutting pipe. Running nipples long screws shall not be permitted unless exceptionally approved by the Engineer.

c) Steel and Copper Pipes and Tubes

Pipe runs shall be secured by clips connected to pipeangers, wall brackets, or trapeze type supports. 'U' bolts shall not be used as a substitute for pipe clips without the prior approval of the Engineer.

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An approximate guide to the maximum permissible supports spacing in metres for steel and copper pipe and tube is given in the following table for horizontal runs.

Size Nominal Bores	Copper Tube to B.S. 659	Steel Tube to B.S. 1387
15mm	1.25m	2.0m
20mm	2.0m	2.5m
25mm	2.0m	2.5m
32mm	2.5m	3.0m
40mm	2.5m	3.0m
50mm	2.5m	3.0m
65mm	3.0m	3.5m
80mm	3.0m	3.5m
100mm	3.0m	4.0m
125mm	3.0m	4.5m
150mm	3.5m	4.5m

The support spacing for vertical runs shall not exceed one and a half times the distances given for horizontal runs.

d) Expansion Joints and Anchors

Where practicable, cold pipework systems shall be arranged with sufficient bends and changes of direction to absorb pipe expansion providing that the pipe stresses are contained within the working limits prescribed in the relevant B.S. specification.

Where piping anchors are supplied, they shall be fixed to the main structure only. Details of all anchor design proposals shall be submitted to the Engineer for approval before erection commences.

The Sub-contractor when arranging his piping shall ensure that no expansion movements are transmitted directly to connections and flanges on pumps or other items of plant.

The Sub-contractor shall supply flexible joints to prevent vibrations and other movements being transmitted from pumps to piping systems or vice versa.

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3.2.5 Sanitary Appliances

All sanitary appliances supplied and installed as part of the Sub-contract works shall comply with the general requirements of B.S. Code of Practice 305 and the particular requirements of the latest B.S. Specifications.

3.2.6 Pipe Sleeves

Main runs of pipework are to be fitted with sleeves where they pass through walls and floors. Generally the sleeves shall be of P.V.C. except where they pass through the structure, where they shall be mild steel. The sleeves shall have 6mm - 12mm clearance all around the pipe or for insulated pipework all around the installation. The sleeve will then be packed with slag wool or similar.

3.3 INSTALLATION

3.3.1 General

Installation of all pipework, valves, fittings and equipment shall be carried out under adequate supervision from skilled staff to the relevant codes and standards as specified herein. The Sub-contractor shall be responsible to the Main Contractor for ensuring that all builders work associated with his piping installation is carried out in a satisfactory manner to the approval of the Engineer.

3.3.2 Above Ground Installation

a) Water Services

Before any joint is made, the pipes shall be hung in their supports and adjusted to ensure that the joining faces are parallel and any falls which shall be required are achieved without springing the pipe.

Where falls are not shown on the Contract Drawings or stated elsewhere in the Specification, pipework shall be installed parallel to the lines of the buildings and as close to the walls, ceilings, columns, etc., as is practicable. All water systems shall be provided with sufficient drain points and automatic air vents to enable them to function correctly.

Valves and other user equipment shall be installed with adequate access for operation and maintenance. Where valves and other operational equipment are unavoidably installed beyond normal reach or in such position as to be difficult to reach from a small step ladder, extension spindles with floor or wall pedestals shall be provided.

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

Full allowances shall be made for the expansion and contraction of pipework, precautions being taken to ensure that any force produced by the pipe movements are not transmitted to valves, equipment or plant.

All screwed joints to piping and fittings shall be made with P.T.F.E. tape.

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The test pressure shall be maintained by the pump for about one hour and if there is any leakage, it shall be measured by the quantity of water pumped into the main in that time. A general leakage of 4.5 litres per 25mm of diameter, per 1.6 kilometres per 24 hours per 30 metres head, may be considered reasonable but any visible individual leak shall be repaired.

b) Sanitary Services

Soil, waste and vent pipe system shall be installed in accordance with the best standard of modern practice as described in B.S. 5572 to the approval of the Engineer.

The Sub-contractor shall be responsible for ensuring that all ground waste fittings are discharged to a gully trap before passing to the sewer via a manhole.

The Sub-contractor shall provide all necessary rodding and inspection facilities within the draining system in positions where easy accessibility is available.

Where a branch requires rodding facilities in a position to which normal access is unobtainable, then that branch shall be extended so as to provide a suitable purpose made rodding eye in the nearest adjacent wall or floor to which easy access is available.

The vent stacks shall terminate above roof level and where stack passes through roof, a weather skirt shall be provided. The Sub-contractor shall be responsible for sealing the roof after installation of the stacks.

The open end of each stack shall be fitted with a plastic coated or galvanised steel wire guard.

Access for rodding and testing shall be provided at the foot of each stack.

c) Sanitary Appliances

All sanitary appliances associated with the Sub-contract works shall be installed in accordance with the best standard of modern practice as described in C.P. 305 to the approval of the Engineer.

3.4 TESTING AND INSPECTION

3.4.1 Site Tests – Pipework Systems

a) Above Ground Internal Water Services Installation

All water service pipe system installed above ground shall be tested hydraulically for a period of one hour to not less than one and half times to design working pressure.

If preferred, the Sub-contractor may test the pipelines in sections. Any such section found to be satisfactory need not be the subject of a further test when system has been completed, unless specifically requested by the Engineer.

During the test, each branch and joint shall be examined carefully for leaks and any defects revealed shall be made good by the Sub-contractor and the section re-tested.

The Sub-contractor shall take all necessary precautions to prevent damage occurring to special valves and fittings during the tests. Any item damaged shall be repaired or replaced at the Sub-contractor's expenses.

e) Above Ground Soil Waste and Ventilation System

All soil, waste and ventilating pipe system forming part of the above ground installation, shall be given appropriate test procedures as described in B.S. 5572, 1972.

Smoke tests on above ground soil, waste and ventilating pipe system shall not be permitted. Pressure tests shall be carried out before any work which is to be concealed is finally enclosed.

In all respects, tests shall comply with the requirements of B.S. 5572.

3.4.2 Site Test – Performance

Following satisfactory pressure test on the pipework system operational tests shall be carried out in accordance with the relevant B. S. Code of practice on the systems as a whole to establish that special valves, gauges, control, fittings, equipment and plant are functioning correctly to the satisfaction of the Engineer.

All hot water pipework shall be installed with pre-formed fibre glass lagging to a thickness of 25mm where the pipe runs above a false ceiling or in areas where the ambient temperature is higher than normal with the result that pipe "sweating", due to condensation will cause nuisance.

All lagged pipes which run in a visible position after erection shall be given a canvas cover and prepared for painting as follows:

- i) Apply a coating of suitable filler until the canvas weave disappears and allow to dry.
- ii) Apply two coats of an approved paint and finish in suitable gloss enamel to colors approved by the Engineer.

All lagging for cold and hot water pipes erected in crawl ways, ducts and above false ceiling which after erection are not visible from the corridors of rooms, shall be covered with a reinforced aluminium foil finish banded in colours to be approved by the Engineer.

In all respects, unless otherwise stated, the hot and cold water installation shall be carried out in accordance with the best standard of modern practice and described in C.P.342 and C.P.310 respectively to the approval of the Engineer.

The test pressure shall be applied by means of a manually operated test pump or, in the case of long main or mains of large diameter, by a power driven test pump which shall not be left unattended. In either case precautions shall be taken to ensure that the required pressure is not exceeded.

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Pressure gauges should be recalibrated before the tests.

The Sub-contractor shall be deemed to have included in his price for all test pumps, and other equipment required under this specification.

The test pressure shall be one and a half times the maximum working pressure except where a pipe is manufactured from a material for which the relevant B.S. specification designates a maximum test pressure.

3.5 STERILISATION OF COLD WATER SYSTEM

All water distribution system shall be thoroughly sterilised and flushed out after the completion of all tests and before being fully commissioned for handover.

The sterilisation procedures shall be carried out by the Sub-contractor in accordance with the requirements of B.S. Code of Practice 301, Clause 409 and to the approval of the Engineer.

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SECTION C:

**PARTICULAR SPECIFICATION FOR PORTABLE FIRE
EXTINGUISHER BOOSTED HOSE REEL SYSTEM AND FIRE
SPRINKLER SYSTEM**

MECHANICAL INSTALLATIONS
TRADE PREAMBLES

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1.0 PORTABLE FIRE EXTINGUISHER AND HOSE REEL INSTALLATIONS

1.1 General

The particular specification details the requirements for the supply and installation and commissioning of the Portable Fire Extinguishers, Hose Reel, Fire Hydrant and Dry Riser. The Sub-contractor shall include for all appurtenances and appliances not necessarily called for in this specification or shown on the contract drawings but which are necessary for the completion and satisfactory functioning of the works.

If in the opinion of the Sub-contractor there is a difference between the requirements of the Specifications and the Contract Drawings, he shall clarify these differences with the Engineer before tendering.

1.2 Scope of Works

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

1.3 Water/CO2 Extinguishers

These shall be 9-litre water filled CO2 cartridge operated portable fire extinguishers and shall comply with B.S. 1382: 1948 and to the requirements of B.S.4523: 1977. Unless manufactured with stainless steel, bodies shall have all internal surfaces completely coated with either a lead tin, lead alloy or zinc applied by hot dipping. There shall be no visibly uncoated areas.

The extinguishers shall be clearly marked with the following:

- a) Method of operation.
- b) The words 'WATER TYPE' (GAS PRESSURE) in prominent letters.
- c) Name and address of the manufacturer or responsible vendor.
- d) The nominal charge of the liquid in imperial gallons and litres.
- e) The liquid level to which the extinguisher is to be charged.
- f) The year of manufacture.
- g) A declaration to the effect that the extinguisher has been tested to a pressure of 24.1 bar (350 psi.).
- h) The number of British Standard 'B.S' 1382 or B.S. 5423: 1977.

1.4 Portable Carbon Dioxide Fire Extinguishers

These shall be portable carbon dioxide fire extinguishers and shall comply with B.S. 3326: 1960 and B.S. 5423: 1977.

The body of extinguisher shall be a seamless steel cylinder manufactured to one of the following British Standards; B.S. 401 or B.S. 1288.

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The filling ratio shall comply with B.S. 5355 with valves fittings for compressed gas cylinders to B.S.341. Where a hose is fitted it shall be flexible and have a minimum working pressure of 206.85 bar (3000 p.s.i.). The hose is not to be under internal pressure until the extinguisher is operated.

The nozzle shall be manufactured of brass gunmetal, aluminium or stainless steel and may be fitted with a suitable valve for temporarily stopping the discharge if such means are not incorporated in the operating head.

The discharge horn shall be designed and constructed so as to direct the discharge and limit the entrainment of air. It shall be constructed of electrically non-conductive material.

The following markings shall be applied to the extinguishers:-

- a) The words "Carbon Dioxide Fire Extinguisher" and to include the appropriate nominal gas content.
- b) Method of operation.
- c) The words "Re-charge immediately after use".
- d) Instructions for periodic checking.
- e) The number of the British Standard B.S. 3326: 1960 or B.S. 5423.
- f) The manufacturers name or identification markings

1.5 Dry Chemical Powder Portable Fire Extinguisher

The portable dry powder fire extinguishers shall comply with BS3465: 1962 and BS 5423. The body shall be constructed to steel not less than the requirements of BS 1449 or aluminium to BS 1470: 1972 and shall be suitably protected against corrosion.

The dry powder charge shall be not-toxic and retain its free flowing properties under normal storage conditions. Any pressurizing agent used as an expellant shall be in dry state; in particular compressed air.

The discharge tube and gas tube if either is fitted shall be made of steel, brass, copper or other not less suitable material. Where a hose is provided it shall not exceed 1,060mm and shall be acid and alkali resistant. Provision shall be made for securing the nozzle when not in use.

The extinguisher shall be clearly marked with the following information

- a) The word "Dry Powder Fire Extinguisher"
- b) Method of operation in prominent letters.
- c) The working pressure and the weight of the powder charge in Kilogramme.
- d) Manufacturers name or identification mark
- e) The words "RECHARGE AFTER USE" if rechargeable type.

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- f) Instructions to regularly check the weight of the pressure container (gas Cartridge) or inspect the pressure indicator on stored pressure types when fitted, and remedy any loss indicated by either.
- g) The year of manufacture.
- h) The Pressure to which the extinguisher was tested.
- i) The number of this British Standard BS 3465 or BS 5423: 1977.
- j) When appropriate complete instructions for charging the extinguisher shall be clearly marked on the extinguisher or otherwise be supplied with the refill.

1.6 Air Foam Fire Extinguisher

These shall be of 9 litres capacity complete with refills cartridges and wall fixing brackets and complying with B.S. 5423 with the following specifications:-

Cylinder:	to B.S. 1449
Necking:	to be 76mm outside diameter steel EN 3A 2 ³ / ₄ X 8TPI female thread.
Head cap:	to be plastic moulding acetyl resin.
CO₂ Cylinder:	to be 75gm P.V.C coated.
Internal Finish:	to be polythene lining on phosphate coating.
External finish:	to be phosphated - One coat primer paint and one coat stove enamel B.S. 381 C.

1.7 Fire Blanket

The fire blanket shall be made from cloth woven with pre-asbestos yarn or any other fire proof material and to measure 1800 x 1210 mm and shall be fitted with special tapes folded so as to offer instantaneous single action to release blanket from storing jacket.

2.0 Boosted Hose Reel System

2.1 General

The Particular Specification details the requirements for the supply, installation and commissioning of the hose reel installation. The hose reel installation shall comply in all respects to the requirements set out in C.O.P 5306 Part 1: 1976, B.S 5041 and B.S 5274. The System shall comprise of a pumped system.

2.2 Hose Reel Pumps

The fire hose reel pumps shall consist of a duplicate set of multi-line centrifugal pumps from approved manufacturers. The pumps shall be capable of delivering 0.76 lit/sec at a running pressure of 2 bars.

The pump casing shall be of cast iron construction with the impeller shaft of stainless steel with mechanical seal.

2.3 Control Panel

The control panel shall be constructed of mild steel 1.0mm thick sheet, be moisture, insect and rodent proof and shall be provided complete with circuit breakers and a wiring diagram enclosed in plastic laminate.

The pump shall be controlled by a flow switch therefore; the control panel shall include the following facilities:

- (a) 'On' push button for setting the control panel to live.
- (b) Green indicator light for indicating control panel live.
- (c) Duty / Stand-by pump auto change over.
- (d) Duty pump run green indicator light.
- (e) Stand-by pump run green indicator light.
- (f) Duty pump fail red indicator light.
- (g) Stand-by pump fail red indicator light.
- (h) Low water condition pump cut-out with red indicator light.

The pumps are to be protected by a low level cut-out switch to prevent dry pump run when low level water conditions occur in the water storage tank.

2.3.1 Hose Reel

The hose reel to the installation shall consist of a recessed, swing-type hose reel as Angus Fire Armour Model III or from other approved manufacturers.

The hose reel shall comply with B.S. 5274: 1975 and B.S 3161: 1970 and is to be installed to the requirements of C.P. 5306 Part 1: 1976.

The hose reel shall be supplied and installed complete with a first-aid Non-kinking hose 30 meters long with a nylon spray / jet / shut-off nozzle fitted. A screw down chrome - plated globe valve to B.S 1010 to the inlet to the reel is to be supplied.

The orifice to the nozzle is to be not less than 4.8mm to maintain a minimum flow of 0.4 lit / sec to jet.

The hose reels shall be installed complete with electro-galvanized cabinet recessed on the wall.

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

2.3.2 Pipe Work

The pipe work for the hose reel installation shall be galvanized wrought steel tubing heavy grade Class B to B.S 1387: 1967 with pipe threads to B.S 21. The pipe work and all associated fittings shall be in approved colour for fire fittings.

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2.3.3 Pipe Fittings

The pipe fittings shall be wrought steel pipe fittings, welded or seamless fittings conforming to B.S. 1740 or malleable iron fittings to B.S. 143.

All changes in direction will be with standard bends or long radius fittings. No elbows will be provided.

2.3.4 Non-return Valves

The non-return valves up to and including 80mm diameter shall be to B.S. 5153: 1974.

The valves shall be of cast iron construction with gunmetal seat and bronze hinge pin.

2.3.5 Gate Valves

The gate valves up to and including 80mm diameter shall be non-rising stem and wedge disc to B.S. 5154: 1974 with screwed threads to B.S. 21 tapes thread

2.3.6 Sleeves

Where pipe work passes through walls, floors or ceilings, a sleeve shall be provided one diameter larger than the diameter of the pipe, the space between them to be packed with mineral wool, to the Engineer's approval.

2.3.7 Earthing

The hose reel installation shall be electrically earthed by a direct earth connection. The installation of the earthing shall be carried out by the Electrical Sub- contractor.

2.3.8 Finish Painting

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

2.3.9 Testing and Commissioning

The hose reel installation shall be flushed out before testing to ensure that no builder's debris has entered the system. The installation is to be then tested to one and half times the working pressure of the installation to the approval of the Engineer. Simulated fault conditions of the pumping equipment are to be carried out before acceptance of the System by the Engineer.

2.3.10 Instruction Period

The Sub-contractor shall allow in his contract sum for instructing of the use of the equipment to the Client's maintenance staff. The period of instruction may be within the contract period but may also be required after the contract period has expired.

The period of time required shall be stipulated by the Client but will not exceed two days in which time the Client's staff shall be instructed on the operation and maintenance of the equipment.

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2.0 Signage-Fire Instruction /Fire Exit

2.1 Fire Instruction Notice

Print fire instruction on the Perspex plates with White Colour

Background measuring 510mm length x 380mm width x 4mm thick as follows;

FIRE INSTRUCTION NOTICE

In the event of fire;

1. Raise the alarm by actuating the nearest alarm system point, Sound Siren /gong or **Shout Fire**
2. Attack fire using the nearest available equipment.
3. Call nearest fire Brigade or Police 999 and inform your switchboard (PABX) Operator
4. Ensure that all personnel not involved in fire fighting evacuation to safety outside the building.
5. Close but **DO NOT LOCK** doors behind as you leave.
6. Evacuate the building using stairs or fire escapes. Do not use Lifts/escalators. Walk calmly. Avoid panic. Do not stop or return for personal belongings.
7. Assemble as per floor outside the building for roll call.

2.1.1.1 Fire Exit Sign

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

1. Lettering **IN RED COLOR** of not less than 50mm in height.
2. A pendant sign bearing words, **FIRE EXIT** and with a directional arrow.

The sign must be capable of being read from both approaches to exit and so is double sided.

2.1.1.2 Hose Reel Label

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

1. Lettering **IN RED COLOR** of not less than 50mm in height.
2. A pendant sign bearing words, **HOSE REEL** and with a directional arrow.

The sign must be capable of being read from both approaches to exit and so is double sided.

4.0 The Dry Riser Installation

4.1 Definition

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

4.2 Installation

The dry riser is installed with Fire Brigade Breeching inlet installed at street level in front of the building at a position where fire brigade can access and pump water into the building. Landing valves are then installed on each floor above the ground level to which the fire brigade can attach fire fighting hoses.

4.3 Landing Valves

The Hydrant outlets shall comply with the requirements of C.P 5306 Part 1:1976 and B.S 5041 Part 1. The hydrant Riser outlets shall be 2No minimum per floor including the roof and shall be mounted with their centre line between 910mm and 1060mm above finished floor level positioned at the entry lobby on each floor.

4.4 Fire Brigade Breeching Inlets

One of the Brigade Breeching inlets shall consist of four (4No.) 64mm internal diameter instantaneous male coupling for connection to the fire brigade pumps and other two shall consist of two (2No.) 64mm internal diameter instantaneous male coupling.

The breeching inlet shall incorporate a 100mm diameter flanged connection to the 100mm dry riser mains.

The breeching inlet shall be located 1000mm to the centre line of the box above ground level.

The breeching inlet shall be enclosed in a galvanized mild steel cabinet of suitable dimensions to contain all visible pipe work. A 7.5mm thick wired glass front shall be provided with 50mm high, red lettering, **DRY RISER BREECHING CONNECTOR**. The remainder of the box is to be finished in fire red enamel paint.

4.5 Pipework

The pipe work fittings shall be wrought steel pipe fittings welded or seamless fittings conforming to B.S 1740 Part 1971 or malleable iron fittings to B.S 193.

All changes in direction will be standard bends or long radius fittings. **No elbows will be permitted.**

4.6 Flanges

The flanges shall comply with B.S 4504:1969. All flanges shall comply with a nominal Pressure Rating of 16 bars and shall be of either grey cast iron or steel.

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4.7 Gaskets

The gaskets for use with flanges to B.S 4504: 1969 shall comply with B.S 4865 Part 1: 1972 for pressure up to 64 bars.

4.8 Air Relief Valves

The dry riser shall terminate 1M above the roof landing valve with an air relief valve. The valve construction shall be of iron Grade E conforming to B.S 1452. Float Guide and Seat Ring shall be of A.B.S plastic with seal ring of moulded rubber, Maximum working pressure of the valve is to be 16 bar.

4.9 Non-Return Valves

The non-return valves up to and including 80mm diameter shall conform to B.S 5153:1974 with flanges to B.S 4504 PN 16. The valves shall be of cast iron construction with gunmetal seat and disc with spring of phosphor bronze.

Non return valves exceeding 80mm diameter and up to 300mm diameter shall be conform to B.S 5153:1974 with flanges to B.S 4504 PN 16. The valve shall be is Cast Iron Construction with Gunmetal seat to B.S 1400.

4.10 Gate Valves

The gate valves up to and including 80mm shall be non-rising stem and wedge disc to B.S. 1952:1964 (B.S 5154:1974) with screwed threads to B.S.21(KS ISO 7 – 1) taper thread. The valves shall be of high-grade bronze construction.

Gate valves exceeding 80mm and up to 300mm shall be to B.S 5163 with flanges to B.S 4504 PN 16. The valve is to be double flanged cast iron wedge gate valve for water works purposes with cast iron body to B.S 1452 GRADE 14 with rubber covered cast iron gate. The stem is to be of Forged Stainless Steel to B.S 970 with cast iron hand wheel.

4.11 Sleeves

Where Pipework pass through walls or floors or ceiling a sleeve shall be provided one diameter larger than the diameter of the pipe the space between to be the packed with mineral wool, to the Engineers approval.

4.12 Floor and Ceiling Plates

Where pipes pass through floors, walls and ceilings, floor, wall and ceilings plates shall be secured around the pipe. The plated shall be of stainless-steel construction and will serve no other purpose than to present a neat finish to the exposed installations.

4.13 Earthing

The dry riser shall be electrically earthed by a direct earth connection. The installation of the earthing to be carried out by the electrical Sub-Contractor.

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4.14 Finish Painting

Upon completion, testing and commissioning of the dry rise installation the pipe work shall be primed, and finish painted with 2No. Coats of paint by the Sub-Contractor to the Engineer's requirements.

4.15 Testing and Commissioning

The installation is to be tested to one and half times the working pressure of the installation, all to the approval of the Engineer. The pressure shall be maintained for about 1 hour ensuring that there is no change in pressure is observed.

4.16 Canvas Hose

The canvas hose shall be 65mm diameter 30m long designed for a bursting pressure of 34 bars. The canvas hose shall have attached instantaneous hose coupling, branch pipes and nozzle to B.S 336: 1965.

4.17 Hose Cradle

The hose cradle shall be a high-quality fitting designed for use in public buildings. The cradle **shall be made in aluminium** throughout and shall be supplied with a wall bracket and the finish shall be polished or chrome plated.

5.0 Fire Hydrant

5.1 Fire Hydrant Details

5.1.1 Definition

The fire hydrant is a system which is installed along the water mains to used as a means of providing water to the fire brigades through the connection of the hose from a standpipe.

5.1.2 Installation

The fire hydrants are installed along the water mains with the first hydrant at a location which is not more than 60 m from the entry of any building, and they should not be more than 120 m apart.

5.1.3 Hydrant body

The body of the hydrant shall be made of grey cast iron complying with the requirements of BS 1452 having a tensile strength not less than that given for grade 14.

5.1.4 Hydrant Valve

The valve shall be faced with suitable resilient material. The threaded part of the valve, which engages with the spindle, shall be of bronze.

Body seating for the valves shall be of copper alloy complying with the requirements of BS 1400 (KS 06 – 744 – 1:1991) or high tensile brass complying with the requirements of BS 2872 or BS 2874.

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Turning the spindle cap in a clockwise direction when viewed from above shall close valves and the direction of opening shall be permanently marked on the gland.

5.1.5 Spindle & Spindle Cap

The spindle note shall be either of the same material as the spindle, or of copper alloy complying with the requirements of BS 1400 (KS 06 – 744 – 1:1991). It shall have a squared top formed to receive either a cast iron spindle cap.

The spindle shall be made of copper alloy complying with the requirements of BS 2874 (KS 06 – 744 – 1:1991), and it shall have a threaded machined of trapezoidal form. The spindle cap shall be of a cast iron secured to the spindle by on M12 hexagon socket set screw conforming to BS 4168.

5.1.6 Hydrant Outlet

The outlet flange of the hydrant shall have above nominal diameter 65mm, and shall be fitted with a screwed outlet – Both flanges shall be 50 mm conforming to BS 4504: Part 1: 1969

The screwed outlet shall be provided with a cap of cast iron or other suitable material. The cap shall cover the outlet thread completely and shall be attached to the hydrant by a chain

The distance between the axis of the outlet and the nearest point on the spindle fitting shall be not less than 100 mm.

The screwed outlet shall be made of Copper alloy to BS 1400 (KS 06 – 744 – 1:1991), or Copper alloy to BS 2872, or Suitable Spheroidal graphite iron to BS 2789 protected against corrosion accordance with CP 2008.

5.1.7 Drain Boss

Each shall be provided with a suitable drain boss on the outlet side. This shall be located at the lowest practical point which will permit the filling of self-operating a drilled drip plug.

5.1.8 Jointing

The hydrants shall have machined joint faces through out and the fitting of adjoining parts shall be such as to make sound joints, corresponding parts of hydrants of the same design and manufacture shall be interchangeable.

5.1.9 Hydrant coating

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

5.1.10 Surface Box

The clear opening of hydrant surface boxes at ground level shall not be less than 250mm x 380mm.

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The depth of frame shall normally be:

- a) For boxes located on footpaths: 100mm
- b) For boxes located in roads: 125mm

5.1.11 Marking

Surface box covers shall be clearly marked by having the words '**FIRE HYDRANT**' in letter not less than 30mm high, or the initials '**FH**' in letters not less than 75mm high cast into the cover.

5.1.12 Surface Box Covers & Frames

The surface box frames and covers shall be graded in accordance with BS 497:1967 and shall meet the loading test requirement also given in BS 497.

5.2 Standpipes

One end of these shall have internal threads to couple with the 80mm diameter external threads of the screw down type or above ground fire Hydrant (BS 750 type 2 hydrants) outlet. It shall have 65mm diameter internal threads to couple with the interconnect or hose of the pump set.

5.3 Hose Pipe

Each cotton synthetic fibre rubberized fire hosepipe to be at least 30 metres long with 65mm diameter female instantaneous type connector complete with nozzle.

5.4 Testing

The hydrants shall be deemed to have undergone the necessary hydrostatic and flow test at time of manufacture. Necessary test certificates from the manufacturer shall be needed. The test, to conform to BS 750: 1977:

SECTION D:

BILLS OF QUANTITIES

AND

SCHEDULE OF UNIT RATES

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BILLS OF QUANTITIES AND SCHEDULE OF UNIT RATES

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TRADE PREAMBLES

SECTION A
GENERAL SPECIFICATIONS
OF
MATERIALS AND WORKS

ELECTRICAL INSTALLATIONS
TRADE PREAMBLES

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GENERAL SPECIFICATIONS OF MATERIALS AND WORKS

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2.1 GENERAL

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

2.2 STANDARD OF MATERIALS

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

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

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

2.3 WORKMANSHIP

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

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

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

2.4 PROCUREMENT OF MATERIALS

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

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

2.5 SHOP DRAWINGS

Before manufacture or Fabrication is commenced the sub-contractor shall submit Two copies of detailed drawings of all control pillars, meter cubicles, medium voltage switchboards including their components showing all pertinent information including sizes, capacities, construction details, etc., as may be required to determine the suitability of the equipment for the approval of the Engineer. Approval of the detailed drawings shall not relieve the sub-contractor of the full responsibility of errors or the necessity of checking the drawings himself or of furnishing the materials and equipment and performing the work required by the plans and specifications.

2.6 RECORD DRAWINGS

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

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

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

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

2.7 REGULATIONS AND STANDARDS

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

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

2.8 SETTING OUT WORK

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

2.9 POSITIONS OF ELECTRICAL PLANT AND APPARATUS

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

2.10 MCB DISTRIBUTION PANELS AND CONSUMER UNITS

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

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

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

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

A locking plate shall be provided for each size of breaker; A complete list of circuit details on typed cartridge paper glued to stiff cardboards and covered with a sheet of Perspex, and held in position with four suitable fixings, shall be fitted to the inner face of the lids of each distribution panel. The appropriate MCB ratings shall be stated on the circuit chart against each circuit in use: Ivorine labels shall be secured to the insulation barriers in such a manner as to indicate the number of the circuits shown on the circuit chart.

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

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

2.11 FUSED SWITCHGEAR AND ISOLATORS

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

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

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

Isolators shall be load breaking/fault making isolators.

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

2.12 CONDUITS AND CONDUIT RUNS

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

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

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

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

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

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

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

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

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

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

It will be the Sub-contractor's responsibility to ascertain from site, the details of reinforced concrete or structural steelwork and check from the builder's drawings the positions of walls, structural concrete and finishes. No reinforced concrete or steelwork may be drilled without first obtaining the written permission of the Structural Engineer.

The drawings provided with these specifications indicate the appropriate positions only of points and switches, and it shall be the Sub-Contractors responsibility to mark out and centre on site the accurate positions where necessary in consultation with the Architect and the Engineer. The sub-contractor alone shall be responsible for the accuracy of the final position.

2.13 CONDUIT BOXES AND ACCESSORIES

All conduit outlets and junction boxes are to be either malleable iron and of standard circular pattern of the appropriate type to suit saddles being used or super high impact PVC manufactured to KS 04 – 179 : 1983.

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Small circular pattern boxes are to be used with conduits up to and including 25mm outside diameter. Rectangular pattern adaptable boxes are to be used for conduits of 32mm outside diameter and larger. For drawing in of cables in exposed runs of conduit, standard pattern through boxes are to be used:

Boxes are to be not less than 50mm deep and of such dimensions as will enable the largest appropriate number of cables for the conduit sizes to be drawn in without excessive bending.

Outlet boxes for lighting fittings are to be of the loop-in type where conduit installation is concealed and the sub-contractor shall allow one such box per fitting, except where fluorescent fittings are specified when two such boxes per fitting shall be fitted flush with ceiling and if necessary fitted with break joint rings. Pattresses shall be fitted where required to outlets on surface conduit runs.

Adaptable boxes are two of PVC or mild steel (of not less than 12swg) and black enamelled or galvanised finish according to location. They shall be of square or oblong shape complete with lids secured by four 2 BA brass roundhead screws; No adaptable box shall be less than 75mm x 75mm x 50mm or larger than 300mm x 300mm x 75mm and shall be adequate in depth in relation to the size of conduit entering it. Conduits shall only enter boxes by means of conduit bushes.

2.14 LABELS

Labels fitted to switches and fuse boards; -

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

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2.15 EARTHING

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

- (i) It shall be carried out in accordance with the appropriate sections of the current edition of the Regulations, for the Electrical Equipment of Buildings issued by Institute of Electrical Engineers of Great Britain.

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At all main distribution panels and main service positions a 25mm x 3mm minimum cross sectional area Copper tape shall be provided and all equipment including the lead sheath and armouring of cables, distribution boards and metal frames shall be bonded thereto.

- (ii) The earth tape in Sub-clause (ii) shall be connected by means of a copper tape or cable of suitable cross sectional area to an earth electrode which shall be a copper earth rod (see later sub-clause).
- (iii) All tapes to be soft high conductivity copper, untinned except where otherwise specified and where run underground on or through walls, floors, etc., it shall be served with corrosion resisting tape or coated with corrosion compound and braided
- (iv) Where the earth electrode is located outside the building a removable test link shall be provided inside the building as near as possible to the point of entry to the tape, for isolating the earth electrode for testing purposes.
- (v) Earthing of sub-main equipment shall be deemed to be satisfactory where the sub-main cables are M.I.C.S. or conduit with separate earth wire, and installation is carried out in accordance with the figures stated in the current edition of the I.E.E Regulations.
- (vi) Where an earth rod is specified (see Sub-clause (iii)) it shall be proprietary manufacture, solid hand drawn copper of 15mm diameter driven into the ground to a minimum depth of 3.6M. It shall be made up to 1.2m sections with internal screw and socket joints and fitted with hardened steel tip and driving cap.
- (vii) Earth plates will not be permitted
- (viii) Where an earth rod is used the earth resistance shall be tested in the manner described in the current edition of the IEE Regulations, by the Sub-Contractor in the presence of the Engineer and the Sub-Contractor shall be responsible for the supply of all test equipment.
- (ix) Where copper tape is fixed to the building structure it shall be by means of purpose made non-ferrous saddles which space the conductor away from the structure a minimum distance of 20mm. Fixings, shall be made using purpose made plugs; No fixings requiring holes to be drilled through the tape will be accepted.
- (x) Joints in copper tape shall be tinned before assembly riveted with a minimum of two copper rivets and seated solid.
- (xi) Where holes are drilled in the earth tape for connection to items of equipment the effective cross-sectional area must not be less than required to comply with the IEE regulations.

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- (xii) Bolts, nuts and washers for any fixing to the earth tape must be of non-ferrous material.
- (xiii) Attention is drawn to the need for the earthing metal parts of lighting fittings and for bonding ball joint suspension in lighting fittings.

2.16 CABLES AND FLEXIBLE CORDS

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

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

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

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

2.17 ARMOURED P.V.C. INSULATED AND SHEATHED CABLES:

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

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

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

2.18 CABLE SUPPORTS, MARKERS AND TILES

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

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

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

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

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

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

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

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

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

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

2.19 PVC INSULATED CABLES

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

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

2.20 HEAT RESISTING CABLES

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

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

2.21 FLEXIBLE CORDS

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

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

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

2.22 CABLE ENDS AND PHASE COLOURS

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

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

2.23 CABLE INSULATION COLOURS

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

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

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

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2.24 SUB-CIRCUIT WIRING

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

Lighting circuits P.V.C. cable.

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

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

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

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

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

2.25 SPACE FACTOR

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

2.26 INSULATION

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

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

2.27 LIGHTING SWITCHES

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

2.28 SOCKETS AND SWITCHED SOCKETS

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

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

2.29 FUSED SPUR BOXES

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

2.30 COOKER OUTLETS

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

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

2.31 CONNECTORS

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

2.32 LAMPHOLDERS

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

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

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

2.33 LAMPS

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

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

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

2.34 LIGHTING FITTINGS AND STREET LIGHTING LANTERNS

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

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

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

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

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

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

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

2.35 POSITIONS OF POINTS AND SWITCHES

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

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

2.36 STREET/SECURITY OUTDOOR LIGHTING COLUMNS:

The column shall be at a minimum of 225mm in the ground on 75mm thick concrete foundations and the pole up to 150mm shall be surrounded with concrete. The top bracket and plain section of the columns shall be common to and interchangeable with all brackets with maximum mismatching tolerance of 3mm between any pole and bracket. After manufacture and before erection the columns shall be treated with an approved mordant solution which shall be washed off and the whole allowed to dry. Thereafter, the columns shall be painted with one undercoat and two coats of gloss paint to an approved colour. All columns shall be complete with fused cut-outs.

2.37 TIMING CONTROL SWITCH

These shall be installed where shown on the drawings. Photocell timing control circuits which will operate 'on' with a specified level of darkness and 'off' with a given level of light. The initial adjustment will be done with approval of the Electrical Engineer.

2.38 WIRING SYSTEM FOR STREET LIGHTING

Cables shall be as indicated on the drawings, and shall be laid in a cable trench 450mm deep along the roadsides and 600mm deep across the roads and 900mm away from the road kerb or 1500mm away from the edges of the road. 'Loop-in' and 'Loop-out' arrangement shall be used at every pole. Wiring to the lanterns on each pole shall be with 1.5mm² PVC twin insulated and sheathed cable with earth wire shall be laid at least 600mm below the finished road level on a compact bed of murram at least 50mm thick and covered with a concrete surrounded 150mm thick.

2.39 METAL CONTROL PILLAR

These shall be metal clad and fabricated as per contract drawings and specification. The Sub-Contractor shall supply, install, test and commission control pillars including supplying, fixing connecting switchgears as detailed on the appropriate drawings.

2.40 CURRENT OPERATED EARTH LEAKAGE CIRCUIT BREAKER

Current operated earth leakage circuit breaker shall conform to B.S.S. 4293:68 rated at 240 volts D.P. 50 cycles A.C. Mains.

The breaker shall be provided with test switch and fitted in weatherproof enclosure for surface mounting. The rated load current and earth fault operating current shall be as specified in the drawings. These shall be as manufactured by Crabtree, Siemens or other equal and approved.

2.41 M.V. SWITCHBOARD AND SWITCHGEAR

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

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

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

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

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

Small wiring, which will be neatly arranged and cleated, shall be executed in accordance with B.S. 158 and the insulation of the wiring shall be coloured according to the phase or neutral connection.

Switches and fuse switches, shall be in strict accordance with KS04-183:1978 Class 2 switches. Means of locking the switch in the "OFF" position shall be provided.

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

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

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

2.42 STEEL CONDUITS AND STEEL TRUNKING

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

TRADE PREAMBLES

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

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

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

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

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

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

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

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

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

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

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

TRADE PREAMBLES

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

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

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

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

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

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

All adaptable boxes and lids of the same size shall be interchangeable. Boxes used on surface work are to be tapped or drilled to line up with the conduit fixed in distance type saddles allowing clearance between the conduit and wall without the need for setting the conduit.

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

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

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

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

TRADE PREAMBLES

Where buried in the ground outside the building the whole of the buried conduit is to be painted with two coats of approved bitumastic composition before covering up. Where run on the surface, unpainted fittings and joints shall be painted with two coats of oil bound enamel applied to rust and grease free metalwork.

2.43 TESTING ON SITE

The Sub-contractor shall conduct during and at the completion of the installation and, if required, again at the expiration of the maintenance period, tests in accordance with the relevant section of the current edition of the Regulations for the electrical equipment of buildings issued by the I.E.E of Great Britain, the Government Electrical Specification and the Electric Supply Company's By-Laws.

- (a) Tests shall be carried out to prove that all single pole switches are installed in the 'live' conductor.
- (c) Tests shall be carried out to prove that all socket outlets and switched socket outlets are connected to the 'live' conductor in the terminal marked as such, and that each earth pin is effectively bonded to the earth continuity system. Tests shall be carried out to verify the continuity of all conductors of each 'ring' circuit.
- (d) Phase tests shall be carried out on completion of the installation to ensure that correct phase sequence is maintained throughout the installation. Triplicate copies of the results of the above tests shall be provided within 14 days of the witnessed tests and the Sub-contractor will be required to issue to the service engineer the requisite certificate upon completion as required by the regulations referred to above.
- (e) Any faults, defects or omissions or faulty workmanship, incorrectly positioned or installed parts of the installation made apparently by such inspections or tests shall be rectified by the Sub-contractor at his own expense.
- (f) The Sub-contractor shall provide accurate instruments and apparatus and all labour required to carry out the above tests. The instruments and apparatus shall be made available to the services engineer to enable him to carry out such tests as he may require.
- (g) The Sub-contractor shall generally attend on other contractors employed on the project and carry out such electrical tests as may be necessary.
- (h) The Sub-contractor shall test to the services engineer's approval and as specified elsewhere in this specification or in standards and regulations already referred to, all equipment, plant and apparatus forming part of the works and before connecting to any power or other supply and setting to work.

TRADE PREAMBLES

- (i) Where such equipment, etc., forms part of or is connected to a system whether primarily or of an electrical nature or otherwise (e.g. air conditioning system) the Sub-contractor shall attend on and assist in balancing, regulating testing and commissioning, or if primarily an electrical or other system forming part of works, shall balance, regulate, test and commission the system to the service engineer's approval.

TRADE PREAMBLES

APPENDIX TO GENERAL SPECIFICATIONS OF MATERIALS AND WORKS

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

1. Government Electrical Specifications No. 1 and No. 2.
2. All requirements of Kenya Power and Lighting Company Limited, and Communications Authority of Kenya (CAK).

TRADE PREAMBLES

SECTION B
PARTICULAR SPECIFICATIONS
OF
MATERIALS AND WORKS

ELECTRICAL INSTALLATIONS
TRADE PREAMBLES

5/180 A-25

TRADE PREAMBLES

PARTICULAR SPECIFICATIONS

1.00 SITE LOCATION

The site of the proposed works is at Bondeni, Eldoret Municipality, Uasin Gishu County.

2.00 SCOPE OF WORKS

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

a) Electrical Works

This shall include conduiting, cabling, fittings and accessories.

b) CCTV Installation

This shall include conduiting, fittings cameras, termination and ensuring they are functional.

3.00 MATERIALS FOR THE WORKS

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

4.00 BROCHURES FOR FIRE ALARM PANEL & ANY ELECTRICAL EQUIPMENT AND FITTINGS

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

5.00 MINIMUM SPECIFICATIONS FOR LED LIGHTING FITTINGS

- 1) Power Factor: ≥ 0.9
- 2) Operating freq. range: 45-55Hz
- 3) Operating Voltage Range: 130-300Vac
- 4) Operating hours: $\geq 50,000$ Hrs
- 5) Correlated Colour Temperature (CCT): ≥ 6000 K
- 6) Total Harmonic Distortion (THD): $< 15\%$

Bidders must provide technical brochures

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5.00 ENERGY EFFICIENT SOLAR POWERED LED LIGHTING SPECIFICATIONS

The Contractor shall furnish and install the complete SOLAR LED lighting system as described in the Tender Specifications. The specific wattages of the LED luminaires, solar panels, battery subsystems etc. are to be indicated in individual luminaire specifications.

SOLAR LED Streetlight Luminaire

1. Housing

The luminaire shall have a full die cast housing to provide adequate rigidity and strength and also ensure proper heat dissipation. The luminaire housing shall have separate Driver and LED lamp cavity to ensure cooler operation of LED lamps and good electrical separation.

The optical LED compartment shall have a thermally hardened glass cover and high-quality silicon gasket system. The glass cover shall be tightly secured with the housing. The complete luminaire shall be rated for IP 66 (Ingress Protection).

The housing shall feature highly reflective components and films to increase light output.

The weight of the luminaire shall not be more than stipulated below: -

- 1) Up to 9,500 lumens < 7 kg
- 2) Up to 15,000 lumens < 9 kg
- 3) Up to 28,000 lumens < 15 kg

2. Optics

The luminaire shall have flexible optical system to achieve lighting parameters, as stipulated by CUSTOMER NAME for various kinds of road from M1 to M6. The luminaire shall offer a composite system efficiency of at least 90 Lumen/Watt and a lumen package of up to 11,000 lumens. The luminaire shall use high efficiency LED and optics system to achieve max energy savings. Specially designed lens system with unique inner and outer profile for high efficiency LED to ensure maximum spacing between the poles and cover higher road widths. Multi-layer optics design to ensure adequate luminance and illuminance uniformity in the unlikely event of individual LED failure.

The luminaire should offer choice of narrow beam, medium beam and wide beam light distribution.

The optical lens system should ensure:

- 1) Long life with no discoloration (UV Protection)
- 2) White painted circuit board to have high reflectivity for maximum light output.

3 Future Compatibility

The luminaire shall be fully compatible with future LED upgrades when they become available. It shall have a modular design to upgrade / replace with new LED modules or LED drivers at site. All electronic components/drivers shall be mounted on a separate gear tray with tool-less access and replacement. The luminaire shall have space available inside for communications antenna or equipment to be integrated into the luminaire for future tele-management control system implementation. Evidence showing tele-management capability shall be provided.

4 Surge Protection

The proposed luminaire shall have an in-built surge protection system to protect the electronic driver and the LED module with a minimum surge protection rating of 2KV.

5 Ingress Protection (IP) & Impact Resistance

The luminaire shall have Full IP 66 protection to ensure long reliable performance and to minimize maintenance requirement and an Impact resistance of IK 08. No chemical glue is to be used as that may cause breakdown of water-proof and dust-proof seal.

6 Maintenance

Tool-less maintenance of the LED modules and gears shall be provided for easy upgrade of LED modules on the pole

7 Mounting

The mounting of the luminaire will be in axial orientation through Ø 48-60mm sidearm.

8 Thermal Management

Managing thermal properties in LED luminaires are most critical to ensure optimum performance of LEDs and reliability of the system. The housing shell under the circuit board should be specially designed to ensure perfect contact between the board and the luminaire housing for efficient heat dissipation. The housing over the Driver compartment cavity shall have adequate surface area to ensure fast heat dissipation.

9 Color Rendering Index and Color Temperature

The luminaire should have a minimum color rendering index (Ra) of 75+/- 5 and a color temperature of up to 5700K for maximum efficiency. The LED shall have a color consistency within 5 SDCM (standard deviation of color matching) as defined by McAdam. The color temperature variation of the LEDs should be restricted as per ANSI C78.377A with CCT variation limiting within 500K for nominal CCT of 4000K.

TRADE PREAMBLES

10 Useful Life Hours

The LED luminaire shall be designed for lumen maintenance of L70 or 70% at the end of useful life at ambient temperature of 35 deg C. The complete luminaire shall have a useful life of 50,000 burning hours. The luminaire including the driver will include a warranty of 3 years against manufacturing defects and complete Solar Lighting System 2 years.

11 Standards Conformity

The luminaire should fully conform to following Specifications: -

- 1) IEC 62471:2006, IEC/TR 62471-2:2009, EN 62471:2008, Photo biological safety of lamps and lamp systems IEC 62471 – Photo-biological safety of lamps and lamp systems.
- 2) IEC 60598-1:2008, EN 60598-1:2008 + A11:2009, General requirements and tests for Luminaires
- 3)
- 4) IEC 60598-2-3:2012, EN 60598-2-3:2003 + A1:2011, Luminaires, Part 2: Particular requirements: Section Three – Luminaires for road and street lighting
- 5) IEC 62493:2009, EN 62493:2010, Assessment of lighting equipment related to human exposure to electromagnetic fields
- 6) EN 55015: 2006/+A1:2007+A2:2009, Limits and methods of measurement of radio disturbance of electrical lighting and similar equipment.
- 7) EN 61547:2009, Equipment for general lighting purposes — EMC immunity requirements.
- 8) EN 61000-3-2:2006+A1:2009+A2:2009, Limits for harmonic currents emissions.
- 9) EN 61000-3-3:2008, Limitation of voltage fluctuations and flicker.

12 LED Driver Specifications

The solar LED luminaire's LED module and electrical components should be embedded in separated chamber. The solar LED luminaire input voltage / or system voltage should be 12V or 24V.

13 LED Chip Specifications

Solar LED luminaire should use 1st tier brand LED chips, and LED efficiency should be $\geq 125\text{lm/W}$ for NW/CW, $\geq 105\text{lm/W}$ for WW; the 1st tier LED manufacturers should be Cree, LumiLEDs, Osram or Nichia.

TRADE PREAMBLES

14 Ambient Temperature

The luminaire shall be suitable for ambient temperature range of between -40 to 45 degrees Celsius.

15 Controls

Dimming function and customization should be available for example programmable multistep dimming profile

16 Materials and Finishing

- Housing: Die-cast aluminum;
- Gasket: Heat resistant silicone rubber
- Glass: Tempered Glass with higher transmittance
- Frame: Gray Paint RAL7040 or different on request
- Tool-less maintenance of the LED modules and gears shall be provided for easy upgrade of LED modules on the pole.

17 Photo biological Safety

Light without blue and no photo biological risk; have been tested according to the IEC 62471 (first edition, 2006-07) and been classified as Exempt group.

18 Wiring

The connector and cable should be attached with luminaire, ensuring IP67 protection.

PV Panels (Photovoltaic Solar Panels)

1. Power Output (Pmax)

PV Panel sub-system should include panel and connectors. Solar Panel utilizes polycrystalline and mono-crystalline silicon solar cells that combine high Wp (Watts Peak) output, affordability and efficiency. PV output peak wattage should be between 35Wp and 295Wp $\pm$ 3% (depends on configuration). PV Panel subsystem should have IP65 protection junction box for wiring.

2. Ambient temperature / operating temperature

PV panel shall be able to work / operate at -40°C to $+85^{\circ}\text{C}$.

3. Encapsulation Material

Encapsulation Material Ethylene Vinyl Acetate (EVA)

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4. Lamination

PV panel shall be laminate with tempered safety glass which provide safety and best possible transmittance.

5. Wiring

PV panel shall be equipped with plug-and-play connector allowing easy connection and maintenance.

6. Lifetime

The panel shall be with 25-year designed lifetime, with power decrease less than 20%.

7. Standards Conformity

Solar Panels shall meet the following standards:

- 1) EN 61730-1:2007, Photovoltaic (PV) module safety qualification-Part 1 Requirements for construction.
- 2) EN 61730-2:2007, Photovoltaic (PV) module safety qualification - Part 2 Requirements for testing.
- 3) EN 61215:2005, IEC 61215:2005, crystalline silicon terrestrial photovoltaic (PV) modules – Design qualification and type approval.

Charge Controller

1. The system should have protection against battery overcharge and deep discharge conditions.
2. Charge controller should be High-quality, 4-stage PWM-charging (4 Stage Battery Charging (Main, Float, Boost, Equalization)),
3. Charge controller should provide:
 - Automatic System Voltage Recognition (12 V/24 V)
 - Reverse polarity protection
 - Short circuit protection: for panel and load terminals
 - Over discharging protection
 - Over voltage disconnection
 - Automatic electronic fuse protection
 - Over current protection: for load terminal
 - Reverse current protection: for panel terminal
 - Over temperature protection: reduce the charging current by WM until switch off the load

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Battery Subsystem

Battery sub system should be Valve Regulated Lead Acid (VRLA) Battery integrates gel electrolyte technology with long service lifetime, high performance in deep discharging; it can be used in wide range of ambient temperature and keep good performance of constant power input. The battery shall be equipped in dedicated designed box with following features:

- Water-proof — Battery box housing IP68, against from water or humidity underground; 0.6m water-resistant by 1 week underwater; housing of plastic ensures good performance of stability with non-chapping at -20°C.
- Conform to requirements of lead-acid utilization — pipeline from box and lighting pole antrum, to keep balance of air pressure inside box. The pipe is made of low temperature resistant nylon, stable quality without distortion at -40°C.
- The battery shall provide following features and functions, Gelatin electrolyte, 12 years lifespan in float service without acidification at 77°F (25°C) owes to a good recycle capability
- all plug and play connection
- Working Temperature Range

Charge (-22 °C to 55 °C)

Discharge (-10 °C to 55 °C)

Storage (-22 °C to 55 °C)

Standards Conformity

Battery shall meet the following standards:

1. EN 61427:2005, IEC 61427:2005, Secondary cells and batteries for renewable energy storage – General requirements and methods of test

Battery box shall meet the following standards:

2. IEC 60598-1:2008, General requirements and tests for Luminaires, IPX8 rating.

QUALITY AND WARRANTEE:

- i) All the components and parts used in the solar street lighting systems should conform to the latest BIS or IEC specifications, wherever such specifications are available and applicable.
- ii) The street lighting system including the battery will be warranted for a period of five years from the date of supply.
- iii) The PV module(s) will be warranted for a minimum period of 5 years from the date of supply. The PV modules must be warranted for their output peak watt capacity, which should not be less than 90% at the end of five (10) years and 80% at the end of Ten (10) years.

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- iv) The Warranty Card to be supplied with the system must contain the details of the system.

OPERATION AND MAINTENANCE MANUAL:

An Operation, Instruction and Maintenance Manual, in English and/or the National Language -Kiswahili, should be provided with the Solar Street Lighting System. The following minimum details must be provided in the Manual:

- Basic principles of Photovoltaic.
- A small write-up (with a block diagram) on Solar Street Lighting System - its components, PV module, battery, electronics and luminaire and expected performance.
- Type, Model number, Voltage & capacity of the battery, used in the system.
- The make and wattage of the CFL LED used in the lighting system.
- About Charging and Significance of indicators.
- Clear instructions about erection of pole and mounting of PV module (s) and lamp housing assembly on the pole or underground
- Clear instructions on regular maintenance and troubleshooting of the Solar Street Lighting System.
- Name and address of the contact person for repair and maintenance, in case of non-functionality of the solar street lighting system.

SOLAR LIGHTING LED DETAIL PARAMETERS

Item No.	Parameters	Values	Comments
1.	Input Voltage	12V	
2.	LED Efficiency (Lumens/watt)	140 Lumens/Watt	Certificate from LED manufacturer needs to be provided with Datasheet of LED LED used must be of make CREE/Nichia/Osram/ Lumileds

TRADE PREAMBLES

Item No.	Parameters	Values	Comments
3.	Life Expectancy	Above 60,000 Hours with 70 lumens	LED model should have LM80 certificate to prove the LED life is guaranteed for > 75,000. LED manufacturer should provide T21 –Life test report
4.	Color Temperature	5500-6500K	
5.	Working Humidity	10 to 90% RH6	
6.	Working Temperature	5 to 50 degree	
7.	Average Lighting Angle (Beam Angle)	120 Degree	
8.	Make of LED	PHILIPS/ CREE/LUMILEDS/ OSRAM/NICHIA	
9.	Total System Power Consumption (includes LED & drive part) in watts.	Total wattage =15W	
10.	Lamp Starting Time	Instantaneous, Less than 2 Seconds	
11.	System Efficacy (%)	Greater than 90%	
12.	Ingress Protection	IP65	NABL accredited certificate must be provided for IP65
13.	Light Output	Minimum 20 Lux when measured at the periphery of 4 meter diameter from a height of 4 meter. The illumination should be uniform without dark bands or abrupt variations, and soothing to the eye. Higher Light Output will be preferred	
14.	Power Factor	>0.95	
15.	Protection Function	Open and Short Circuits	

ELECTRICAL INSTALLATIONS**TRADE PREAMBLES**

SECTION SIX
BUILDER'S WORK
TWO- BEDROOM UNITS
BILL NO. 2

ITEM	DESCRIPTION	UNIT	QTY	RATE	SHS.	CTS.
	ELEMENT NO. 1					
	ALL PROVISIONAL					
	SUBSTRUCTURES					
	EXCAVATION AND EARTHWORK					
A	Allow for keeping the whole of the excavation free from all spring and running water by pumping or any other such means as may be necessary	ITEM				
B	Allow for maintaining and upholding the sides of excavations and keeping excavations clear of all fallen materials, rubbish etc	ITEM				
C	Excavate to reduce levels not exceeding 1.50M deep. commencing from stripped level	CM	626			
D	Ditto exceeding 1.50M deep but not exceeding 3.0M deep	CM	313			
E	Excavate foundation trenches not exceeding 1.50M commencing from reduced levels	CM	35			
F	Excavate pits for bases not exceeding 1.50M commencing from reduced levels	CM	69			
G	Extra over Excavation in any position for excavating in rock class 3	CM	313			
H	Ditto rock class 1	CM	104			
J	Return, fill in and well consolidate selected excavated material around foundations	CM	153			
K	Remove all surplus excavated materials from site	CM	264			
	FILLING					
L	Selected excavated material or other approved filling spread, levelled and consolidated in 150mm layers including ramming ground under	CM	626			
M	300mm Thick hardcore filling ditto to receive floor slabs	SM	288			
N	50mm Thick murrum blinding well watered and rolled on top of hardcore	SM	288			
	Anti-termite treatment					
P	Treat the top surface of hardcore and excavated plinths with 'Premise 200 SC or any other equal and approved insecticide applied by a Pest Control Products Board registered specialist with 10years printed warranty.	SM	335			
	CARRIED TO COLLECTION					
	SUBSTRUCTURE					
				KSHS.		

ITEM	DESCRIPTION	UNIT	QTY	RATE	SHS.	CTS.
A	Level and compact bottoms of excavated foundations and bases as directed on site	SM	273			
	<u>Mass Concrete (1:4:8) as described in:-</u>					
B	50mm Thick blinding under foundations	SM	141			
C	Ditto to column bases	SM	132			
	<u>Vibrated reinforced concrete Class 25/20 mix 1:1¹/₂:3 in:-</u>					
D	Foundation footing	CM	28			
E	Column bases	CM	62			
F	Columns	CM	9			
G	Ramp	CM	5			
H	150mm Thick ground floor slab.	SM	335			
	<u>REINFORCEMENT (ALL PROVISIONAL)</u>					
	<u>Hot rolled, ribbed high yield mild steel</u>					
	<u>Reinforcement bars to BS 4449 including soft iron tying wire and concrete spacer blocks in:-</u>					
J	8mm Diameter	KG	450			
K	10mm Diameter	KG	1,052			
L	12mm Diameter	KG	2,216			
M	16mm Diameter	KG	417			
N	20mm Diameter	KG	825			
	<u>BRC fabric reinforcement mesh as described:-</u>					
P	Mesh ref. No. A142 weighing 2.2.kg/m2 in floor including all tying wires and supports (measured net - No allowance made for laps)	SM	335			
	<u>Sawn formwork as described to:</u>					
Q	Sides of footing	SM	94			
R	Battering sides of column bases	SM	131			
	<u>CARRIED TO COLLECTION</u>			KSHS.		
	<u>SUBSTRUCTURE</u>					

ITEM	DESCRIPTION	UNIT	QTY	RATE	SHS.	CTS.
A	To sides of columns	SM	116			
B	Edges of slabs, etc 150-225mm girth	LM	151			
	<u>DAMP PROOFING</u>					
C	1000 gauge polythene sheeting laid with 150mm laps measured net no allowance made for laps	SM	335			
	<u>WALLING</u>					
	<u>Natural stone wall bedded and jointed in cement and sand (1:4) mortar in:-</u>					
D	200mm Thick selected approved quality natural stone (7N/mm ²) or other equal and approved block walling dressed :including double dressing to corner blocks:in cement and sand (1:3) mortar : 20 gauge x 25mm wide hoop iron in every alternate course: to	SM	704			
	<u>PLINTHS</u>					
	<u>Cement and sand (1:3) render as described in:-</u>					
E	13mm Thick with wood float finish to vertical surfaces	SM	45			
	<u>Prepare and apply three coats first grade plastic emulsion paint as described on:-</u>					
F	Vertical rendered surfaces	SM	45			
	<u>Precast concrete paving slabs</u>					
G	600 x 600 x 50mm Thick precast concrete paving slabs laid on and including 50mm Thick sand bed jointed and pointed in cement and sand (1:4) mortar	SM	90			
	<u>Expansion Joint</u>					
H	25mm thick flexcel expansion joint	SM	29			
J	25 x 25 mm sealer	LM	53			
	<u>CARRIED TO COLLECTION</u>				KSHS.	
	<u>COLLECTION PAGE</u>					
	Brought forward from page 6/01					
	Brought forward from page 6/02					
	Brought down from above					
	<u>TOTAL ELEMENT NO 1 - SUBSTRUCTURE</u>				KSHS.	
	<u>CARRIED TO SUMMARY OF BILL NO2</u>					
	<u>SUBSTRUCTURE</u>					

ITEM	DESCRIPTION	UNIT	QTY	RATE	SHS.	CTS.
ELEMENT NO. 2						
CONCRETE IN SUPERSTRUCTURE						
<u>Vibrated reinforced concrete Class 25/20 mix 1:11/2:3:</u>						
A	175mm Thick suspended Staircase Roof slab.	SM	86			
B	175mm Thick suspended Roof slab.	SM	300			
C	Roof Beams	CM	18			
D	Beams	CM	44			
E	Columns	CM	41			
F	Staircase	CM	12			
G	150mm thick Suspended slab	SM	956			
H	150mm thick suspended landing	SM	40			
J	150mm thick Entrance lobby cover slab	SM	20			
<u>REINFORCEMENT (ALL PROVISIONAL)</u>						
<u>Hot rolled,ribbed high yied mild steel reinforcement bars to BS 4449 including soft iron tying wire and :- concrete spacer blocks in:-</u>						
K	8mm Diameter	KG	16,436			
L	10mm Diameter	KG	20,265			
M	12mm diameter	KG	14,678			
N	16mm diameter	KG	13,086			
P	20mm Diameter	KG	5,495			
Q	25mm Diameter	KG	1,920			
<u>CARRIED TO COLLECTION</u>				KSHS.		
<u>CONCRETE IN SUPERSTRUCTURE</u>						

ITEM	DESCRIPTION	UNIT	QTY	RATE	SHS.	CTS.
	<u>Sawn formwork to:-</u>					
A	Sides and soffits of beams	SM	971			
B	Sides of columns	SM	478			
C	Horizontal soffits of landing	SM	34			
D	Slopping soffits of stairs	SM	39			
E	Soffits of suspended slabs	SM	1,157			
F	Edges of suspended slab 75 -150mm high	LM	180			
G	Edges of landing 75 - 150mm high	LM	72			
H	Edges of riser 75 - 150mm high	LM	115			
J	Edges of suspended slab 150 -225 mm high	LM	512			
K	Edges of staircase strings 400mm wide(extreme) including cutting to form profile of treads and risers	LM	57			
	<u>CARRIED TO COLLECTION</u>			KSHS.		
	<u>COLLECTION PAGE</u>					
	Brought forward from page 6/04					
	Brought down from above					
	<u>TOTAL OF ELEMENT NO.2 -CONCRETE IN SUPERSTRUCTURE</u>					
	<u>CARRIED TO SUMMARY OF BILL NO 2</u>			KSHS.		
	<u>CONCRETE IN SUPERSTRUCTURE</u>					

ITEM	DESCRIPTION	UNIT	QTY	RATE	SHS.	CTS.
	<u>ELEMENT NO. 3</u>					
	<u>WALLING</u>					
	<u>DAMP PROOF COURSE</u>					
	<u>Hessian based bituminous felt damp proof course laid on and including cement and sand (1:4) mortar in:-</u>					
A	200mm wide	LM	223			
	<u>EXTERNAL WALLS</u>					
	<u>Selected approved quality machine cut stone (7N/mm²) or other equal and approved block walling dressed :including double dressing to corner blocks:in cement and sand (1:3) mortar : 20 gauge x 25mm wide hoop iron in every alternate course: to</u>					
B	200mm thick walling	SM	954			
C	Ditto Gable walling	SM	32			
	<u>Selected approved quality machine cut stone (7N/mm²) or other equal and approved block walling dressed :including double dressing to corner blocks:in cement and sand (1:3) mortar : 20 gauge x 25mm wide hoop iron in every alternate course: to</u>					
D	200mm thick walling	SM	993			
E	Extra over make or leave and cutting openings	LM	542			
	<u>Precast Concrete Vent Blocks</u>					
F	200mm thick concrete vent block walling bedded and jointed in cement and sand (1:3) mortar reinforced with hoop iron in alternate courses.	SM	28			
	<u>CARRIED TO COLLECTION</u>					
	<u>WALLING</u>					
				KSHS.		

ITEM	DESCRIPTION	UNIT	QTY	RATE	SHS.	CTS.
	ELEMENT NO. 4					
	ROOFING					
A	20mm thick cement sand (1:4) laid to fall of screed with and including water proof additive to receive roofing felt	SM	386			
B	Ditto to parapet walling 600mm high	LM	150			
C	4mm thick modified bituminous as APP bituminous membrane torch bonded including priming surfaces with bituminous primer and dressing around surfaces	SM	386			
D	Ditto to parapet walling	LM	150			
	<u>The Following Flat roof finishes fixed with approved adhesive</u>					
E	20mm thick interlocking Concrete tiles of size 225 x 225mm	SM	386			
F	20mm thick Burnt Clay tiles of size 150 x 150mm	SM	386			
G	100mm diameter plastic fulbora outlet cast in concrete	NO	12			
H	Triangle fillet size 25 x 25mm	LM	150			
	Sundries					
J	Groove in walling for turn in waterproofing membrane	LM	150			
	<u>24 Gauge Prepainted galvanized iron in:-</u>					
K	150 x 125mm Box gutter	LM	151			
L	Extra over box gutter for 100 x 75mm outlet	NO	12			
M	Ditto but for 90 degrees bends	NO	12			
N	100 x 75mm Down pipe	LM	171			
P	Extra over down pipe for sawnneck 600mm wide	NO	12			
Q	Ditto but shoe.	NO	12			
	PAINTING AND DECORATION					
	<u>Prepare and apply two coats of zinc chromate primer and one finishing coat of gloss oil paint as manufactured by Duracoat or other equal and approved paints as described on:-</u>					
R	Metal surfaces 200 - 300 girth externally	LM	130			
	<u>TOTAL FOR ELEMENT NO. 4 - ROOFING</u>					
	<u>CARRIED TO SUMMARY OF BILL NO.2</u>					
				KSHS.		

ITEM	DESCRIPTION	UNIT	QTY	RATE	SHS.	CTS.
	<u>ELEMENT NO.5</u>					
	<u>DOORS</u>					
	<u>EXTERNAL DOORS</u>					
	<u>Supply and fix the following purpose made steel small pane casement doors with mild steel angle frame primed with red oxide including building in lugs to jambs,plugging and screwing to head and sides and bedding frame in water proof cement mortar and pointing in approved mastic in:-</u>					
A	Steel casement door overall size 1200x2400mm high in standard door glazing sections consisting of fixed light top section size 900x300mm high and openable bottom section size 900x2100mm high with 900x300mm metal sheet at the bottom complete with necessary ironmonger,18No.small glazing obscure panes size 300x300mm fixed with putty to steel door.	NO	16			
B	Steel casement door overall size 800 x 2400mm high	NO	16			
C	Steel casement door overall size 1200 x 2400mm high in two equal leaves size 600 x 2400mm	NO	2			
	<u>INTERNAL DOORS</u>					
	<u>FLUSH DOORS</u>					
	<u>Supply and fix the following flush doors.</u>					
D	45mm Thick semi-solid core flush door size 725 x 2250mm high	NO	32			
E	Ditto size 825 x 2250mm high	NO	48			
	<u>FRAMES AND FINISHINGS</u>					
	<u>supply and fix Wrot prime grade cypress in:-</u>					
F	20 x 15mm Glazing bead	LM	176			
G	20mm thick quadrant beading	LM	474			
H	38 x 20mm thick Moulded architrave	LM	474			
J	100 x 50mm thick frame plugged to wall with rawl bolt and pelleted	LM	405			
K	100 x 50mm Transome with four labours	LM	69			
	<u>CARRIED TO COLLECTION</u>			KSHS.		
	<u>DOORS</u>					

ITEM	DESCRIPTION	UNIT	QTY	RATE	SHS.	CTS.
	<u>Metal Work</u>					
A	150mm long x 50mm wide x 3mm thick fish tailed wrought iron door cramps three times bent, one end screwed into frame and the other end built in walls	NO	684			
	<u>IRON MONGERY</u>					
	<u>Supply and fix the following ironmongery complete with matching screws (Ref.is to UNION catalogue or other equal and approved)</u>					
B	Pairs of 100mm brass butt hinges	PRS	120			
C	3-lever metal door lock	NO	48			
D	2-lever ditto	NO	32			
E	Ditto but bathroom type	NO	32			
F	100mm brass barrel bolts	NO	32			
G	Coat and hat hook	NO	80			
H	Rubber door stop with rawl bolt fixed to concrete.	NO	116			
	<u>GLAZING</u>					
	<u>5mm Thick obscure glass sheet (Ordinary Quality) and glazing to metal with putty with and including setting edges of glass in wash leather in panes size:-</u>					
J	725 x 275mm high	NO	32			
K	825 x 275mm high	NO	48			
	<u>PAINTING AND DECORATION</u>					
	<u>Prepare and apply one coat aluminium primer before fixing to:</u>					
L	Back of wood 0 - 100mm girth	LM	405			
	<u>Touch up primer, prepare and apply two undercoats and one finish coat enamel paint to metal work on:-</u>					
M	Door surfaces generally	SM	150			
N	Surfaces 100 - 200mm girth	LM	188			
	<u>CARRIED TO COLLECTION</u>			KSHS.		
	<u>DOORS</u>					

ITEM	DESCRIPTION	UNIT	QTY	RATE	SHS.	CTS.
	<u>Prepare, knot, prime, stop and apply two undercoats and one finishing coat gloss oil paint as described on wood work to:</u>					
A	General surfaces	SM	149			
B	Surfaces 100-200mm girth	LM	379			
C	Surfaces 200 - 300mm girth	LM	474			
	<u>CARRIED COLLECTION</u>			KSHS.		
	<u>COLLECTION</u>					
	Brought forward from page 6/09					
	Brought forward from page 6/10					
	Brought down from above					
	<u>TOTAL FOR ELEMENT NO. 5 - DOORS</u>			KSHS.		
	<u>CARRIED TO SUMMARY OF BILL NO. 2</u>					

ITEM	DESCRIPTION	UNIT	QTY	RATE	SHS.	CTS.
	ELEMENT NO. 6 WINDOWS <u>Precast concrete (1:2:4) bedded and jointed in</u> <u>Cements and mortar (1:3) as described in</u>					
A	200x75mm weathered and throated window cill with smooth finish on all exposed surfaces	LM	212			
B	Splayed cutting to walls.	LM	212			
	<u>STEEL CASEMENT WINDOWS</u> <u>Supply, assemble and fix the following steel casement windows</u> <u>with 25mm zed and tee sections to approved sample with and</u> <u>including; 25x6mm burglar proofing flat bars behind all</u> <u>open-able windows; splayed zed section anchors;</u> <u>brass handles and stays of approved pattern; two coats of red</u> <u>oxide primer before delivery to site; permanent vents to be</u> <u>provided to all windows with mosquito mesh reinforcement</u> <u>including cutting, pinning and building in lugs to jambs and</u> <u>pointing in cement and sand motar</u> <u>(1:3) as per schedules and Architect's approval</u>					
C	Window size 2500 x 1500mm high	NO	16			
D	Window size 1800 x 1500mm high	NO	64			
E	Window size 700 x 1100mm high	NO	16			
F	Window size 650 x 800mm high	NO	32			
	<u>Metal Work</u>					
G	150x40x3mm Thick fish-tailed holdfast screwed to back of frames and built into walling	NO	870			
	<u>GLAZING</u>					
H	4mm Thick clear sheet glass and glazing to steel panes in panes exceeding 0.50 square meters but not exceeding 1.00 square metres	SM	246			
	<u>Obscure glass</u>					
J	Ditto but obscure glass	SM	17			
	<u>Curtain Rods</u>					
K	20mm diameter plastic double rod complete with wall brackets and rings	LM	212			
	<u>CARRIED TO COLLECTION</u>			KSHS.		
	<u>WINDOWS</u>					

ITEM	DESCRIPTION	UNIT	QTY	RATE	SHS.	CTS.
	<u>WINDOWS (CONT'D)</u>					
	<u>Burglar-proofing bars</u>					
A	50 x 25 x 4mm thick heavy guage mild steel rectangular hollow section tubes in framework and bars in burglar proofing grilles. Fabrication finished with red oxide primer with and including building into walls and making good	SM	263			
B	Apply three coats of gloss oil paint as specified to small diameter bars	SM	526			
	<u>Render, cement and sand (1:4), Steel trowelled</u>					
C	15mm Thick cement sand(1:4)rendering to window reveal	SM	263			
D	Ditto to window trim 50mm girth	LM	876			
	<u>Painting & Decoration</u>					
	<u>Prepare including and apply three coats of premium exterior quality silk vinyl paint Paints" or equal and approved to:-</u>					
E	Window trim and surround 50mm wide	LM	876			
F	Ditto Window reveal	SM	263			
	<u>Prepare, prime and apply two undercoats and one Finishing coat gloss oil paint on</u>					
G	Metal surfaces externally	SM	263			
H	Ditto but internally	SM	263			
	<u>CARRIED COLLECTION</u>				KSHS.	
	<u>COLLECTION</u>					
	Brought forward from page 6/12					
	Brought down from above					
	<u>TOTAL OF ELEMENT NO.6 - WINDOWS</u>				KSHS.	
	<u>CARRIED TO SUMMARY OF BILL NO. 2</u>					
	<u>WINDOWS</u>					

ITEM	DESCRIPTION	UNIT	QTY	RATE	SHS.	CTS.
	ELEMENT NO. 7					
	<u>JOINERY FITTINGS AND FIXTURES(ALL PROVISIONAL)</u>					
	<u>NOTE: All blockboard, MDF boards,etc in joinery works shall be lipped with hardwood beading all round before fixing.</u>					
	<u>High level cupboards</u>					
	<u>The following in 16 No high level storage cupboard units 3000mm long x 600mm high x 300mm deep</u>					
	<u>Prime grade cypress</u>					
A	38 x 25mm thick bearer plugged.	LM	332			
B	Ditto pinned.	LM	77			
C	20 x 20mm lipping pinned.	LM	256			
	<u>25mm Thick blockboard</u>					
D	Sides	SM	12			
E	Shelving	SM	48			
F	Bottom	SM	48			
G	Top	SM	48			
H	Partition	SM	34			
	<u>25mm Thick patterned MDF boards</u>					
J	25mm Thick door size 400 x 600mm high.	NO	192			
	<u>Ironmongery</u>					
	<u>Supply and fix the following ironmongery as UNION or other equal and approved manufacturer with matching screws:</u>					
K	Pairs of Malpa hinges	NO	192			
L	Cupboard door knobs	NO	192			
M	Cupboard door ball catches	NO	192			
	<u>Prepare and apply one coat aluminium primer to:</u>					
N	Back of wood 0 - 100mm girth.	LM	332			
	<u>CARRIED TO COLLECTION</u>			KSHS.		
	<u>JOINERY FITTINGS</u>					

ITEM	DESCRIPTION	UNIT	QTY	RATE	SHS.	CTS.
	<u>JOINERY CONT'D</u>					
	<u>Knot, prime, stop. Prepare, apply two undercoats and one finishing coat of first quality hard gloss oil paint on woodwork:-</u>					
A	General surfaces	SM	192			
	<u>Prepare, knot, prime and apply two undercoats and one finishing coat clear wax varnish on woodwork to:-</u>					
B	Surfaces 0-100mm girth	LM	256			
	<u>Low level kitchen cupboards</u>					
	<u>The following in 16 No. low level kitchen cupboards below concrete worktop total girth grouped together 3000mm long x 850mm high x 550mm deep</u>					
C	100mm thick concrete (mix 1:3:6) plinth	SM	64			
D	Sawn formwork to edge of concrete plinth 75-150mm girth	LM	206			
E	50 x 20mm thick fillet in forming rebate in concrete for door frame	LM	206			
F	20mm thick cement and sand (1:3) screed trowelled smooth	SM	64			
	<u>Worktop</u>					
G	75mm thick concrete class 20 (1:2:4) in worktop reinforced with BRC mesh No. A142 holed for 1400mm long x 500mm wide kitchen sink (measured seperately)	SM	64			
H	Sawn formwork to soffits of worktop	SM	64			
J	Ditto to edges of worktop 75 - 150 mm girth	LM	206			
	<u>Selected grade celcure treated wrot cypress in:-</u>					
K	50 x 50mm rebated door frame	LM	128			
L	50 x 40mm frame	LM	96			
M	50 x 50mm twice rebated door frame	LM	96			
N	32 x 20mm bearer pinned	LM	144			
P	Ditto but plugged	LM	192			
	<u>CARRIED TO COLLECTION</u>			KSHS.		
	<u>JOINERY FITTINGS</u>					

ITEM	DESCRIPTION	UNIT	QTY	RATE	SHS.	CTS.
	<u>JOINERY CONT'D</u>					
A	12 x 12mm sliding rails but in hardwood	LM	77			
B	Prime back of door frames before fixing a.b.d.	LM	256			
	<u>20mm thick blockboard hardwood lipped to all edges in</u>					
C	Shelves	SM	50			
D	Sides	SM	27			
E	Divisions	SM	66			
F	Door size 400mm wide x 650mm high	NO	11			
G	Ditto size 300 x 650mm high	NO	11			
H	Labour in rebating meeting stiles	LM	142			
	<u>Drawers</u>					
J	Drawer unit 800mm wide x 520mm long x 200mm deep in prime grade cypress comprising of 20mm thick front 20mm thick sides with 1 No. labour and back with 6 mm thick plywood bottom	NO	102			
	<u>Ironmongery</u>					
K	Brass coated piano hinges	LM	102			
L	Approved plastic ball catch	NO	102			
M	100mm aluminium 'D' door pull handle	NO	102			
N	Ditto but drawer pull handle	NO	154			
P	75mm long aluminium barrel bolts	NO	51			
Q	"UNION" or other equal and approved drawer lock	NO	102			
R	Ditto but cupboard door lock	NO	51			
	<u>Painting</u>					
S	Apply one under coat and two coats of gloss paint as specified on general wood surfaces internally	SM	154			
T	Ditto to surfaces 100 - 200mm girth.	LM	256			
	<u>CARRIED TO COLLECTION</u>			KSHS.		
	<u>JOINERY FITTINGS</u>					

ITEM	DESCRIPTION	UNIT	QTY	RATE	SHS.	CTS.
<u>JOINERY CONT'D</u>						
<u>The following in wardrobes (32 No.)</u>						
<u>size 1650mm wide x 2500mm high x 600mm deep</u>						
<u>in bedrooms</u>						
A	100mm plain concrete (class Q) plinth.	SM	51			
B	Sawn formwork to edge of plinths 75 - 150mm girth	LM	130			
C	Fillet planted on formwork to form 30 x 70mm rebate.	LM	130			
D	20mm cement and sand (1:3) screed as before.	SM	51			
<u>Wrot Cypress</u>						
E	12 x 12mm drawer runner	LM	246			
F	75 x 50mm rebated door frame	LM	340			
G	75 x 50mm transome ditto	LM	85			
H	75 x 50mm mullion	LM	207			
J	50 x 25mm bearer	LM	256			
K	20mm diameter quadrant	LM	272			
<u>Blockboard</u>						
L	25mm thick ordinary blockboard lipped all round in shelves etc.	SM	77			
M	25mm thick one side veneered blockboard door overall size 450 x 2100mm high hardwood lipped all round.	NO	205			
N	Ditto 450 x 600mm high ditto.	NO	205			
P	Drawer unit 900mm wide x 520mm long x 200mm deep in prime grade cypress comprising of 20mm thick front 20mm thick sides with 1 No. labour and back with 6 mm thick plywood bottom	NO	154			
Q	25mm Diameter chromium plated hanging rail, 1800mm long including end fixing brackets.	NO	51			
R	Ditto shoe rack 900mm long including fixing brackets.	NO	51			
S	Approved quality 25mm diameter pair of plastic air vents fixed to blockboard doors with and including forming opening in door	NO	102			
<u>CARRIED TO COLLECTION</u>				KSHS.		
<u>JOINERY FITTINGS</u>						

ITEM	DESCRIPTION	UNIT	QTY	RATE	SHS.	CTS.
	<u>JOINERY CONT'D</u>					
	<u>Supply and fix the following ironmongery to timber as before</u>					
A	75mm pressed steel butt hinges	PAIRS	154			
B	'Ideal' ball catch	NO	102			
C	100mm aluminium 'D' door pull handle	NO	102			
D	Ditto drawer pull handle	NO	154			
E	Wardrobe locks	NO	51			
F	75mm long aluminium barrel bolts	NO	51			
G	Prepare and apply one coat of aluminium wood primer before fixing on backs of wood surfaces not exceeding 100mm girth as before.	LM	246			
	<u>Knot, prime, stop. Prepare and apply two undercoats and one finishing coat gloss paint on woodwork internally.</u>					
H	General surfaces	SM	256			
J	Surfaces not exceeding 100mm girth.	LM	205			
K	Ditto 100 - 200mm girth	LM	424			
	<u>The following in wardrobes (16 No.) size 1800mm wide x 2500mm high x 600mm deep in bedrooms</u>					
L	100mm thick plain concrete (class Q) plinth.	SM	43			
M	Sawn formwork to edge of plinths 75 - 150mm girth	LM	67			
N	Fillet planted on formwork to form 30 x 70mm rebate.	LM	67			
P	20mm cement and sand (1:3) screed as before.	SM	43			
	<u>Wrot Cypress</u>					
Q	12 x 12mm drawer runner	LM	26			
R	75 x 50mm rebated door frame	LM	102			
	<u>CARRIED TO COLLECTION</u>			KSHS.		
	<u>JOINERY FITTINGS</u>					

ITEM	DESCRIPTION	UNIT	QTY	RATE	SHS.	CTS.
<u>JOINERY CONT'D</u>						
A	75 x 50mm transome ditto	LM	69			
B	75 x 50mm mullion	LM	146			
C	50 x 25mm bearer	LM	350			
D	20mm diameter quadrant	LM	102			
<u>Blockboard</u>						
E	25mm thick ordinary blockboard lipped all round in shelves etc	SM	102			
F	25mm thick one side veneered blockboard door overall size 450 x 2100mm high hardwood lipped all round.	NO	51			
G	Ditto 450 x 600mm high ditto.	NO	102			
H	Drawer unit 900mm wide x 520mm long x 200mm deep in prime grade cypress comprising of 20mm thick front 20mm thick sides with 1 No. labour and back with 6 mm thick plywood bottom	NO	77			
J	25mm Diameter chromium plated hanging rail, 1800mm long including end fixing brackets.	NO	77			
K	Ditto shoe rack 900mm long including fixing brackets.	NO	26			
L	Approved quality 25mm diameter pair of plastic air vents fixed to blockboard doors with and including forming opening in door	NO	51			
<u>Supply and fix the following ironmongery to timber as before</u>						
M	75mm pressed steel butt hinges	PAIRS	102			
N	'Ideal' ball catch	NO	51			
P	100mm aluminium 'D' door pull handle	NO	51			
Q	Ditto drawer pull handle	NO	51			
R	Wardrobe locks	NO	51			
S	75mm long aluminium barrel bolts	NO	51			
T	Prepare and apply one coat of aluminium wood primer before fixing on backs of wood surfaces not exceeding 100mm girth as before.	LM	215			
<u>CARRIED TO COLLECTION</u>				KSHS.		
<u>JOINERY FITTINGS</u>						

ITEM	DESCRIPTION	UNIT	QTY	RATE	SHS.	CTS.
	ELEMENT NO. 8					
	<u>BALUSTRADES (ALL PROVISIONAL)</u>					
	STAIRCASE AND BALCONY BALUSTRADING.					
	<u>The following in rolled hollow sections in staircase and walkways with one coat red oxide primer as described in:-</u>					
A	50mm dia x 3mm Circular hollow section handrail welded	LM	56			
B	50 x 25 x 3mm Balusters 1250mm long with one end welded on handrail and other grouted and built 100mm into concrete	NO	56			
C	25 x 25 x 2mm middle rails welded to balusters	LM	134			
D	20 x 20 x 2mm infill 750mm high with one end welded to middle rail and other hand rail	NO	56			
	<u>Extra over RHS tubes for:-</u>					
E	50mm Bend	NO	16			
F	50mm Endcaps	NO	4			
G	Splay cutting to 50 x 50 x 3mm tubes	NO	104			
H	Formed bend to 50 x 50 x 3mm tubes	NO	32			
J	Cranked bend to 50 x 50 x 3mm tubes	NO	32			
K	Welded joints between RHS members	NO	640			
	<u>SUNDRIES</u>					
L	Make hole in concrete or walling 125mm deep and built in end of 50 x 25 x 3mm balusters with cement grout	NO	160			
	<u>Touch up primer, prepare and apply two undercoats and one finishing coat gloss paint to:-</u>					
M	Metal surfaces	SM	112			
N	Ditto 100 -200mm girth	LM	56			
	<u>TOTAL FOR ELEMENT NO. 8 - BALUSTRADES CARRIED TO SUMMARY OF BILL NO. 2</u>					
	<u>BALUSTRADES</u>					
				KSHS.		

ITEM	DESCRIPTION	UNIT	QTY	RATE	SHS.	CTS.
	ELEMENT NO. 9					
	<u>FINISHES</u>					
	<u>EXTERNAL FINISHES</u>					
	<u>Cement and sand (1:4)masonry or concrete render as described in:-</u>					
A	13mm Thick with wood float to gable walls	SM	32			
B	Ditto to beams	SM	340			
C	Straight key pointing on machine cut stone walling with quoin teething at the edges	SM	954			
	<u>Prepare surfaces,apply three coats all weather low sheen paint as described on:-</u>					
C	Rendered vertical surfaces	SM	32			
D	Ditto to beams	SM	340			
	<u>INTERNAL WALL FINISHES</u>					
	<u>Gauged cement and sand(1:2:9) plaster in:-</u>					
E	13mm Thick with steel float finish to vertical surfaces	SM	3019			
	<u>Cement and sand (1:5) backing in:-</u>					
F	12mm thick with approved plasticiser and screed anti fungal Treatment finish to receive tiles (measured separately)	SM	920			
	<u>Supply and fix glazed wall tiles bedded on cement sand (1:5) backing and pointed in white cement in:-</u>					
G	330 x 250 x 8mm thick tiles	SM	920			
	<u>Prepare and apply three coats of silk vinyl paint on:-</u>					
H	Plastered surfaces	SM	2210			
	<u>Prepare,apply one coat of universal under coat and two coats of super gloss paint on:-</u>					
J	Plastered surfaces	SM	205			
	<u>CARRIED TO COLLECTION</u>					
	<u>FINISHES</u>					
				KSHS.		

ITEM	DESCRIPTION	UNIT	QTY	RATE	SHS.	CTS.
	<u>FINISHES CONT'D</u>					
	<u>FLOOR FINISHES</u>					
	<u>Kerbs</u>					
A	Concrete(1.3:6) in kerb size 100mm Thick x 75mm high including all necessary formwork	LM	240			
	<u>Cement and sand (1:3) screed as described in:-</u>					
B	32mm thick screed mixed with plasticiser and finished smooth with steel float.	SM	1104			
C	Ditto to sides and top of kerbs 250mm girth including fair edges and coved junction with floor finish.	LM	240			
D	20x100mm high skirting screed (a.b.d) with coved junction and rounded top edge	LM	1600			
	<u>Water proofed cement and sand (1:3) screed as described in:-</u>					
E	40mm Thick in water room in roof space and balconies	SM	406			
F	32mm thick backing finished to slope in wet areas to receive ceramic tiles	SM	207			
	<u>Non-slip ceramic tiles laid to regular pattern, bedding and jointing in cement/sand mortar (1:4), pointing in white cement</u>					
G	Ceramic floor tiles	SM	207			
	<u>300 x 300 x 8mm Thick coloured ceramic floor tiles laid on screed backing (m.s) and pointed in matching mortar to:-</u>					
H	Floors	SM	914			
J	100 x 20mm skirting with rounded top.	LM	1440			
	<u>Approved granito tiles</u>					
K	Supply and fix 600 x 600 x 12mm thick non-slip granito Floor tiles laid in pattern with appropriate adhesive pointing in cement slurry to match to architect's approval and specifications	SM	190			
L	100 x 20mm skirting with rounded top.	LM	160			
	<u>CEILING FINISHES</u>					
	<u>Cement and sand (1:4) render as described in:-</u>					
M	13mm Thick with wood float to horizontal surfaces	SM	971			
	<u>CARRIED TO COLLECTION</u>			KSHS.		
	<u>FINISHES</u>					

ITEM	DESCRIPTION	UNIT	QTY	RATE	SHS.	CTS.
	<u>FINISHES CONT'D</u>					
	<u>Cement, lime and sand (1:2:9) plaster steel trowelled as described to:-</u>					
A	15mm thick to horizontal soffits of ceiling	SM	320			
	<u>Prepare, apply one coat of emulsion under coat and two coats of vinylmurt paint as described to:-</u>					
B	Ceiling soffits	SM	1,291			
	<u>STAIRCASE FINISHES</u>					
C	32mm thick cement sand screed 1:4 including 20 x 4mm thick plastic terrazzo strips to approved pattern to receive terrazzo	SM	34			
D	Ditto to 270mm wide treads	LM	115			
	<u>Polished Grey Terrazzo Finish</u>					
E	Provide and lay 10mm thick terrazzo laid on screed measured separately including polishing to smooth complete with grinding, polishing and sealing and with an approved hardener to architect's specifications and approval	SM	34			
F	Ditto to 250mm wide terrazzo paving in treads	LM	115			
G	Ditto finish to 150mm high risers	LM	115			
H	Ditto 100mm high skirting with coved junction and rounded top edge	LM	57			
J	15mm Thick finish to outer string 380mm (maximum) high finished to profile treads and risers.	LM	57			
K	20mm Thick finish wall string 250mm(maximum) high with rounded top raking edge and small coved junction to profile of treads and risers	LM	57			
	<u>CARRIED TO COLLECTION</u>			KSHS.		
	<u>FINISHES</u>					

ITEM	DESCRIPTION	UNIT	QTY	RATE	SHS.	CTS.
	<u>FINISHES CONT'D</u>					
A	Extra over paving for 50mm wide non-slip carboradum strip 1200mm long including cutting grove in screed and making good	NO	115			
B	30 x 3mm Thick plastic dividing strip	LM	115			
	<u>12mm thick cement sand (1:2:9) plaster to:-</u>					
C	Slopping to soffites of staircase	SM	39			
D	Horizontal soffites of landings	SM	40			
	<u>Prepare, apply one coat of emulsion under coat and two coats of vinylmutt paint as described to:-</u>					
E	Plastered soffites of staircase	SM	39			
F	Horizontal soffites of landings	SM	40			
	<u>CARRIED TO COLLECTION</u>					
				KSHS.		
	<u>COLLECTION</u>					
	Brought forward from page 6/23					
	Brought forward from page 6/24					
	Brought forward from page 6/25					
	Brought down from above					
	<u>TOTAL OF ELEMENT NO. 9 - FINISHES</u>					
	<u>CARRIED TO SUMMARY OF BILL NO 2</u>				KSHS.	
	<u>FINISHES</u>					

ITEM	DESCRIPTION	UNIT	QTY	RATE	SHS.	CTS.
	ELEMENT NO. 10 PLUMBING AND DRAINAGE INSTALLATIONS ALL PROVISIONAL NOTE: The RATES inserted should include for:- (1) Fixing complete with all necessary cutting and jointing along the running lengths, waste, shorts and supports. (ii) Forming chases, mortices holes in walls and concrete structure including making good surfaces. NOTE: TRADE NAMES Where Trade names are mentioned below, the tenderer MUST provide the same materials and other brands shall not be accepted without a written authority to supply alternative brands by the Engineer or the Architect. ALL ARE INTERNAL DIMENSIONS WATER SUPPLY TO ROOF TANKS AND OVERFLOWS Supply, delivery and install Chlorinated PolyVinyl Chloride (CPVC) solvent welded plumbing system as per ASTM D-1784, all traded as 'Astral CPVC PRO' for hot and cold water plumbing Indicated diameters are internal (Nominal Bores) A 25mm Diameter pipe in wall chase or under floor slab LM 668 B 20mm Diameter pipe in wall chase or under floor slab LM 416 C 25mm Diameter pipe in roof space LM 88 D 20mm Diameter overflows LM 96 E 15mm Diameter pipe (rising mains) LM 288 Extra over CPVC pipes for:- F 15mm Diameter elbow LM 80 G 25mm Diameter elbows NO 112 H 20mm Diameter elbow NO 32 J 25mm Equal Tee NO 16 K 20mm unions NO 160 L 20mm Female threaded Socket Adapter NO 80 M 20mm Female threaded Socket Adapter NO 80 N 25mm Female threaded Socket Adapter NO 32 P 15mm male threaded Adapter NO 32 CARRIED TO COLLECTION PLUMBING AND DRAINAGE					
					KSHS.	

ITEM	DESCRIPTION	UNIT	QTY	RATE	SHS.	CTS.
	<u>Water Meter Chambers</u>					
A	750 x 700 x 600mm deep comprising of 100mm thick mass concrete 1:3:6 base; 100mm thick masonry , complete with lockable 2mm thick mild steel sheet hinged on fixed angle iron frames, painted in black super gloss paint, complete with necessary steel stiffeners and meter viewing area	NO	4			
	<u>Brass Fittings as "Kent" or other equal and approved</u>					
B	25mm diameter gate valves	NO	16			
	<u>Water Tank</u>					
C	Supply and install 1000 litres vertical Cylindrical plastic water tanks heavy gauge plastic cold water storage tank size 1110 mm dia x 1060mm high with lockable hinged covers including hoisting and fixing at roof level approximately 15 meters from ground level	NO	16			
	<u>Ball Valve</u>					
D	Supply and fix 15mm(NB)Diameter medium pressure ball valve comprising of plastic ball and brass stem	NO	16			
	<u>Connections</u>					
E	25mm (NB) Diameter straight connections to heavy gauge plastic header tank with two back nuts and rubber washer including perforation to the tank	NO	16			
F	15mm Ditto	NO	16			
	<u>COLD WATER DISTRIBUTION</u>					
	<u>Distribution pipes to sanitary fitting</u>					
	<u>Supply, delivery and install Chlorinated PolyVinyl Chloride (CPVC) solvent welded plumbing system as per ASTM D-1784, all traded as 'Astral CPVC PRO' for hot and cold water plumbing</u>					
	<u>Indicated diameters are internal (Nominal Bores)</u>					
G	15mm Diameter pipe in wall chase	LM	668			
H	20mm Ditto	LM	154			
J	25mm Ditto	LM	256			
	<u>Extra over UPVC pipes for</u>					
K	15mm Diameter bends	NO	768			
L	20mm Diameter bends	NO	80			
M	25mm Ditto	NO	40			
N	20mm Equal Tee	NO	60			
P	25mm Ditto	NO	51			
	<u>CARRIED TO COLLECTION</u>					
	<u>PLUMBING AND DRAINAGE</u>					
				KSHS.		

ITEM	DESCRIPTION	UNIT	QTY	RATE	SHS.	CTS.
	<u>Extra over CPVC pipes for</u>					
A	25 x 20mm Diameter Reducer	NO	51			
B	25 x 15mm Diameter Reducer	NO	48			
C	20 x 15mm Diameter Reducing tee	NO	96			
D	25mm union	NO	128			
E	15mm Diameter male adapter socket	NO	230			
F	15mm Diameter female adapter socket	NO	230			
G	25mm Diameter female adapter socket	NO	128			
	<u>Brass gate valves</u>					
H	25mm (NB) Diameter low pressure Peglar screw down crutch head stop cork with coupling and two red lead joints	NO	20			
J	15mm ditto	NO	16			
	<u>Connections</u>					
K	20mm (NB) Diameter straight connections to heavy gauge plastic header tank with two back nuts and rubber washer including perforation to the tank	NO	32			
	<u>SANITARY FITTING</u>					
	<u>Supply and install the following sanitary fittings and accessories including all connections to services, wastes, jointing to supply, over flows pipes and all plugging and screwing to walls and floors.</u>					
	<u>Water closet</u>					
L	White vitreous china dual flush, close coupled W.C. suite comprising of closet "P" or "S" trap, 9 litres cistern with valveless fitting and plastic syphon, plastic flush bend, heavy duty plastic seat and cover; pan plugged and screwed to concrete floor and bedded in mastic and cistern fixed to walls To be as "Lecico" or equal and approved.	NO	32			
	<u>Water closet accessories</u>					
M	White vitreous china built in toilet roll holder size 205 x 150mm as "Ideal ceramics" or equal and approved.	NO	32			
N	15mm diameter flexible connectors, 300mm long complete with chrome plated angle valve including union jointing to steel tubing and the sanitary fittings.	NO	32			
	<u>Wash hand basin</u>					
P	White vitreous china wash hand basin size 350 x 445mm "Nova" complete with 1 No. 12mm chrome plated pillar tap "Vado" or equal and approved.	NO	32			
	<u>Wash hand basin accessories</u>					
Q	32mm Diameter heavy duty plastic bottle trap complete 32mm chrome plated waste, plug, chain and stay; fixing steel brackets and all necessary accessories	NO	32			
	<u>CARRIED TO COLLECTION</u>			KSHS.		
	<u>PLUMBING AND DRAINAGE</u>					

ITEM	DESCRIPTION	UNIT	QTY	RATE	SHS.	CTS.
A	15mm diameter flexible connectors, 300mm long complete with chrome plated angle valve including union jointing to steel tubing and the sanitary fittings.	NO	32			
	<u>Kitchen sink</u>					
B	Stainless steel heavy duty single bowl single drainer sink size 1000 x 500mm wide as manufactured by M/S Associated Steel LTD.for counter top mounting including setting opening in concrete slab	NO	16			
	<u>Kitchen sink accessories</u>					
C	40mm Diameter heavy duty plastic bottle trap as "Metro Plastics" or equal and approved.	NO	16			
D	40mm Diameter chrome plated heavy duty sink waste outlet complete with plug and chain.	NO	16			
E	15mm diameter kitchen sink mixer taps for wall mounting as "cobra" or equal and approved.	NO	16			
	<u>Shower Fittings</u>					
	<u>Instantaneous Shower Heater</u>					
F	Instant electric shower head heater with embedded rod type sheathed element. Electrically insulated with electronic temperature control complete with wide rose and overflow to withstand a working pressure of upto 400kPa. It shall have a heating capacity of about 5.5kw and complete with extension shower arm and 4mm ² electric supply cable to neon lit DP switch (measured separately), all to be as "Lorenzetti" or equal and approved	NO	16			
G	White vitreous china built in soap tray size 205 x 150mm	NO	16			
H	450mm long chromium coated shower arm with end bend, threaded on both sides ready to receive instant shower heater.	NO	16			
J	15mm diameter galvanised mild steel shower riser complete with bend and threaded ends for connection to the water supply pipe adapter to one end and shower arm to the other end	NO	16			
K	Shower bib tap complete with galvanised mild steel nipple Connection as "pegler" or other equal and approved	NO	16			
L	Shower stop cork in chrome plated steel as "Cobra" or other equal and approved	NO	16			
M	Towel rail	NO	16			
	<u>CARRIED TO COLLECTION</u>			KSHS.		
	<u>PLUMBING AND DRAINAGE</u>					

ITEM	DESCRIPTION	UNIT	QTY	RATE	SHS.	CTS.
A	100mm long radius bend	NO	78			
B	40mm Equal tee	NO	192			
C	50mm diameter inspection tee complete with access cap	NO	268			
D	100mm diameter inspection tee complete with access cap	NO	154			
E	50mm diameter plug	NO	268			
F	100mm diameter Ditto.	NO	154			
G	100mm Single branch	NO	154			
H	100mm diameter WC connectors	NO	51			
J	40 x 100mm boss connector	NO	78			
K	50 x 100mm boss connector	NO	78			
L	40 x 32 mm reducer	NO	102			
M	50 x 40mm reducer	NO	51			
N	100mm diameter weathering slate and apron	NO	4			
P	100mm diameter vent cowls	NO	4			
<u>Floor traps</u>						
Q	50 x 100mm diameter heavy duty gauge UPVC 4 way floor trap with plastic grating	NO	56			
R	100mm diameter gulley trap with painted mild steel plate cover	NO	16			
<u>Testing</u>						
S	Allow for testing the whole of internal drainage works while in progress and on completion to the satisfaction of the Engineer and Local Authority		ITEM			
<u>CARRIED TO COLLECTION</u>				KSHS.		
<u>PLUMBING AND DRAINAGE</u>						

ITEM	DESCRIPTION	UNIT	QTY	RATE	SHS.	CTS.
	<u>INTERNAL PLUMBING AND FIRE FIGHTING</u>					
	<u>Water/CO2 portable fire extinguisher</u>					
A	9 litres water/Carbon dioxide gas portable fire extinguisher complete with nozzle, pressure gauge, initial charge and mounting brackets.	NO	4			
	<u>Carbon dioxide (CO2) gas portable fire extinguisher</u>					
B	5.0 Kg carbon dioxide gas portable fire extinguisher complete with nozzle, pressure gauge, initial charge and mounting brackets.	NO	4			
	<u>Fire alarm bell</u>					
C	9" (225mm diameter) wall mounted rotary manual alarm bell, complete with mounting accessories.	NO	4			
	<u>Fire blanket</u>					
D	Fire blanket made of cloth woven with fire proof material and measuring 1800x1210mm, and fitted with special tapes folded to offer instantaneous single action to release blanket from storing jacket. Manufactured to BS 1721.	NO	16			
	<u>Fire instruction notices</u>					
E	Fire instruction notices on perspex plate of size 450x600mm. Font height to be minimum 12mm printed in white on contrasting background.	NO	4			
	<u>Fire exit signs</u>					
F	Standard fire exit signs on perspex plate, size 300x150mm wide, on white background	NO	4			
	<u>Painting</u>					
G	Allow for painting of the hosereel pipework with a coat of red oxide primer, under-coat and two gloss coats to NFPA colour code specification.	ITEM				
	<u>Testing and commissioning</u>					
H	Allow for setting to work, testing, commissioning and labelling of the entire fire protection pipework, pumps and fittings to NFPA guidelines and to the satisfaction of the engineer.	ITEM				
	<u>CARRIED TO COLLECTION</u>			KSHS.		
	<u>PLUMBING AND DRAINAGE</u>					

ITEM	DESCRIPTION	UNIT	QTY	RATE	SHS.	CTS.
	ELEMENT NO.11					
	<u>ELECTRICAL INSTALLATION</u>					
	<u>NOTES</u>					
	1. The electrical installation shall unless otherwise specified herein comply with the provisions of the latest edition and supplement rules and regulations published by the Institute of Electrical Engineers (I.E.E) and shall also be in accordance with the requirements of Kenya Power and Lighting Company Limited					
	2. All the Electrical Installations Specialist's work should include RATEs for builder's work and making good , providing plugs for items and all necessary fittings and to be carried out by a licensed/registered electrician whose license and name shall be approved by the Engineer before his work starts on site.					
	3. RATEs to include for forming chases, mortices, holes in walls and concrete structure and making good disturbed surfaces.					
	<u>NOTE: TRADE NAMES</u>					
	Where Trade names are mentioned below, the tenderer MUST provide the same materials or other equal and approved therefore other brands shall not be accepted without a written authority to supply alternative brands by the Engineer or the Architect.					
	<u>LIGHTING POINTS AND SWITCHES</u>					
	<u>Supply, install, test and commission the following</u>					
A	Lighting points wired in 3 x 1.5mm ² PVC insulated single core cables (SC) copper in concealed 20mm diameter Heavy Gauge PVC conduits in walls and floors	NO	288			
B	Ditto but two way.	NO	48			
	<u>Supply and install the following lighting switches on recessed switch boxes as MK or other equivalent</u>					
C	10A plate switch one gang one way Cat. No. S 4870 WHI	NO	16			
D	10A plate switch one gang Two way Cat. No. S 4871 WHI	NO	80			
E	10A plate switch two gang two way Cat. No. S 4872 WHI	NO	80			
F	10A intermediate switch as Cat. S 4875 WHI	NO	8			
	<u>CARRIED TO COLLECTION</u>			KSHS.		
	<u>ELECTRICAL INSTALLATION</u>					

ITEM	DESCRIPTION	UNIT	QTY	RATE	SHS.	CTS.
	Supply and install the following lighting fittings					
A	Ceiling rose pendant set complete with B22 Holder and energy saving lamps as MK Cat. No. 1149 WHI	NO	60			
B	Half-moon shaped wall mounted luminaire with 60W E27 screw lampholder with metallic base, faux mahogany trim and frosted glass diffuser as MASSIVE FERGIE Cat. No. 81531/01/70	NO	8			
C	IP44 Circular surface fixed luminaire with black polycarbonate base, opal diffuser and E27 LED lamp as MASSIVE CASABLANCA Cat No. 71416/01/30	NO	32			
D	1 x 15W 600mm Fluorescent shaver light with opal diffuser inline switch and lamp as MK Cat No. K711WHI	NO	32			
E	Angled wall bracket lamp holder complete with B22 holder and LED lamps as MK Cat No. 1152WHI	NO	38			
F	Straight Batten lamp Holder complete with B22 holder and energy saving lamps as MK Cat. No. 1154WHI	NO	16			
G	1200mm long 40W, 4100 lumen warm white LED fitting complete with control gear as Phillips Cat. No. BN008C LED40/CW L1200 GM	NO	16			
H	1200mm long 16W, 1600 lumen warm white LED fitting complete with control gear as "Phillips" Cat No. BN016CLED16/CWL1200 GM	NO	16			
J	Circular surface-mount luminaire fitting with opal polycarbonate finish complete with E27 60W lamp holder as OMS Cat. No. OMS CAT PLAST 3 1x60W	NO	16			
K	IP-65 die cast aluminium bulkhead for 100W BC A60 lamp with glass bowl retained by tamper-resistant fixings as Thorn Cat. No. OLG 1x100 A60 BC GL WH	NO	32			
L	86mmx86mm surface mounted simple-fit presence detector with PIR & passive photocell, rated 6A with adjustable ambient light & time delay as MK K5016WHI	NO	1			
M	IP-65 photocell comprising UV-stabilized polycarbonate enclosure, filtered photodiode with negligible sensor drift, long life capacitors and NEMA socket bracket as Lucy Zodion Cat. No. Super 6	NO	1			
N	20A 240V 50Hz 4 poles AC 1 duty contactor in ample watertight enclosure as MK CAT No. 6420S	NO	1			
P	Non-maintained emergency lighting bulkhead with 11W PL-S lamp and 3 hours autonomy ("BROADWAY" range) as Tam-lite Cat. No. BRY11NM3	NO	1			
Q	320mm diameter surface mount 18W LED (>80lm/W) luminaire with opal diffuser finish in staircase as NLUX Cat No. XD9002 18W	NO	16			
	CARRIED TO COLLECTION			KSHS.		
	ELECTRICAL INSTALLATION					

ITEM	DESCRIPTION	UNIT	QTY	RATE	SHS.	CTS.
	<u>POWER POINTS AND OUTLETS</u>					
	<u>Supply and install the following power points to work complete with all necessary assesories</u>					
A	13 Amp twin socket outlet points wired as for a ring main in 3 x 2.5mm ² PVC SC copper cables drawn in 20mm dia. HG PVC conduits concealed in walls and floors complete with all accessories excluding the socket outlet plate	NO	200			
B	13 Amp single socket outlet points wired as for a radial in 3 x 2.5mm ² PVC SC copper cables drawn in 20mm dia. HG PVC conduits concealed in walls and floors complete with all accessories excluding the socket outlet plate	NO	16			
C	Ditto for watertight Twin switched fused spur unit ditto	NO	16			
D	Cooker Circuit wired in 3 x 6mm ² PVC single core copper cables drawn in 20mm heavy gauge PVC conduits concealed in the walls and floors, one way switched with all accessories but excluding the cooker control unit.	NO	16			
E	Outlet for cooker connector unit comprising single box 25mm diameter conduits, wiring in 3 x 6.00mm ² SC PVC CU cables to the cooker control unit and all accessories including cooker connector unit as MK	NO	16			
F	Instant Water Heater circuit wired in 3x4.00mm ² PVC SC copper Cables drawn in 20mm HG PVC conduits concealed in the walls and floors complete with all accessories and three meters of 4mm ² three core flex, but excluding the D.P. switch	NO	32			
G	20 AMP DP switch with neon light marked "Water Heater" as "MK" Cat. No. S 5423 WHI	NO	32			
H	Allow for connection of water heater element with 3 x 2.50mm ² heat resistant cable (max meters)	LM	432			
J	Allow for conduiting & blanked out boxes for future pump installations in 32mm diameter HG PVC conduit (each 32metres) complete with blanking plate (3 No.)	ITEM	1			
K	Electric bell circuit wired in 3 x 1.50mm ² single core PVC copper cables drawn in 20mm HG PVC conduits complete with all accessories but excluding the bell chime and push	NO	16			
L	Hand drier circuits wired in 3 x 2.5mm ² PVC SC copper cable in 20Diameter HG Conduit.	NO	2			
	<u>CARRIED TO COLLECTION</u>			KSHS.		
	<u>ELECTRICAL INSTALLATION</u>					

ITEM	DESCRIPTION	UNIT	QTY	RATE	SHS.	CTS.
A	Bell chime complete with 240/12 Volts transformer as "FRIEDLAND OAKLAND" Cat. No. D846 + D780S 8V/1A	NO	16			
B	10A Bell push one gang as "MK" Cat. No. S4778B WHI	NO	16			
C	13A Weatherproof Single switched socket as "MK" Cat. No. K564826GRY	NO	16			
D	13 Amps Twin switched sockets as "MK" Cat. No. S2647 WHI	NO	200			
E	13 Amps Single switched sockets as "MK" Cat. No. S2657 WHI	NO	16			
F	45A D.P Cooker control unit switch with 13A switched socket outlet as "MK" Cat. No. S5061 WHI	NO	16			
G	Flush cooker connection unit as "MK" Cat. No. S5045 WHI	NO	16			
<u>TELEPHONE & TELEVISION OUTLETS</u>						
<u>Supply, install, test and commission:-</u>						
H	32mm Diameter H.G. PVC Conduits for linking the adaptable boxes concealed in the walls and floor with all accessories for Telephone and Television (T.V.)	LM	154			
J	38mm Diameter H.G. PVC Conduits for linking the adaptable boxes concealed in the walls and floor with all accessories for Power	LM	154			
K	Ditto but 50mm diameter from power manhole	LM	16			
L	Ditto but 100mm	LM	16			
M	Telephone outlet point comprising of 20mm diameter HG PVC conduits and draw wire, concealed in walls and floors	NO	102			
N	Twin/dual TV coaxial socket outlet as "MK" Cat. No. S5853 WHI	NO	102			
P	Single RJ11/RJ45 telephone socket outlet as "MK" Cat. No. S5450 WHI + SX5453 + SX5457	NO	102			
<u>CARRIED TO COLLECTION</u>				KSHS.		
<u>ELECTRICAL INSTALLATION</u>						

ITEM	DESCRIPTION	UNIT	QTY	RATE	SHS.	CTS.
	SUB MAINS AND DISTRIBUTION					
A	Supply and install 8-way consumer unit as Schneider Electric complete with 63A/30mA DP RCBO intergral isolator for flush mounting and the following MCB as Schneider Electric 32A; 3 No., 20A; 3 No., 10A; 1 No. with 1 No. blanking plate	NO	16			
B	Ditto but 4-way with the following MCB's as Schneider Electric, 20A; 2 No., 6A; 1 No. with 1 No. blanking plates	NO	2			
C	Carry out very concise permanent labelling for all the sub circuits in the board as before described (20 No.)	ITEM	1			
D	Sub-mains comprising of 3 x 16mm ² SC copper cables drawn in 38mm HG PVC conduits from the switchboard to the consumer unit as before described.	LM	480			
E	300 x 300 x 50mm 14 gauge galvanized iron sheet power draw box complete with cover	NO	16			
	<u>One off wall free standing lockable Main meter board, metal clad, cubicle pattern Type tested to KS IEC 61434-1, Form 2b IP44 comprising the following:- As per the Distribution Schematics TP MCCB 250A Incomer</u>					
F	Set of 1 No. 250A TPN bus bar Bus bar Chamber 25 No. 63A DP MCB out goers (16kA) Sufficient capacity for 25No.Sets of 3-phase KPLC's cut-outs, 25 No. KWH meters, 3 phase control, 3 phase meter Sufficient knock-outs for incoming/outgoing cables Sufficient capacity for 4-way consumer unit Type 2 Surge Protective device ((SPD) as Legrand or ABB Perspex viewing windows for the meters	NO	1			
G	Allow for prepaid meter communication cable wired in 2 core cable and drawn in 25mm diameter PVC conduit	LM	400			
	<u>Supply and install the following as described:-</u>					
H	Supply and install Earthing for the above meter board, complete with Earthing Matt measuring 1.0 x 1.0m built in 25mm x 3mm thick riveted with copper rivets (Total length of copper tape required 20m). 2 No earth electrodes, and 2 No. Rod to tape clamps. The earth matt to be treated by charcoal and salt to obtain reading of < (less than) 1.0 ohms.	ITEM	1			
J	Supply and install 300mm x 300mm concrete earth inspection pit complete with heavy duty manhole covers.	NO	1			
	<u>CARRIED TO COLLECTION</u>					
	<u>ELECTRICAL INSTALLATION</u>					
				KSHS.		

ITEM	DESCRIPTION	UNIT	QTY	RATE	SHS.	CTS.
A	Supply and install 1 x 16mm ² PVC/PVC Earth lead from Matt to Equipotential bars (2 No.)	LM	24			
B	PG cable glands for item above	NO	2			
C	PG cable lugs for item above	NO	2			
D	Provide workshop drawings for Ground floor and typical floor	ITEM	1			
E	Provide record drawings for Ground floor and typical first floor	ITEM	1			
F	Kenya Power and Lighting Company Limited liaison and Attendance including initial application, documentation, follow-up, issuance of Completion Certificate and Test Reports.	ITEM	1			
G	Testing, Commissioning and Hand over the entire Installation to BS 7671	ITEM	1			
<u>LIGHTNING PROTECTION</u>						
H	Air termination Type Furse RA225 + RA600 fixed to ridge saddle FurseSD155 bolted to roof with water tight rubber washers	NO	2			
J	25mm x 3mm copper tape TC030 on tape clip Furse CP210 fixed at 750mm intervals to approved detail	LM	80			
K	50mm ² PVC insulated copper conductor enclosed in 25mm dia HG concealed PVC conduit between copper tape and test joint	LM	6			
L	Lugs for item K above including fixing bolts to roof conductors	NO	12			
M	Test clamps Furse CN305	NO	6			
N	Rod to earth conductors clamps Furse CR520	NO	6			
P	Earth rods Furse RC015 with driving sud, furse ST015 and spike furse SP015 driven into ground	NO	6			
Q	50mm ² ECC in 1 x 25mm dia PVC conduit between the test clamp and the earth rods	LM	6			
R	125 x 100 x 50mm deep boxes with cover and marked safety earth installed columns to approved detail	NO	6			
S	Concrete earthing inspection pits, Furse PT-005	NO	6			
<u>CARRIED TO COLLECTION</u>				KSHS.		
<u>ELECTRICAL INSTALLATION</u>						

ITEM	DESCRIPTION	UNIT	QTY	RATE	SHS.	CTS.
	<u>Supply, install, test, commission and maintain: - FIRE ALARM SYSTEM</u>					
A	Fire alarm initiating points wired in 2x1.0mm ² fire resistant FP200 cables enclosed in 25 dia.HG high impact concealed PVC conduit	NO	17			
B	Ditto but Fire alarm sounder points	NO	5			
C	4- zone conventional fire alarm panel as Menvier MF93088 complete with 24V batteries (72hrs standby) and integral charger	NO	1			
D	Connect power supply to the fire alarm panel from adjacent 13A fused spur unit comprising in 2.5mm ² fire resistant 3 core cable enclosed in 25 dia.HG high impact concealed PVC conduit.	ITEM	1			
E	Reusable Fire alarm call points with resettable element and key- Menvier MBG917 (weatherproof)	NO	4			
F	Optical smoke detector-Menvier MPD821+Base No. MDB800	NO	4			
G	Rate of rise heat detector- Menvier MFR830 Base No. MDB800	NO	1			
H	Sounder beacon - Menvier MDS824B	NO	4			
	<u>CARRIED TO COLLECTION</u>			KSHS.		
	<u>ELECTRICAL INSTALLATION</u>					

ITEM	DESCRIPTION	UNIT	QTY	RATE	SHS.	CTS.
	The successful bidder shall engage a subcontractor, duly licensed by Communications Authority of Kenya (CA) to carry out these installations All installations to BS and IEC standards TV WIRING INSTALLATIONS Supply, install, test, commission and maintain: -					
A	TV outlet points wired in low loss coaxial cables drawn in existing HG concealed conduits cast in the floors and concealed in the walls complete with all other necessary accessories	NO	16			
B	Dual outlet; TV/FM as MK CAT No.S3522 WHI	NO	16			
C	Digital terrestrial (free-to-air) antennae, amplifier and 2 way splitter as Televes	NO	1			
D	Rust-protected aerial supports comprising steel pipe, clamps, bolts etc	ITEM	1			
E	Satellite dish antennae as DSTV®	NO	1			
F	Quattro LNB (Low Noise Block) downconverter as Televes or ALCAD	NO	1			
G	Rust-protected dish supports comprising arm, clamps, bolts etc	NO	1			
H	20-way multiswitch for collecting satellite and terrestrial TV signal and distributing to 32 outlets as ALCAD	NO	1			
J	Power supply unit with UK plug	NO	1			
K	High voltage surge protector as Solatec	NO	1			
L	Complete earthing of cabinet to IEE requirements comprising 2.5sq.mm ECC and accessories	ITEM	1			
M	Lockable Rack with finish/colour to engineer's approval	ITEM	1			
	CARRIED TO COLLECTION			KSHS.		
	ELECTRICAL INSTALLATION					

ITEM	DESCRIPTION			SHS.	CTS.
BILL NO. 2 16NO UNITS TWO BEDROOM UNITS ELDORET BONDENI SUMMARY					
	ELEMENT NO.	DESCRIPTION	FROM PAGE		
A	1	SUBSTRUCTURES	6/03		
B	2	CONCRETE IN SUPERSTRUCTURE	6/05		
C	3	WALLING	6/07		
D	4	ROOFING	6/08		
E	5	DOORS	6/11		
F	6	WINDOWS	6/13		
G	7	JOINERY FITTINGS	6/21		
H	8	BALUSTRADING	6/22		
J	9	FINISHES	6/26		
K	10	INTERNAL PLUMBING AND DRAINAGE	6/34		
L	11	ELECTRICAL INSTALLATION	6/43		
TOTAL FOR 1 NO. BLOCK OF 16 NO. UNITS			KSHS.		
TOTAL AMOUNT OF SECTION NO. 6 - BILL NO.2					
BUILDING WORKS CARRIED TO GRAND SUMMARY			KSHS.		

SECTION SEVEN
EXTERNAL WORKS
BILL NO. 3

ITEM	DESCRIPTION	QTY	UNIT	RATE	KSHS	CTS
	<u>BILL NO. 03</u> <u>EXTERNAL WORKS</u> <u>(ALL PROVISIONAL)</u> 1. Keeping all excavations free from general water in this section is deemed to be included in the rates. 2. Ditto upholding sides of excavations <u>ELEMENT NO.1</u> <u>SITE CLEARANCE AND DEMOLITIONS</u> A Clear site of all vegetation, shrubs and bushes and cart away debris (Approx. 3100 SM) B Cut down trees 0 - 600mm girth, grub up roots, reinstate ground and cart away debris. C Cut down trees 600 - 1200mm girth, 5000mm high grub up roots, reinstate ground and cart away debris. D Cut down trees 1200 - 1800mm girth, 10000mm high grub up roots, reinstate ground and cart away debris. <u>DEMOLITIONS BUNGALOWS</u> E Carefully remove, store safely and dispose existing corrugated asbestos roofing sheets as per NEMA guidelines with and including obtaining requisite permissions and documentation from the authority F Demolish existing houses including foundations with a total plinth area of approx. 156m² constructed of 200mm thick block walling and concrete lintolscart away arising debris from site with and including protecting adjacent buildings and making good where necessary and allow discount for reuse of any materials <u>TOTAL FOR ELEMENT NO. 1</u> <u>CARRIED TO SUMMARY</u> <u>EXTERNAL WORKS; SITE CLEARANCE</u>					
			ITEM			
		5	NO			
		1	NO			
		1	NO			
		2000	SM			
		10	NO			
				KShs.		

ITEM	DESCRIPTION	QTY	UNIT	RATE	KSHS	CTS
	<u>ELEMENT NO. 2</u>					
	<u>PARKING AND DRIVEWAY</u>					
	<u>Road works in Linking to Existing</u>					
A	Allow for obtaining authority from Eldoret , Traffic Police, comply with regulations in force for the construction of new roads linking existing roads and temporary diversion of traffic during progress of the work till completion and carry out construction work in joining new road to existing road.(1 No)					
			ITEM			
	<u>Road Works</u>					
B	Excavate oversite to reduce levels commencing at existing ground level but not exceeding 1.50M deep.	285	CM			
C	Ditto exceeding 1.50m but not exceeding 3.00m	43	CM			
D	Extra over for excavating in rock class 1.	16	CM			
E	Ditto in rock class 3.	16	CM			
F	Compact excavated base to 100% M.D.D as specified.	1140	SM			
G	Imported quarry waste material as approved in filling to roads well watered and compacted to 95% M.D.D. standard compaction in layers not exceeding 150mm thick	570	CM			
H	Apply "Hyvar" or "Telvar W" or other equal and approved herbicide insecticide applied on the road by a Pest Control Products Board registered specialist in accordance with the manufacturer's printed instructions with at least 10years warranty.	570	SM			
J	150mm thick bed of murram well watered and rolled to roads as specified.	570	SM			
	<u>CARRIED TO COLLECTION</u>				KShs.	
	<u>EXTERNAL WORKS; PARKING AND DRIVEWAY</u>					

ITEM	DESCRIPTION	QTY	UNIT	RATE	KSHS	CTS
A	225mm thick handpacked stone base course well compacted to 95% M.D.D. standard compaction and blinded with approved fine material (murrum, sand or stone dust) 50mm thick and finished to falls, cross falls and chambers to receive precast concrete block paving (measured separately)	570	SM			
	<u>Roads surface finish</u>					
B	60mm thick 49N/mm ² heavy duty precast concrete paving blocks as per 'Bamburi Blox' or any other equal and approved manufacturer in approved pattern	570	SM			
	<u>Kerbs and Channels</u>					
C	Combined precast concrete (Grade 20) kerb type "A" to BS 340 size 125 x 255mm and channel size 125 x 100mm finished fair on all exposed surfaces with kerb having one rounded and chambered edge, bedded, jointed and pointed in cement and sand mortar (1:3) laid on and including 580 x 100mm plain concrete Grade "C" (mix 1:3:6 - 40mm) foundation haunched up on both sides including all necessary excavations and formwork.	137	LM			
D	Ditto but curved on plan to various mean radius	20	LM			
E	125mm wide x 100mm high road channel laid on and 325 x 200 including 200 x 100mm plain concrete (1:3:6 - 40mm) foundation haunched up on one side including excavations and formwork.	137	LM			
F	Ditto but curved on plan to various mean radius	20	LM			
G	Standard 250 x 450mm precast concrete quadrant.	8	NO			
	<u>Paint works</u>					
H	Prepare pre-cast concrete road surfaces and apply yellow reflective roadline paint not exceeding 100mm girth	125	LM			
	<u>CARRIED TO COLLECTION</u>			KShs.		
	<u>EXTERNAL WORKS; PARKING AND DRIVEWAY</u>					

ITEM	DESCRIPTION	QTY	UNIT	RATE	KSHS	CTS
	<u>Gulley Chambers</u>					
A	Precast concrete Gulley chamber size 900 x 900 x 600mm deep average in 100mm thickwalls on 100mm thick concrete (1:3:6) bed complete with 40mm thick combined cast iron and concrete grating cover size 356 x 405mm including all excavations and disposals	16	NO			
	<u>Plain in-situ vibrated concrete (1:3:6) 25mm aggregate in:-</u>					
B	Bed and surround type 'C' to 600mm dia pipe	50	LM			
	<u>Invert Block Drains</u>					
C	300mm Diameter x 100mm thick half round Pre-Cast concrete mix (1:2:4) invert drain blocks with splayed edges linked with and including two courses on either sides of 600 x 225 x 75mm thick Precast side slabs bedded and jointed in cement and sand mix (1:3) mortar laid to slope on 50mm thick mass concrete (1:4:8) on 100mm thick murrum base	50	LM			
D	Ditto but curved	26	LM			
	<u>HEADWALLS</u>					
E	Headwalls size 1500 long x 1500mm high in 200mm thick machine cut stones rendered on both sides on and including concrete (1:3:6) strip footings for 600mm diameter culvert and all necessary excavations, formwork and disposals	5	NO			
F	600 mm Diameter pipe including bedding concrete and surround, all granular compacted fill as detailed on engineer's drawing	30	LM			
	<u>CARRIED TO COLLECTION</u>			KShs.		
	<u>EXTERNAL WORKS; PARKING AND DRIVEWAY</u>					

ITEM	DESCRIPTION	QTY	UNIT	RATE	KSHS	CTS
A	450mm wide (internal) x 300mm deep (minimum) vibrated reinforced concrete class 20 (1:2:4) insitu storm water drain comprising 200mm thick walls each side reinforced with 8mm diameter high tensile ribbed mild steel bars at 150mm centres both ways with 150mm thick base reinforced with B.R.C. Ref A142 finished with 12mm thick cement and sand (1:3) plaster and screed to sides of walls and bottoms respectively with and including 50mm thick concrete class 10 (1:4:8) blinding to bottoms of levelled trenches, formwork, backfilling with approved material and carting away surplus excavated material to receive mild steel grating (measured seperately)	30	LM			
	<u>Mild steel Grating</u>					
B	450mm wide (approx) mild steel grating in 1000mm panels to Vibrated Reinforced Concrete storm water drains comprising 50 x 6mm thick flat bars welded to 50 x 6mm thick flat bar frame all round at 40mm centres with and including drilling holes in bars to receive 10mm diameter square twisted high tensile stiffening bar welded in centre of grating laid on 50 x 50 x 6mm thick angle line frame built into drain walls complete with one coat red oxide primer pre-delivery to site and 3 coats gloss paint	30	LM			
C	Allow for testing the Storm water drainage to approvals		ITEM			
	<u>CARRIED TO COLLECTION</u>			KShs.		
	<u>EXTERNAL WORKS; PARKING AND DRIVEWAY</u>					

ITEM	DESCRIPTION	QTY	UNIT	RATE	KSHS	CTS
	<u>ELEMENT NO. 3</u>					
	<u>WATER RETICULATION</u>					
	1. All the plumbing work shall be carried out by a registered plumber and proof thereof will be required.					
	2. Keeping excavations free from general water shall be deemed to be included in the rates as no separate provision has been made in the Bills.					
	3. Similarly upholding sides of excavated trenches shall be deemed to be included in the rates.					
	4. Local authority mains shall be 90mm diameter minimum all the works under the connection to the mains up to the boundary of this project shall be executed by the county					
	<u>Excavations</u>					
A	Excavate trench for pipes not exceeding 100mm Diameter not exceeding 1.50m deep average 500mm deep part return fill in ram and remainder cart away from site.	68	LM			
B	Ditto across existing tarmac road including warning signs and reinstating road to original condition on completion or micro tunneling of road and insertion of sleeves for pipe work after obtaining approvals from the County and making payment of of related charges. (1 No. Crossings)	4	NO			
	<u>Supply and install High-Density Polyethylene (HDPE) pipes, PN 16 for cold water plumbing.</u>					
C	50mm Diameter pipe in trench or under floor slab	50	LM			
D	40mm Ditto	10	LM			
E	32mm Diameter pipe in trench or under floor slab	10	LM			
F	25mm Ditto	10	LM			
	<u>CARRIED TO COLLECTION</u>			KShs.		
	<u>EXTERNAL WORKS; WATER RETICULATION</u>					

ITEM	DESCRIPTION	QTY	UNIT	RATE	KSHS	CTS
	Extra over pipes for:					
A	25mm Bends	6	NO			
B	32mm Bends	3	NO			
C	40mm Bends	1	NO			
D	50mm Bends	3	NO			
E	32mm Equal Tee	6	NO			
F	40mm Equal Tee	3	NO			
G	50mm Ditto	14	NO			
H	65mm Ditto	1	NO			
J	65 x 50mm Reducer	2	NO			
K	50 x 40mm Ditto	1	NO			
L	50 x 32mm Ditto	1	NO			
M	40 x 32mm Ditto	4	NO			
N	32 x 25mm Ditto	6	NO			
P	65mm Diameter female adapter socket	4	NO			
Q	50mm Diameter female adapter socket	10	NO			
R	40mm Diameter female adapter socket	4	NO			
	Brass valves					
S	32mm diameter approved medium pressure screw down full way non-rising, stem wedge gate valve to BS 1952, with wheel and head as "Pegler" or equal and approved; jointed to tubing with couplings, unions etc.	1	NO			
T	40mm Ditto	1	NO			
U	50mm Ditto	5	NO			
V	65mm Ditto	5	NO			
W	65mm Ditto but non-return valve	1	NO			
	Fire Hydrant					
X	65mm diameter exposed fire hydrant conforming to BS 750: 1977 complete with screwed double outlet landing valve with cast iron caps attached to the hydrant body by chain and cast iron wheel-head with inscribed turning (open/close) direction indicator. Price to include mounting flanges, screws and fixing accessories.	2	NO			
	CARRIED TO COLLECTION					
	EXTERNAL WORKS; WATER RETICULATION					
				KShs.		

ITEM	DESCRIPTION	QTY	UNIT	RATE	KSHS	CTS
	<u>Brass valves</u>					
A	40mm air release valve	1	NO			
B	65mm Diameter sluice valve.	1	NO			
C	50mm Diameter wash out plug	1	NO			
	<u>Precast Concrete works</u>					
D	Reinforced concrete marker post painted with appropriate colours fixed firmly with concrete footing 450mm deep in ground and marked "SV".	1	NO			
E	Ditto marked "FH"	2	NO			
F	Ditto marked "WO"	1	NO			
G	Ditto marked "G.V."	7	NO			
H	Ditto marked "WL"	5	NO			
	<u>Valve Chambers</u>					
J	Excavate for and construct valve chamber internally size 500 x 400mm maximum 600mm deep comprising 150mm thick machine-cut quarry stone plastered internally, rendered externally complete with concrete (1:3:6) footings and 50mm thick concrete cover slab including all necessary excavations and disposals	2	NO			
K	Ditto multi valve chamber size 1000x900mm wide	2	NO			
	<u>Sterilizing</u>					
L	Allow for sterilizing of new water reticulation system to approvals		ITEM			
	<u>Testing</u>					
M	Allow for testing the new water reticulation system to approvals		ITEM			
				KShs.		
	<u>EXTERNAL WORKS; WATER RETICULATION</u>					

ITEM	DESCRIPTION	QTY	UNIT	RATE	KSHS	CTS
	<u>ELEMENT NO. 3</u> <u>WATER RETICULATION</u> <u>COLLECTION</u> Brought forward from page 7/08 Brought forward from page 7/09 Brought forward from page 7/10 <u>TOTAL FOR ELEMENT NO. 3</u> <u>CARRIED TO SUMMARY</u> <u>EXTERNAL WORKS; WATER RETICULAION</u>					
				KShs.		

ITEM	DESCRIPTION	QTY	UNIT	RATE	KSHS	CTS
	ELEMENT NO. 4					
	FOUL DRAINAGE					
	EXCAVATIONS					
	<u>Excavate the following trenches, part backfil and compact excavated materials and remove surplus spoil from site, grade and compact bottoms of trenches including planking and strutting.</u>					
A	For 100mm Diameter pipe in existing soil or other unsuitable material not exceeding 1.50M deep average 750mm deep.	42	LM			
B	For 150mm Diameter pipe in existing soil or other unsuitable material not exceeding 1.50M deep average 750mm deep.	10	LM			
C	Ditto 1000mm deep ditto.	5	LM			
D	Ditto 1250mm deep ditto.	5	LM			
E	Ditto 1500mm deep ditto.	5	LM			
F	Ditto exceeding 1500MM but not 3000MM deep average 1750MM	5	LM			
G	Ditto 2000mm deep ditto.	5	LM			
H	Ditto 2250mm deep ditto.	5	LM			
J	Ditto 2500mm deep ditto.	5	LM			
K	Ditto for 225mm diameter pipe 2750mm deep ditto.	5	LM			
L	Ditto exceeding 3000mm but not exceeding 4500mm deep average 3000mm	5	LM			
M	Extra over excavations for excavating in rock Class 3	45	CM			
N	Ditto in rock class 1.	45	CM			
	CARRIED TO COLLECTION			KShs.		
	EXTERNAL WORKS; FOUL DRAINAGE					

ITEM	DESCRIPTION	QTY	UNIT	RATE	KSHS	CTS
	<u>Precast concrete drain pipes to B.S. 556 part 2: spigot and socket jointed with yarn and cement sand (1:3) mortar.</u>					
A	150mm Diameter pipe laid in trench.	42	LM			
B	225mm Diameter ditto.	28	LM			
	<u>Extra over concrete drain pipe for:</u>					
C	150mm Diameter off 225mm diameter "Y" junction.	4	NO			
	<u>Plain in-situ vibrated concrete (1:3:6) 25mm aggregate in:-</u>					
D	Bed and surround type 'C' to 150mm diameter pipe.	28	LM			
E	Ditto to 225mm diameter pipe.	50	LM			
F	Ditto but type 'D' to 225mm diameter pipe.	50	LM			
	<u>UPVC soil pipes and fittings to BS. 4660 and fixing in accordance with manufacturer printed instructions:-</u>					
G	150mm diameter pipe laid in trench	45	LM			
H	100mm ditto	42	LM			
	<u>Concrete (1:3:6) in bed and surround as described to:</u>					
J	150mm pipe	45	LM			
K	100mm ditto	42	LM			
	<u>CARRIED TO COLLECTION</u>			KShs.		
	<u>EXTERNAL WORKS; FOUL DRAINAGE</u>					

ITEM	DESCRIPTION	QTY	UNIT	RATE	KSHS	CTS
	<u>Inspection chambers</u>					
	<u>Inspection chambers consisting of 100mm concrete (1:3:6) bed and 250mm benching, 125 mm thick concrete (1:2:4) cover slab and frame reinforced with steel bars including forming opening for manhole cover; 150mm thick masonry stone walling finished in waterproofed plaster complete with heavy duty cast iron manhole cover and frame including all necessary excavations and disposals as described to manhole internal size:-</u>					
A	Chamber external size 900x750x500mm deep	1	NO			
B	Ditto 1000mm deep	1	NO			
C	Ditto 1250mm deep	1	NO			
D	Ditto 1500mm deep ditto.	1	NO			
E	2000 mm deep	1	NO			
F	2500mm deep	1	NO			
	<u>Circular/Ring Manholes</u>					
G	Excavate for, provide all necessary materials and construct circular ring manhole consisting of 150mm thick shaft rings 1200mm internal diameter and 150mm thick vibrated reinforced concrete (1:2:4) cover around the rings including steel reinforcement and formwork, maximum 1000mm deep to invert including heavy duty triangular cast iron manhole cover and frame 40 B.S 497 set in 150 thick precast concrete cover slab reinforced with 10mm diameter steel bars spaced at 150mm centres both ways, 150mm thick concrete (1:3:6) base, benching, rendering, forming holes, complete with backfill and carting away surplus excavated material.	2	NO			
	<u>CARRIED TO COLLECTION</u>			KShs.		
	<u>EXTERNAL WORKS; FOUL DRAINAGE</u>					

ITEM	DESCRIPTION	QTY	UNIT	RATE	KSHS	CTS
	<u>Circular/Ring Manholes</u>					
A	Excavate for, provide all necessary materials and construct circular ring manhole consisting of 150mm thick shaft rings 1200mm internal diameter and 150mm thick vibrated reinforced concrete (1:2:4) cover around the rings including steel reinforcement and formwork, maximum 1000mm deep to invert including heavy duty triangular cast iron manhole cover and frame 40 B.S 497 set in 150 thick precast concrete cover slab reinforced with 10mm diameter steel bars spaced at 150mm centres both ways, 150mm thick concrete (1:3:6) base, benching, rendering, forming holes, complete with backfill and carting away surplus excavated material.	1	NO			
B	Ditto 1250mm deep ditto.	1	NO			
C	Ditto 1500mm deep ditto.	1	NO			
D	Ditto but consisting of shaft rings 1600mm external diameter 1750mm deep ditto.	1	NO			
E	Ditto 2000mm deep ditto.	1	NO			
F	Ditto 2500mm	1	NO			
G	Ditto 2750mm	1	NO			
H	Ditto 3000mm	1	NO			
J	Cast iron"u" shaped step irons 25x750mm girth with ends built into sides of concrete ring walls	63	NO			
	<u>Connection</u>					
K	Allow for making connection of new 225mm diameter sewer pipes to existing sewer line		ITEM			
	<u>TESTING</u>					
L	Allow for testing the new foul drainage system to approvals		ITEM			
	<u>CARRIED TO COLLECTION</u>			KShs.		
	<u>EXTERNAL WORKS; FOUL DRAINAGE</u>					

[illegible]

ITEM	DESCRIPTION	QTY	UNIT	RATE	KSHS	CTS
	<u>ELEMENT NO. 5</u>					
	<u>BUILDER'S WORK FOR K.P. & L.C. POWER SUPPLY</u>					
	<u>Excavations and earthwork</u>					
A	Excavate trench not exceeding 1500mm deep and average 1000mm deep starting from natural ground level, fill bed with 75mm thick sand, part return, fill and ram and remainder cart away after the K.P. & L.C. Ltd has installed their power supply cables	68	LM			
B	<u>Extra over</u> excavations in any positions for excavating in rock class 1.	10	CM			
	<u>Cable ducts</u>					
C	100 mm diameter heavy duty UPVC ducts	68	LM			
D	150mm ditto	20	LM			
E	Concrete bed and surround Type "C" to the 100 mm cable duct	68	LM			
F	Ditto for 150mm	20	LM			
	<u>Cable tiles</u>					
G	"HATARI" precast concrete cable tiles laid in trench over the power supply cables	68	LM			
	<u>CARRIED TO COLLECTION</u>			KShs.		
	<u>PROPOSED NHC -</u>					
	<u>EXTERNAL WORKS; BUILDER'S WORK FOR K.P. & L.C. POWER SUPPLY</u>					

ITEM	DESCRIPTION	QTY	UNIT	RATE	KSHS	CTS
	<u>Manholes</u>					
	<u>Standard rectangular manholes consisting of 150mm concrete 1:3:6 bed and 250mm haunchings; 150mm dressed natural stone walling; water proofed rendering internally; 125mm concrete (1:2:4) cover slab reinforced with 10mm mild steel round bars at 150mm centres both ways with 600 x 450mm opening for manhole cover; standard heavy duty cast iron manhole cover and frame; cement and sand (1:3) render to cover slab and exposed external surfaces; holes for large or extra large pipes, channels etc; excavations, disposal from site; formwork</u>					
A	450 x 600 x 600mm deep	2	NO			
B	450 x 600 x 450mm deep	2	NO			
	<u>CARRIED TO COLLECTION</u>			KShs.		
	<u>ELEMENT NO. 5</u>					
	<u>BUILDER'S WORK FOR K.P. & L.C. POWER SUPPLY</u>					
	<u>COLLECTION</u>					
	Brought forward from page 7/26					
	Brought down from above					
	<u>TOTAL FOR ELEMENT NO. 7</u>					
	<u>CARRIED TO SUMMARY</u>			KShs.		
	<u>PROPOSED NHC -</u>					
	<u>EXTERNAL WORKS; BUILDER'S WORK FOR KP & LC POWER SUPPLY</u>					

ITEM	DESCRIPTION	QTY	UNIT	RATE	KSHS	CTS
	<u>ELEMENT NO. 6</u>					
	<u>DUSTBIN CUBICLE</u>					
	<u>SUB-STRUCTURES (All Provisional)</u>					
	<u>Excavation</u>					
A	Allow for keeping the whole of the excavation free from all spring and running water by pumping or other such means as may be necessary		ITEM			
B	Allow for maintaining and upholding the sides of excavations and keeping excavations free from debris and other materials		ITEM			
C	Excavate oversite average 150mm deep to remove top vegetable soil and cart away	46	SM			
D	Excavate to reduce level 0.00 - 1.50 metres deep	8	CM			
E	Excavate foundation trench 0.00 - 1.50 metres commencing from reduced levels	58	CM			
	Extra over excavation for excavating in rock in any position	66	CM			
F	Return, fill in and ram selected excavated materials around foundations	54	CM			
G	Load and cart away surplus excavated materials from the site	10	CM			
	<u>Filling</u>					
H	Hardcore filling, spread, levelled and consolidated in 150mm layers in making up levels	8	CM			
I	300mm thick ditto	24	SM			
J	Level and blind surfaces of hardcore with 25mm thick murrum or quarry dust to receive concrete (measured seperately)	24	SM			
	<u>CARRIED TO COLLECTION</u>			KShs.		
	<u>PROPOSED NHC -</u>					
	<u>EXTERNAL WORKS; DUSTBIN CUBICLE</u>					

ITEM	DESCRIPTION	QTY	UNIT	RATE	KSHS	CTS
A	Treat surfaces of hardcore with Termidor 25EC or equal and approved insecticide to the satisfaction of the Architect and subject to Ten years guarantee.	30	SM			
	<u>External walling</u>					
B	200mm thick machine cut natural stone walling from different quarries in mixed colours bedded and jointed in cement and sand (1:3) mortar reinforced with hoop iron in alternate courses.	50	SM			
C	Extra over masonry walling for 600 x 200mm stone piers 2900mm high fair finished	6	NO			
D	Extra over walling for smooth chisel dressing including pointing with neat half round recessed horizontal joints and flush vertical joints in cement and sand (1:3) mortar.	50	SM			
	<u>Precast concrete grade 20/20 in</u>					
E	200 x 150mm thick lintol reinforced with and including 2 No. 12mm diameter mild steel reinforcing bars hooked at the ends (1 No.)	1	LM			
F	300 x 75mm (average) thick coping bedded and jointed in cement and sand mortar (1:4) on top of walling	6	LM			
	<u>Ring Beam</u>					
G	Vibrated reinforced concrete class 20 (1:2:4) in ring beam.	1	CM			
	<u>Hot rolled, ribbed, high yield mild steel bars including soft iron tying wire and concrete spacer blocks in:-</u>					
H	8mm diameter bars	45	KG			
I	12mm diameter ditto	83	KG			
J	Sawn formwork to sides and soffits of ring beams.	19	SM			
	<u>CARRIED TO COLLECTION</u>			KShs.		
	<u>PROPOSED NHC -</u>					
	<u>EXTERNAL WORKS; DUSTBIN CUBICLE</u>					

ITEM	DESCRIPTION	QTY	UNIT	RATE	KSHS	CTS
	<u>ROOFING</u>					
	<u>Roof structure</u>					
	<u>Nailed and Bolted connections</u>					
	<u>All structural timber shall be sawn celcure treated second grade cypress timber members in:-</u>					
A	150 x 50mm thick purlins	44	LM			
B	100 x 50mm thick wall plate	15	LM			
C	12mm Diameter mild steel anchor bolt x 150mm long fixed at 1200mm centres	14	NO			
	<u>The following in 2NO. double pitch roof trusses spanning 2800mm and 400mm high</u>					
D	75 x 50mm thick rafters	7	LM			
E	75 x 50mm thick main tie	7	LM			
F	75 x 50mm thick struts and ties	4	LM			
G	150 x 25mm thick Splice pieces 1000mm long	24	NO			
	<u>Roof covering</u>					
	<u>Gauge 28 "Versatile" Aluminium pre-painted "Metcoppo" corrugated iron sheets as per "Kaluworks Ltd" or any other equal and approved manufacturer to:-</u>					
H	Roof covering	23	SM			
I	Ridging	7	LM			
	<u>CARRIED TO COLLECTION</u>			KShs.		
	<u>PROPOSED NHC -</u>					
	<u>EXTERNAL WORKS; DUSTBIN CUBICLE</u>					

ITEM	DESCRIPTION	QTY	UNIT	RATE	KSHS	CTS
	<u>WINDOWS</u>					
	<u>Window cills</u>					
A	250 x 65mm thick; weathered and throated precast concrete (1:2:4) window cill finished smooth on exposed surfaces and jointed and bedded in cement/sand (1:3) mortar.	1	LM			
	<u>Casement windows</u>					
B	Supply and fix purpose made steel casement window in standard sections and finished with red oxide primer before delivery to site, complete with all opening and closing brass accessories, pressed steel metal hood permanent vent infilled with galvanised mosquito gauze including cutting and fixing lugs to wall and bedding and pointing in cement and sand (1:3) mortar, overall size 600 x 600 mm high.	1	NO			
	<u>Glazing</u>					
C	5mm thick obscure sheet glass in panes size 300 x 300mm fixed to steel window with putty.	2	NO			
	<u>Painting and decoration</u>					
D	Touch up primer, prepare and apply three coats of gloss paint on steel casement windows on both sides	1	SM			
	<u>DOORS</u>					
	<u>Wrot prime grade cypress</u>					
E	100 x 50mm thick frame plugged to wall with rawl bolts and pelleted	5	LM			
F	100 x 50mm transome with four labours	1	LM			
G	15mm thick quadrant beading	5	LM			
	<u>CARRIED TO COLLECTION</u>			KShs.		
	<u>PROPOSED NHC -</u>					
	<u>EXTERNAL WORKS; DUSTBIN CUBICLE</u>					

ITEM	DESCRIPTION	QTY	UNIT	RATE	KSHS	CTS
A	20mm thick architrave	5	LM			
B	20 x 15mm Glazing bead	2	LM			
	<u>Flush Doors</u>					
	45mm thick semi-solid core flush door overall size 725 x 2050mm high with marine plywood with 25mm thick hardwood lipping all round as D2	1	NO			
	<u>Steel Doors</u>					
D	Purpose made mild steel double door size 1200 x 2600mm high in 2 No. equal leaves complete with metal frame and locking fittings	1	NO			
	<u>Supply and fix the following ironmongery complete with matching screws and furniture</u>					
E	100mm 'Pressed' steel butt hinges	1.5	PRS			
F	2-lever mortice door lock complete with furniture as cat. No. 2227	1	NO			
G	38mm Diameter Rubber door stop	3	NO			
	<u>Painting and decoration</u>					
H	Prepare and apply one coat aluminium primer before fixing back of wood not exceeding 100mm girth	5	LM			
	<u>Painting and decoration</u>					
I	Touch up primer, prepare and apply three coats of gloss paint on steel casement windows on both sides	6	SM			
J	Knot, prime, stop. Prepare and apply two undercoats and one finishing coat of gloss paint on woodwork surfaces 100 - 200mm girth	5	LM			
K	Ditto 200 - 300mm girth	1	LM			
L	Ditto to general surfaces	4	SM			
	<u>CARRIED TO COLLECTION</u>			KShs.		
	<u>PROPOSED NHC -</u>					
	<u>EXTERNAL WORKS; DUSTBIN CUBICLE</u>					

ITEM	DESCRIPTION	QTY	UNIT	RATE	KSHS	CTS
	<u>FINISHES</u>					
	<u>External wall finishes</u>					
A	12mm thick cement and sand (1:4) render to surfaces of concrete, steel trowelled smooth	7	SM			
B	Prepare and apply three coats of "Crown" weatheguard paint to rendered surfaces	7	SM			
	<u>Internal wall finishes</u>					
C	12mm thick gauged cement and sand (1:2:9) plaster to walls, steel trowelled smooth.	72	SM			
D	Prepare and apply three coats of "Crown" plastic emulsion paint to plastered surfaces	53	SM			
E	Prepare and apply three coats of "Crown" gloss paint to plastered surfaces	19	SM			
	<u>Floor finishes</u>					
F	30mm thick cement and sand (1:3) screed paving steel trowelled smooth.	17	SM			
G	100 x 20mm thick skirting	21	LM			
	<u>Ceiling finishes</u>					
H	12mm thick cement, lime and sand (1:2:9) plaster steel trowelled smooth to soffites of bench	1	SM			
I	Prepare and apply three coats first grade plastic emulsion paint to horizontal surfaces of plastered bench	1	SM			
	<u>ELECTRICAL INSTALLATIONS</u>					
	<u>Supply, install, test and commission the following including forming holes, chases in walls and concrete and making good surfaces:</u>					
J	Supply and install lighting points wired in 3 x 1.50mm ² PVC cables in concealed HG PVC conduits.	3	NO			
	<u>CARRIED TO COLLECTION</u>			KShs.		
	<u>PROPOSED NHC -</u>					
	<u>EXTERNAL WORKS; DUSTBIN CUBICLE</u>					

ITEM	DESCRIPTION	QTY	UNIT	RATE	KSHS	CTS
	<u>Supply and install the following lighting switches as crabtree on recessed switch boxes including conduiting and wiring</u>					
A	5A Plate switch one gang one way	1	NO			
B	60W spherical ball fitting as Thorn MTC 1060	1	NO			
C	300mm Diameter vendal resistant fitting as Thorn city scape.	2	NO			
	<u>Consumer unit</u>					
D	Supply and install 4 - ways SPN MCB consumer unit complete with 20A, 10A MCBs and blanking plate as per schematic wiring diagram	1	NO			
	<u>Meter board</u>					
E	Supply and install single tariff meter box comprising of wall mounted meter board complete with 80AMPS double pole moulded switch fuse and 1 No. 80 AMPS cut-out including painting.	1	NO			
	<u>Sub-mains</u>					
F	Supply and install sub-mains from meter box to consumer unit comprising of 2 x 10mm ² PVC single core cables and 1 x 10mm ² PVC cable insulated earth continuity conductor in 32 mm diameter heavy gauge PVC conduit.		ITEM			
G	Supply and install 1 No. 50mm diameter and 1 No. 32mm diameter heavy gauge PVC conduit to take K. P. & L. Co. service line loop in-loop out arrangement and 20mm diameter heavy gauge PVC conduit for earthing lead.		ITEM			
	<u>Earthing</u>					
H	Allow for earthing the whole of electrical installation comprising of 10mm ² earth lead single PVC insulated cable) 15mm diameter x 2000mm long earth electrode in and including precast concrete standard chamber and cover.		ITEM			
	<u>CARRIED TO COLLECTION</u>			KShs.		
	<u>PROPOSED NHC -</u>					
	<u>EXTERNAL WORKS; DUSTBIN CUBICLE</u>					

ITEM	DESCRIPTION	QTY	UNIT	RATE	KSHS	CTS
A	Testing					
	Allow for testing the whole of electrical installation to approvals		ITEM			
	<u>CARRIED TO COLLECTION</u>			KShs.		
	<u>ELEMENT NO. 6</u>					
	<u>DUSTBIN CUBICLE</u>					
	<u>COLLECTION</u>					
	Brought forward from page 7/19					
	Brought forward from page 7/20					
	Brought forward from page 7/21					
	Brought forward from page 7/22					
	Brought forward from page 7/23					
	Brought forward from page 7/24					
	Brought forward from page 7/25					
	Brought down from above					
	<u>TOTAL FOR ELEMENT NO. 6</u>					
	<u>CARRIED TO SUMMARY</u>			KShs.		
	<u>PROPOSED NHC -</u>					
	<u>EXTERNAL WORKS; DUSTBIN CUBICLE</u>					

ITEM	DESCRIPTION	QTY	UNIT	RATE	KSHS	CTS
	ELEMENT NO. 7 <u>CHAINLINK FENCING AND GATES</u>					
A	2400mm high chainlink fencing consisting of 14 gauge chainlink as per "Wire Products Ltd." or any other equal and approved manufacturer tied with and including galvanized tying wire onto 3 - strands, galvanized barbed wire (measured separately)	244	LM			
B	12½ gauge galvanized barbed wire in 3 - strands as per "Khetshi Dharamshi Ltd." or any other equal and approved manufacture fixed through pre-drilled holes in pre-cast concrete fencing posts (measured separately)	732	LM			
C	3 - strands, 12½ gauge galvanized barbed wire as described above fixed through pre-drilled holes in cranked sections of pre-cast concrete fencing posts (measured separately)	732	LM			
	<u>Pre-cast concrete fencing posts</u>					
D	3000mm high, 125 x 100mm thick cranked pre-cast concrete posts pre-drilled with 6 No. (minimum) holes as per "Kenya Builders Ltd" or any other equal and approved manufacturer erected at 3000mm centres set in and including 300mm diameter x 500mm deep concrete (1:3:6) bed and surround in the ground complete with all necessary excavations and disposals	81	No.			
	<u>Pre-cast concrete struts</u>					
E	125 x 100mm thick struts; 2400mm long set in and including 300mm diameter x 500mm deep concrete (1:3:6) bed and surround in the ground fixed to pre-cast concrete fencing posts (measured separately) complete with all necessary excavations and disposals.	20	NO			
	<u>Metal grille gates</u>					
	Supply and fix a purpose made mild steel grille gate overall size 5000 mm wide x 2100 mm high in two equal openable leaves size 2500 x 2100mm high with a pedestrian gate in one leaf size 1000 x 2100mm high comprising of a 50 x 50 x 4mm thick SHS frame and centre horizontal member infilled with 25 x 25 x 2mm thick SHS vertical tubes at 200 mm centres welded to frame and centre member complete with all necessary ironmongery and locking devices with and including one coat red oxide primer and fixing to 75 x 75 x 4mm thick SHS mild steel columns (measured separately)	2	NO			
	<u>CARRIED TO COLLECTION</u>			KShs.		
	<u>EXTERNAL WORKS; FENCING, BOUNDARY</u>					

ITEM	DESCRIPTION	QTY	UNIT	RATE	KSHS	CTS
A	75 x 75 x 4mm thick SHS mild steel columns, 3000mm long set in and including 300mm diameter x 500mm deep concrete (1:3:6) bed and surround in the ground complete with fish tail fixing lugs at bottom, 75 x 75 x 4mm thick cover plate welded to top and bottom of post with and including one coat red oxide primer, excavations and disposals	4	NO			
B	Mild steel gate-stops and welded	2	NO			
C	Mild steel gate-catches and welded	2	NO			
	<u>Touch up primer, prepare and apply two undercoats and one finish coat enamel paint to metal work on:-</u>					
D	Gates surfaces generally	42	SM			
E	Gate posts surfaces generally	4	SM			
	<u>CARRIED TO COLLECTION</u>				KShs.	
	<u>COLLECTION</u>					
	Brought forward from page 7/36					
	Brought down from above					
	<u>CARRIED TO SUMMARY</u>				KShs.	
	<u>PROPOSED NHC -</u>					
	<u>EXTERNAL WORKS; FENCING, BOUNDARY</u>					

ITEM	DESCRIPTION	QTY	UNIT	RATE	KSHS	CTS
	<u>ELEMENT NO. 8</u>					
	<u>SOLAR STREET LIGHTING</u>					
	<u>Excavations and Disposals</u>					
A	Excavate for pit size 600 x 600mm not exceeding 1.50m deep starting from natural ground level part backfill and remainder cart away	16	NO			
	<u>Supply ,Install, test, commission and maintain: -</u>					
B	7 metres single arm street lighting column made from class "B" steel hot- dipped galvanized pipe to BS EN 40 to approval, for single side entry suitable for mounting solar street light (Item C below) The column to be erected in a concrete base of 600 x 600 x 1000mm	8	NO			
C	Ditto with double arm	8	NO			
	<u>SOLAR STREET LIGHTING</u>					
D	IP65 rated integrated solar street lighting luminaire as LEADSUN or approved equivalent, comprising of 20W, 2400 lumen LED lamp with a bat wing optical distribution (IES LM-79- 08), monocrystalline solar panel conforming to IEC 61701, IEC 61215 and IEC 61730 standards, lithium iron phosphate (LiFeP04) battery and maximum power point tracking (MPPT) charge controller. The LED modules shall be manufactured by either CREE, Osram, Samsung or Philips and the system shall have a system efficacy of atleast 130 lm/W. LED modules shall have rated life of atleast 50,000 hours in accordance to IES LM- 80-08. The control system shall incorporate Transient Voltage Suppression device (TVS), built-in motion detection and lux level sensor. The system shall provide atleast 2-day autonomy during over-cast weather. All components shall conform to relevant IEC standards and the luminaire shall conform 10 IEC 60598-1:2014 standard for LED luminaires (Attach certificates of conformity)	16	NO			
	<u>CARRIED TO COLLECTION</u>					
	<u>PROPOSED NHC -</u>					
	<u>EXTERNAL WORKS; SOLAR STREET LIGHTING</u>					
				KShs.		

ITEM	DESCRIPTION	QTY	UNIT	RATE	KSHS	CTS
	<u>ELEMENT NO. 8</u> <u>STREET LIGHTING</u> <u>COLLECTION</u> Brought forward from page 7/29 Brought forward from page 7/30					
	<u>TOTAL FOR ELEMENT NO. 10</u> <u>CARRIED TO SUMMARY</u>			KShs.		
	<u>PROPOSED NHC -</u> <u>EXTERNAL WORKS; SOLAR STREET LIGHTING</u>					

ITEM	DESCRIPTION	QTY	UNIT	RATE	KSHS	CTS
	<u>ELEMENT NO. 9</u>					
	<u>LANDSCAPING</u>					
	<u>TREES AND GRASS PLANTING</u>					
	<u>Supply,store in approved conditions, plant and maintain trees 1200 mm high including forming pit size 1200 x 1200 x 1200mm deep, removing all excavated materials from site and backfilling with cowdung manure and red soil (1:2) and providing 2 No. 50mm diameter support poles and tie bands, water and well maintain until fully established</u>					
A	Thika Palm tree	3	NO			
B	Stacalina (bottle brush)	3	NO			
C	Siphodhia	3	NO			
D	Australia flame tree	3	NO			
E	Alkaria Kukai tree	3	NO			
	<u>Supply,store in approved conditions,plant grass and other approved ground cover at 150mm centers both ways including digging soil 300mm deep removing all roots and weeds and mixing cow dung manure and red soil (1:2) 200mm thick raking to fine tilth, fertilizing and all necessary preparations including tilling, watering and maintaining until fully established.</u>					
F	Kikuyu grass or other equal and approved with good ground cover planted at 50mm centres both ways	226	SM			
G	China grass (Alternanthera Ficoidea) ditto at 100mm centers both ways	10	SM			
H	Gazania(Gazania Gazania) ditto	10	SM			
	<u>CARRIED TO COLLECTION</u>			KShs.		
	<u>PROPOSED NHC -</u>					
	<u>EXTERNAL WORKS; LANDSCAPING</u>					

ITEM		QTY	UNIT	RATE	KSHS	CTS
	<u>Shrubs</u>					
	<u>Supply,store in approved conditions, plant and maintain Shrubs including forming pits ize 1000 x 1000 x 1000mm deep, removing excavated materials and backfilling with cow dung manure and red soil (1:2) compacted in 300 mm layers.</u>					
A	Golden Duranta (Duranta Variegatum)	10	NO			
B	Split-Leaf Philodendron(Monstera Deliciosa)	5	NO			
	<u>CONCRETE BENCHES</u>					
	<u>BOLLARDS</u>					
	<u>Excavations and Earthworks</u>					
C	Excavate for pits in normal soils overall size 500mm deep x 300mm diameter, part backfill and surplus load and cart way from site	10	NO			
	<u>Concrete works</u>					
D	Mass concrete (1:3:6) in pits size 300mm diameter x 500mm deep	10	NO			
E	Ditto in 100mm diameter metal tubes, 1200mm high overall	10	NO			
F	10mm diameter mild steel bar reinforcement	148	KG			
	<u>CARRIED TO COLLECTION</u>			KShs.		
	<u>PROPOSED NHC -</u>					
	<u>EXTERNAL WORKS; LANDSCAPING</u>					

ITEM	DESCRIPTION	QTY	UNIT	RATE	KSHS	CTS
A	<u>Metal Work</u>					
	100 x 4mm thick 1200mm high primed circular hollow section tubes, 300mm in ground	10	NO			
B	<u>Paint Work</u>					
	Prepare metal surfaces and apply one undercoat and two finishing coats of gloss paint as "crown" or any other equal and approved manufacturer	14	SM			
	<u>CARRIED TO COLLECTION</u>			KShs.		
	<u>ELEMENT NO. 9</u>					
	<u>LANDSCAPING</u>					
	<u>COLLECTION</u>					
	Brought forward from page 7/32					
	Brought forward from page 7/33					
	Brought down from above					
	<u>TOTAL FOR ELEMENT NO. 9</u>					
	<u>CARRIED TO SUMMARY</u>			KShs.		
	<u>PROPOSED NHC -</u>					
	<u>EXTERNAL WORKS; LANDSCAPING</u>					

ITEM	DESCRIPTION	UNIT	QTY	RATE	KSHS.	CTS.
	ELEMENT NO. 10 <u>CCTV INSTALLATION</u>					
	<u>Supply, install, test, commission and maintain Set of indoor IP fixed camera comprising the following:-</u> <u>LAN Network based IP CCTV camera set with 30m view range, full HD 1080p resolution, colour,motion activated,with power over ethernet (POE) wall mounted,as HIKVISION DS-2CD2142FWD-I or equal and approved</u>					
A	At the staircase lobby	NO	5			
	<u>LAN Network based IP CCTV camera set with 30m view range,full HD 1080p resolution, colour,2.8-12mm vari-focal lens, H.264+ video, motion activated,with power over ethernet (POE) , wall mounted,as HIKVISION DS-2CD2642FWD-I or equal and approved</u>					
B	At the gate house	NO	4			
C	At entrances to the block	NO	2			
D	18-Port unmanaged PoE Switch with 16 Fast Ethernet PoE Ports and 2 Gigabit uplink ports complete with UK-type power supply as D-Link DES-1018MP	NO	3			
E	Category 6 F/UTP shielded outside plant (OSP) cable as siemon Cat No.9A6O4-A5-01-R1A drawn in ducts linking the blocks (Backbone cabling)	LM	50			
F	Network video recorder with 16-channel POE inputs, 9 TB capacity SATA hard-disk drives •H.265 Pro+/H.265 Pro/H.265 video compression. •HDTVI/AHD/CVI/CVBS/IP video input. • Max 40/48 IP cameras input (up to 6 MP) complete with accessories as HIKVISION DS-7316HQHI-K4 or equal and approved.	ITEM	1			
G	46" LCD LED direct-lit backlight with uniform brightness; 1920x1080 High resolution,High definition, high brightness and high color gamut;Stable running and low maintenance cost, supporting 24 hours continuous working; LCD screen with 178° wide angle and Intelligent fan HIKVISION DS-D2046NH-E	ITEM	1			
	100 X 50mm x 18 SWG 2-compartment metal trunking with screwed cover powder coated to approved colour complete with factory made bends and tees, complete with 125mm and 200mm templates	LM	100			
	<u>CARRIED TO COLLECTION</u>				KShs.	
	<u>CCTV INSTALLATION</u>					

ITEM	DESCRIPTION	UNIT	QTY	RATE	KSHS.	CTS.
	<u>Supply, install, test, commission and maintain: -</u>					
A	Video Surveillance Control Board inclusive of 4-axis joystick and accessories compatible with the network video recorder as HIKVISION	ITEM	1			
B	9U free standing integrated rack enclosure with cable managers as Siemon or equivalent	ITEM	1			
C	3kVA in-line Uninterruptible Power Supply unit to be installed within the rack including associated interwiring and remote management software as APC	ITEM	1			
D	IP telecommunication outlet point wired in Cat 6 enclosed in trunking or conduit network switch/network video recorder and CCTV point including terminations at both ends	LM	300			
E	Dual data face plate as Siemon Cat 6A	NO	50			
	<u>Excavate, insert duct and compact to approval for service ducts related to Internet and communication services</u>					
F	Not exceeding 1000mm deep for 350mm Diameter HDPE Service duct pipe (measured separately)	LM	30			
G	Not exceeding 1000mm deep for 600mm Diameter HDPE Service duct pipe (measured separately)	LM	10			
H	Not exceeding 1000mm for 900mm Diameter HDPE Fabricated Manholes (Measured separately)	NO.	10			
	<u>Supply, install, test and fix the following as per WEHOLITE PRODUCT Manual as supplied by Mega pipes solutions limited or equal and approved make or supplier the following service ducts at ground level</u>					
J	350mm HDPE Service duct for installation for Internet and other Communication Technology Cables	LM	50			
K	600mm HDPE Service duct for installation for Internet and other Communication Technology Cables	LM	10			
L	Complete HDPE Fabricated Manholes at intervals not exceeding 30metres for inspection of communication cables	NO.	5			
	<u>CARRIED TO COLLECTION</u>				KShs.	
	<u>CCTV INSTALLATION</u>					

ITEM	DESCRIPTION	UNIT	QTY	RATE	KSHS.	CTS.
	<u>CCTV INSTALLATION</u> <u>COLLECTION</u> Brought forward from page 7/35 Brought forward from page 7/36					
	<u>TOTAL FOR CCTV INSTALLATION</u> <u>CARRIED TO SUMMARY OF BILL NO 4</u> <u>CCTV INSTALLATION</u>			KShs.		

ITEM	DESCRIPTION	QTY	UNIT	RATE	KSHS	CTS
	<u>PROPOSED NHC - ELDORET BONDENI</u>					
	<u>EXTERNAL WORKS</u>					
	<u>SUMMARY</u>					
	<u>DESCRIPTION</u>			<u>PAGE NO.</u>		
1	SITE CLEARANCE AND DEMOLITIONS			7/01		
2	PARKING AND DRIVEWAY			7/07		
3	WATER RETICULATION			7/11		
4	FOUL DRAINAGE			7/16		
5	BUILDER'S WORK FOR K.P. & L.C. POWER SUPPLY			7/18		
6	DUSTBIN CUBICLE			7/26		
7	CHAINLINK FENCING AND GATES			7/28		
8	SOLAR STREET LIGHTING			7/31		
9	LANDSCAPING			7/34		
10	CCTV INSTALLATION			7/37		
	<u>TOTAL FOR EXTERNAL WORKS</u>					
	<u>CARRIED TO MAIN SUMMARY</u>				KShs.	
	<u>PROPOSED NHC -</u>					
	<u>EXTERNAL WORKS SUMMARY</u>					

SECTION EIGHT
PRIME COST (P.C.) SUMS
AND
PROVISIONAL SUMS
BILL NO. 4

ITEM	DESCRIPTION	QTY	UNIT	RATE	SHS	CTS
	BILL NO. 4					
	PRIME COST AND PROVISIONAL SUMS					
	PRIME COST SUMS					
	POWER SUPPLY					
A	Allow a Prime cost sum of Kenya Shillings Five Hundred Thousand (Kshs. 500,000.00) only for KPLC supply charges.		SUM		500,000	
B	Allow for Profit		%			
C	Allow for Attendance		ITEM			
	SOLAR INSTALLATIONS (COMMON AREAS)					
D	Include the sum of Kenya Shillings Two Hundred Thousand (Kshs. 200,000.00) for Supply, Installation Testing, and Commissioning of Solar Installation by approved Solar Installation Specialist.		SUM		200,000	
E	Allow for Profit		%			
F	Allow for Attendance		ITEM			
	CARRIED TO COLLECTION			KShs.		
	PRIME COST AND PROVISIONAL SUMS					

SECTION NINE
SCHEDULE OF RATES
BILL NO. 5

ITEM	DESCRIPTION	QTY	UNIT	RATE	SHS	CTS
	<u>BILL NO. 5</u> <u>SCHEDULE OF RATES</u> <u>NOTE:</u> 1. The rates inserted herein are to include for all costs of labour, overheads and contractors profit. 2. The rates shall be the basis for variations for the works executed on Architects or Engineers variations. <u>This section shall form part of the contract and as such, it shall form part of key considerations to be made for purposes of analyzing the bidders for price competitiveness.</u> <u>EPS PANEL WALLING</u> <u>Expanded Polystyrene panel manufactured National Housing Corporation -EPS factory, complete with 3mm galvanised steel mesh on both sides joined using galvanised binding wire and anchored to concrete surfaces.</u> A Supply and fix 60mm thick single wall panels density 15kg/m3 including necessary supports internal walling B Supply and fix 80mm thick single wall panels density 20kg/m3 including necessary supports internal walling <u>Galvanised wiremesh manufactured by the National Housing Corporation.</u> C Flat mesh to corner openings D Ditto U- mesh to openings E Ditto Bent/Angle mesh to coners <u>WALLING</u> 200mm Thick solid concrete block walling bedded and jointed in cement sand (1:3) mortar reinforced with hoop iron in alternate courses. F 150mm Thick approved 'Ravenna' clay grille walling ditto. G 150mm thick concrete vent blocks bedded and jointed in cement and sand mortar (1:3) H <u>CARRIED TO COLLECTION</u> <u>PROPOSED NHC</u> <u>SCHEDULE OF RATES</u>					
		1	SM			
		1	SM			
		1	KG			
		1	KG			
		1	KG			
		1	SM			
		1	SM			
		1	SM			
				KShs.		

ITEM	DESCRIPTION	QTY	UNIT	RATE	SHS	CTS
	<u>EPS PANELS</u> <u>Expanded Polystyrene panel manufactured by the National Housing Corporation – EPS factory, Complete with 3mm galvanised steel mesh on both sides joined using galvanised binding wire</u>					
A	Supply and fix 150mm thick EPS suspended floor panels density 15KG/M3 including necessary supports	1	SM			
B	Supply and fix 200mm thick EPS suspended floor panels density 20KG/M3 including necessary supports	1	SM			
	<u>Shortcrete Class 25 1:11/2:3 structural plaster (cement, sand and quarry dust) applied to panels</u>					
C	35mm Thick finish to soffits of suspended slab	1	SM			
D	35mm Thick finish to walls	1	SM			
	<u>BRC fabric reinforcement mesh as described:-</u>					
E	Mesh ref. No. A98 weighing 1.54.kg/m2 in floor including all tying wires and supports (measured net - No allowance made for laps)	1	SM			
	<u>CONCRETE WORKS</u> <u>Hollow pot slab</u>					
F	175mm Thick hollow pot slab comprising of 300 x 125mm hollow clay blocks at 405mm centres; 100mm wide reinforced concrete mix 1:2:4 ribs and 50mm thick topping.	1	SM			
G	250mm ditto	1	SM			
	<u>CARRIED TO COLLECTION</u>					
	<u>PROPOSED NHC SCHEDULE OF RATES</u>					

ITEM	DESCRIPTION	UNIT	QTY	RATE	SHS	CTS
	ELEMENT NO. 6					
	<u>(POWDER COATED ALUMINIUM FRAMED AND ALUMINIUM SLIDING WINDOWS</u>					
	<u>POWDER-COATED FRAMED AND SLIDING WINDOWS</u>					
A	1200 x 1500mm high overall size consisting of 2No top fixed lights size 600mm x 300mm high and 2No. Bottom fixed light size 600mm x 300mm high , 2No. Sliding windows size 600 x 900mm comprising of 25mm x 50mm high in 2mm thick aluminium as Window	NO	1			
	<u>POWDER-COATED FRAMED WINDOWS</u>					
B	600 x 900mm high overall size consisting of 1No Top hung openable lights size 600mm x 600mm high and 1No. Bottom fixed light size 600mm x 300mm high, comprising of 25mm x 50mm high in 2mm thick aluminium as Window	NO	1			
	<u>WINDOW JOINERY</u>					
	<u>CURTAIN RODS</u>					
	<u>BRASS CURTAIN RODS</u>					
	<u>Supply and fix approved quality brass circular section curtain rail/track complete with runners and stopped ends. (Assume Single Rail)</u>					
C	125 x 25mm Double curtain rod holders of approved patte	NO	1			
D	30mm Diameter 3mm Thick inner curtain rod	LM	1			
E	25mm Diameter 3mm Thick outer curtain rod	LM	1			
	<u>CARRIED TO COLLECTION WINDOWS</u>			Kshs.		

ITEM	DESCRIPTION	UNIT	NOMINAL QTY	RATE	SHS	CTS
SCHEDULE OF DAYWORK RATES-MATERIALS						
DWM1	Cement	Bags	1			
DWM2	Mild steel Reinforcement	Tons	1			
DWM3	Sand	Tons	1			
DWM4	Ballast	Tons	1			
DWM5	Hardcores	Tons	1			
DWM6	Machine Cut Stones (200mm)	Nr	1			
DWM7	Machine Cut Stones (150mm)	Nr	1			
DWM8	Natural fine Chiselled Stones 200mm	Feet	1			
DWM9	200mm Concrete Blocks	Nr	1			
DWM10	150mm Concrete Blocks	Nr	1			
DWM11	100mm Concrete Blocks	Nr	1			
DWM12	150mm Clay Brick Walling	Nr	1			
DWM13	100mm Clay Brick Walling	Nr	1			
DWM14	75mm Clay Brick Walling	Nr	1			
DWM15	25mm Blockboards	M2	1			
DWM16	25mm MDF Boards	M2	1			
DWM17	20mm Gypsum Boards	M2	1			
DWM18	8mm Thick Glass	M2	1			
DWM19	Ceramic Floor Tiles	M2	1			
DWM20	Ceramic Wall Tiles	M2	1			
DWM21	Granito tiles	M2	1			
DWM22	Natural Stone Mazeras	M2	1			
DWM23	150 x 50 mm Cypress Timber	Feet	1			
DWM24	100 x 50mm Cypress Timber	Feet	1			
DWM25	75 x 50mm Cypress Timber	Feet	1			
DWM26	50 x 50mm Cypress Timber	Feet	1			
CARRIED TO COLLECTION				Kshs.		
SCHEDULE OF DAYWORK RATES - MATERIALS						

ITEM	DESCRIPTION	UNIT	NOMINAL QTY	RATE	SHS	CTS
	SCHEDULE OF DAYWORK RATES-CONTRACTOR EQUIPMENTS					
DWE1	Trucks Upto and Including 1 Ton	Hour	1			
DWE2	Trucks 3 Ton	Hour	1			
DWE3	Trucks Over 7 Ton	Hour	1			
DWE4	Welding Machines	Hour	1			
DWE5	Excavators	Hour	1			
DWE6	Dumpers	Hour	1			
DWE7	Concrete Mixers	Hour	1			
DWE8	Concrete Vibrators	Hour	1			
DWE9	Dozers	Hour	1			
DWE10	7Ton Naumatic Roller	Hour	1			
DWE11	Pneumatic Compresor With 2 Breakers	Hour	1			
DWE12	3HP Water Pump	Hour	1			
DWE13	15KVA Generator	Hour	1			
	CARRIED TO COLLECTION					
	SCHEDULE OF DAYWORK RATES-CONTRACTOR EQUIPMENTS			Kshs.		

ITEM	DESCRIPTION	QTY	UNIT	RATE	SHS	CTS
	<u>BILL NO. 5</u>					
	<u>SCHEDULE OF RATES</u>					
	<u>COLLECTION</u>					
	Brought forward from page 9/01					
	Brought forward from page 9/02					
	Brought forward from page 9/03					
	Brought forward from page 9/04					
	Brought forward from page 9/05					
	Brought forward from page 9/06					
	Brought forward from page 9/07					
	<u>TOTAL FOR SCHEDULE OF RATES, DAYWORK RATES FOR LABOUR, MATERIALS AND CONTRACTOR'S EQUIPMENTS</u>					
	<u>CARRIED TO GRAND SUMMARY</u>					
	<u>PROPOSED NHC SCHEDULE OF RATES, LABOUR, MATERIALS AND CONTRACTOR'S EQUIPMENT</u>					

SECTION TEN

GRAND SUMMARY

ITEM	DESCRIPTION	AMOUNT	CTS
<u>PROPOSED NHC REGIONAL OFFICES AND RESIDENTIAL DEVELOPMENT BONDENI - ELDORET ON PLOT ELDORET MUNICIPALITY BLOCK V/83 AND 84 - UASIN GISHU COUNTY</u> <u>GRAND SUMMARY</u>			
	<u>DESCRIPTION</u>	<u>PAGE</u>	
1	BILL NO.1: GENERAL AND PARTICULAR PRELIMINARIES	4/25	
2	BILL NO.2: BUILDER'S WORK TWO BEDROOMED FLATS	6/44	
3	BILL NO.3: EXTERNAL WORKS	7/75	
4	BILL NO. 4: PRIME COST (P.C.) AND PROVISIONAL SUMS	8/02	
5	BILL NO.5: SCHEDULE OF RATES	9/08	
<u>TOTAL AMOUNT CARRIED TO FINANCIAL PROPOSAL FORM</u>		Kshs.	
CONTRACTOR'S NAME.....			
ADDRESS.....			
.....			
AUTHORISED SIGNATURE.....			
DATE.....			
NAME OF WITNESS.....			
SIGNATURE.....			
ADDRESS.....			
OCCUPATION.....			
DATE.....			

SECTION ELEVEN

APPENDIX "A"

SIGNBOARD

SITE OFFICE

CLIENT:
**NATIONAL
HOUSING
CORPORATION**

PROJECT:

**NHC
STANDARD
DETAILS**

DRAWING TITLE

SITE OFFICE 1

CHIEF ARCHITECT
N H C
P.O. BOX 30257
NAIROBI

DRAWN BY:
J. LAMUNDO

REVISION DATE

SCALE: 1:50

DETAIL NO.:

09a

