

COAST WATER SERVICES BOARD



BIDDING DOCUMENTS

**Project Name: Coast Region Work plans For Small Dams Pans
and Boreholes for FY 2018-2019 Fund**

Issued on: 18th December 2018

For

**Contract Name: Mata Water Pan Taveta Constituency, Taita
Taveta County**

Tender No. CWSB/T/SPB/W/04/2018-2019

Employer:

COAST WATER SERVICES BOARD

P.O. BOX 90417-80100

MOMBASA, KENYA

December 2018

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INSTRUCTIONS TO TENDERERS.

1. General

- 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 said Appendix.

- 1.2 Tenderers shall include the following information and documents with their tenders, unless otherwise stated:
- (a) copies of certificates of registration, and principal place of business;
 - (b) total monetary value of construction work performed for each of the last three years;
 - (c) experience in works of a similar nature and size for each of the last three years, and clients who may be contacted for further information on these contracts;
 - (d) major items of construction equipment owned;
 - (e) qualifications and experience of key site management and technical personnel proposed for the Contract;
 - (f) reports on the financial standing of the Tenderer, such as profit and loss statements and auditor's reports for the last three years;
 - (g) authority to seek references from the Tenderer's bankers.
- 1.3 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.
- 1.4 The Tenderer, at the Tenderer's own responsibility and risk, **must** 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 tenderer must prove that they visited the site because this will be considered during tender examination.** The costs of visiting the Site shall be at the Tenderer's own expense.
- 1.5 The procurement entity's employees, committee members, board members and their relative (spouse and children) are not eligible to participate in the tender.
- 1.6 The price to be charged for the tender document shall not exceed Kshs.5,000/=
- 1.7 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 here below and any addenda issued in accordance with clause 2.4 here below:-
- (a) These instructions to Tenderers
 - (b) Form of Tender
 - (c) Conditions of Contract and Appendix to Conditions of Contract
 - (d) Specifications
 - (e) Drawings
 - (f) Bills of Quantities/Schedule of Rates (whichever is applicable)
 - (g) Other materials required to be filled and submitted in accordance with these Instructions and Conditions
- 2.2 The Tenderer shall examine all instructions, forms and specifications in the tender documents. Failure to furnish all information required by the tender documents may result in rejection of his tender.
- 2.3 A prospective Tenderer making inquiries of the tendering 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 respond to any request for clarification received earlier than seven [7] 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) The Tender;
- (b) Tender Security;
- (c) Priced Bill of Quantities/Schedule of Rates for lump-sum Contracts
- (d) Any other materials required to be completed and submitted by Tenderers.
- 3.3 The Tenderer shall fill in rates and prices for all items of the Works described in the Bill of Quantities/Schedule of Rates. 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/Schedule of Rates. All duties, taxes and other levies payable by the Contractor under 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 not be subject to any adjustment during the performance of the Contract.
- 3.5 The unit rates and prices shall be in **Kenya Shillings**.
- 3.6 Tenders shall remain valid for a period of ninety (90) 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.
- 3.7 The Tenderer shall prepare one original of the documents comprising the tender documents as described in these Instructions to Tenderers.
- 3.8 The original 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. All pages of the tender where alterations or additions have been made shall be initialed by the person or persons signing the tender.
- 3.9 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.
- 3.10 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.

4. Submission of Tenders

- 4.1 The tender duly filled and sealed in an envelope 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.
- 4.3 The tenderer shall not submit any alternative offers unless they are specifically required in the tender documents.

Only one tender may be submitted by each tenderer. Any tenderer who fails to comply with this requirement will be disqualified.

- 4.4 Any tender received after the deadline for opening tenders will be returned to the tenderer un-opened.
- 4.5 The Employer may extend the deadline for submission of tenders by issuing an amendment in accordance with sub-clause 2.5 in which case all rights and obligations of the Employer and the Tenderers previously subject to the original deadline will then be subject to the new deadline.

5. Tender Opening and Evaluation

- 5.1 The tenders will be opened in the presence of the Tenderers' representatives who choose to attend at the time and in the place specified in the invitation to tender.
- 5.2 The Tenderers' names, the total amount of each tender and such other details as may be considered appropriate, will be announced at the opening by the Employer. Minutes of the tender opening, including the information disclosed to those present will also be prepared by the Employer.
- 5.3 Information relating to the examination, clarification, evaluation and comparison of tenders and recommendations for the award of the 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 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's representative, there is an obvious typographical error, in which case the adjustment will be made to the entry containing that error.
 - (c) In the event of a discrepancy between the tender amount as stated in the Form of Tender and the corrected tender figure in the main summary of the Bill of Quantities/Quotation, the amount as stated in the Form of Tender shall prevail.
 - (d) The Error Correction Factor shall be computed by expressing the difference between the tender amount and the corrected tender sum as a percentage of the Corrected Builder's Work (i.e. corrected tender sum less P.C. and Provisional Sums).
 - (e) The Error Correction Factor shall be applied to all Builder's Work (as a rebate or addition as the case may be) for the purposes of valuations for Interim Certificates and valuation of variations.
 - (f) The amount stated in the tender will be adjusted in accordance with the above procedure for the correction of errors and with concurrence of the Tenderer, shall be considered as binding upon the Tenderer. If the Tenderer does not accept the corrected amount, the tender may be rejected and the Tender Security forfeited.
- 5.5 The tender evaluation committee shall evaluate the tender within 30 days of the validity period from the date of opening the tender.
- 5.6 Contract price variations shall not be allowed for contracts not exceeding one year (12 months)
- 5.7 Where contract price variation is allowed, the valuation shall not exceed 15% of the original contract price.

- 5.8 Price variation requests shall be processed by the procuring entity within 30 days of receiving the request.
- 5.9 Preference where allowed in the evaluation of tenders shall not exceed 15%
- 5.10 To assist in the examination, evaluation, and comparison of tenders, the Employer at his discretion, may request [in writing] 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 tender price or substance of the tender shall be sought, offered or permitted.
- 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.

6. Award of Contract

- 6.1 The award of the Contract will be made to the Tenderer who has offered the lowest evaluated tender price.
- 6.2 Notwithstanding the provisions of 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" which 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. The contract shall be formed on the parties signing the contract. At the same time the other tenderers shall be informed that their tenders have not been successful.
- 6.4 The Contract Agreement will incorporate all agreements between the Employer and the successful Tenderer. It will be signed by the Employer and sent to the successful Tenderer, within 30 days following the notification of award. Within 21 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 amount stipulated in the Appendix to Conditions of Contract.
- 6.6 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.
- 6.7 The procuring entity may at any time terminate procurement proceedings before contract award and shall not be liable to any person for the termination.
- 6.8 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.

7. Corrupt and fraudulent practices

- 7.1 The procuring entity requires that the tenderer observes the highest standard of ethics during the procurement process and execution of the contract. A tenderer shall sign a declaration that he has not and will not be involved in corrupt and fraudulent practices.
- 7.2 The procuring entity will reject a tender if it determines that the tenderer recommended for award has engaged in corrupt and fraudulent practices in competing for the contract in question.
- 7.3 Further a tenderer who is found to have indulged in corrupt and fraudulent practices risks being debarred from participating in public procurement in Kenya.

SECTION III
CONDITIONS OF CONTRACT

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SECTION III - CONDITIONS OF CONTRACT

1. Definitions

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

“Bills of Quantities” means the priced and completed Bill of Quantities forming part of the tender [where applicable].

“Schedule of Rates” means the priced Schedule of Rates forming part of the tender [where applicable].

“The Completion Date” means the date of completion of the Works as certified by the Employer’s Representative.

“The Contract” means the agreement entered into by the Employer and the Contractor as recorded in the Agreement Form and signed by the parties.

“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.

“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 Employer’s Representative upon correction of defects by the Contractor.

“The Defects Liability Period” is the period named in the Appendix to Conditions of Contract and calculated from the Completion Date.

“Drawings” include calculations and other information provided or approved by the Employer’s Representative for the execution of the Contract.

“Employer” Includes Central or Local Government administration, Universities, Public Institutions and Corporations and 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.

“Site” means the place or places where the permanent Works are to be carried out including workshops where the same is being prepared.

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

“Employer’s Representative” is the person appointed by the Employer and notified to the Contractor for the purpose of supervision of the Works.

“Specification” means the Specification of the Works included in the Contract.

“Start Date” is the date when the Contractor shall commence execution of the Works.

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

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

“ A Variation” is an instruction given by the Employer’s Representative which varies the Works.

“The Works” are what the Contract requires the Contractor to construct, install, and turnover to the Employer.

2. Contract Documents

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

- (1) Agreement,
- (2) Letter of Acceptance,
- (3) Contractor's Tender,
- (4) Conditions of Contract,
- (5) Specifications,
- (6) Drawings,
- (7) Bills of Quantities or Schedule of Rates [whichever is applicable]

3. Employer's Representative's Decisions

3.1 Except where otherwise specifically stated, the Employer's Representative will decide contractual matters between the Employer and the Contractor in the role representing the Employer.

4. Works, Language and Law of Contract

4.1 The Contractor shall construct and install the Works in accordance with the Contract documents. 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 Employer's Representative, and complete them by the Intended Completion Date.

4.2 The ruling language of the Contract shall be English language and the law governing the Contract shall be the law of the Republic of Kenya.

5. Safety, Temporary works and Discoveries

5.1 The Contractor shall be responsible for design of temporary works and shall obtain approval of third parties to the design of the temporary works where required.

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

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

6 Work Program and Sub-contracting

6.1 Within seven days after Site possession date, the Contractor shall submit to the Employer's Representative for approval a program showing the general methods, arrangements, order and timing for all the activities in the Works.

- 6.2 The Contractor may sub-contract the Works (but only to a maximum of 25 percent of the Contract Price) with the approval of the Employer's Representative. However, he shall not assign the Contract without the approval of the Employer in writing. Sub-contracting shall not alter the Contractor's obligations.

7 The site

- 7.1 The Employer shall give possession of all parts of the Site to the Contractor.
- 7.2 The Contractor shall allow the Employer's Representative and any other person authorised by the Employer's Representative, 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.

8 Instructions

- 8.1 The Contractor shall carry out all instructions of the Employer's Representative which are in accordance with the Contract.

9 Extension of Completion Date

- 9.1 The Employer's Representative shall extend the Completion Date if an occurrence arises which makes it impossible for completion to be achieved by the Intended Completion Date. The Employer's Representative shall decide whether and by how much to extend the Completion Date.

- 9.2 For the purposes of this clause, the following occurrences shall be valid for consideration;

Delay by:-

- (a) force majeure, or
- (b) reason of any exceptionally adverse weather conditions, or
- (c) reason of civil commotion, strike or lockout affecting any of the trades employed upon the Works or any of the trades engaged in the preparation, manufacture or transportation of any of the goods or materials required for the Works, or
- (d) reason of the Employer's Representative's instructions issued under these Conditions, or

- (e) reason of the contractor not having received in due time necessary instructions, drawings, details or levels from the Employer's Representative for which he specifically applied in writing on a date which having regard to the date for Completion stated in the appendix to these Conditions or to any extension of time then fixed under this clause was neither unreasonably distant from nor unreasonably close to the date on which it was necessary for him to receive the same, or
- (f) delay on the part of artists, tradesmen or others engaged by the Employer in executing work not forming part of this Contract, or
- (g) reason of delay by statutory or other services providers or similar bodies engaged directly by the Employer, or
- (h) reason of opening up for inspection of any Work covered up or of the testing or any of the Work, materials or goods in accordance with these conditions unless the inspection or test showed that the Work, materials or goods were not in accordance with this Contract, or
- (i) reason of delay in appointing a replacement Employer's Representative, or
- (j) reason of delay caused by the late supply of goods or materials or in executing Work for which the Employer or his agents are contractually obliged to supply or to execute as the case may be, or
- (k) delay in receiving possession of or access to the Site.

10 Management Meetings

10.1 A Contract management meeting shall be held regularly and attended by the Employer's Representative and the Contractor. Its business shall be to review the plans for the remaining Work. The Employer's Representative shall record the business of management meetings and provide copies of the record to those attending the meeting and the Employer. The responsibility of the parties for actions to be taken shall be decided by the Employer's Representative either at the management meeting or after the management meeting and stated in writing to all who attend the meeting.

10.2 Communication between parties shall be effective only when in writing.

11 Defects

- 11.1 The Employer's Representative 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 Employer's Representative may instruct the Contractor to search for a defect and to uncover and test any Work that the Employer's Representative 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.
- 11.2 The Employer's Representative 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.
- 11.3 Every time notice of a defect is given, the Contractor shall correct the notified defect within the length of time specified by the Employer's Representative's notice. If the Contractor has not corrected a defect within the time specified in the Employer's Representative's notice, the Employer's Representative 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.

12 Bills of Quantities/Schedule of Rates

- 12.1 The Bills of Quantities/Schedule of Rates 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 rates in the Bills of Quantities/Schedule of Rates for each item. Items against which no rate is entered by the Tenderer will not be paid for when executed and shall be deemed covered by the rates for other items in the Bills of Quantities/Schedule of Rates.
- 12.2 Where Bills of Quantities do not form part of the Contract, the Contract Price shall be a lump sum (which shall be deemed to have been based on the rates in the Schedule of Rates forming part of the tender) and shall be subject to re-measurement after each stage.

13 Variations

- 13.1 The Contractor shall provide the Employer's Representative with a quotation for carrying out the variations when requested to do so. The Employer's Representative shall assess the quotation and shall obtain the necessary authority from the Employer before the variation is ordered.
- 13.2 If the Work in the variation corresponds with an item description in the Bill of Quantities/Schedule of Rates, the rate in the Bill of Quantities/Schedule of Rates shall be used to calculate the value of the

variation. If the nature of the Work in the variation does not correspond with items in the Bill of Quantities/Schedule of Rates, the quotation by the Contractor shall be in the form of new rates for the relevant items of Work.

- 13.3 If the Contractor's quotation is unreasonable, the Employer's Representative may order the variation and make a change to the Contract Price, which shall be based on the Employer's Representative's own forecast of the effects of the variation on the Contractor's costs.

14 Payment Certificates and Final Account

14.1 The Contractor shall be paid after each of the following stages of Work listed here below (subject to re-measurement by the Employer's Representative of the Work done in each stage before payment is made). In case of lump-sum Contracts, the valuation for each stage shall be based on the quantities so obtained in the re-measurement and the rates in the Schedule of Rates.

- (i) Advance payment _____ **10% of Contract Price as part of Mobilization against a Bank Guarantee issued by a reputable Bank.**
- (ii) First stage _____ **Once the Contractor executes works worth 30% of the Contract Price as approved by the Employer Representative**
- (iii) Second stage **Once the Contractor executes works worth 50% of the Contract Price as approved by the Employer Representative**
- (iv) Third stage **Once the Contractor executes works worth 80% of the Contract Price as approved by the Employer Representative**
- (v) After defects liability period – Release of the **10% of Contract Price Retention as approved by the Employer Representative**

14.2 Upon deciding that Works included in a particular stage are complete, the Contractor shall submit to the Employer's Representative his application for payment. The Employer's Representative shall check, adjust if necessary and certify the amount to be paid to the Contractor within 21 days of receipt of the Contractor's application. The Employer shall pay the Contractor the amounts so certified within 30 days of the date of issue of each Interim Certificate.

14.3 The Contractor shall supply the Employer's Representative with a detailed final account of the total amount that the Contractor considers payable under the Contract before the end of the Defects Liability Period. The Employer's Representative shall issue a Defect 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 Employer's Representative shall issue within 21 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 Employer's Representative shall decide on the amount payable to the Contractor and issue a Final Payment Certificate. The Employer shall pay the Contractor the amount so certified within 60 days of the issue of the Final Payment Certificate.

14.4 If the period laid down for payment to the Contractor upon each of the Employer's Representative's Certificate by the Employer has been exceeded, the Contractor shall be entitled to claim simple interest calculated pro-rata on the basis of the number of days delayed at the

Central Bank of Kenya's average base lending rate prevailing on the first day the payment becomes overdue. The Contractor will be required to notify the Employer within 15 days of receipt of delayed payments of his intentions to claim interest.

15. Insurance

15.1 The Contractor shall be responsible for and shall take out appropriate cover against, among other risks, personal injury; loss of or damage to the Works, materials and plant; and loss of or damage to property.

16. Liquidated Damages

16.1 The Contractor shall pay liquidated damages to the Employer at the rate 0.001 per cent of the Contract price per day for each day that the actual Completion Date is later than the Intended Completion Date except in the case of any of the occurrences listed under clause 9.2. The Employer may deduct liquidated damages from payments due to the Contractor. Payment of liquidated damages shall not affect the Contractor's liabilities.

17. Completion and Taking Over

17.1 Upon deciding that the Work is complete the Contractor shall request the Employer's Representative to issue a Certificate of Completion of the Works, upon deciding that the Work is completed.

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

18. Termination

18.1 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 continuously without reasonable cause or authority from the Employer's Representative;
- (b) the Contractor is declared bankrupt or goes into liquidation other than for a reconstruction or amalgamation;
- (c) a payment certified by the Employer's Representative is not paid by the Employer to the Contractor within 30 days after the expiry of the payment periods stated in sub clauses 14.2 and 14.3 hereinabove.
- (d) the Employer's Representative 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.

18.2 If the Contract is terminated, the Contractor shall stop Work immediately, and leave the Site as soon as reasonably possible. The Employer's Representative 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.

19. Payment Upon Termination

19.1 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 Site, plant, equipment and temporary works.

19.2 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 Employer's Representative may in writing specify, any temporary buildings, plant, machinery, appliances, goods or materials belonging to him, and in default thereof, 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.

19.3 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 therefor the Employer's Representative 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.

20. Corrupt Gifts and Payments of Commission

20.1 The Contractor shall not;

- (a) Offer or give or agree to give to any person in the service of the Employer any gifts 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 with the Employer or for showing or forbearing to show favour or disfavour to any person in relation to this or any other contract with the Employer.
- (b) 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 Laws of Kenya.

21. Settlement of Disputes

21.1 Any dispute arising out of the Contract which cannot be amicably settled between the parties shall be referred by either party 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 of the Chartered Institute of Arbitrators, Kenya branch, on the request of the applying party.

APPENDIX TO CONDITIONS OF CONTRACT

THE EMPLOYER IS

Name: **Coast Water Services Board**

Address: **P.O. Box 90417-80100, Mombasa Mikindani off- Nkrumah Road**

Name of Employer's Representative: **Jacob K. Torutt**

Title; **Chief Executive officer**

Telephone: **041-2315230**

The name (and identification number) of the Contract is **Mata Water Pan Desilting, CWSB/T/SPB/W/05/2018-2019**

The Works consist of: **Desilting, Rip Rap formation Cattle Ramp**

The Start Date shall be **14 days after contract signing**

The Intended Completion Date for the whole of the Works shall be **3 calendar months.**

The following documents also form part of the Contract:

- (1) Agreement,**
- (2) Letter of Acceptance,**
- (3) Contractor's Tender,**
- (4) Conditions of Contract,**
- (5) Specifications,**
- (6) Drawings,**
- (7) Bills of Quantities or Schedule of Rates [whichever is applicable]**

The Site Possession Date shall be **at contract Signature date.**

The Site is located at **Mata, Mata location, Taveta Sub County, 60 km south of Taveta town.**

The Defects Liability Period **is 180 days.**

Amount of Tender Security is **N/A**

The name and Address of the Employer for the purposes of submission of tenders is; **Chief Executive officer, Coast Water Services Board, Mikindani Street off Nkurumah, Mombasa**

The tender opening date and time is 12:00PM on 4th day of January 2019

The amount of performance security shall not be required

Insurance

1) The minimum insurance covers shall be:

(a) Loss of or damage to the Works, Plant, and Materials: Contract price

(b) Loss of or damage to Equipment:

Contract Price

(c) Loss of or damage to property (except the Works, Plant, Materials, and Equipment) in connection with the Contract: Kshs 100,000; and

(d) Personal injury or death Kshs 100,000 for one incident, number of incidences unlimited.

Liquidated damages shall be 0.001 per cent of the Contract price per day

**SECTION IV – SPECIFICATIONS, DRAWINGS AND BILLS OF
QUANTITIES/SCHEDULE OF RATES**

I. SPECIFICATIONS

Specifications

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STANDARD TECHNICAL SPECIFICATIONS

1 GENERAL SPECIFICATIONS

1.1 Introduction

These specifications cover the construction of the works as shown on the drawings and listed in the Bills of Quantities and shall be read in conjunction **GCC** and **PCC**

All references given are intended solely for the convenience of those using the above clauses in the documents, which may, in the opinion of the Project Manager have any bearing on the point in question.

1.1.1 Location

The works are located within Nyangoro kwa Mnengwa and Msorongu villages of Taita Taveta County.

1.1.2 Scope of Works

The scope of the works shall include:

- 1) Bore hole Drilling and Equipping.
- 2) Construction of 1 No. 7.0m x4.0m Pump
- 3) Construction of raising mains Pipeline from Bore Hole to Kisoghokonyi Tank.
- 4) Excavation, laying, jointing and backfilling the following lengths pipes in depths of between 0.6m to 1.0m below ground level within the Project area.

Pipe Diameter	6" Dia GI pipe Class B	4" Dia GI Pipe Class B	3" Dia GI Pipe Class B	2.5" Dia GI Pipe Class B	110mm PVC 15bar	90mm PVC 12bar	50mm PVC 12bar	40mm PVC 12bar	32mm PVC 9bar
Length (meters)	0	0	0	0	0	0	0	0	0

- 5) Road Crossings within the pilot area.
- 6) Construction of valve chambers.
- 7) Testing and sterilization of pipes.
- 8) Commissioning of works.
- 9) Maintenance during Defect Liability Period of 18 months

1.2 Extent of Contract

The works specified under this contract shall include all general works preparatory to the construction of the works and materials and work of any kind necessary.

1.3 Precedence of Contract Documents

Should the provisions of any clauses of any or all of the Contract Document to be shown to be mutually at variance or exclusive, the following order of precedence shall be applied in order to establish which of the said provisions, mutually at variance or exclusive, shall be deemed to be true and correct intent of the contract entered into by Employer, and the contractor shall forthwith be absolved from any liability under the provisions not so proved to be the true and correct intent of the contract, provided that in the execution of the contract the contractor has, or shall have complied with such true and correct intent.

- (i) Provision of the Standard or Special Specifications shall take precedence over those of the General Conditions of Contract.
- (ii) Provision of Bill of Quantities shall take precedence over the Standard or Special Specifications unless otherwise indicated.
- (iii) Details shown or noted on the contract drawings shall take precedence over the requirements of both the Standard or Special Specifications and Bills of Quantities
- (iv) Detail drawing shall take precedence over General Drawings.
- (v) Within the Standard Specifications, the provisions of any section particular to the provisions at variance shall take precedence over the general section, and within any section clauses particular to the provisions at variance shall take precedence over those not so particular. The foregoing order of precedence shall apply also to sections and clauses of the special specifications.
- (vi) Where there is conflict in Units of measurement quoted in standard specifications and Units quoted in Bills of Quantities the Units in latter will apply.

Notwithstanding any fore written provisions, should the application of the foregoing order of precedence fail to resolve any variance or mutual exclusions as to the true and correct intent of the contract to the satisfaction of the Project Manager, the Project Manager may exercise the right to arbitrarily give a ruling as to the true and correct intention of the contract, and the contractor shall have the right to claim additional payment for any additional expense incurred by him as a consequence of such variance or exclusion and arbitrary ruling.

1.4 Standards

In the specifications, Bills of Quantities, and Drawings reference has been made to relevant British Standard Specifications and Codes of Practice- to which the materials and workmanship should comply with. However, the materials and workmanship complying with equivalent Kenya Bureau of Standards (KEBS) or International Standards Organisation (I.S.O.) Standard for that particular material or workmanship will also be acceptable.

Mixture of different standards in one trade will not be allowed. For pipes instance, if are to be provided to I.S.O Standard, then all the pipes in the works are to be to I.S.O. Standard.

Where the dimension in one standard does not completely correspond to the dimensions of the other standard, which is being used for construction of works, ruling of the Project Manager will be sought and any decision given by the Project Manager will be final and binding upon the contractor.

1.5 Quality of Materials and Workmanship

Unless otherwise specified all the materials for this project shall be purchased and supplied to the respective sites by the contractor at the right quantities as required in the bill of quantities. The materials shall be issued as per **Coast Water Services Board** regulations and with the approval of the officer in charge of the Project.

The materials and workmanship shall be of the best of their respective kinds and shall be to the approval of the Project Manager if sourced elsewhere. In reading of these specifications, the words" to the approval of the Project Manager" shall be deemed to be included in the description of all materials incorporated in the works, whether manufactured or natural, and in the description of all operations for the due execution of the works.

No materials of any description shall be used without prior approval by the Project Manager and any condemned as unfit for use in the works shall be removed immediately from the site, and without recompense to, the contractor. All works or parts thereof shall be in accordance with the latest edition of either Kenya Bureau of Standards (K.B.S.) specification or British Standard (B.S.) specifications and British Codes of Practice (C.P.) as published by British Standards Institution.

Where materials are to be provided by the contractor and are not provided by the Employer, all such materials shall be of approved manufacture and origin and the best quality of their respective kind, equal to sample and delivered on to the site a sufficient period before they are required to be used in the works to enable the Project Manager to take such samples as he may require for testing or approval, and the contractor shall furnish any information required by the

Project Manager as to the quality, weight, strength, description, etc. of the materials. No materials of any description shall be used without prior approval by the Project Manager and any condemned as unfit for use in the works shall be removed immediately from the site by, and without recompense to, the contractor.

1.6 Trade Names

Trade Names and Catalogue Reference are given solely as the guide to the quality and alternative manufacturers of the materials or goods of equivalent quality will be accepted at the discretion of the Project Manager.

1.7 Samples

Samples of all materials shall be deposited with the Project Manager and approved prior to ordering or delivery to site. The Project Manager reserves his right to test any sample to destruction and retain samples until the end of the maintenance period. No payment will be made for samples and the contractor must in the rates of prices allow for costs of samples. All materials delivered to site shall be equal or better in all respect than the samples delivered to the Project Manager.

All sampling of materials on the site must be done by or in the presence of the Project Manager. All other samples will be deemed not to be valid under the contract.

All materials delivered to the site or intended for the works not equal or better than the samples approved by the Project Manager shall be removed and replaced at the contractor's expense.

1.8 Testing

As provided in **clause 32** of the **GCC** and in accordance with the specification quoted for any material used on works of this contract, tests may be called upon by the Project Manager to be carried out at the place of manufacture or on the site. The contractor may assume that the tests will be required on soils, workmanship, and materials whether natural or manufactured to verify their compliance with the specifications. Samples of all such materials and manufactured articles together with all necessary labour, materials, plant and apparatus for sampling and for carrying out of the tests shall be supplied by the contractor at his own expense.

1.9 Programmes for the Execution of Works

- (i) In accordance with **clause 25 of GCC** and **as stated in the PCC**, the contractor upon receiving Project Manager's order to commence shall within 28 days draw up a working programme setting out order in which the works are to be carried out with appropriate dates thereof together with delivery dates for materials. The contractor shall together with his work programme supply an expenditure chart showing monthly anticipated expenditure.
- (ii) The programme shall be deemed to have taken into account normal variations in climatic conditions to provide for completion of the works in the order and within the times specified therein.
- (iii) The order in which it is proposed to execute the permanent works shall be subject to adjustment and approval by the Project Manager, and contractor's price shall be held to include for any reasonable and necessary adjustment required by the Project Manager during the course of the works.
- (iv) The contractor shall carry out the contract in accordance with the programme agreed with the Project Manager, but he shall in no manner be relieved by the Project Manager's approval of the programme of his obligations to complete the works in the prescribed order and by the prescribed completion date and he shall from time to time review his progress and make such amendments to his rate or executions of the works as may be necessary to fulfil these obligations.
- (v) Once the proposed programme is approved by the Project Manager, the contractor shall not depart from the programme without the written consent of the Project Manager. In the event of unforeseen difficulties or disturbances arising, which forces the contractor to depart from the approved programme of works, he shall advise the Project Manager in writing of such occurrences without delay and submit proposals for any necessary remedial measures, for which he shall obtain the Project Manager's approval before putting such measures into effect.
- (vi) The contractor shall furnish the Project Manager with a monthly statement of all works done on the contract and of all materials on site.

1.10 Substantial (Practical) Completion

Substantial or Practical Completion of works is to be understood as a state of completion, which leaves out only minor outstanding items that can be readily completed within a period of less than one month without interfering with the normal operation of the works.

The works will not be considered as substantially or practically completed without the works being capable of being used by the Employer in accordance with the purpose of the works. This means amongst other things, that all

final tests have been carried out, the pumping stations and treatment plant fully operational to the required capacity, all storage tanks filled up, operation manuals provided, and clearance of the site upon completion of the works has been carried out, all to the satisfaction of the Project Manager.

The contractor shall allow for a period of one month for the completion by others of as built drawings before the works are handed over to the Employer.

1.11 Nominated Sub-contractors and Nominated suppliers

The contractor shall be responsible for Nominated Sub-contractor in every respect. In particular, it shall be the Contractor's responsibility to ensure that each sub-contractor commences and completes the work in a manner so as to conform to the working programme, as specified above.

It is also the responsibility of the contractor to ensure a satisfactory progress of the works and to ensure that the works are completed to a standard satisfactory to the Project Manager.

The contractor shall accept liability for and bear the cost of General and Specific Attendance on Nominated Sub-contractors which shall be deemed to include for:-

- (i) Allowing the use of standing scaffolding, providing special scaffolding, maintenance and alteration of all scaffolding, retention of all scaffolding until such time as all relevant Sub-contractor's works are complete and removal of all scaffolding on completion.
- (ii) Providing equipment and labour for unloading and hoisting subcontractor's materials.
- (iii) Providing space for office accommodation, and for storage of plant and materials; allowing use of sanitary accommodation; the supply of all necessary water, power, lighting and watching and clearing away all rubbish.

Cutting away for and making good after the work of sub-contractors as may be required will be measured and valued separately in the Bills of Quantities.

Before placing any orders with nominated sub-contractors or nominated suppliers, the contractor should enter into an agreement with the nominated sub-contractor/nominated suppliers to ensure that the conditions and delivery of materials to site comply with the conditions of contract and the working programme.

Particular clause should be inserted in the agreement with the nominated suppliers ensuring the validity of the rates for the supply of materials as per the delivery schedule.

Nominated suppliers who are unable to meet the delivery schedule will not be given allowance for any increases in prices incurred after the delivery time agreed in the delivery schedule.

1.12 Entry upon Land, Working site and Adjoining Lands

The employer shall provide land, right of ways and wayleaves for the works specified in the contract.

If nothing else is mentioned, the contractor will be allotted for execution of the works only the actual area as necessary for the extent of the construction.

The contractor shall give notice to the Project Manager at least 30 days before he wishes to enter onto the land required to carry out the contract.

The contractor shall not enter onto any land or commence any operations until such time as he receives formal confirmation from the Project Manager that all necessary compensation formalities have been completed and that permission has been obtained from the landowner to enter the land and commence operations. Should the contractor enter onto land or commence operations without first obtaining this confirmation, he shall be liable in whole or in part, at the sole discretion of the Project Manager, for all additional costs and/or legal charges which might arise therefore.

The contractor shall on his own accord obtain rights of admission, and rights of using all other areas which are necessary for storing and manufacturing or for setting up site offices and Project Manager's site office or whatsoever will be necessary.

No separate payment will be made to the contractor on account of these items and the contractor must make due allowance for them in his rates.

The contractor shall take care to prevent injury, damage and trespass on lands, fences and other properties near and adjacent to the works and must in this connection make all necessary arrangements with adjoining landowners, or into the case of Government property with officers appointed for this purpose, and ensure the workmen's observance of all Government rules and ordinances regarding game protection and other matters and provide, maintain and clear away on completion of the works, all temporary fencing which may be required for execution of the works.

Before completion of the works, the contractor must make good or compensate any such injury, damage or trespass on lands, fences and other properties which have no otherwise been provided for in the contract

1.13 Preservation of Survey Beacons

Ordinance Survey Beacons, Bench marks, etc., or around the site of the works shall not be disturbed unless permission has been obtained by the Project Manager from the Survey of Kenya.

In the event of unauthorized disturbance of such beacons, bench marks, etc., in the course of the works being carried out, the contractor shall be responsible for reporting same to the Project Manager and the Survey of Kenya and for payment of any fees due to said Survey of Kenya for replacement of such disturbed beacons, bench marks, etc. The contractor shall not replace such disturbed beacons bench marks, etc. on his own accord.

1.14 Land for Camp Sites

The employer shall make available free of charge to the contractor all land on under or through which the works other than Temporary works are to be executed or carried out all as indicated onto the drawings or as detailed in the specifications. Such land shall exclude land for Project Manager's site offices and the land required by the contractor for his own camps, offices, houses, temporary works or any other purpose.

1.15 Existing Services

Drains, pipes, cables and similar services encountered in the course of the works shall be guarded from damage by the contractor at his own costs to safeguard a continued uninterrupted use to the satisfaction of the owners thereof, and the contractor shall not store materials otherwise occupy any part of the site in a manner likely to hinder the operation of such services.

The contractor shall on the Project Manager's direction arrange for the construction of permanent or temporary diversions of the said drains etc., together with their reinstatement in liaison with the respective departments, bodies, corporations or authorities. No services may be tampered with by the contractor and all works in connection with any kind of services shall be carried out by their respective owners.

It is the responsibility of the contractor to inform the Project Manager immediately any existing service is exposed.

1.16 Damage to Services

The contractor shall be held liable for all damage and interference to mains and pipes, to electric cables or lines of any kind either above or below ground caused by him or his sub-contractors in execution of the works, whether such services are located on the contract drawings or not. The contractor must make good or report to the appropriate authorities the same without delay and do any further work considered by the Project Manager or owner. The contractor shall provide for these contingencies in his rates.

1.17 Temporary Roads and Traffic

The contractor shall provide and maintain all temporary roads, bridges and other work required for the construction of the works including access to quarries, borrow-pits, accommodation etc.

1.18 Road Closure

Where a road used by the contractor for delivery of any materials used in the works is closed under section 71 of the Traffic Ordinance Act 1962 or amendments thereto, the contractor shall obey such closure order and use alternative roads.

1.19 Road and Railway Crossing and Traffic Control

Wherever the pipeline is crossing the classified roads and railway line, the contractor will contact the relevant authorities in advance and obtain necessary permission to dig across the road and railway-line in accordance with requirements of the authorities concerned and shall pay any royalties connected with this work, and the contractor will provide temporary detour road together with any warning signs necessary. There will be no separate payment for this and cost of all expenses connected with road and railway crossing for which no separate items have been included in the Bills of Quantities.

1.20 Protection from Water

Unless otherwise mentioned, the contractor shall keep the whole of the works free from water and allow in his rates for all dams, coffer dams, pumping, piling, shoring, temporary drains, slumps, etc., necessary for this purpose and shall make good at his own costs all damage caused thereby.

1.21 Weather Conditions

The contractor shall be deemed to take into account all possible weather conditions when preparing his Bid and he shall not be entitled for extra payment by the reason of the occurrence or effect of high winds, excessive rainfall, temperature or any other meteorological phenomena.

1.22 Protection from Weather

All materials shall be stored on site in a manner approved by the Project Manager's Representative and the contractor shall carefully protect from the weather all works and materials which may be affected thereby.

No separate payment will be made for this and contractor will allow in his rates for this.

1.23 Explosives and Blasting

At works requiring the use of explosives, the contractor shall employ men experienced in blasting, and these men must be in possession of a current blasting certificate. The purchase, transport, storage and use of explosives shall be carried out in accordance with the most recent Explosives Ordinance and rules issued by the Government and the contractor shall allow in his rates for excavation and quarrying for all expenses incurred in meeting these requirements, including the provision of suitable stores. Blasting operations shall be carried out with as little interference as possible to traffic or persons and the rates shall include for all flagging, watching, barricades and clearance of debris.

In all cases previous permission from the Project Manager must be obtained before commencing any blasting operation.

If, in the opinion of the Project Manager, blasting would be dangerous to persons or property, or it is carried out in a reckless manner, the Project Manager can prohibit any further use of explosives.

1.24 Liaison with Police, etc,

The contractor shall keep himself in close contact with the police, Labour Officers and other officials in the areas concerned regarding their requirements in the control of workmen, passage through townships, or other matters and shall provide all assistance and/or facilities which may be required by such officials in execution of their duties in connection with the works.

1.25 Provision of Water

The contractor shall provide water for use in the works. He shall supply all hydrants, hose, cocks, vessels and appliances necessary for the distribution

there-of and shall provide pumps, tanks, carts, vessels and appliances, transport and labour when and where-ever it is necessary for water to be carted for use at the works. All water used in connection with the works shall if possible be obtained from a public water supply and the contractor shall make all necessary arrangements and pay all the charges for connections to mains and for water used.

1.26 Temporary Lighting and Power

The contractor shall provide all artificial lighting and power for use on the works, including all sub-contractors and Specialists' requirements and including all temporary connections, wiring, fittings, etc., and clear away on completion. The contractor shall pay all fees and charges and obtain all permits in connection therewith.

1.27 Sanitation

The site shall be kept in a clean and proper sanitary condition. No nuisance shall be committed on or around the work, and latrines for the workmen and staff shall be provided in accordance with the requirements of the Medical Officer or Sanitary Authorities. The contractor shall be responsible for the sanitary discipline of his labour.

1.28 Medical Facilities

The contractor's attention is drawn to Legal Notice No. 79 of 22nd September, 1978 by which it is mandatory that every contractor employing more than twenty people should appoint (in writing) a safety supervisor. A safety supervisor advises the management on all matters regarding safety, hygiene and welfare of the people affected by the Contractor's undertaking on the site. The safety officer may in addition carry out other duties.

The contractor shall provide adequate first aid equipment on the site, and ensure that at least two of his site staff is competently trained in first aid.

1.29 Signboards

The contractor shall erect signboards in prominent positions adjacent to the works to the satisfaction of the Project Manager.

1.30 Setting out and Survey Equipment

The contractor must before commencing any construction works, make sure that levels shown on the drawings correspond with levels found on the site.

Should any discrepancy be discovered between the levels shown on the drawings and those found on the site, which may affect the levels and dimensions of any part of the works, the contractor shall notify the Project Manager, who if necessary, will issue drawings showing the amended levels and dimensions.

The Contractor shall allow for in his rates, the cost of the necessary qualified and experienced staff to set out the works and during the continuance of the contract for the sole use of the Project Manager, provide approved new and accurate instruments together with all other requisites, all necessary chairmen and other attendance and transport required for setting out and checking the works or purposes in connection therewith.

The major requirements are as a minimum but not limited to the following:

(a) Theodolites including the following accessories:

- (i) 1No. Tripod for equipment
- (ii) 6No. Target rods.
- (iii) Data Cables.
- (iv) Power Cables.
- (v) PC data processing software.
- (vi) Carrying case.

(b) Digital level (2 No.) Including the following accessories.

- (i) 2No. levelling staves
- (ii) 1No. equipment tripod.

(c) 50m steel tapes (2no.)

(d) 2m ranging rods (2no)

(d) Bush Clearing implements-pangas, slashers etc

The contractor shall clear the site and set out the works well in advance to enable the Project Manager to inspect and approve the setting out prior to commencement of the works.

1.31 Backfilling of Holes and Trenches

The contractor shall immediately upon approval of any work at his own expense and to the satisfaction of the Project Manager backfill all holes, trenches and temporary quarries which have been made.

1.32 Inspection of Works

The contractor must give due notice in writing to the Project Manager's Representative when any part of the works are ready for inspection.

1.33 Testing of Water Retaining Structures

All water retaining structures shall on completion be tested for water tightness in the following manner:-

The structure shall be filled with portable water in stages and held at each stage for such time as the Project Manager may require. Should any dampness or leakage occur at any stage, the water shall be drained off and the defects made good. The procedure shall be continued and finally the structure shall after a period allowed for absorption remain full for seven days. Within those seven days, the level of the structure of the water should be recorded and measurements made at intervals of 24 hours. The total leak must not exceed 0.3% of the total volume of water in the tested structure.

If the structure does not satisfy the conditions of the test, and the daily drop in water level is decreasing, the period of test may be extended for a further 7 days, and if the specified limit is then not exceeded, the structure may be considered as satisfactory.

1.34 Testing of Roofs

Where structures are used for the storage of portable water, adequate precautions should be taken to ensure that the roof is watertight in order to give protection against a potential source of pollution.

The roof should be tested by lagooning the concrete slab to a minimum depth of 75mm for a period of 3 days, the roof slab should be regarded as satisfactory if no damp patches occur on the soffit. The roof screed should be completed immediately after testing.

1.35 Cleaning and Sterilizing Water Retaining Structures

The interior of all potable water retaining structures shall be thoroughly cleaned and washed after the water tightness test has been approved by the Project Manager in order to remove all contaminations.

The structure shall then be filled to overflow level with clean water containing 50 parts per million of chlorine and left for a period of at least 24 hours. The chlorinated water shall then be drained away and the structures refilled with clean water from which samples shall be taken for bacteriological examination and for tests of residual chlorine. If any of the results of the tests are unsatisfactory when compared with those of the control sample of the supply

water, the sterilizing process shall be repeated until the results of the tests are satisfactory.

1.36 Contractor's Superintendence

The contractor shall give or provide all necessary superintendence during the execution of the works and as long thereafter as the Project Manager may consider necessary for proper fulfilling of the contractor's obligations under the contract.

1.37 Normal Working Hours

The contractor shall inform the Project Manager in writing, at the time of submitting the work programme, the normal working hours. The contractor shall respect all public holidays. Where the contractor wishes to work outside these hours, he shall request the Project Manager in writing at least 24 hours in advance for consideration.

1.38 Compliance with Statutes and Local Regulations

In addition to requirements of the **GCC 3.1** and **as stated in PCC**, the contractor shall be responsible for acquainting himself with all current valid statute ordinance or bye-laws or regulations which may affect the works and shall include these in the item provided in the Bills of Quantities. This applies to training levy and other similar taxes for which no claim on the part of the contractor other than the one inserted in the bills of quantities will be allowed.

1.39 Accommodation for Workmen

The contractor shall if he wishes provide and maintain suitable shelters and mess facilities for his workmen and supervisory staff. The contractor shall throughout the contract provide an adequate supply of potable water for the workmen.

1.40 Storage Spaces and sheds

Suitable temporary stores and work-shops shall be erected and later removed on completion of the works.

1.41 Office for Contractor

The Contractor shall erect or rent an office near the works on a site to be approved by the Project Manager. This office shall be kept open at all hours during which the work is in progress.

Any notice to be given to or served upon the Contractor shall be deemed and taken to be effectively given or served upon by the delivery there-of at such office on the site.

1.42 Office for the Project Manager's Representative n/a

The Contractor shall provide and maintain an office inclusive of furniture; staffs etc to enable the Project Manager's Representative perform his duties. This will be as provided in the B.O.Q. The facilities shall revert to the Contractor when not needed or otherwise as specified in the B.O.Q.

The Contractor shall be paid for Project Manager's site office in the following manner:

- (i) 40% (Forty per cent) of the sum when the offices have been erected or hired, furnished, equipped and handed over to the Project Manager.
- (ii) 40% (Forty per cent) of the sum in equal monthly installments spread over the period from the time the offices are taken over by the Project Manager until the end of the Contract. (in the event of an interim certificate not being issued in any month, then the installment shall be added to the subsequent certificate).
- (iii) 20% (Twenty per cent) of the sum when the building has been removed and the site is left neat and tidy to the satisfaction of the Project Manager.

All the above payments of the sums shall be subjected to deductions of retention money. No payment for offices will be made unless their erection has been ordered in writing by the Project Manager.

1.43 Telephones n/a

The Contractor shall arrange to provide one post office telephone for the exclusive use of the Project Manager's site staff. The telephone shall be installed in the Project Manager's Site Office, on the onset of the Contract.

A provision sum item has been allowed in the Bills of Quantities for the payment of the cost of telephone installations and telephone Bills.

1.44 Housing for the Project Manager's staff n/a

Housing facilities shall be provided for the Project Manager's staff as allowed in the Bills of Quantities

1.45 Maintenance of the Project Manager's , offices, furniture and Equipment n/a

For the entire duration of the Contract, the contractor will:-

- (i) For rented premises, ensure that the Landlord attends to any maintenance problems regularly. The furniture shall be maintained by the contractor.
- (ii) Keep all buildings provided by him, for the use of the Project Manager's staff, in well maintained, clean and fully habitable condition, and shall maintain all access roads, car parks, footpaths, fences, gates, drains, potable water supplies, gas, electricity and water-borne sewage disposal system in good stage of repair, all to the satisfaction of the Project Manager.
- (iii) The Contractor shall also provide an adequate refuse collection for all houses and offices provided by him.
- (iv) The Contractor shall maintain all furniture and equipment provided by him in a reasonable state of repair and usable condition and shall replace promptly any item which becomes unserviceable or is lost.
- (v) The Contractor shall provide day and night watchmen for the Project Manager's premises whether rented or constructed by him.

1.46 Attendance Upon Project Manager's Site Staff

For the duration of the Contract:-

- (i) The Contractor shall provide all assistance including labourers, chainmen, clerks and junior staff as and when required by the Project Manager for checking, setting out, surveying measuring or for testing of work. The Contractor shall also provide a full time assistant in Project Manager's site office.
- (ii) The Contractor shall provide all tools and protective clothing, wooden pegs, iron pins and pickets, water cement and aggregate for concreting, transport for labourers and materials as may be required by the Project Manager and his site staff for checking, setting out, surveying, measuring or testing of the work.

1.47 Insurance n/a

All buildings, furniture and equipment provided by the contractor for the Project Manager's Representative shall be insured by the Contractor against loss or

damage by accident, fire, theft and other risks ordinarily insured against for the duration of the Contract. The theft shall include personal belongings of the tenants in the Project Manager's staff houses.

1.48 Transports for Project Manager's Representative n/a

The contractor shall bear all costs of transporting the Project Manager's representative staff from the rented premises to and from the site on a daily basis. The contractor shall provide a suitable road worth vehicle with up to date vehicle's road license, comprehensive insurance, safety belts, driver, maintenance, fuel and lubricants and must keep the vehicles clean and in a good roadworthy condition throughout the contract.

The costs of the above shall be met in item spelt out in the Bills of Quantities.

The Contractor shall be solely responsible for safe custody of the vehicle during the construction period.

1.49 Removal of Camps

On the completion of the Contract, the Contractor shall if so requested take down and remove all structures connected with his camp, and shall take up all pipes, drains and culverts, backfill trenches, fill up all latrine pits, soak ways and other sewage disposal excavations and shall restore the site as far as practicable to its origin condition and leave it neat and tidy to the satisfaction of the Project Manager.

1.50 Site Meetings

Site meetings will normally be held monthly, but will be called for whenever the progress of the works so require or when demanded by the Project Manager.

The Contractor shall at all meetings be represented by a responsible representative other than the Site Agent, who has the powers to commit the contractor in all matters concerning the contract.

In the event, no responsible representative of the contractor is present at the meetings; any decision taken by the Project Manager at the meeting will be binding upon the contractor.

2 SITE CLEARANCE

2.1 Clearance of Trees, Bushes, Scrub, Huts, etc.

The contractor shall unless otherwise directed cut down all trees, remove bushes, plantations, crops and other vegetable growth and grub up all roots, take down all huts, buildings, walls fence and any other obstruction except services

mentioned in clause 2.13 and handle and transport salvaged usable materials, to a site approved by the Project Manager. All salvaged and usable materials are the property of the respective owners. The clearing and demolition herein described shall be carried out to a width of the minimum excavation plus 1.50m on either side where applicable.

With exception of the salvaged material afore-mentioned, the contractor shall destroy or otherwise remove the whole of the rubbish from the site to an approved tip or number of tips provided by him.

Trees shall be cut down to as near the ground level as possible and the rates entered in the Bills of Quantities shall include for cutting down, removing branches and foliage, cutting into suitable lengths, grubbing up stumps and roots, stacking up, burning or disposing of as directed.

Before commencing any site clearance, general clearance, clearance of pipelines etc, the contractor shall inform the Project Manager's Representative of his intention. The Project Manager's Representative will be visiting the section of works concerned, determine the extent of the clearance expressly required.

2.2 Damage to Lands, etc.

Except where necessary for the proper execution of the works, the contractor shall not interfere with any fence, hedge, trees, land or crop forming the boundary of the site, or elsewhere. In the event of any interference, the contractor shall make good any damage to such fence, hedges, tree, land or crop to the satisfaction of the Project Manager and the owner thereof.

Where the work is to be executed in private land, the Employer will be responsible for negotiating and obtaining rights of way and the serving of all notices as may be required upon the owners and/or occupiers of the land and it shall be the obligation of the contractor to keep the Employer and the Project Manager fully informed concerning the rate of progress and of his intention to enter and begin work within any way leave as provided for under the condition of contract and required by this specification.

2.3 Clearing the Site on Completion

On completion of the works, the contractor shall clear the site of all plant, building, spoils, dumps, rubbish, etc. and leave the site to the satisfaction of the Project Manager.

Borrow pits and temporary quarries shall be made good and covered with vegetative soil. Dumps for waste material shall be covered with at least 0.5m of soil of which at least a 0.10m layer in top shall be vegetative soil.

3 EARTHWORKS

3.1 General

Excavation shall be made to such lengths, depths and inclinations as may be necessary for the construction of the works or as shown on the drawings or as the Project Manager may direct.

3.2 Classification of Excavation

The Project Manager or his Representative and the Contractor or his Representative shall be present during classification of materials.

Where the terms "rock excavation" and "soft excavation" or "excavation" are used in these specifications, the following definitions shall apply.

3.2.1 Rock Excavation

Rock excavation includes all solid rock in place which cannot be removed until loosened by blasting, barring, wedging, and all boulders or detached pieces of solid rock more than 0.25 cubic metres in volume. Solid rock under this class is defined as sound rock of such hardness and texture that it cannot be loosened or broken down by hand- drifting picks.

All materials containing more than 50% by volume of boulders exceeding 0.25 cubic metres in volume shall be classified as rock excavation.

3.2.2 Soft Excavation

Common excavation includes all material other than rock excavation: including, but not restricted to earth, gravel, and also such hard and compact material as hardpan, cemented gravel, and soft or disintegrated rock together with all boulders or detached pieces of solid rock not exceeding 0.5 cubic metres in volume.

3.3 Stripping of Topsoil

3.3.1 Stripping

Stripping shall consist of removing, transporting and disposing of topsoil, stumps, roots, buried logs, debris, humus and similar objectionable matter.

Areas to be stripped are all areas required for the permanent constructional works, borrow-pits and embankment fills.

The limits of stripping shall extend 2 metres beyond the limits of excavation or toes of fills.

The depth of stripping shall normally be 0.2m, but deeper stripping might be needed to remove stumps.

3.3.2 Disposal

Materials from stripping suitable as topsoil shall be spread in approved areas. All other non-combustible materials shall be buried in approved disposal area; covered with a minimum of 0.5m of excavation spoil. These disposal areas shall be left with neatly graded surfaces and stable slopes that assure drainage. Alternatively, the non-combustible material shall be removed from the area by the contractor.

3.4 Excavation in Open Cut

3.4.1 General

All open cut excavation shall be performed in accordance with this section to the lines, grades and dimensions shown on the drawings or as directed by the Project Manager. The Project Manager reserves his right to at any time during the progress of the work to vary the slopes or dimensions of the excavations from those previously specified.

Any damage to the works due to the contractor's operations, including shattering of the material beyond the required excavation lines, shall be repaired at the expense of and by the contractor. All excess excavations and over-excavation shall be filled with compacted concrete grade 10 furnished and placed at the expense of and by the contractor.

All excavation for structure foundations shall be performed in the dry.

If excavations are carried out in roads, footpaths, separators, or within 5m of buildings, the contractor is requested to execute the work in a way that will minimise damage and disturbances.

3.4.2 Mechanical Excavation

- (a) A mechanical excavator shall be employed only if the sub-soil is suitable and will allow timbering of trenches or other excavations to be kept sufficiently closed up to ensure that no slips fall or disturbance of the ground takes place or there are no pipes, cables, mains or other services or property which may be disturbed or damaged by its use.
- (b) When mechanical excavators are used, a sufficient depth of material shall be left over the bottom of the excavation to ensure that the ground at finished excavation level is not damaged or disturbed in any way. The excavations shall then be compacted by hand to the finished levels required.

3.4.3 Rock Excavation

The contractor shall trim all rock faces in cuttings according to the dimensions shown on the drawings and upon completion leave them safe from rock falls to the satisfaction of the Project Manager.

3.4.4 Foundation for Structures

(a) Common Material

The bottom and side slopes of common material upon or against which concrete is to be placed shall be finished accurately to the established lines and grades, and loose materials on surfaces so prepared shall be moistened with water and tamped or rolled with suitable tools and equipment to form a firm foundation for the concrete structure. If, at any point, material is excavated beyond the established excavation lines, then the over-excavation resulting voids shall be filled with consolidated concrete grade 10 at the contractor's expense.

If the excavation is carried out in advance, a protective layer of 150mm thickness shall be left above the foundation level until immediately before the contractor is ready to pour the blinding concrete.

(b) Rock Materials

The bottom and side slopes of rock material upon or against which concrete is to be placed shall be excavated to the required dimensions as shown on the drawings or established by the Project Manager. No material will be permitted to extend within the neat lines of the structure. If at any point in the rock material, material is excavated beyond the limits required to receive the structure, the additional excavation shall be filled solidly with concrete grade 10.

All soft or loose materials shall be removed by the use of stiff, brooms, picks, hammer or jets and cavities backfilled with concrete grade 10, grout or compacted rock fill as directed.

(c) Levels and Dimensions of Foundations

Levels and dimensions of foundations shown on the drawing may be changed by the Project Manager to suit actual site conditions.

The additional volume shall be measured net and paid according to the rates in the Bills of Quantities.

3.4.5 Trench Excavations for Pipe Laying

All surface material including top soil which differs in any nature whatsoever from the sub-strata shall in every case be carefully set aside and stored separately from other excavated material. No extra claim will be allowed for setting aside surface matter or topsoil for later use.

Trench excavation shall be carried out with great care, true to line and gradient and as near as practicable to the size required for construction of the permanent work. Nowhere shall the external dimensions of the excavations be less than the dimensions of the permanent work shown on the drawings or as directed by the Project Manager.

If the bottom of the excavation becomes weathered prior to pipe laying, due to fault of the contractor, the weathered soil shall be replaced with suitable compacted material to the original formation level at the contractor's expense. The pipe trench shall be excavated to a depth of 150mm below the invert level of the pipe and refilled with sand, gravel or other selected materials free from stones and well rammed in order to provide a smooth bed for the pipes.

Where concrete pipes are laid in concrete, the pipe trench shall be excavated to a depth of 150mm below the invert level of the pipe and the width shall be equal to the breadth of concrete bedding for the pipes plus 150mm on either side.

Excavation for pipe trenches shall be of sufficient depth to give a minimum cover of 600mm over the top of the pipe. Where pipes/sewers cross under roads, minimum cover shall be 900mm, or such cover as may be directed by the Road Authority.

Where the pipeline is required to be laid at depth, which does not satisfy the minimum cover conditions set out above, the ground surfaces shall be brought up to the required level by banking the backfill or as directed by the Project Manager.

No pipes shall be laid and no excavation filled in or covered with concrete until the formation has been inspected and permission to proceed with the work obtained.

Where P.V.C. or Polythene pipes are being laid, the bottom of the trench must be completely free from stones, and a smooth bed of fine material must be provided. Where the bed of the trench for P.V.C. or Polythene pipes is excavated in rock, it must be excavated to a depth of not less than 100mm below the bottom of the pipe, and refilled with selected fine granular material to make a smooth bed for the pipe.

The width of the trench to be excavated will depend on the size and type of pipe being laid. Sufficient width must be excavated to allow the pipe to be correctly bedded and aligned, and to allow for the joints to be correctly made.

Any excavated material stored on site for backfilling or other purposes shall be deposited alongside the excavation at a minimum distance of 0.5m in such a manner that it will cause no damage and as little inconvenience as possible.

3.4.6 Timbering of Excavation

The contractor shall supply and fix outside the limits of the permanent works all the timber necessary for support of sides and bottoms of the excavations, for the security of adjacent structures and properties and for every other purpose for which it may be required, all to the satisfaction of the Project Manager. The contractor shall maintain such supports until in the opinion of the Project Manager, the works is sufficiently advanced to permit the withdrawal of the support. Such withdrawal shall be executed only under the personal supervision of a competent foreman.

The Project Manager may order excavations to be timbered or to be close timbered or may order timbering to be driven ahead of the excavation, or may order the adoption of any other method of supporting the sides and bottoms of the excavations as may appear to be necessary, and the contractor shall adopt and shall make no charge for executing the adopted method.

The contractor shall be responsible for any injury to the work and any consequential damage caused by or arising out of the insufficiency of the support he provides for his excavations or caused by or arising out of the removal of that support, and any advice permission, approval or instruction given by the Project Manager relative to that support or removal thereof shall not relieve the contractor of his responsibility.

Any instruction given by the Project Manager will be directed to the provision of stronger support than that proposed by the contractor, and will be given only when, in the opinion of the Project Manager, the support proposed by the contractor is insufficient.

Where timber has been used in excavations any such timber left in position shall be at the expense of the contractor except where the Project Manager has ordered the timber to be left in place or if any timber should be left in place with the prior approval of the Project Manager. The timber approved or ordered to be left in place will be paid for at the rates entered in the Bills of Quantities.

For the purpose of this clause, the words "timber" and "timbering" shall be construed to include trench sheeting and steel or concrete sheet, piling or any other means adopted by the contractor for supporting excavations.

3.4.7 Refilling Excavations

The refilling of excavations shall be commenced as soon as practicable after the permanent works have been tested where so required and inspected and approved by the Project Manager. In particular, the back filling of trenches shall be carried out expeditiously to reduce lengths of trenches open at any one time.

Backfilling shall be executed with selected materials in 150mm layers (300mm layers of a mechanical hammer are used) each layer being well rammed and watered to obtain the maximum compaction. Care shall be taken to ensure that no stone or other material, which could damage pipes or other work, is placed within 300mm of such work.

As soon as P.V.C. or Polythene pipes are laid and jointed in their final positions, they should be protected from possible damage by carefully backfilling of fine granular material brought up to about 150mm over the top of the pipe, for the full width of the trench, and well compacted.

Joints must be left open for inspection until the pressure test is completed.

Backfilling over steel pipes shall be generally as described above, except that the initial protective filling around the pipe is not necessary.

3.4.8 Reinstatement of Surfaces

Generally, all trenches and backfilled excavations shall be reinstated to equal surfaces as before excavation.

Trenches in any existing road shall be refilled to the level of natural soil below the road with sub-soil in 75mm layers, each layer being carefully tamped with rammers. The remaining top layer shall be filled to the road surface with materials equal in type, Quantity and compaction to materials used for the existing road.

The trench shall then be left to settle for 30 days. At the expiration of this period, the surface shall be made up to level and tamped or rolled to the approval of the Project Manager, who will decide on the particular surfacing employed in accordance with the existing surface of the road.

Before expiration of the maintenance period, the contractor shall make good any defaults in reinstatements.

3.4.9 Removal of Surplus Excavated Material

Excavated material, which is not needed either for backfilling trenches or other excavations or use in embankments or otherwise, shall be removed and

disposed of to tipping places obtained by the contractor. All rubbish and waste material shall similarly be removed by the contractor. All surplus excavated material shall be spread and levelled in the tipping places in accordance with such directions as the Project Manager may give, and the contractor's rates for disposal shall include for the costs of such operations.

The contractor shall take every practical precaution against causing any nuisance, damage, injury or inconvenience in the handling, stacking, carting or disposal of excavated materials or any other operation matter or thing in connection therewith.

No excavated material shall be placed in any position here it may be washed away or may be liable to fall or spread into any private property or across a road or footpath, should such occur, the contractor shall forthwith remove the same at his own costs.

Should the Project Manager direct the contractor to tip certain surplus excavated materials in a particular place (other than the tipping places obtained by the contractor) the contractor shall abide by such instruction and shall make no charge in consequence thereof unless the place specified entails a longer haul than what would be incurred by tipping at the place obtained by the contractor.

In the case of bulk excavations, the contractor shall unless otherwise directed by the Project Manager prior to the commencement of any excavation prepare grid plans of the various sites showing the existing ground levels at intervals of not more than 10m. For any particular part of excavation, the mean ground level shall be determined from the aforesaid grid plan and the depth shall be calculated from the above mean ground level

Rates for excavation shall also include for working in a manner that causes no interference with the stability of adjacent structures and properties; for the cost of all timber or other support left in place unless ordered or approved to be left in place by the Project Manager: for ground stabilization by means of de-watering, chemical processes or other approved method whether affected by floods, storms or otherwise; for the provision and sealing of temporary channels, drains and dumps; for temporarily storing excavated materials required for backfill or other purposes; for temporarily supporting, protecting, diverting, maintaining utility services; for maintaining flows in sewers and water found necessary for the proper execution and safety of the works.

3.5 Borrow Pits

No borrow pits will be allowed to be opened on the site unless permission in writing has been obtained from the Project Manager.

Before the excavation of an approved borrow area is commenced, the contractor shall clear the surface and strip the topsoil in accordance with clauses 3.

Borrow excavations shall be regular in width and shape and shall be properly graded and drained and finished with neatly trimmed slopes, and if so directed soiled and grassed.

3.6 Hardcore Filling

Hardcore fill shall consist of clean hard broken stone or rubble with measurements not below 200mm and not exceeding 500mm in any one direction with sufficient murrum added to fill the interstices. The hardcore shall be well packed, rammed and where possible rolled with a 5 ton roller. Where rolling is impossible, compaction shall be by hand or by mechanical tampers. Before any concrete is laid on hardcore, the hardcore shall be levelled and blinded with fine stone chipping, rolled and watered as necessary. Hardcore filling is measured after compaction.

3.7 Earth Filling

3.7.1 General

Earth not suitable to be used in filling may at any time is rejected by the Project Manager. If there is a deficit of soil, the contractor shall from approved borrow pits supply selected material in the ordered amount.

Before earth filling, the sand or gravel bedding of the pipes, according to the drawings shall be made. Soil filled to 500mm over the top of pipes shall be free from stones and be filled in by hand with the utmost care to avoid replacement of pipes.

3.7.2 Compaction of Fill

The 500mm fill over the pipe shall be compacted carefully by hand. In other areas, after removal of topsoil as specified, fill material shall be spread in even layers over the full width of the area to be filled. Each layer shall not exceed 300mm in thickness after compaction.

The water content of the earth fill material prior to and during compaction shall be distributed uniformly throughout each layer of the material. The allowable ranges of placement water content are based on design considerations. In general, the average placement water content will be required to be maintained at the Proctor Laboratory Standard Optimum Condition. This standard optimum water content is defined as, "That water content which will result in a maximum dry Units weight of the soil when subjected to the standard Proctor Compaction Test".

Proctor compaction tests are to be carried out in accordance with BS 1377 and the contractor shall provide the Project Manager with facilities to carry out such tests, or cover the cost of tests carried out elsewhere.

As far as practicable, the material shall be brought to the proper water content in the borrow pit before excavation. Supplementary water, if required, shall be added to the material by sprinkling on the earth fill and shall be mixed uniformly throughout the layer.

Compaction of fill shall be carried out to 95 per cent standard proctor if not otherwise indicated on the drawings.

In case of unsatisfactory compaction test results, the contractor shall recompact or remove the fill to the satisfaction of the Project Manager.

The number of tests to be made shall be agreed upon by the Project Manager and the contractor at commencement of the work.

The machinery the contractor intends to use for compaction (pneumatic, vibrating, static or other rollers) must be approved by the Project Manager before employment.

The contractor shall take care that each separate layer is formed with side slopes to ensure that water cannot gather on the surface, thus causing softening of the soil. Compaction shall start from the side of the embankment and continue towards the middle.

Earth fill shall be measured after compaction.

3.8 Grass Planting and Top Soil

Top soil shall be selected vegetable soil, well compacted and except where otherwise specified of 150mm thickness.

The contractor shall trim the faces of the side slopes to open channels and elsewhere where directed to the dimensions, inclinations and curves shown on the drawings, remove all excess material and make good all depressions with suitable material.

Where instructed by the Project Manager, the contractor shall plant Kikuyu or other approved grass at the rate of 16 plants per m² corresponding to 250mm c/c. The Project Manager shall satisfy himself that natural growth of grass will not take place within a reasonable time before instructing the contractor to grass specified areas.

The contractor shall be responsible for obtaining suitable grass plants and for making all necessary arrangements with the owners and/or occupiers of the land from which they are to be obtained. The contractor shall be responsible

for the preparation of the embankment for planting, and for maintaining adequate grass cover and necessary watering during the Contract and Maintenance Period.

3.9 Ant Proofing

Where an ant-proof course has been specified, it should be made by application of Rentokil Termite Soil Concentrate or equal diluted one part concentrate to forty parts water (by weight) at the rate of 5 litres solution to 1 square metre to the whole area of the building immediately before (36 hours maximum) the concrete is poured. Additionally to all critical areas, i.e. both sides of wall foundations, piers and porches the application should be 5 litres per running metre. Treatment should not be made when the soil is excessively wet. Precautions should be taken to prevent disturbance of the treated areas before they are covered.

4 CONCRETE WORKS

4.1 General

All materials and workmanship for concrete shall comply with BS 8110 and BS 8007 where applicable.

4.2 Materials and Tests

4.2.1 Cement

Cement shall be ordinary Portland cement complying with BS 12. The cement shall be delivered in properly sealed, unbroken bags.

Rapid hardening Portland cement complying with BS 12 may be used with the approval of the Project Manager.

Quantities in excess of one ton shall be stored in a water-proof shed with a raised floor. The cement shall be used in the order in which it has been received.

Quantities of less than one ton for early use may be stored on a raised floor and covered by a water-proof tarpaulin.

Any cement damaged by water or proving defective shall be removed from the site immediately.

4.2.2 Aggregates for Concrete

The aggregate shall comply in all respects with the requirements of BS 882.

The aggregate shall be free from dust, decomposed material, clay, earthy matter, and foreign substance or friable, then or laminated material. The fine aggregate shall be of approved river sand.

Coarse and fine aggregate shall be stored on the sites in separate heaps so that no possibility of any intermixing of the two shall occur. Any materials, which have been intermixed, shall be removed by the Contractor forthwith.

A sample of all aggregates shall be delivered to the site for the approval of the Project Manager, and it shall remain on the site until all concrete work is finished.

Should the Project Manager so require, the Contractor shall furnish a certificate from an approved testing laboratory in connection with each source of fine and coarse aggregates showing that materials comply with the specifications. All such testing shall be carried out at the Contractor's expense.

4.2.3 Water

All water to be used for concrete, mortar and curing shall be of good drinkable quality, free from humus acid, chemicals, salts or other matters that in any way whatsoever, may be harmful to the concrete, either by diminishing the strength or causing a discolouration of the concrete.

Generally, water from public mains shall be used, but if this is not possible, the Contractor shall obtain water from other sources approved by the Project Manager. The Contractor may be requested to provide test analysis according to BS 3148 from an approved laboratory.

4.2.4 Admixture

Admixture of any kind of accelerating the setting of cement, plasticizers, water proffers, etc shall not be used except by written permission of the Project Manager. The Contractor must by request supply all details of any admixture.

4.2.5 Concrete Mixes

Concrete shall be "Designed mixes" for reinforced concrete and "Nominal Mixes for Mass Concrete" to BS 8110 and used as shown on the drawings and in the Bills of Quantities. The concrete mixes, maximum aggregate sizes, maximum water/cement ratio and minimum cement content shall be in accordance with the following table.

Concrete Grade	Maximum size of Coarse Aggregate	Minimum Cement Content	Maximum water/cement
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			Ratio
10	40mm	210 /kg/m ³	
15	40mm	250 kg/m ³	
20	20mm	320 kg/m ³	0.5
25	14mm	390 kg/m ³	0.5

4.2.6 Trial Mixes

The actual concrete shall be determined prior to starting of concrete works according to BS 8110

For each grade of concrete three separate batches shall be made using the actual aggregate.

The workability of each of the trial batches should be determined and two times three cubes made from each batch for test at 7 days and 28 days.

The average strength of the nine cubes shall exceed the following values:-

Concrete Minimum average Strength of 9 te grade At 7 days cubes at 28 days

20	21 N/mm ²	31.5 N/mm ²
25	24.5 N/mm ²	36.5 N/mm ²

For all the trial mixes the mix proportion shall be as specified under clause 6.3 of BS 8110.

4.2.7 Testing of Concrete

Testing of concrete shall comply with BS 8110.

All test cubes shall be manufactured, cured and tested as detailed in BS 1881.

The Contractor shall provide at his own expense all the necessary labour, equipment, moulds, etc, required for manufacture of the test cubes. All test cubes requested by the Project Manager shall be tested by Ministry of roads and Public Works, materials Branch and the Contractor shall allow in his rates for concrete for all costs in relation with test cubes.

Should the Contractor require independent tests, he shall make them at his own expenses, and the results of such tests shall not be valid unless test cubes are manufactured in the presence of the Project Manager and tested by an approved agency and to the requirement in all details of the BS mentioned above.

Sufficient moulds and equipment shall be provided to enable a minimum of six test cubes to be prepared on each day when concrete is being mixed or such other number as the Project Manager may direct. The Contractor shall be responsible for delivery of the cubes to the Ministry of Roads and Public Works, materials Branch, or other approved testing laboratory.

The precise location of the concrete which the test cubes represent is poured, and the time of placing it, shall be noted on the drawings or elsewhere.

Where the concrete in the work is compacted by mechanical vibration, the test cubes shall be compacted by mechanical vibration, and where the concrete in the work is compacted by hand, the test cubes shall also be compacted by hand as specified in BS 1881.

The Project Manager may in the Laboratory make test cubes for any purpose from site materials, and the Contractor shall supply such materials required free of charge.

The test cubes shall be stored at the site of construction at a place free from vibration under damp sacks for 24 hours after which time they shall be removed from their moulds, marked and buried in damp sand or under water until the time for delivery to the testing laboratory.

The cubes shall then be placed in damp sand or other suitable damp material and sent to the testing laboratory, where they shall be similarly stored until the date of test. Test cubes shall be kept on the site for as long as practicable but for at least three-fourths of the period before testing, except for tests at ages less than seven days.

4.2.8 Standards for Acceptance of Cubes Tests

The result of all cube tests shall be accepted by the Contractor and Project Manager as true results of the crushing strength of the cubes. The cube strength shall be calculated from the maximum load sustained by the cube at failure.

The appropriate strengths required may be considered to be satisfied if the requirements in BS 5328: Part 4, clause 3.16, is fulfilled.

If the tests fail to give the required strengths, further testing of the concrete shall be carried out. If these tests fail to prove the strength of the concrete used, the

Contractor shall at his own expense remove and replace all such concrete as directed by the Project Manager.

4.2.9 Slump Tests

Concrete consistency shall be determined by a slump test carried out in accordance with BS 1881 and at the Contractor's expense.

Unless otherwise specified by the Project Manager, the following are the slump for the particular class of work.

Compaction by vibrator or Compaction by hand	Reinforced Concrete
30 to 60 mm	
Mass Concrete	0 to 30 mm, 30 to 80 mm

Concrete having a slump test value exceeding the values here-in specified may be rejected by the Project Manager.

4.2.10 Steel Reinforcement

Steel for reinforced concrete shall be stored under cover clear of the ground and shall comply with BS 4449, BS 4461 and BS 4483.

All steel reinforcement shall be supplied by an approved manufacturer, and the Contractor may be required to obtain a manufacturer's test certificate in respect of steel reinforcement supplied. In the absence of such a test certificate, the Contractor may be required to submit samples to be tested at the Contractors expense in such a manner as the Project Manager may determine.

4.3 Pre-cast Concrete Units

Precast concrete shall be cast in properly made strong moulds true to the shapes required. For work described "Finished Fair" the moulds shall be lined with hardboard, sheet metal or other approved material.

The concrete shall be thoroughly tamped in the moulds and shall not be removed from them until 7 days after placing the concrete, but the sides may be removed after 3 days, provided the moulds are such that the sides are easily removable without damaging the concrete.

The pre-cast work shall be cast under sheds and shall remain under same for 7 days in the moulds and a further 7 after removal from the moulds. During the whole of the period, the concrete shall be shielded by sacking or other approved material kept wet. It shall then be removed from the sheds and stacked in the open for at least 7 days to season.

All pre-cast work shall be cast in lengths convenient for handling unless otherwise described.

4.4 Workmanship

4.4.1 Inspection of Reinforcement and Formwork

No concreting shall commence until the reinforcement and formwork have been inspected and approved by the Project Manager. Reinforcement in walls and columns shall be inspected and approved before being enclosed in the formwork. Before concreting any part of the work, the Contractor shall give at least 24 hours notice in writing to the Project Manager and obtain his approval.

The concrete shall be placed in layers as directed by the Project Manager over the whole area to be concreted and the second layer shall not be commenced until the first is completed. Sloping beds will not be allowed when placing concrete. Should any accidental segregation occur, the affected area shall be thoroughly turned over by hand until homogeneous mix has been obtained.

4.4.2 Mixing Concrete

Concrete for grade 20 and grade 25 shall be mixed by weight batching only, unless approval has been obtained from the Project Manager for the concrete materials to be mixed by volume. Concrete for grade 10 and 15 can be mixed by volume.

The weight of coarse and fine aggregate in each batch shall be so computed that each batch contains one or more full 50 Kg bags of cement.

All concrete is to be mechanically mixed in a batch mixer of an approved type. The dry materials for concrete shall be mixed in the mixer until a uniform colour is obtained after which the gauged Quantity of water shall be gradually added. After all the water has been added, the mixer shall continue to mix for a period of not less than two minutes.

The mixers shall be equipped with an adjustable device capable of supplying a predetermined amount of water.

On the completion of each mixed batch of concrete, the mixer drum shall be completely emptied before a fresh batch is placed therein. On the cessation of work, the mixer and all handling plant shall be washed out and shall always be left clean and free from hardened concrete.

Any mix considered to be unsatisfactory by the Project Manager for any reason, will be discharged to waste at the Contractor's expense, as and where directed by the Project Manager, well clear of all mixed and placing operations

in such a manner as to avoid the risk of defective concrete being incorporated in the works.

The mixer shall be maintained in a first class condition throughout the contract and any mixer or plant, which is faulty in any respect, shall not be used. The drums of all mixers shall revolve at the speed recommended by the makers. A mixer which has been out of use for more than 20 minutes shall be thoroughly cleaned out before any fresh concrete is mixed.

The Contractor shall always have one spare mixer ready on the site to avoid interruption in the mixing and casting of concrete.

4.4.3 Transport and Placing of Concrete

Concrete shall be transported in a manner which shall avoid a segregation of the constituent material, and placing in the forms shall be completed before the concrete has taken its initial set. In no case shall concrete be placed in the works more than 30 minutes after mixing. Concrete shall not be dropped through a height greater than 1.2m. Chutes may be used if they are constantly kept free from coatings or hardened concrete or other obstructions. Pumping of concrete through delivery pipes may be used, but only with the prior approval of the Project Manager.

Concrete of any Units or section of the work shall be carried out in one continuous operation, and no interruption of the concreting will be allowed without the approval of the Project Manager.

The concrete shall be placed in layers as directed by the Project Manager over the whole area to be concreted and the second layer shall not be commenced until the first is completed. Sloping beds will not be allowed when placing concrete. Should any accidental segregation occur, the affected area shall be thoroughly turned over by hand until a homogeneous mix has been obtained.

When concreting walls and columns, the mix proportions of the first 250mm depth of concrete placed in contact with the horizontal joint should be adjusted by reducing the amount of coarse aggregate.

4.4.4 Compaction

After the concrete has been placed in a position it shall be compacted by vibration with a rigid poker type with internal vibrator approved by the Project Manager. The Concrete shall be worked well up against the form, joints and around the reinforcement and be free from voids and other imperfections. Under no circumstances shall the concrete be shifted or transported inside the form with vibrator.

The Contractor shall always have one spare vibrator ready on the site to avoid interruption in the mixing, casting and vibrating of concrete.

In the case of reinforced concrete, a competent steel fixer shall be in constant attendance during the placing of concrete to adjust and correct the position of the reinforcement, if so required, immediately before the concrete is placed. In no case shall the vibrators be attached to or be allowed to come into contact with the reinforcement.

Each freshly placed layer of concrete must be thoroughly compacted and worked into the preceding one but care shall be taken that no damage is done to previous work that has already set. Excessive compaction of concrete shall be avoided.

The upper surface of slabs shall be compacted by approved external vibrator.

4.4.5 Placing of Concrete under Water

Concrete shall only be placed under water with the prior approval of the Project Manager who shall likewise approve the methods to be used and the precautions necessary to prevent loss of material. In no circumstances shall concrete be dropped or placed in water in a loose condition or be placed in flowing water. In all cases the cement content shall be increased by 25% for each class of concrete at the Contractors' Expense.

4.4.6 Placing of Concrete on Earth Surface

Earth surfaces on which concrete is to be placed shall be clean, firm and free from standing or flowing water. After the excavation has been completed to the approved lines, levels and dimensions it shall be kept as damp as practicable to reduce absorption of water from the concrete to a minimum. No concrete shall be placed until the prepared earth surface has been approved by the Project Manager.

4.4.7 Construction and Expansion Joints

The position and arrangement of construction and expansion joints shall be as shown on the drawings. Where additional joints are requested, the positions must be approved by the Project Manager.

All construction joints shall be rebated to form a key with subsequent work. Concreting of any Units or section of the work shall be carried out in one continuous operation up to construction joints and no interruption of the concreting will be allowed without approval.

Where shown on the drawings, construction and expansion joints shall be provided with water bars of P.V.C or other approved material. The widths and shapes of the water bars shall be as specified on the drawings and all joints shall be used. The trade mark of the water bars shall be approved by the Project Manager before commencement of work, and fixing and jointing of water bars shall be approved by the Project Manager before commencement of work, and fixing and jointing of water bars shall be approved by the Project Manager before casting.

The fusing of water bars shall be performed in a way so as to secure that the two bars are joined over the entire width. The fused joint shall be able to withstand tension and shall be intact after 10 consecutive bending. The Project Manager may request that the fusing is carried out by specialists.

Where shown on the drawings, joints shall be provided with a joint sealing compound. The sealing compound shall be a two component polysulphide rubber sealing compound complying with BS 4254, and the trade mark shall be approved by the Project Manager. The compound shall be placed in a chase made by a fillet strip in the formwork. The concrete shall be dry and a suitable primer shall be applied to the joint before applying the sealant. The procedure for the workmanship shall be approved by the Project Manager before commencement of work, but the Contractor shall have the full responsibility for the water tightness of the joints.

It should be noted that the lower part of the concrete walls shall be cast together with the floor slab and no joint directly on the slab will be permitted.

Before depositing fresh concrete against which the already set, the face of the latter shall be roughened to expose the coarse aggregate, all cement latency removed whilst the concrete is still green and the surface thoroughly wetted with water and cleared of foreign matter. Cement mortar grout mixed in the proportion of one part of cement to two parts of sand shall be spread to a thickness of 5mm over the face of the set concrete before fresh concrete is deposited.

4.4.8 Curing and protection of Concrete

Curing shall be as soon as the surface of the concrete has hardened sufficiently. All exposed concrete surfaces shall be cured for a period of seven days by covering them with a layer of sand, hessian canvas or other approved material kept damp. Concrete shall be protected from sun, wind, heavy rains and flowing water for at least three days after placing.

4.4.9 Finishes of Horizontal Surfaces

Concrete surfaces for floor shall be true to level and falls as shown on the drawings. Water coming to the surface when vibrating shall be removed. After casting the surface shall be smoothed with a wooden flat. After some hours, when the surface has dried up, the surface shall be trowelled smooth with a steel trowel.

All other horizontal surfaces shall have the same surface finish except for the final trowelling with steel trowel.

4.4.10 Finishes of Vertical Surfaces

The shuttering for exposed concrete faces shall be so constructed that the latter shall be true to line and surface. The concrete shall be consolidated as specified against the shuttering to keep the face of the work free from honeycombing and other blemishes.

After removal of the shuttering, no concrete surfaces shall be treated in any way until they have been inspected by the Project Manager.

If upon removal of the shuttering, the line of surface of the work is, in the opinion of the Project Manager, unsightly and not in accordance with the requirements of the contract, the Contractor shall at his own expense cut out and make good such portions of the work as the Project Manager directs.

Rendering over defective surfaces shall not be permitted. Areas of honeycombing shall with the approval of the Project Manager be made good immediately upon removal of the shuttering, and isolated superficial air and water holes shall be filled. Care shall be taken not to leave mortar or cement on parts of the surface which have been cast smooth and without pores.

Unless otherwise instructed, the face of exposed concrete placed against shuttering shall after removal of the shuttering be rubbed down with a carborundum stone or in other approved manner to remove fins and other irregularities, and washed perfectly clean.

Concealed concrete faces shall be left as from the shuttering, except that surfaces with honeycombing shall be made good.

4.4.11 Accuracy of Finish

The arrangement of all formwork shall be made in such a way that all dimensions shall comply as exactly as possible with those given on the drawings. The following tolerance shall be respected.

Foundations	50 mm
Position of columns and Walls	5 mm
Thickness of walls	5 mm
Lateral dimensions of columns	5 mm
Level of slabs, beams	5 mm
Slab thickness	5 mm
Lateral dimensions of beams	5 mm
Plumb of columns and walls	3 mm in each storey (non/accumulative)
Window and door opening sizes	5 mm

Surfaces and edges must not show any noticeable warping. On a length of less than 10m the deviation may be 10mm at the most.

The Contractor shall be responsible for the cost of all corrective measures required by the Project Manager to rectify work which is not constructed within the tolerance set out above.

4.4.12 Construction of Formwork

All formwork shall be substantially and rigidly constructed of timber or steel or pre-cast concrete or other approved materials and shall be true to the shape, line, level and dimensions shown on the drawings.

Timber shall be well seasoned, free from loose knots and or fork worm of exposed concrete faces be planned to thickness. Faces in contact with concrete shall be free from adhering grout, projecting nails, splits, or other defects that will mark the concrete surface. Formwork for foundations and other concealed work may be undresses or rough timber.

All joints shall be sufficiently tight to prevent leakage of cement grout and to avoid the formation of fins or other blemishes, and all faulty joints shall be caulked.

All formwork shall be thoroughly cleaned and coated with an approved type of oil before it is fixed in position. Immediately before concreting the formwork shall be watered thoroughly and washed out to remove sawdust, shavings, or other rubbish. Where the appearance of the concrete face is important, the position and direction of the joints shall be as directed.

Filet strips shall be fixed in the formwork to form a chamber 20mm by 20mm on all external corners of the concrete.

Openings for inspection of the inside of the formwork for walls, beams and similar work and for the escape of wash water shall be formed in such a way that they can be conveniently closed before starting to place the concrete.

Connections between formwork elements shall be constructed to allow for easy removal of the formwork, and shall be either nailed, screwed, bolted, clamped, braced or otherwise fixed securing a sufficient strength to retain the correct shape and line during compaction of the concrete.

Bracing members placed in the formwork to keep two sides of formwork in exact position shall be approved by the Project Manager. Holes in the concrete after bracing arrangement shall be made good by plugging with approved material.

Top formwork shall be provided to concrete faces where the slope exceeds 1 vertical to $2^{1/2}$ horizontal. Such formwork shall be counterweighted or otherwise anchored floating.

The formwork shall be so designed that the formwork for soffits of slabs and for sides of beams, columns and walls may be removed first leaving the formwork for the soffits of beams and their supports in position. Wedging or other suitable ways of adjustment shall be provided to allow accurate adjustments of the formwork and to allow a gradual removal of the same without jarring the concrete.

On demand the Contractor shall provide such drawings and calculations as necessary for determination of the structural strength of the formwork. The Project Manager's approval of such drawings and calculations will not relieve the Contractor of his responsibilities under the contract.

Formwork shall be erected true to line and braced and shuttered to prevent deformation under the weight and pressure of the wet concrete, construction loads, wind pressure or other forces. Forming for beam soffits shall be erected with an upward camber as shown on the drawings or as directed by the Project Manager or of 2mm for each 1m of horizontal span.

Re-propping of beams will not be approved except when props are re-instated to relieve the beams of loads in excess of the design load. Vertical; props shall be supported on folding wedges on sole-plates, or other measures shall be taken whereby the props can be gently lowered vertically when commencing to remove the formwork.

If, in the opinion of the Project Manager, the formwork is faulty, inadequate or does not comply with the specifications, then the Contractor shall at his own cost modify the formwork until it meets the approval of the Project Manager.

4.4.13 Mould Oil

All faces of formwork that will come in contact with wet concrete shall be treated with approved mould oil or other coating to prevent adherence to the concrete. Such coatings shall be insoluble in water, non-staining, nor injurious to the concrete, shall not become flaky and shall not be removable by rain or wash-water. Liquids that retard the setting of cement shall only be applied to the shuttering when approved. Mould oils and similar coatings shall be kept free from contact with the reinforcement.

4.4.14 Holes for Pipes, Cast-in Items etc., General

The Contractor shall be responsible for the co-ordination with the subcontractors for the setting out and fixing of all pipes and holes, pockets and chases for pipes. Sleeves provided by the sub-contractors are to be accurately set out and cast in and cutting away in completed concrete work is to be minimized.

Details of all holes etc. required in a structural work for services must be submitted to the Project Manager who will assess the necessity for extra trimming reinforcement.

No opening, holes, chases, etc, are to be formed in the concrete without the approval of the Project Manager and details of fixtures or fixings to be cast in must be approved.

4.4.15 Pipes through Water Retaining Walls

Pipes passing through water retaining walls and floors shall, wherever possible, be built into the structure in-situ. Shuttering shall be formed closely to the outside of the pipe, and concrete shall be placed and compacted thoroughly round the pipe.

Pipes, bolts and other steel items cast into the concrete in water retaining structures must not in any way be in contact with the steel reinforcement.

When not possible to build in place, pipes shall pass through preformed holes. Holes shall be formed with formwork which shall be stripped cleanly and without shock to the concrete. As soon as the shuttering is tripped, the hole shall be thoroughly wire brushed to expose the aggregate. The hole shall be as neat as possible to allow the pipe to be passed through the wall, while the corners shall be chamfered or rounded.

The pipe shall be set and the hole filled up as soon as possible. Immediately before filling, the hole shall be continuously soaked so as to saturate the concrete, and the surface coated with a stiff mix of 1:1 sand grout. Shutters shall be fixed true to the faces of the wall, and stiff mix of concrete packed in until the hold is completely filled, particular care to be taken to ensure that the spaces beneath the invert of the pipes and beneath the slopping soffit of the whole are completely filled. Shuttering shall be stripped as soon as possible and filling rubbed smooth. The filling and the surrounding concrete shall be kept wet for 7 days after filling.

4.4.16 Removal of Formwork

Formwork shall be left in position until the concrete has attained sufficient strength to be self-supporting. The Contractor shall be responsible for the safe removal of the formwork without shock or vibration - which would damage the concrete.

Any work showing sign of damage through premature removal of formwork or through premature loading shall be entirely reconstructed at the contractor's expense. The Project Manager may delay the time of removal of formwork if necessary. Subject to the above, the minimum period for removal of formwork shall generally be as follows:-

Slabs	Soffits (props left under)	7 days
	Props	21 days
Beams	Sides	3 days
	Soffits	21 days
Walls and Columns	(unloaded)	3 days

When formwork is removed after 3 days, it will be necessary to ensure that the exposed surfaces of the concrete are kept thoroughly wet for the period of curing.

4.4.17 Reinforcement

All bending, cutting and fixing of reinforcement bars are to comply with BS 8110 and BS 4466. Normally bending schedules are incorporated into the Contract Drawings, but the Contractor shall satisfy himself about their accuracy and about their complete coverage of the work involved. Any omission, inaccuracy

or other errors observed by the Contractor shall be reported to the Project Manager before commencement of the work.

In case of errors in bending schedules, no extra payment will be approved, provided the reinforcement is shown correctly on the contract drawings.

Bars shall be of the shown lengths, and lapping, except where indicated on the drawings, is not permitted unless approved by the Project Manager.

Spacing between bars shall not differ more than 5mm from the required spacing. Any inaccuracy in the total length of a bar as cut shall be compensated for in the end hooks or other approved parts of the bar.

The internal radius of a bend shall neither be less than allowed by BS 4466 nor less than the radius given in the Bending Schedule. The steel reinforcement shall be assembled and fixed in the form of a rigid case. To prevent displacement before or during concreting the bars shall be secured one to the other with approved binding wire at each intersection. In slabs and walls binding at every second intersection is sufficient.

Concrete cover blocks (mix 1:3) shall unless otherwise directed be used between the reinforcement, the bottoms and sides of the forms to ensure the specified concrete cover to the bars. Variations of cover shall be kept within plus/minus 3mm from the specified cover.

The minimum clear horizontal distance between adjacent bars shall be of 25mm or the diameter of the bar whichever is the biggest, and 25mm vertically. Space bars shall be inserted at such intervals that the bars do not perceptibly sag. Projecting bars shall be adequately protected against displacement both during and after concreting.

At the time of fixing and when concrete is being placed, all reinforcement shall be free from oil, painting, grease, dust and scale or any other coating which would destroy and bond with the concrete. The Contractor must obtain the Project Manager's approval of the reinforcement when places, before any concreting is commenced.

5.0 MASONRY WORKS

5.1 Concrete Block walling

5.1.1 Precast Concrete Blocks

Concrete Blocks shall comply with BS 6073. The blocks shall be solid or hollow as specified on the drawings, with a minimum comprehensive strength of 3.5 N/mm², tested as described in BS 6073.

All blocks must be left with goods sharp edges. The standard face size of blocks for use in the works shall be 440mm x 190mmx190mm and this size of blocks shall be used whenever practicable.

The Contractor shall be responsible for making test blocks and experimenting with available materials to ascertain what mix will be necessary to attain the required strength. If suitable materials are not available locally, the Contractor shall obtain them from other approved sources.

Manufacture shall be carried out under shelter and after casting, the blocks shall be struck under shelter to protect them from sun and weather, and properly cured by covering with sand or sacks and sprayed daily for not less than 14 days.

5.1.2 Wall reinforcement

Reinforcement in walls made of solid blocks shall where so specified consist of a 25mm wide strip of "Exempt" or similar block reinforcement centrally in joints at a approximately 450mm centre (vertically) for the fullness of the walls, lapped and crumped 300mm at running joints and full width of walls at angles and intersections.

5.1.3 Sand

The sand for mortar shall be fine sand.

5.1.4 Mortar

The cement mortar shall consist of 1 part of Portland cement to 4 parts of sand by volume or as specified on the drawing.

5.1.5 Damp-Proof Coarse

All Damp-proof coarse shall be of bituminous felt to BS 743 weighing not less than 3 Kg/m² free from tears and holes, lapped 150mm at running joint and for full

width of wall at angles and intersection and banded and including at 12mm levelled screed of cement mortar.

5.1.6 Workmanship

Blocks shall be laid in regular even courses and shall be bedded in cement mortar consisting of 1 part of cement to 3 parts of sand or as indicated on the drawing.

All bends and vertical joints shall be filled completely with mortar when the blocks are laid.

All exposed faces of wall for plastering are to be left rough and the joints raked out while mortar is green to form adequate key.

All other faces shall be cleaned down on completion with wire brush or as necessary and mortar dropping, smear marks, etc removed.

Where block work faces are to be left exposed, blocks shall be chosen for their uniformity, and unmarked faces and unbroken arises and shall be finished with a fair face and pointed with a neat joint recessed from the face of the blocks.

5.1.7 Block work Tanks

The concrete blocks shall be solid, type A with a minimum comprehensive strength of 7N/mm², tested as described in BS 2028 for circular block work tanks, the blocks shall be manufactured as the required shape to fit the curvature of the tank, and all block shall be immersed in water for 24 hrs before being laid.

Internal plaster shall be of mix 1:2, made water proof by use of approved additive.

5.2 Plaster Work

5.2.1 Lime

The lime for plastering shall comply with BS 890 clause "A" for non-hydraulic lime and shall be as obtainable and too approved.

5.2.2 Composition of Plaster

A mix referred as 1:4 or other mixes as specified on the drawing shall be used.

5.2.3 Surfaces

All surfaces to be paved or plastered must be brushed clean and well wetted before each coat is applied. All cement paving and plaster shall be kept continuously

damp in the interval between application of coats and for seven days after the application of the final coat.

5.2.4 Partially or wholly set materials

Partially or wholly set materials will not be allowed to be used or remixed. The plaster mixes etc. must be used within one hour of being combined with water.

5.2.5 Samples

The contractor shall prepare sample areas of the screed, paving and plastering as directed until the quality, texture and finish required is obtained and approved by the Project Manager, after which all work executed, shall conform with the respective approved samples.

5.2.6 Finish Generally

All screed and paving shall be finished smooth, even and truly level unless otherwise specified.

Rendering and plastering shall be finished plumb, square, smooth and even.

All surfaces to be plastered shall be thoroughly wetted before any plastering is commenced.

No plastering will be allowed to take place until all chases for services have been cut; services installed and chased made good.

On no account may finished plaster surface be chased and made good.

All work shall be to the approval of the Project Manager and any work not complying with the above shall be hacked away and replaced at the Contractor's expense.

5.2.7 Arises and Angles

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

5.2.8 Making Good

All making good shall be cut out to a rectangular shape, the edges undercut to form dovetail key and finished flush with the face of surrounding paving or plaster.

All cracks, blisters and other defects shall be cut out and made good and the whole of the works shall be perfect on completion.

5.2.9 Cement Paving, Screed etc.

Cement screed shall consist of cement and sand mix 1:2 laid in panels and finished with a steel trowel if not otherwise specified.

Where specified as waterproof "pudlo" or similar waterproofing compound shall be added to the cement paving or screed strictly in accordance with the manufacturer's instructions.

Where practicable, screed is to be laid while the concrete is still green. When this is not practicable, the concrete is to be well washed and brushed perfectly clean with a steel wire brush, to remove laitance and to give a roughened face as a key and then kept wet for at least seven days before the screed is laid. On the day of laying the surface is to be only damp with all surplus water removed and has to be painted with cement and sand mix 1:1 grout immediately before commencing laying of the screed. The grout is to be applied continuously in front of the screed, and not in large areas that will dry out before the screed is applied.

Screed shall be protected during the first stage of hardening from harmful effects of sunshine, drying winds, rain or water. In exposed positions, the screed shall be covered with a well wetted layer of sawdust, hessian or other approved material, and this layer shall be damp for at least seven days, during which period no traffic is to be allowed over the screed.

5.2.10 Cement Rending

Cement rending shall consist of cement and sand mix 1:4 to not less than 15mm finished thickness and be furnished to a true and even surface.

5.3 Carpentry and Joinery

5.3.1 Timber Materials

All timber shall be in accordance with the latest approved grading rules issued by the Government of Kenya or other competent authority (legal notice No. 358).

The quality shall be as first (or prime) grade. All timber works to be carried out in accordance with BS 1186 and CP 112.

Any of the following timber may be used:

Standard Common Name & Botanical Name

Podocarpus	Podocarpus Spp
Cedar	Juniperus Procera
African Mahogany (Munyama)	Khaya anthotheca
Mininga	Pterocarpus Angloensis
Mvule	Chrophora Excelsa

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

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

5.3.2 Boards and Sheets

Fibreboard

Shall be 12mm "Celotex" or other approved fibreboard complying with BS 1142, Part 3

Plywood

Shall be laminated board faced on in both sides with 4mm plywood. Exposed edges shall be lipped with 20mm hardwood and rates shall include for leaping.

Plastic Sheeting

Shall be 45mm thick, and shall be obtained from an approved manufacturer. The doors shall comply with BS 459, Part 2. External doors shall be framed, ledged and braced as shown on the drawings, and they shall comply with BS 459, Part 4.

5.3.3 Workmanship

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

No nails, screws or bolts are to be fixed in any split end. If splitting is likely, or is encountered in the course of the work, holes for nails must be bent at right angles to the grain.

All exposed surfaces of joinery work shall be wrought and all arises "eased off" by planning and sand papering to an approved finish suitable to the specified treatment.

Where intended to be in contact with stone, concrete blocks, cement or plaster, the backs and other faces of all doors, windows and other frames and linings, posts, architectural skirting, fillets and fascias shall be treated with two coats of wood preservative before fixing.

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

Any fixed joinery which in the opinion of the Project Manager 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.

5.3.4 Inspection and Testing

The Project Manager shall be given facilities for inspection of all works in progress whether in work-shop or on site. Such tests will be carried out by the Forestry Department.

5.3.5 Clearing Up

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

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

5.4 Roofing

5.4.1 Asbestos Roof Sheeting

The floor sheeting and fittings shall be "Super-Seven" corrugated asbestos cement roofing, manufactured by the Kenya Asbestos Cement Company Limited laid and fixed in strict accordance with the manufacturer's instructions.

Fixing to be of approved type and quality.

5.4.2 Protection

All roof surfaces shall be kept clean and protected and handed over watertight at completion.

5.5 Steelwork

5.5.1 Materials

All materials shall be the best of their respective kinds and free from defects. The materials in all stages of transportation handling and stacking shall be kept clean and injury from breaking, bending and distortion prevented.

All steel and steel sections shall comply with BS 4, BS 4360 and BS 4848.

All steel shall be of approved manufacture and the contractor shall on request deliver to the Project Manager a manufacturer's test certificate for all steel used.

All structural steel shall be of grade 43A according to BS 4360.

Steel for handrails, screens etc. can be of lower grade, but all steel shall be weldable and the grade shall be approved by the Project Manager.

Electrodes shall be of a class appropriate to the steel. Bolts and nuts shall be according to BS 4190.

5.5.2 Workmanship

Workmanship for all steelwork shall generally follow the requirements in BS 449 and BS 5135.

The contractor shall prepare all the necessary work-shop drawings, which shall be approved by the Project Manager. The Project Manager's approval shall not in any way relieve the contractor of his responsibility for the workshop drawings being in accordance with the contract drawings and specifications.

All welding of structural steel shall be carried out in the contractor's workshop and the whole structure or parts thereof shall be test assembled in the work-shop before delivery to the site.

Should any doubt arise as to the quality of the steel or the welds, the Project Manager may require testing carried out. If the results show insufficient quality of materials or workmanship, the contractor shall cover all expenses related to the tests and shall replace and rectify all materials and welds found unsatisfactory.

5.5.3 Ladders

Ladders and tanks etc shall be galvanized steel pipes in accordance with BS 1387 "Medium clause" and shall be made to the dimensions on the drawing.

5.6 Ironmongery and other Fittings

All ironmongery shall be approved by the Project Manager. The approved samples shall be regarded as the standard for work.

5.6.1 Locks

All locks and ironmongery shall be with screws, etc. to match. Before the door etc. is painted, handles shall be removed, carefully stored and prefixed after completion of painting. Locks shall be oiled and left in perfect working order.

25mm diameter rubber door stops shall be provided at all doors and securely plugged and screwed to floors or walls.

All external doors shall be provided with locks of cylinder type. All internal doors to be provided with approved latch locks and handles. All locks shall have two keys with attached labels with door references before being handed over to the Project Manager.

5.6.2 Sanitary Fittings

All sanitary fittings shall be of approved manufacture and installed in accordance with the manufacturer's recommendation.

5.7 Glazing

5.7.1 Glass

All glass shall comply with BS 952 and be free from flaws, bubbles, specks and other imperfections.

Glass panes shall be cut to sizes to fit the opening with not more than 2mm play all round and where puttied shall be clipped to the frames.

Clear sheet glass shall be of ordinary glazing quality

5.7.2 Cleaning etc

On completion, remove all broken, scratched or cracked panes and replace with new to the satisfaction of the Project Manager. Clean inside and out with approved liquid cleaner. On no account shall windows be cleaned by scrapping with glass.

5.8 Painting, Decorating and other surface Treatment

5.8.1 Approved Specialist

An approved specialist must execute all work under this trade unless the Project Manager agrees otherwise. The paint shall be of approved manufacture.

5.8.2 General

The contractor shall so arrange his programme of work that all other trades are completed and the workmen are away from the area to be painted, when painting begins. Before painting, the contractor must remove all concrete and mortar dropping and the like from all work to be decorated and remove all stains as to obtain uniform colour to work to be oiled and polished.

All plaster, metal, wood and other surfaces which are to receive finishes of paint, stain, and distemper or paint work of any description are to be carefully inspected by the contractor before he allows any of his painters to commence work.

5.8.3 Painting Generally

All materials to be applied externally shall be of exterior quality and/or recommended by the manufacturers for external use, all in accordance with BS 4800 or similar.

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

Unless specially instructed or approved by the Project Manager, no paints are to be thinned or otherwise adulterated, but are to be used as supplied by the manufacturers and direct from the tins.

The priming, undercoats and finishing coats shall each be of differing tints and the priming and undercoats shall be the correct brands and tints to suit the respective finishing coats in accordance with the manufacturer's instruction.

No painting is to be done in wet weather or on surfaces which are not thoroughly dry.

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

5.8.4 Preparation and priming of plaster etc. surfaces

Surfaces shall be perfectly smooth, free from defects and ready for decoration. All such surfaces shall be allowed to dry for a minimum period of six weeks, stopped with approved plaster compound stopping and rubbed down flush, as

necessary, and then be thoroughly brushed down and left free from all efflorescence, dirt and dust immediately prior to decorating.

Plaster surfaces, which are to be finished with emulsion, oil or enamel paint, shall be primed with an alkali resisting primer complying with the particular paint manufacturer's specification and applied in accordance with their instructions.

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

5.8.5 Preparation and Priming of Metalwork

All surfaces shall be thoroughly brushed down with wire brushes and scraped where necessary to remove all scale, rust, etc. immediately prior to decorating. Where severe rust exists and if approved by the Project Manager, a proprietary de-rusting solution may be used in accordance with the manufacturer's instructions.

Shop primed and un-primed surfaces shall be given one coat of metal chromate primer or lead oxide primer.

Galvanized surfaces shall be treated before priming with an approved proprietary mordant or de-greasing solution. The surfaces shall be thoroughly washed down with water, allowed to dry and primed at last.

Coated surfaces already treated with bituminous solution, shall be scraped to remove soft parts and then receive two isolating coats of aluminium primer or other approved ant-tar primer.

5.8.6 Preparation and Priming Woodwork

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

5.8.7 Wood Preservative

All woodwork in contact with walling or plaster shall be treated after cutting and preparation but before assembly or fixing with one coat of approved wood preservative. The solution is to be brushed on all faces of all timbers, unless exposed to view and painted.

5.8.8 Cement Paint

Cement paint shall be super snowed or equal and approved. Two coats shall be applied after preparation as specified above.

5.8.9 Emulsion Paint

After preparation as specified above, a minimum of three coats shall be applied using a thinning medium or water only if and recommended by the manufacturer.

An approved plaster primer tinted to match may be substituted for the first coat.

5.8.10 Enamel Paint

Apply two undercoats and one finishing coat, after preparation and priming as specified above.

5.8.11 Lining of Chemical Tanks

The lining of chemical tanks with "EPOBOND" and "EPOFLOOR" shall be carried out by specialists approved for such work by the manufacturer or his agent

5.8.12 Cover Up

Cover all floors, fittings, etc. with dust sheets when executing all painting and decoration work.

5.8.13 Clean and Touch Up

Paint splashes, spots and stains shall be removed from floors, woodwork, etc., and any damaged surfaces touched up and the whole of the work left clean and perfect upon completion and during the maintenance period.

6.0 PIPEWORKS.

6.1 Materials, General.

Unless or otherwise stated all pipes and the pipe fittings shall be supplied by the Employer. But the couplings, gaskets, lubricants, seals, Coupling Machinery other materials etc., necessary for the proper construction of the pipe works as detailed in the Bills of Quantities and drawings shall be supplied by the Contractor.

The Contractor shall be responsible for ensuring that the pipes, couplings and other fittings laid or installed on each section of the work is of the standard and pressure classification specified as appropriate to the circumstances, and are manufactured of the specified materials.

The Project Manager reserves his right to refuse any materials that in his opinion is inferior.

The Project Manager has the right to test any material upon delivery, and materials found defective shall be replaced forthwith by the Contractor.

If the Contractor procures materials of different specifications in respect of flanges and threads etc. (Imperial units-metric units), he shall at his own cost provide all adaptors and other fittings necessary to make connections to the satisfaction of the Project Manager.

All materials shall be marked as specified in the relevant current British or ISO Standards for easy identification on site.

6.2 Handling and Storing Materials, General.

The method of transportation, handling and storing of pipes and fittings shall be in accordance with the manufacturer's recommendations.

Pipes, valves, specials and other materials shall be handled, moved, lifted or lowered with the least possible impact. Handling equipment shall be of approved type. In slinging pipes only flat slings shall be used and the use of chain slings, hooks or other devices working on scissors or grab principles shall not be permitted. Pipes shall be slung from two or more points as the Engineer may direct and the Slinging, lifting and lowering shall be in the hands of a competent and experienced man.

Subject to the requirements of inspection before acceptance, protective bolsters, caps or discs on the ends of flanges of pipes or specials shall not be removed until the pipes or specials are about to be lowered into the trench. Every precaution shall be taken to prevent damage to internal linings or external coatings.

Pipes in storage shall be supported clear of the ground on approved supports and adequately braced to prevent rolling. They shall not be stacked more than four tiers high without the approval of the Project Manager.

Materials of different classification shall be stored separately.

All pipes and associated material shall at all times be protected from sun and weather to the satisfaction of the Project Manager.

No valves shall be lifted by the spindle.

No valves, fittings or specials shall be stacked more than one tier high without the permission of the Project Manager, and they shall not be stored in a dirty place or condition and shall not be allowed to become embedded in earth, sand, stone, aggregate, water, fuel, or any other deleterious matter.

Valves and their ancillary equipment shall be protected before and after erection against collapse of earthworks, falls of materials, concrete and cement droppings, wood and other matter.

Shortly before the laying or fixing any valve, pipe or fitting the Contractor shall in the presence of the Project Manager or his representative carefully examine each valve, pipe and fitting to ascertain damage or defect occasioned to the valves, pipes and fittings during loading, unloading, handling, storage and transportation. All damage and all defects revealed by this examination shall be repaired and remedied by the Contractor.

6.3 Laying and Jointing, General

6.3.1 Pipes and Fittings.

All laying and jointing of pipes except jointing of PVC and polythene pipes shall be in conformity with CP 310 and CP 2010.

The bottom of the trench or surface of the bed shall be finished to a smooth even surface at the correct level to permit the barrel of the pipe to rest on the surface throughout its whole length between joint and sling holes. If considered necessary by the Project Manager, fine screened material shall be placed and consolidated in the trench bottom to provide such a bed.

In General, the preparation of the trench bottom and bed shall be completed for a length of one pipe in advance of the pipe-laying.

The bottom of the trench and pipe bed shall be inspected by the Project Manager, and only when passed as satisfactory shall pipe laying commence.

Each pipe shall be laid accurately to line, level and gradient so that, except where otherwise directed, the finished pipe line shall be in a straight line both in horizontal and vertical plans.

The levels and gradients shown on the Drawings shall be rigidly adhered to unless otherwise ordered by the Project Manager.

Where lines of pipes are to be constructed, the Contractor shall provide and fix, at such points as may be directed, properly painted and securely positioned sight rails, the levels and positions of which shall be examined and checked by the Project Manager before the rails are used and as often thereafter as may be necessary. There shall at no time be less than three sight rails in position on each length of pipeline under construction to any one gradient, and the sight rails shall be situated vertically above the line of pipes, or immediately adjacent there-to.

Pipes shall be lowered singly into the trench, brought to the correct alignment and inclination bedded throughout their length, and properly jointed strictly in accordance with the manufacturer's instructions.

Notwithstanding any flexibility provided in pipe joints, pipes must be securely positioned to prevent movement during and after the making of a joint. On screw and socket joints threads shall be coated with an approved tape to ensure water tightness.

Long radius curves in the pipeline shall be negotiated by deflections taken up in the joints or pipes of one or more lengths of pipes. The deflection at each of the various types of joint of pipes used in the Works shall not exceed the manufacturer's specifications.

The Contractor shall take care that all pipes and couplings are clean and free of foreign matter before subsequent sections are jointed.

The Contractor shall obtain from the manufacturer or other Approved supplier the necessary tackle required for the proper jointing of the pipes.

The Contractor shall make himself and his employees acquainted with and comply with the instructions issued by the manufacturers of the various types of proprietary joints and couplings for incorporation in the Works. The Contractor shall be responsible for obtaining copies of such instructions.

No person shall be employed on the jointing of pipes who is not thoroughly experienced and skilled in the particular work in hand.

Pipes shall not be cut without the permission of the Project Manager.

The cut shall be made with an approved mechanical pipe cutter and the edges of the cut shall be clean, true and square. Threading of steel pipes shall be done with an approved device.

The normal continuity of construction may have to be interrupted at points on the pipelines pending the delivery of certain valves or specials. The exact extent of the temporary gap to be left in such instances shall be predetermined, but shall not be fixed without reference to the Project Manager to whom the Contractor shall submit for approval a sketch with dimensions showing details of the pipe and jointing arrangement to be adopted to effect ultimate closure.

Special care shall be exercised to preserve the accurate alignment of the pipeline over the extent of the temporary gaps which may be necessary to leave.

Subject to the permission of the Project Manager, pipes shall be covered over with approved fill material upon successful completion of laying and joining. Joints shall be left exposed until completion of the pressure test.

Fill for surrounding and cushioning shall consist of uniformly readily compatible material free from tree roots, vegetable matter, building rubbish and excluding clay lumps retained on a 75 mm sieve and stone retained on a 25 mm sieve.

The materials for bedding shall, where ordered consist of suitable selected materials obtained from the excavations or from approved borrow pits and transported to the location where they are required.

Adequate precautions shall be taken by way of back-filling or other means to anchor each pipe securely to prevent flotation of the pipeline in the event of the trench being flooded or during concreting.

Upon successful completion of the pressure test, the pipeline shall be backfilled as specified.

Supplying of pipes is measured on linear metres.

Storing, handling, laying and jointing of pipes is measured in linear metres. The rates shall include for levelling of the trench bottom, compacting the foundation, embedding the pipe together with the materials used for the bedding, testing, cleansing and sterilizing all to the satisfaction of the Project Manager.

6.3.2 Valves and Specials.

Unless otherwise directed, all valves, flow meters, fittings and specials shall be individually supported and their weight shall not be borne by the pipeline, joints or couplings etc.

All supports for valves and fittings shall be of concrete Grade 20 or as specified on the drawings.

Where air valves are to be placed, the Contractor shall ensure that the highest point in the main is determined by leveling instrument.

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 is no dirt or other deleterious materials into the cavities of the body. All air nozzles shall be probed to see that they are clear. No air valve shall be stored before erection in the open in sunlight, or upside down to expose the balls and air cavities.

Scour valves shall be installed at low points in the pipelines as shown on the Drawings. The Contractor shall be in agreement with the Project Manager on the exact position of scour valves in particular situations.

Scour valves shall, where possible, discharge into the direction of natural drainage and at such a distance from the Works as to preclude erosional effects.

Unless otherwise directed, the controlling valve for a scour shall be installed not more than 1.5 m from the main pipeline.

Ends of all scours shall be protected from intrusion of animals and other foreign matter by suitable screening securely fixed to the pipe end.

Valve penstocks and other fittings shall be securely fixed and where require extension spindles and headstocks shall be properly aligned and fixed in a vertical position unless otherwise directed. They shall be tested for ease of operation and water tightness and valve glands shall be repacked where necessary. Any damaged protective coating shall be made good and they shall be left clean in all respects.

Before each valve is put into service all gears, bearings and spindles shall be oiled with an approved oil as recommended by the valve manufacturer. Oil baths shall be topped up to the appropriate levels and all grease nipped charged with grease of approved manufacturer. No deleterious matter shall be allowed to come into contact with the working faces and oil sumps shall be maintained clean.

All valves, fittings, specials shall be fixed with proper sealing tape, gaskets, washers etc. as necessary to the satisfaction of the Project Manager.

The rates in the Bills of Quantities shall cover for the supply storing handling, installation and joining, together with all bolts, washers, gaskets and lubricants etc.

6.4 Pipes and Fittings.

6.4.1 Flanges.

Where flanged joints are used, flanges shall be in accordance with the requirements of BS 4504: Part 1 or BS 4622 or BS 4772.

The minimum pressure rating shall be for a working pressure of 1.6 N/mm² (approximately 160 metres head) corresponding to NP 16 flanges. The hydraulic test pressure shall not exceed 2.5 N/mm².

The number of holes shall be as follows:

Ø80 mm to Ø150 mm -	8 holes
Ø200 mm to Ø300 mm -	12 holes
Ø350 mm to Ø400 mm -	16 holes
Ø450 mm to Ø600 mm -	20 holes

Flanges in pipelines with higher pressure rating shall be for a working pressure of 2.5 N/mm² (approximately 250 metres head) corresponding to NP 25 flanges. The hydraulic test pressure shall not exceed 4.0 N/mm².

Bolts, nuts and washers shall comply with the requirements of BS 4190 and BS 4320. Gaskets shall fulfil the requirements of BS 2494 and shall have a minimum thickness of 2 mm.

6.4.2 Ductile Iron.

Ductile iron pipes and fittings shall comply with BS 4772 or ISO 2531, and pipeline contribution shall be as per CP 2010 Part 3. The pressure rating of the pipes shall be for a minimum working pressure of 2.5 N/mm². Care should be taken when the pressure test is carried out not to exceed the permissible test pressure for the fittings installed.

Joint shall be either "Tyton", "Stanlock", "Viking Johnson" of flanged joints as specified in the drawings and the Bills of Quantities. Before any other joint is used, written approval of the Project Manager must be obtained.

Pipes and fittings shall be coated inside the outside with a hot material complying with the requirements of BS 4147, type 1, grade "d", or with a cold applied material complying with BS 3416: Type II material.

6.4.3 Grey Iron or Cast Iron.

Grey iron or cast iron pipes and fittings shall comply with BS 4622 or ISO/R 13. The pressure rating of the pipes shall be for a minimum working pressure of 1.0 N/mm² (approximately 100 metres head) and a hydraulic test pressure of 1.6 N/mm².

Joints, internal and external coatings to be as specified in Clause 6.4.2, Ductile Iron.

6.4.4 Steel Pipes.

The steel pipe shall conform to B.S. 534 1981, B.S. 1387, B.S. 3600 and B.S. 3601 and pipeline contribution shall be as per CP 2010 part 2, 1970 and unless otherwise stated specials shall be made from pipes that have been manufactured and tested in accordance with B.S. 3601. Joints shall be screwed and shocked for nominal diameters up to 50mm and flanged or socketed for nominal diameter above 50mm unless otherwise stated.

The type and flanged or socketed for nominal diameter above 50 mm unless otherwise stated. The type of joint used shall be to the approval of the Project Manager. The pipes and specials shall be protected from corrosion internally and externally complying with the requirements of BS 539. The type of protection used shall be to the approval of the Project Manager.

Welds shall be inspected by Radio graphical Non Destructive. Testing and Tensile and Weld Bend tests as per American petroleum Institute Specification 5 LS.

Steel Tubes and tubulars with screwed and socket joints shall be covered by the requirements of BS 1387.

Flanges shall be as specified in Clause 6.4.1 and threads as specified in BS 21.

6.4.5 Unplasticized Polyvinyl Chloride Pipes.

All PVC pipes and fittings shall comply with KS 06-149:1981, ISO 161/1-1976 (E) or BS 3505.

Pipes indicated with a pressure class shall conform to the following minimum working pressures.

Class 0.6 MPa - 0.6 N/mm² (marking: red) (KS classification: A)

Class 0.9 MPa - 0.9 N/mm² (marking: blue)(KS classification: B)

Class 1.2 MPa - 1.2 N/mm² (marking: green)(KS classification: C)

Class 1.5 MPa - 1.5 N/mm² (marking: brown)(KS classification: D)

All fittings shall be of pressure class 1.5 MPa and be manufactured of cast iron, PVC or steel.

Joints to be solvent Cement Joints for nominal sizes equal to or smaller than Ø50 mm and mechanical joints (rubber ring) for nominal sizes equal to or bigger than Ø80 mm.

For both types of joints the manufacturer's jointing instructions must be strictly adhered to.

For solvent cement joints, it is essential that the solvent cement used is the correct type, i.e. it shall be purchased from the same factory which delivers the pipes.

The rubber ring joints can be either the Polva type, which incorporates only one rubber ring or loose couplers with two rubber rings. In any case, the fittings used shall be purchased from the safe factory which delivers the pipes.

If the joint is difficult to push home, the manufacturer should be consulted immediately. No cutting or scrapping in any of the joints components shall take place, and all pipes shall be jointed manually.

PVC pipes and fittings shall be stored under cover, which fully protects the material from sunlight.

6.4.6 Polythene.

Polythene (Palothene) pipes shall comply with BS 3284.

Couplings and other fittings to be of the Compression type or the Singer type. The material for both types of fittings to be brass. In any case, the fittings used shall be purchased from the same factory, which delivers the pipes.

For both types of joints the manufacturer's jointing instructions must be strictly adhered to. The pipe classes and markings shall correspond to those of PVC pipes.

6.4.7 Precast Concrete.

Precast concrete pipes and fittings shall comply with BS 556: Part 2.

Minimum crushing test loads shall be as specified in Table 2, Standard pipes.

The laying and jointing of the pipes shall comply with CP 301.

The Contractor shall adopt such measures as may be approved by the Project Manager to ensure that every newly laid pipe is concentric with previously laid pipes with which it joins.

Unless otherwise approved by the Engineer pipes shall be laid in an upstream direction and the socket ends shall point upstream.

Before commencing the laying operation, the Contractor shall ensure that the parts of pipe which will come into contact with the jointing material are perfectly clean.

Cement mortar joints for spigot and socket pipes shall be made as follows:

- (1) Before commencing the jointing operation, the socket of the previously placed pipe and the spigot of the new pipe shall be cleaned and thoroughly soaked with water.
- (2) The spigot shall be wrapped one complete lap with tarred hempen spun yarn and the new pipe shall be carefully drawn towards the previously laid pipe so that spigot enters the full depth into the socket of the previously laid pipe. The new pipe shall then be adjusted and fixed in its correct position in line, level and gradient and the tarred yarn shall be caulked tightly home into the socket.

On completion of this operation, the yarn shall not fill more than one quarter of the total depth of the socket.

- (3) The remainder of the socket shall be completely filled with cement mortar consisting of one part of cement to three parts of sand. The mortar filling shall terminate flush with the socket and shall be nearly trowelled to a smooth finish around the pipe.
- (4) To assist the curing of the mortar, the Contractor shall cover the joints immediately after they are made with a layer of hessian, which shall be kept, continuously wet during daylight hours and he shall further adopt such other measures as the Engineer may direct.

Provided the Contractor has the Engineer's written consent other means of jointing may be adopted, e.g. rubber ring-joints. The Engineer's instructions in regard to other jointing materials must be strictly complied with.

6.5 Protection of Pipes.

The concrete used for bedding, hunching and surrounding the pipes shall be concrete "Grade 15" unless otherwise ordered by the Project Manager. The concrete protection shall have total dimensions not less than those given below.

The various types of concrete protection to pipelines are detailed below:

- (1) Bedding concrete shall have a width of at least 300 mm bigger than the external diameter of the pipe and shall support at least the bottom quarter of the pipe circumference. It shall have a minimum depth of 100 mm measured under the pipe throughout the cross-section.
- (2) Bedding and hunching shall comprise a concrete bed with a minimum width of 300 mm more than the external diameter of the pipe and a minimum thickness of 150 mm below the pipe, and hunching with a minimum thickness of 150 mm on both sides of the pipe. The top of the hunching to be flush with the top of the pipe.
- (3) Surrounding concrete shall comprise a concrete bed as described above together with 150 mm concrete on both sides and on top of the pipe, giving a pipe protection of at least 150 mm concrete everywhere around the pipe.

Concreting of bedding, hunching or surround shall not be done until the pipes have been jointed, inspected and tested. The concrete shall be placed on one side of the pipe only until the flow of material under the weight placed ensures that the concrete is in full contact with the underside of the barrel of the pipe throughout its length. The concrete shall be placed in one operation and shall be well worked to a homogenous mass. The pipe shall be carefully anchored against floatation. All anchorages, haunches, surround, etc. shall be placed on and about against undisturbed earth or rock as directed by the Project Manager.

PVC pipes are laid in suitable bedding material as per drawings. Protection against e.g. load from traffic is carried out by laying of concrete slabs as detailed on the drawings.

Special care shall be taken regarding compaction of fill below the concrete slabs.

6.6 Valves and Specials.

Where flanged joints are used, flanges shall be as specified in Clause 6.4.1.

Where screwed joints are used, thread shall be complying with BS 21.

Joints shall be flanged for sizes equal to or bigger than nominal diameter 80 mm and screwed for small sizes.

The names of manufacturers and the specifications of the products offered shall be provided at the time of tender.

6.6.1 Gate Valves and Sluice Valves.

Gate (Sluice) valves shall comply with BS 5163.

The valves offered shall be with straight through openings and shall be with double faced cast iron wedges and have two machined gunmetal faces securely fixed into machined recesses.

The body of the valves shall withstand a pressure equal to or greater than the test pressure of the line and the valve seat shall withstand a pressure equal to or greater than the working pressure of the pipeline. All gate valves and sluice valves installed in sections of the pipeline having a working pressure below 1 N/mm² shall have a rating of PN 10 (100 metres head). Valves installed in sections of pipeline having a working pressure between 1 N/mm² and 1.6 N/mm² shall be valves with a rating of PN 16.

For pipelines having working pressure higher than 1.6 N/mm², BS 5151 shall apply.

Materials shall be Cast Iron for sizes equal to or bigger than Ø 80 mm with flanged joints, and cast Iron or Brass for Smaller sizes with screwed joints.

The valves shall be with non-rising spindle and shall if not otherwise stated be supplied with handwheels.

Handwheels shall be of cast iron, and shall have cast on the upper side of the rim, words "OPEN" with appropriate direction arrows.

6.6.2 Butterfly Valves.

Butterfly valves shall comply with BS 5155. The valves shall be of the "Tight shut-off type" and shall be of either the double flanged or the wafer types with metal-to-metal seating.

The minimum service rating shall be PN 2.5. Care shall be taken when installing water type butterfly valves to ensure that the door when open does not fold the connecting pipe bore or any other adjacently connected valve or fitting.

The valves shall be lever operated and shall be marked with arrows showing "Open" and "Closed" positions.

Where the valve is mounted in a horizontal pipe with the shaft horizontal, it should be fitted in the pipeline so that the lower portion of the disc moves in the same direction as the flow when opening the valve.

6.6.3 Non Return Valves (Reflux or Check Valves)

The valves shall comply with BS 5153, and shall be of the swing pattern type.

The pressure rating shall be NP 16 corresponding to a working pressure of 1.6 N/mm² (160 metres head).

Material to be Mechanite Iron or Cast Iron for sizes equal to or bigger than Ø40 mm, and Bronze or Brass for smaller sizes.

6.6.4 Air Valves (Small Orifice).

Standard small orifice type with inlet ferrule screwed Ø25 mm BSP taper male e.g. M/S Neptune Glenfield Cat. No. 1250 with an outlet orifice diameter of 2.25 mm and an operating pressure not less than 1.6 N/mm² (16 bar).

For pipelines having working pressures higher than 1.6 N/mm² the valves shall have an operating pressure of not less than 2.5 N/mm² (250 m head).

6.6.5 Air Valves (large orifice and double acting).

Double large orifice air valves as Glenfield Cat No. 1271 shall be manufactured of cast iron and shall have a minimum nominal diameter of the inlet of 25mm. Working pressure shall be not less than 1.6 N/mm² (160 m head).

For pipelines having working pressures higher than 1.6 N/mm² the valves shall have an operating pressure of not less than 2.5 N/mm² (250 m head).

6.6.6 Float Valves or Ball Valves.

Working pressure to be minimum 1.0 N/mm² (100 m head) if not otherwise specified on the drawings and in the Bill of Quantities.

Capacities and dimensions to be as specified on the drawings.

Dimensions indicated are the diameters of the inlet to the float valve.

Types: Portsmouth screwed (Ø15 to Ø50 mm) (BS 1212), Single or Double Beat Equilibrium Angular, flanged (Ø50 to Ø150mm)

6.6.7 Constant Flow Valves.

Constant Flow Valves or flow regulators are to be of flexible orifice type or other approved type with an accuracy of discharge flow of plus or minus 10% of the nominal flow-rate, at least up to a pressure of 1 N/mm².

Flow rates to be as shown on drawings.

6.6.8 Main Water Meters.

Woltmann type with metric clock type registration, supplied with blank cover to replace mechanism.

Ends to be flanged.

Where reducers (tapers) are required, special reducers which provide identical overall lengths for varying sizes of meters to be used.

6.6.9 Penstocks or Sluice Gates.

Penstocks shall be single faced cast iron gates with non-rising spindle complete with extension spindle and removable handwheel all of approved manufacture.

6.6.10 Draw-off Taps and Stopvalves.

All draw-off taps (bid-taps, hose-taps etc.) shall comply with BS 1010, and shall be made of brass.

If specified in the drawings or Bills of Quantities the taps shall be chromium plated.

6.7 Auxiliary Works.

All works specified in this clause shall be with materials and workmanship as specified in Section 5: Builders Works.

6.7.1 Valve Chamber

Unless otherwise directed or detailed all valves, meters and other mechanical fittings shall be housed in chambers with lockable covers.

Valve work shall be so placed in chambers as to facilitate operation, meter reading etc. through the cover opening.

Chambers are measured in numbers and shall be priced as lump sum items covering all composite work as specified on the drawings inclusive of excavation in excess of trench excavation, concrete supports for valves, anchoring walls and backfilling around the chambers.

The depths stated on the drawings are nominal depths. Actual depths depend on depth of pipes.

6.7.2 Thrust Blocks and Anchors.

If not instructed to do otherwise, the Contractor shall provide thrust blocks at all bends, tees, end and wherever shown on the drawings.

Enlargements shall be excavated in sides and bottom of the trench to accommodate anchorages and thrust blocks.

Concrete thrust and anchor blocks shall be formed in accordance with the typical sections shown on the Drawings or as directed by the Project Manager. The additional excavation shall be made after the bends etc. have been jointed and the concrete shall be placed immediately after the completion of the excavation.

The back of supports and blocks shall abut on to solid ground, all loose material being removed before concreting.

The concrete used for thrust and anchor blocks shall be of Grade 20 and shall after placing be kept in view for not less than six hours. No pressure shall be applied in any section of mains until the concrete has cured at least three days.

All PVC material shall be wrapped with two layers of bituminous felt for the entire length in contact with concrete. Thrust blocks are measured in numbers and shall be priced as lump sum items covering all necessary works and materials together with excavation, backfilling and formwork.

Anchoring walls for valves are parts of the valve chambers and are included in the lump sum for valve chambers.

6.7.3 Road Crossings.

When the contractor encounters a road where a "Road Crossing" is indicated on the drawings or where to his opinion, such a crossing is required, he shall immediately inform the Engineer. On receipt of the above information, the Engineer will issue appropriate instructions.

6.7.4 Painting.

Painting and other protection of the external and internal pipe surfaces shall be in accordance with manufacturer's recommendations or as specified in Section 5 of these specifications.

6.8 Testing of Pressure Mains.

Pressure pipelines (together with all specials and valves incorporated in the mains) shall, before being covered, be tested with water as specified in CP 310. At least two days' notice must be given in writing to the Project Manager before pressure testing is commenced.

6.8.1 Water Pressure Test.

The water test pressure to be applied will be 1.5 times the nominal working pressure for the class or pipe being tested. The Project Manager, however, reserves the right to alter this figure.

Pressure testing of pipelines is not allowed against a closed valve.

Mains shall be filled and tested in section of convenient lengths, which must not exceed 500 metres. Where pipes are laid with steep gradients the length of pipes tested at any one time shall be as directed by the Project Manager.

The ends of pipes under test shall be closed by means of caps or blank flanges provided by the Contractor. Gate valves must not be used for this purpose. All scour valves and air valves shall be replaced by blank flanges before commencement of the test.

After laying, jointing and anchoring, the main should be slowly and carefully charged with water so that all air is expelled, allowed to stand full for several days and then be tested under pressure. The test pressure shall be applied by means of a manually-operated test pump connected to the main and to two parallel installed pressure gauges calibrated at an approved testing laboratory. The test pressure shall be maintained for five hours, and if there is any leakage, it shall be measured by the quantity of water pumped into the main in order to maintain the test pressure.

The permissible leakage of water which is given in imperial units in CP 310 as 1 gallon per inch of diameter per mile per 24 hours per 100 ft head is (in metric units): 0.0375 litres per mm diameter per 1000 m length per 24 hours per 10 m head of Water.

The above maximum permissible leakage approximately corresponds to the following quantities of water per 100 m length of pipe and 100 m head (1 N/mm²).

Nominal diameter of pipe	Maximum amount of water pumped per hour at 100 m head per 100 m length of Pipe
Ø50 mm	0.08 litres
Ø80 mm	0.12 -
Ø100 mm	0.16 -

Ø150 mm	0.24 -
Ø200 mm	0.32 -
Ø250 mm	0.40 -
Ø300 mm	0.48 -

Should leakage of water occur at the joints, the joint shall be

Re-assembled to eliminate such leakage or, should this not prove possible, the Contractor shall supply and assemble new joints. Should any pipe or joint burst or should water leak or weep through the body of a pipe or joint, the Contractor shall forthwith remove the faulty pipe or joint and replace it with a faulty pipe or joint. In all the above cases the length under test shall be retested as above described and the process repeated, if necessary, until the pipeline satisfactorily withstands the prescribed test.

The contractor shall provide labour, install and work the test pump, pressure gauges and all other equipment required for the test, and he shall fill the pipes with water and subsequently empty them after the test, all to the approval of the Project Manager. Water drained from the pipes shall be discharged in a way that does not affect the stability of the Works or adjacent structures.

The Contractor shall allow for all expenses in connection with testing in his rates for pipe laying.

6.8.2 Testing of Distribution System

If required by the Project Manager, the Contractor shall carry out and/or assist with the testing of the completed distribution system as directed by the Project Manager in order to establish the flow characteristics of the pipelines as built.

The Contractor shall provide all transport, labour and other assistance requested by the Project Manager, and the Contractor shall take delivery, install, remove and make good in connection with the installation of gauges and meters etc. for the purpose of the test.

6.8.3 Testing of Sewer Pipes.

All pipes and fittings shall be tested before being backfilled. The lines shall be tested in lengths between manholes or such shorter lengths as the Project Manager may approve and in all cases the tests shall be applied in the presence and to the satisfaction of the Project Manager or his representative.

The testing shall be carried out as specified in CP 301.

The requirements of CP 301 correspond to the amounts of water indicated below.

Nominal diameter of pipe	Maximum amount of water added per 30min. per 100m length of pipe
Ø 100 mm	3.0 litres
Ø 150 mm	4.5 litres
Ø 230 mm	7.0 litres

Any length of pipeline which is found to be defective shall immediately be put in a sound and satisfactory condition by repairing any defective part - or if necessary by relaying the whole of the defective length and again testing, and so on until the test is satisfactory. Any pipe found to be partly or totally cracked after laying shall be replaced by another, unless the Engineer should approve the adoption of an alternative method of repair.

If the Project Manager should suspect that a pipeline has been damaged during concreting or backfilling, he may order the Contractor to retest the suspected length. Should the re-test indicate that the line is no longer capable of withstanding the press ribbed tests, the Contractor shall forthwith search for and repair the damage and re-test the pipeline until a satisfactory test is obtained.

All manholes must be constructed to be watertight. In general, manholes will be inspected visually and not be tested, but the Project Manager reserves his right to direct the contractor to test the manholes before backfilling the surrounding excavation in order that any necessary works of repair may be carried out prior to backfilling. Any such tests shall be carried out in accordance with such directions as the Project Manager may issue.

The Contractor shall provide ample expanding stoppers for each diameter of pipe to be laid, together with such upstand tubes, U-tubes, pumps, labour and all required testing apparatus to the approval of the Engineer.

The Contractor shall be responsible for adequately strutting stoppers when pipelines are subjected to a water test, and he shall take adequate precautions to ensure against any stopper or strutting being carried into a downstream, pipe when the water is released.

The Contractor shall allow for all expenses in connection with testing in his rates for pipe laying.

6.9 Cleaning and Sterilization of Water Supply Pipes.

The Contractor shall before handing over and during the Maintenance Period clean pipelines, chambers and manholes for all dirt and rubbish.

All pipes shall be thoroughly cleaned and washed out to remove all contamination, and all water from these operations shall be removed and drained away.

Sterilization should be carried out in accordance with CP 310.

Following the satisfactory cleansing, the Contractor shall with the use of a portable dosage system - or by some other approved method introduce a solution of a sterilizing chemical containing chlorine into the pipeline. The solution shall be introduced at a very slow rate and shall be of such strength as to give a chlorine concentration of not less than 50 parts per million throughout the length of the pipelines.

All taps on the distribution pipes shall be opened successively, working progressively away from the place where the solution is introduced. Each tap shall be closed when the water discharged begins to smell of chlorine. The whole system shall then remain charged for 24 hours, after which a test shall be made for residual chlorine. If no residual chlorine is found, the sterilization process will have to be carried out again, until a satisfactory result is obtained. Finally, the pipes shall be thoroughly flushed out and recharged with supply water.

On completion of the sterilization process the pipes shall be left full of water.

The Contractor shall in his rates for pipe laying include all costs of labour, transport, materials, equipment, chemicals and water necessary for the satisfactory completion of the cleansing and sterilization operations.

7 PLUMBING AND DRAINAGE

7.1 General

Testing, cleansing and sterilization are to be carried out as specified in section 6-Pipeworks.

All work shall comply with CP 310, CP 301 or CP 308.

7.2 Plumbing

The entire works must be carried out in strict accordance with the local Authorities. By-Laws and to the satisfaction of the Project Manager.

7.2.1 Tubing

Galvanized mild steel tubing shall comply with BS 1387 'Medium' with screwed and socketed joints made in approved jointing compound.

Fittings for the same shall be galvanized malleable iron to BS 143. Pipes shall be cut by hacksaw or other method which does not reduce the diameter of the pipe or form a bead or feather, which might restrict the flow of water.

Copper tubing shall be light gauge, to conform to BS 2871, and the fittings shall be capillary or compression fittings of approved manufacture complying with BS 864: Part 2.

All brass work and fittings shall be in accordance with BS 1010 for draw of taps and stop valves and BS 1212 for ball valves.

All tubing described as chased into walls shall have the wall face neatly cut and chased, the tubing wedged and fixed and plastered over.

All formed bends shall be made so as to retain the full diameter of the pipe.

Bends shall be formed with approved tools to an internal radius of not less than eight times the outside diameter of the pipe.

Bending of tubes shall only take place when suitable fittings are not available, and unions shall be incorporated in the system in order to facilitate easy repair or augmentation to the system.

7.2.2 Cold Water Storage Tank

Cold water storage tanks shall be of galvanized steel or of approved quality. The tank if galvanized should be supplied with a galvanized sheet iron or fibre glass removable dust covers with edges turned down 25mm to suit the exact size of tank.

7.2.3 Sanitary Fittings

Connections to sanitary fittings shall be made with 450mm copper tubing bent to shape as required with copper to iron couplings at each end.

All waste fittings shall be provided with copper "S" or "P" traps, complying with BS 1184, minimum size 40mm. They shall be properly connected to tails of waste fittings with screwed or other approved joints, and be complete with openings for cleaning. Traps to sinks shall be unpolished, and those to lavatory basins shall have a chromium plated finish.

7.2.4 Cast Iron Soil and Ventilation Pipes

The soil, waste and vent pipes shall be coated cast iron spigot and socket pipes to BS 416 medium grade.

Pipes described as fixed to walls are to be secured at least 25mm clear of finished wall surface with strong cast iron holder bat clamps in two sections bolted together, one section to have lewised end for building into walls, fixed not more than 2 apart.

Pipes shall be jointed with asbestos yarn and caulked with molten lead or jointed with an approved special jointing compound.

Ventilation pipes shall normally be brought up above the roofs and shall be fitted with an approved galvanized wire grating.

Where a ventilating pipe passes through a roof, the contractor shall provide a 24 gauge galvanized sheet metal flashing of approved size to suit the roof dressed tightly against pipe and over and under roof finish-and sealed to the Project Manager's approval.

7.2.5 Manholes

Manholes shall be constructed on sewer lines in the positions indicated, or wherever ordered by the Project Manager.

The manholes shall be constructed in accordance with drawings of typical and special manholes.

Manholes on pipe sewers shall be constructed with an in situ base in concrete grade 20, which shall be raised to form the benching and invert of the manhole.

The benching and channels shall be carefully formed to shape according to the number, diameter and positions of the incoming and out going pipes. The channels shall have circular inverts. The benching shall be sloped towards the channels at a gradient of 1 in 6, or as otherwise detailed on the drawing.

Benching shall be carried out in concrete Grade 15 and rendered with 1:3 cement mortar. The ends of all pipes entering and leaving the manholes are to be carefully cut to shape to suit the internal dimensions of the manholes. All pipes entering and leaving manholes are to be as short as possible.

Manholes of pre-cast concrete rings to be carried out as per BS 556.

Chambers of block work shall be carried out as specified on the drawings. The block work shall be rendered internally with cement mortar 1:3.

Ladders or steps irons as detailed on the drawings shall be provided in manholes deeper than 1.20m.

7.3 Drainage

7.3.1 Cast Iron Drain Pipes

Shall be coated cast iron spigot and socket pipes conforming with BS 437 in all respects, and with fittings to BS 1130. Pipes shall be jointed with asbestos yarn and caulked with molten lead or jointed with an approved special jointing compound.

7.3.2 Open Drains or Channels

Sight rails shall be fixed at intervals not exceeding 50m.

The excavation for the drains shall be neatly taken out to the required levels and gradients so as to avoid any unnecessary under-filling. Where under filling is required, it shall be laid in 100mm layers of approved granular material, each layer being well rammed. The earth sides above the drains shall be neatly dressed off to such slope as the Project Manager may direct.

The invert and sides of the drains shall, where specified, consist of pre-cast concrete elements as specified in section 5 and on the drawings, jointed with cement mortar, the joints being neatly struck as the work proceeds.

8 ROAD WORKS, FOOTPATHS AND FENCING

8.1 General

All materials and workmanship not described in this section are deemed to comply to the relevant specifications of the work in hand contained in other sections of these specifications.

8.2 Roads and Paved Areas

For earthworks see section 3.

8.2.1 Subgrade

The subgrade shall be shaped to the correct cambers, gradients and levels as shown on the drawing for the full width of the crown.

All fill and top 150mm subgrade shall be compacted to at least 100% B.S. standard Compaction.

The subgrade shall be constructed in such a manner and to such levels that no single point deviates more than 30mm from the stipulated levels.

Subgrade should be kept continuously drained and any damage caused by water accumulating on or running off the surface shall be made good at the Contractor's expense.

Before any material is laid on subgrade, the subgrade shall be cleaned off all foreign matter, any pot holes, loose material, ruts corrugation, depressions and any other defects due to improper drainage, traffic or any other cause and shall be corrected to the satisfaction of the Project Manager. Any discrepancies shall be made good to the Project Manager's approval before any work on the base may start.

The Project Manager's approval of the subgrade shall in no way relieve the contractor of any obligations under the contract.

8.2.2 Base Course

(a) Graded Stone base Course

Where this type of base course is specified, stone used for this comply with the following requirements: (a) Grading

BS Sieve	Percentage Passing
75mm	100
65mm	95-100
40mm	0-5

- (ii) The stones should not contain deleterious matter in them and should be free from dust, and admixtures of softer stones.
- (iii) The rock from which the stones are produced should comply with the following:-

A.C.V.(Aggregate Crushing Value) Not greater than 35%

L.A.A. (Los Angeles Abrasion) Not greater than 50%

S.S.S. (Sodium Sulphide Soundness) Loss on 5 cycles not more than 12%.

- (iv) Binder material used shall be crusher fines of P.I. not greater than 8%.

Before commencing delivery of the bulk stones, the contractor must submit to the Project Manager samples of stone he proposes to use and these when approved shall form standard for the work.

The hardcore stones shall be transported and spread on the approved sub-grade in even thickness.

The fines for choking shall be "crusher fines", non-plastic with 95-100% passing BS sieve 200 and well graded.

The stone layer shall be compacted with roller not less than 12/16 tons. Rolling should be longitudinal and shall commence from the outer edges of the road. Rolling shall continue until there is virtually no movement under or ahead of roller.

After a few passes of roller the evenness of the surface will be checked and depressions shall be made good by adding additional material or otherwise as case may be and rolling continued.

When the required firmness of the layer has been obtained the voids in the layer shall be filled with the crusher fines. The fines shall be spread in thin layer and should be brushed and rolled down into the voids. Water shall be sprayed evenly over the surface during this process to ensure complete filling of all the void.

The finished level of the surface should be true to shape and level specified so that no point on the finished surface deviates by 20mm of the specified levels.

(b) Gravel Base

Gravel for base, where specified, shall conform with the following requirements:

(i) California Bearing Ratio (CBR)

Minimum CBR after 4 days soak shall be 18%.

(ii) Grading

The gravel shall have a grading as per grading envelop shown in the attached curve.

(iii) Plasticity

P.I: 30 maximum.

PM. 200 min, 1200 max.

(iv) Nodule Hardness

Nodule hardness shall be good. Compaction top base course gravel shall be carried out to 98% BS compaction.

8.2.3 Wearing Course

(a) Gravel Wearing Course (Murrum Finish)

Gravel shall be from approved source and quarried so as to exclude vegetable matter, loam, top soil or clay. The gravel shall comply with the requirements of clause 8.2.29 (b) and compaction carried out to 100% BS compaction.

The Contractor shall set out the lines and levels of the edges of the carriage way by means of wooden pegs or steel pins to the width and levels shown on the drawings or as directed by the Project Manager. The distance between pegs shall not be greater than 20m where road is straight and gradient uniform and not more than 10m where the road is on horizontal curves or vertical curve.

Gravel wearing course material shall be spread in a uniform layer across the full width required and scarified so that the maximum size of any particle not greater than one half of the compacted thickness of the layer is excluded. It shall then be mixed, watered if directed by the Project Manager, graded and compacted to at least 100% B.S. Compaction and graded to final level. Waterlogged gravel should be allowed to dry to its OMC before it is processed and compacted.

The compacted thickness of any layer shall not exceed 150mm and where a greater compacted thickness is required and material shall be laid and

processed in two layers. Any oversize material, which cannot be broken down to the required size, shall be removed to a soil dump.

The tolerances on levels permitted shall be as follows:

Thickness	25mm
Variation 3m straight edge	25mm
Camber	25mm

(b) Premix (Asphaltic Concrete) Finish

The premix surfacing shall consist of a prime coat and a 40mm thick wearing course.

Prime Coat

The primer used shall be MCI applied between the temperature 45^oC85^oc at the rate of 1 litre/m².

8.2.4 Paving Slabs and Kerbstones

Precast concrete paving slabs and kerbstones shall be made to the sides indicated in the Bills of Quantities and the drawings. The casting shall be carried out as specified in section 4 and the laying as specified in clause 7.3.2- open drains.

8.3 Fencing

All fencing shall be erected in exact vertical position and to straight lines as shown on the drawings. The materials and workmanship shall comply with the recommendations in BS 1722.

8.3.1 Concrete Posts

Pre-cast concrete posts shall be cast of concrete grade 20 as specified in section 4, to the sizes shown on the drawings.

The posts shall be securely placed in preformed holes and cast in concrete to depths as shown on the drawings.

Bracing shall be provided at all corners, and at intervals of not more than 50metres on straight lines of fencing. Maximum distance between posts is 2.5m.

8.3.2 Chain Link

The chain link fencing shall be supplied in rolls of 2130mm (7feet) width and shall be with 65mm mesh of 12½ gauge, fitted to 4 rows of line wires with binding wire at 130mm centres.

The cranked top of the posts shall be fitted with 3 strands of 12 1/2 gauge barbed wire with four point barbs at 150mm centres. All members of the fencing shall be hot dip galvanized.

Drawings

The scope of the works is defined in a separate book of drawings; **BILL OF QUANTITIES**

PREAMBLE TO BILL OF QUANTITIES

1. GENERAL

- 1.1. These Bills of Quantities form part of the Bid Documents and is to be read in conjunction with the Conditions of Contract, Specifications and Drawings
- 1.2. The method of measurement is in general according to “Civil Engineering Standard Method of Measurement” (CESMM3, Third Edition) published by the Institution of Civil Engineers, London, 1991
- 1.3. Any condition contained in this Preamble shall be deemed to prevail in the event of contradiction with a condition contained in the above “CESMM3”.
- 1.4. The brief descriptions of Works under items for the Bills of Quantities, are purely for the purpose of identification only, and shall in no way limit, modify or supersede the detailed description given in the Conditions of Contract, Specification and Drawings.
- 1.5. The Bills of Quantities have been separated into portions of the works for convenience in tabulating quantities and in pricing. They are not intended to subdivide the actual works and the whole of the works must be considered when pricing the various items on the Bills of Quantities.
- 1.6. A rate and price or lump sum shall be inserted in Ink against each item in the Bills of Quantities and Schedule of Day work whether quantities are stated or not. Items against which no rate, price or sum is entered by the Bidder will

not be paid for when executed, but will be deemed to be covered by other rates or prices inserted in the Bills of Quantities.

- 1.7. During construction the Units rate established for an Item in one Bill of Quantities may be used as a basis for establishing a Units rate for similar work in another Bill of Quantities which contains no Units rate for the said item.
- 1.8. The cost of complying with all conditions, special risks, obligations and liabilities described in the Conditions of Contract and/or the Specifications are to be covered by the rates inserted in the Bills of Quantities.
- 1.9. Notwithstanding any limits which may be implied by the brief description of items in the Bills of Quantities and/or the explanation in the Preamble, the rates must include all incidental and contingent expenses of any kind together with any temporary work and installations necessary to complete and maintain the Works in accordance with the Contract Documents.
- 1.10. The rates and prices inserted by the Contractor in the Bills of Quantities are to be fully inclusive of value or the work described under the items and shall cover all overhead charges and profit.
- 1.11. The quantities set out in the Bills of Quantities are believed to give a fair indication of the extent of the works, and when priced it is given for the purpose of facilitating the comparison of the various Bids received. There is no guarantee for any one particular item or group of items in the Bills of Quantities are to be executed.
- 1.12. Upon completion, the work shall be measured for payment in accordance with the method adopted in the Bills of Quantities and under the items as therein set forth, notwithstanding any custom to the contrary. The net measurement or weight of the finished work without allowances for waste will be taken as the quantities eligible for payment.
- 1.13. No claim will be approved in respect of any work or method of execution which may be described in the Contract Documents, but for which there are no corresponding items in the Bills of Quantities.

- 1.14. The rates inserted in the Bills of Quantities for parts of composite work shall cover for the completion of all component parts, although they may not be specifically described in the items, preamble or Specifications.
- 1.15. The cost of keeping excavations and works free from water shall be covered by the rates inserted in the Bills of Quantities.
- 1.16. When in the description of an item in the Bills of Quantities, a reference is made to a clause in the Conditions of Contract and/or the Specifications it is the clause principally but not exclusively related to the item.
- 1.17. All fittings to be supplied by the contractor described in the Bill of Quantities as GI fittings to be replaced by **Polypropylene (PP) fittings** of same diameter for diameters less than 50mm (2") and be replaced by **epoxy coated steel fittings** of the same diameter for diameters larger than 50mm (2").

2. DEFINITIONS

- 2.1. Daywork. The term "Daywork" means the method of valuing the work on the basis of the time spent by the workmen, the materials used and the plant employed. The rates inserted in the Schedules of Daywork are deemed to cover overhead charges and profit, Site supervision and staff, insurance, travel and lodging allowances and any other emoluments and allowances payable to the workmen in connection with the carrying out of the Daywork.
- 2.2. Prime Cost Items. The Terms "Prime Cost" means the net sum entered in the Bills of Quantities by the Project Manager as a sum provided to cover the cost of, or to be paid by the Contractor to merchants or others, for specific articles or materials to be supplied or work to be done, after deducting all trade discounts and any discount for cash. If so stated in the Bills of Quantities separate prices are to be entered by the Contractor for covering the profit and overheads on the Prime Cost in the form of a percentage together with the cost if any other services are to be provided in connection with the Prime Cost Item.

- 2.3. Provisional Quantities or Sums. The Terms “Provisional Quantities” or “Provisional Sums” mean any Quantity or sum of money fixed by the Project Manager and included in the Bills of Quantities to provide for work not otherwise included therein.
- 2.4. The work executed under a Provisional Item shall be measured and valued as described in “Conditions of Contract”.
- 2.5. Lump Sum. The Term “LUMP SUM” expressed as “Item” in the Quantity column in the Bills of Quantities shall be priced by the Contractor to cover an offer to carry out the work shown upon the drawing or drawings or described in the Conditions of Contract and/or Specifications referred to under the item. The sum entered shall cover all costs and charges whatsoever in respect of the works referred to and shall be at the Contractor’s sole risk.
- 2.6. Where the word “Provide”, “Allow” or word of similar meaning are used in any item in the Bills of Quantities it shall be taken to mean that the sum entered by the Contractor shall cover all costs and charges in respect of the work referred to and shall be at the Contractor’s sole risk.
- 2.7. Where the words “Handle” or “Handling” are used in any item in the Bills of Quantities they shall be taken to mean taking delivery, unloading, stacking, storing, taking from store, transporting, unloading and getting into position for fixing all materials concerned and all other contingent expenses.
- 2.8. Wherever the words “Selected” “As directed”, “As required”, or words of similar meaning are used in the Bills of Quantities, it is to be understood that the selection, direction or requirements of the Project Manager are intended. Similarly, the words “Approved by”, “Satisfactory” or other synonyms shall mean “Approved by” or “Satisfactory to” the Project Manager and the Project Manager’s approval must first be obtained before the materials are ordered or the works to which the words refer are put in hand.
- 2.9. Wherever the words “Necessary”, “Proper” or words of similar meaning are used in the Bills of Quantities with respect to the extent, conduct or character of work described, it is to be understood that they shall mean that the said work shall be executed to the extent, must be conducted in a manner, or be

of a character which is “necessary” or “Proper” in the opinion of the Project Manager.

2.10.A hyphen between two dimensions means a range of dimensions which includes all dimensions exceeding that preceding the hyphen but not exceeding that following the hyphen.

3. ABBREVIATIONS

3.1. General

P.C. Shall Mean Prime Cost

P.S. “ “ Provisional Sum

Ditto “ “ The whole of the preceding description
Except the dimensions or measurements stated.

E.O. “ “ Extra over

Spec. “ “ Specifications

Con. “ “ Conditions of Contract

Cl. “ “ Clause

Drg. No. “ “ Drawing Number

B.S. “ “ British Standard or B.S. Specification

D.I. “ “ Ductile Iron

G.S. “ “ Galvanized Steel

C.I. “ “ Cast Iron

N.P. “ “ Nominal Pressure in bars

M.S. “ “ Mild Steel

MAWASCO “ “Malindi Water and Sewerage Company Ltd

R.C. “ “ Reinforced Concrete

PVC “ “ Unplasticised Polyvinyl Chloride

3.2. Measurements and Weights

m³ Shall mean Cubic meter

m² “ “ Square meter

	m	“	“	Linear meter
mm	“	“	Millimeter	dia “
“	diameter	nr	“	“
Number				

Tonne (t) “ “ 1,000 kg

Kg “ “ Kilograms

75mm to 150mm shall mean Exceeding 75mm but not exceeding 150mm
 (All items described in this way shall be similarly understood.)

3.3. Dimensions

When dimensions are entered the length (l) appears first, the width (w) second, and the depth (d) or height (h) third.

4. METHOD OF MEASUREMENTS

4.1. Site Clearance

Site Clearance is measured in square meters or hectares except for a clearance for pipeline which is measured in linear meters with a width of 2.50m.

Payment for Site Clearance will be based upon this width except that the

Project Manager reserves the right to restrict this width because of the presence of obstructions, roads, houses and the like. No claims for additional space will be entertained by the Project Manager.

No claims for inconvenience and the like caused by obstructions will be entertained.

The girth of a tree shall be measured approximately 1.00m above the ground level.

Trees with a girth less than 300mm shall be covered by the rate for clearance, bigger trees are measured separately.

The rate for clearance shall cover the cost of disposal of all waste material in a manner approved by the Project Manager.

4.2. Excavation and Filling

The excavated materials will be classified as described in the Specifications, Section No. 3

The rates for excavation, whether measured separately or included under other items shall amongst others cover the following:

- (a) Excavating, trimming, cleaning, disposal, storage, filling and compacting
- (b) Supplying of bedding material around pipes, fittings, valves etc.
- (c) All necessary supports and pumping
- (d) Disposal of excavated material within a distance of 200 meters
- (e) All extra costs arising from phasing earthwork, including reexcavation and replacement of fill.

The volume of excavations in open cut will be measured in cubic meters and will be measured as the minimum required excavation for carrying out the Works

Pipe trenches are measured in linear meters as one item for each pipe size with minimum width and width as indicated on the drawings. The rate shall cover extra excavation for joints where necessary, but extra depth will be paid for where ordered by the Project Manager.

Rates for trenches with reduced depth or with different soil classifications varying with the depth shall have to be worked out proportionally. Earth filling is measured in cubic meters after compaction/ramming is completed.

Payment will be authorizes as follows:

- (a) Excavation, trimming and storage: 70% of the rate entered in the Bills of Quantities.
- (b) Bedding material, backfilling, compaction and disposal of surplus materials: 30% of the rate entered in the Bills of Quantities.

The above payments are subject to retention.

4.3. Pipe work

Pipes are measured in linear meters. The rates for pipes, fittings, valves etc. shall include for collection, handling, unloading at Site, necessary joints and materials used in jointing, cutting and drilling etc., and for bedding, laying, connecting, testing, disinfecting and backfilling.

Payment for pipe laying will be authorized as follows:

- (a) Lay and joint pipes: 40% of the rate entered in the Bills of Quantities
- (b) Pressure testing of pipes: 40% of the rate entered in the Bills of Quantities
- (c) Disinfection of pipes and backfilling: 20% of the rate entered in the Bills of Quantities.

For fittings, valves, etc. payment will be authorized as follows:

- (a) collection, laying and jointing: 80% of the rate entered in the Bills of Quantities
- (b) Pressure testing: 15% of the rate entered in the Bills of Quantities.
- (c) Disinfection of pipes: 5% of the rate entered in the Bills of Quantities.

4.4. Concrete Work

The rates for concrete shall include for all materials, storage, handling, mixing, transporting, placing and compaction (whether by hand or internal or external vibration) forming slopes, falling and the like, preparing adjacent surfaces, forming all temporary joints, keys, stunt ends, temporary stops, and shuttering of other than permanent faces (except where special items are provided) for placing around reinforcement and other items to be built in, for rubbing down and making good surfaces (except that required to produce fine face), for protecting and curing the concrete; for any additional costs arising from the use, on the Contractor's initiative, of Rapid Hardening Cement in place of ordinary Portland Cement or for a daily return to the Project Manager showing the quantities of cement and the number of mixing of each class of concrete used in each section of the Works and in Temporary Works.

4.5. Formwork

See “CESMM” class G.

4.6. Reinforcement

Rod reinforcement of all diameters will be paid for by weight. The measurement will include all steel detailed on the Drawings including steel stirrups but excluding stools and space bars. Steel will be taken as weighing 7.85 t/m³ no allowance being made for waste or rolling margin. The rates for reinforcements will be deemed to include for all handling, cleaning, cutting, bending, hooking, tying, supporting in position and all other work necessary in providing and fixing the reinforcement as specified or shown on the Drawings.

Fabric reinforcement will be measured in square meter net covered area.

4.7. Steel work

All steel work shall be priced as lump sum items unless indicated otherwise in the Bills. The approximate steel weights given in the Bills of Quantities are to be considered as indicative only and the Tenderer must satisfy himself that the lump sums entered cover the complete work as shown on the drawings. Including fabrication, handling and erection, or whatever is required for completing the item.

4.8. Block work

Concrete block work and dressed stonework will be measured in square meters of covered area for each thickness of blocks. (See also “CESMM” class u). Reinforcement in block work is measured separately.

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

4.9. Cladding Work

Cladding is measured in net square meters covered area with no additions for laps, etc. the rate shall include for supply, storage, handling, cutting and erection of cladding including all flashing, fixings, washers, tropicalized stud

caps, etc. in accordance with the manufacturer's instructions and including all other services or items required for completing the works.

4.10. Joinery Work

The rates for doors and windows, etc., shall include all necessary gluing, spiking, nailing and screwing whether specifically mentioned or not. The rates also include for iron mongery and glazing and for fixing and decorating.

4.11. Finishes

Screed, rendering and plaster work are measured in square meters. The rates shall include for all preparation of backgrounds, making good to window and door frames and around pipes, etc.

Painting is measured in square meters of the area covered. Where the number of coats required is not mentioned in the description under an item, then the number of coats are deemed to be

The rates shall cover all required preparation of backgrounds, cleansing, rubbing down, applying, cutting in at edges and removal of stains, etc.

4.12. Fencing

Fencing is measured in linear meters in respect of chain-link and all kinds of wires. Concrete fence posts and gate posts are measured in numbers.

Notes for preparing Specifications

- 1.0 Specifications must be drafted to present a clear and precise statement of the required standards of materials and workmanship for tenderers to respond realistically and competitively to the requirements of the Employer and ensure responsiveness of tenders. The Specifications should require that all materials, plant, and other supplies to be permanently incorporated in the Works be new, unused, of the most recent or current models and incorporating all recent improvements in designs and materials unless provided otherwise in the Contract.
- 2.0 Specifications from previous similar projects are useful and it may not be necessary to rewrite specifications for every works contract.
- 3.0 Care must be taken in drafting Specifications to ensure they are not restrictive. In the specification of standards for materials, plant and workmanship existing Kenya Standards should be used as much as possible otherwise recognized international standards may also be used.

II DRAWINGS

NOTE:

1. A list of the Contract Drawings should be inserted here
2. The actual Contract Drawings including Site plans should be annexed in a separate booklet

III BILL OF QUANTITIES/SCHEDULE OF RATES

BILLS OF QUANTITIES

PROJECT : DESILTING OF MAKOKORO WATER PAN IN TAITA TAVETA COUNTY					
ITEM	DESCRIPTION	UNIT	QTY	RATE (KSHS)	AMOUNT (KSHS)
1	BILL No.1: PRELIMINARY AND GENERAL ITEMS				
	Contractual requirements				
1.1	Performance security	SUM	1		
1.2	Insurance of Works	SUM	1		
	Specified requirements				
1.3	Provide, erect and maintain project Sign Board	SUM	1		
1.4	Provide and maintain survey equipment for the use of the Engineer's and Engineer's staff as specified	SUM	1		
1.5	Allow for supervision by the Employer's staff	P. sum	1	700,000	
	METHOD RELATED CHARGES				

1.6	Allow for Mobilisation and Demobilization of Contractors machinery and personnel to site	sum	1		
1.7	Constructions of Contractor's camp and office	sum	1		
1.8	Temporary works and de-watering (provisional)	Sum	1		
1.9	Final topographic survey to verify storage capacity	Sum	1		
1.1	Contractor's profits and overheads in respect to item 1.5	%	700,000	0.1	
TOTAL BILL NO. 1 carried to SUMMARY PAGE					

BILL No.2: SITE CLEARANCE, EXCAVATION AND EARTHWORKS					
ITEM	DESCRIPTION	UNIT	QTY	RATE (KSHS)	AMOUNT (KSHS)
2.1	Site clearing and soil stripping: Clear the site of trees/bushes/stumps and top soil including soil stripping (to depth of 200mm) and cart away to spoil as directed by the Engineer. The dimensions of the area to be cleared 22500m ²	M ²	225,000		
2.2	Allow for preparation of site access for plant and equipment	Sum	1		
2.3	Allow for maintenance of site access above	SUM	1		
2.4	Excavation of dry silt to a depth not exceeding 5m	M ³	50,000		
2.5	Allow for carting away to stock pile before hauling to the damping quarry	M ³	50,000		
2.6	Load the stockpiled excavate materials in trucks, haul to a distance of 5km and damp.	M ³	50,000		
2.7	Allow for spreading the excavated materials evenly and compact at the damp site.	M ³	50,000		
2.8	Excavate in soft rock for cut-off trenches as advised by the Supervisor	M ³	5		
2.9	Excavate to create spillway space 15.0m wide x 40m long to an average depth of 0.30m from ground level as directed by the Engineer on site and dispose.	M ³	180		
2.10	Place approved handpacked rip rap 200mm thick as upstream face protection	M ³	3600		
2.11	Place 150mm top soil on Downstream face	M ³	800		
2.12	Provide approved Grassing to specified embankment slopes and dam crest	M ²	600		
2.13	Allow for the construction and equipping of a well 4.0m Deep and 1.5m wide with adequate filter as directed by the Engineer.	Sum	1		
TOTAL BILL NO. 2 carried to SUMMARY PAGE					

Bill No	SUMMARY	
1	BILL NO. 1 PRELIMINARY & GENERAL ITEMS	
2	BILL No.2: SITE CLEARANCE, EXCAVATION AND EARTHWORKS	
	Add 10 % Contingency	
	Add 16%VAT	
	GRAND TOTAL	
Bidder's Name:		
Bidder's Signature / Stamp:		
Date:		

SECTION V
STANDARD FORMS

List of Standard Forms

- (i) Form of Invitation for Tenders**
- (ii) Form of Tender**
- (iii) Letter of Acceptance**
- (iv) Form of Agreement**
- (v) Form of Tender Security**
- (vi) Performance Bank Guarantee**
- (vii) Performance Bond**
- (viii) Bank Guarantee for Advance Payment**
- (ix) Qualification Information**
- (x) Tender Questionnaire**
- (xi) Confidential Business Questionnaire**
- (xii) Details of Sub-Contractors**
- (xiii) Request for Review Form**

FORM OF INVITATION FOR TENDERS

_____ [date]

To: _____ [name of Contractor]
_____ [address]

Dear Sirs:

Reference: _____ [Contract Name]

You have been prequalified to tender for the above project.

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

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

[mailing address, cable/telex/facsimile numbers].

Upon payment of a non-refundable fee of Kshs _____

All tenders must be accompanied by _____ number of copies of the same and a tender security in the form and amount specified in the tendering documents, and must be delivered to

[address and location]

at or before _____ (time and date). Tenders will be opened immediately thereafter, in the presence of tenderers' representatives who choose to attend.

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

Yours faithfully,

_____ *Authorized Signature*

_____ *Name and Title*

FORM OF TENDER

TO: _____ [Name of Employer] _____ [Date]

_____ [Name of Contract]

Dear Sir,

1. In accordance with the Conditions of Contract, Specifications, Drawings and Bills of Quantities/Schedule of Rates for the execution of the above named Works, we, the undersigned offer to construct, install and complete such Works and remedy any defects therein for the sum of Kshs. _____ [Amount in figures]/Kenya Shillings _____ [Amount in words]
2. We undertake, if our tender is accepted, to commence the Works as soon as is reasonably possible after the receipt of the Employer's Representative's notice to commence, and to complete the whole of the Works comprised in the Contract within the time stated in the Appendix to Conditions of Contract.
3. We agree to abide by this tender until _____ [Insert date], and it shall remain binding upon us and may be accepted at any time before that date.
4. Unless and until a formal Agreement is prepared and executed this tender together with your written acceptance thereof, shall constitute a binding Contract between us.
5. We understand that you are not bound to accept the lowest or any tender you may receive.

Dated this _____ day of _____ 20 _____

Signature _____ in the capacity of _____

duly authorized to sign tenders for and on behalf of
_____ [Name of Tenderer] of
_____ [Address of Tenderer]

Witness; Name _____

Address _____

Signature _____

Date _____

(Amend accordingly if provided by Insurance Company)

LETTER OF ACCEPTANCE
[letterhead paper of the Employer]

_____ [date]

To: _____
[name of the Contractor]

[address of the Contractor]

Dear Sir,

This is to notify you that your Tender dated _____
for the execution of _____
[name of the Contract and identification number, as given in the Tender documents] for
the Contract Price of Kshs. _____ [amount in figures][Kenya
Shillings _____ (amount in words)] in accordance with the
Instructions to Tenderers is hereby accepted.

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

Authorized Signature

Name and Title of Signatory

Attachment : Agreement

FORM OF AGREEMENT

THIS AGREEMENT, made the _____ day of _____ 20 _____ between _____ of [or whose registered office is situated at] _____ (hereinafter called “the Employer”) of the one part AND _____ of [or whose registered office is situated at] _____ (hereinafter called “the Contractor”) of the other part.

WHEREAS THE Employer is desirous that the Contractor executes

_____ (name and identification number of Contract) (hereinafter 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 i.e.
 - (i) Letter of Acceptance
 - (ii) Form of Tender
 - (iii) Conditions of Contract
 - (iv) Appendix to Conditions of Contract
 - (v) Specifications
 - (vi) Drawings

(vii) Priced Bills of Quantities/Priced Schedule of Rates[whichever is applicable]

- 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 _____

Was hereunto affixed in the presence of _____

Signed Sealed, and Delivered by the said _____

Binding Signature of Employer _____

Binding Signature of Contractor _____

In the presence of (i) Name_____

Address_____

Signature_____

[ii] Name _____

Address_____

Signature_____

FORM OF TENDER SECURITY

WHEREAS(hereinafter called “the Tenderer”) has submitted his tender dated for the construction of
..... (name of Contract)

KNOW ALL PEOPLE by these presents that WE having our registered office at(hereinafter called “the Bank”), are bound unto(hereinafter called “the Employer”) in the sum of Kshs..... for which payment well and truly to be made to the said Employer, the Bank binds itself, its successors and assigns by these presents sealed with the Common Seal of the said Bank this Day of20.....

THE CONDITIONS of this obligation are:

If after tender opening the tenderer withdraws his tender during the period of tender validity specified in the instructions to tenderers

Or

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 Bank not later than the said date.

[date]

[signature of the Bank]

[witness]

[seal]

PERFORMANCE BANK GUARANTEE

To: _____ (Name of Employer) _____ (Date)
_____ (Address of Employer)

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 recognised 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 civil 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 Contractor 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 shall in any way release us from any liability under this Guarantee, and we hereby waive notice of any change, addition, or modification.

This guarantee shall be valid until the date of issue of the Certificate of Completion.

SIGNATURE AND SEAL OF THE GUARANTOR _____

Name of Bank _____

Address _____

Date _____

(Amend accordingly if provided by Insurance Company)

PERFORMANCE BOND

By this Bond, We _____ of (or whose registered office is situated at] _____

as Principal (hereinafter called "the Contractor") and _____

_____ of [or whose registered office is situated at] _____

as Surety (hereinafter called "the Surety"), are held and firmly bound unto

_____ of [or whose registered office is situated at] _____

as Obligee (hereinafter called "the Employer") in the amount of Kshs. _____ [*amount of Bond in figures*] Kenya Shillings

[*amount of Bond in words*], for the payment of which sum well and truly, the Contractor and the Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS the Contractor has entered into a Contract with the Employer dated the _____ day of _____ 20 _____ for the execution of _____

[*name of Contract*] in accordance with the Contract documents, Specifications and amendments thereto, which to the extent herein provided for, are by reference made part hereof and are hereinafter referred to as the Contract.

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

- (1) complete the Contract in accordance with its terms and conditions; or
- (2) obtain a tender or tenders from qualified tenderers for submission to the Employer for completing the Contract in accordance with its terms and conditions, and upon determination by the Employer and the Surety of the lowest responsive tenderer, arrange for a Contract between such tenderer and Employer and make available as work progresses (even though there should be a default or a succession of defaults under the Contract or Contracts of completion arranged under this paragraph) sufficient funds to pay the cost of completion less the balance of the Contract Price; but not exceeding, including other costs and damages for which the Surety may be liable hereunder, the amount set forth in the first paragraph hereof.

The term "Balance of the Contract Price", as used in this paragraph, shall mean the total amount payable by the Employer to the Contractor under the

Contract, less the amount properly paid by the Employer to the Contractor; or

- (3) pay the Employer the amount required by the Employer to complete the Contract in accordance with its terms and conditions up to a total not exceeding the amount of this Bond.

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

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

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

In testimony whereof, the Contractor has hereunto set his hand and affixed his seal, and the Surety has caused these presents to be sealed with his corporate seal duly attested by the signature of his legal representative, this _____ day of _____ 20_____

SIGNED ON _____ SIGNED ON _____

On behalf of _____ On behalf of _____
[name of Contractor] *[name of Surety]*

By _____ By _____

In the capacity of _____ In the capacity of _____

In the presence of;Name _____ In the presence of;Name _____

Address _____

Address _____

Signature _____

Signature _____

Date _____

Date _____

BANK GUARANTEE FOR ADVANCE PAYMENT

To: _____ *[name of Employer]* _____ *(Date)*
_____ *[address of Employer]*

Gentlemen,

Ref: _____[*name of Contract*]

In accordance with the provisions of the Conditions of Contract of the above-mentioned Contract, We, _____[*name and Address of Contractor*] (hereinafter called "the Contractor") shall deposit with _____[*name of Employer*] a bank guarantee to guarantee his proper and faithful performance under the said Contract in an amount of Kshs. _____[*amount of Guarantee in figures*] Kenya Shillings _____[*amount of Guarantee in words*].

We, _____[*bank or financial institution*], as instructed by the Contractor, agree unconditionally and irrevocably to guarantee as primary obligator and not as Surety merely, the payment to _____[*name of Employer*] on his first demand without whatsoever right of objection on our part and without his first claim to the Contractor, in the amount not exceeding Kshs _____[*amount of Guarantee in figures*] Kenya Shillings _____[*amount of Guarantee in words*], such amount to be reduced periodically by the amounts recovered by you from the proceeds of the Contract.

We further agree that no change or addition to 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 _____[*name of Employer*] and the Contractor, shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modification.

No drawing may be made by you under this guarantee until we have received notice in writing from you that an advance payment of the amount listed above has been paid to the Contractor pursuant to the Contract.

This guarantee shall remain valid and in full effect from the date of the advance payment under the Contract until _____[*name of Employer*] receives full payment of the same amount from the Contract.

Yours faithfully,

Signature and Seal _____

Name of the Bank or financial institution _____

Address _____

Date _____

Witness: Name: _____

Address: _____

Signature: _____

Date: _____

QUALIFICATION INFORMATION

1. Individual Tenderers or Individual Members of Joint Ventures

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

Place of registration: _____

Principal place of business _____

Power of attorney of signatory of tender **shall be required**

1.2 Total annual volume of construction work performed in the last **Three (3) years shall be kshs.20 Million**

Year	Volume	
	Currency	Value
Yr 1		
Yr 2		
Yr 3		

1.3 Work performed as Main Contractor on works of a similar nature within the last Three (3) years with a *minimum value* of Ksh.10 Million. Also list details of work under way or committed, including expected completion date.

Year	Project name	Name of Client	Description of Similar work performed	Value of Contract (Ksh)
Yr 1				
Yr 2				
Yr 3				

1.4 Major items of Contractor's Equipment proposed for carrying out the Works. List all information requested below.

1.5. Equipment

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

No.	Equipment Type and Characteristics	Minimum Number required
1	7/10 ton Tipper Lorry	1
2	Dozer	1
3	Excavator	1
4	4WD Pickup	1
5	Rock breakers	
6	Back hoe excavator	1
7	Water Bowser	1
8	Hand tools equipment (Assorted)	Various

1.6. Personnel

Qualifications and experience of key personnel proposed for administration and execution of the Contract. Attach biographical data.

The Bidder must demonstrate that it will have the personnel for the key positions that meet the following requirements:

No.	Position	Total Work Similar Experience (years)	In Similar Works Experience (years)
1	Civil Engineer	5	3
2	Hydro-geologist	5	3
3	Construction Technicians (Pipefitters)	7	5
4	Plant Operators	8	6
5	Surveyor	5	3

1.7. Financials

Financial reports for the last three (3) years: balance sheets, profit and loss statements, auditor's reports, etc. List below and attach copies.

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

- 1.2 Name, address and telephone, telex and facsimile numbers of banks that may provide reference if contacted by the Employer.
- 1.3 Statement of compliance with the requirements of Clause 1.2 of the Instructions to Tenderers.
- 1.4 Proposed program (work method and schedule) for the whole of the Works shall be submitted

2 Joint Ventures

- 2.0 The information listed in 1.1 – 2.0 above shall be provided for each partner of the joint venture.
- 2.1 The information required in 1.11 above shall be provided for the joint venture.
- 2.2 Attach the power of attorney of the signatory(ies) of the tender authorizing signature of the tender on behalf of the joint venture
- 2.3 Attach the Agreement among all partners of the joint venture (and which is legally binding on all partners), which shows that:
 - a) all partners shall be jointly and severally liable for the execution of the Contract in accordance with the Contract terms;
 - b) one of the partners will be nominated as being in charge, authorized to incur liabilities and receive instructions for and on behalf of any and all partners of the joint venture; and
 - c) the execution of the entire Contract, including payment, shall be done exclusively with the partner in charge.

TENDER QUESTIONNAIRE

Please fill in block letters.

1. Full names of tenderer;

.....

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

.....

3. Telephone number (s) of tenderer;

.....

4. Telex of tenderer;

.....

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

.....

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

.....

.....

Signature of Tenderer

Make copy and deliver to: _____ (*Name of Employer*)

ANTI-CORRUPTION DECLARATION COMITMENT/ PLEDGE

(Sections 39, 40, 41, 42, 43 & of the PPD Act, 2005)

I/We/Messrs.....

of Street, Building, P O Box.....

.....

Contact/Phone/E mail.....

declare that Public Procurement is based on a free and fair competitive Tendering process which should not be open to abuse.

I/We

declare that I/We will not offer or facilitate, directly or indirectly, any inducement or reward to any public officer, their relations or business associates, in connection with

Tender/Tender No

for or in the subsequent performance of the contract if I/We am/are successful.

Authorized Signature.....

Name and Title of Signatory.....

CONFIDENTIAL BUSINESS QUESTIONNAIRE

You are requested to give the particulars indicated in Part 1 and either Part 2 (a), 2 (b) or 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

Business Name

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

Plot No..... Street/Road

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

Nature of Business.....

Current Trade Licence No..... Expiring date.....

Maximum value of business which you can handle at any time: K.
pound.....

Name of your bankers.....

Branch.....

Part 2 (a) – Sole Proprietor

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

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

Citizenship details

Part 2 (b) – Partnership

Give details of partners as follows:

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

Tender-Securing Declaration (Mandatory)

Date: *[insert **date** (as day, month and year)]*

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

Alternative No.: *[insert **identification No if this is a Tender for an alternative**]*

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

We, the undersigned, declare that:

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

We accept that we will automatically be suspended from being eligible for Tendering in any contract with the Procuring Entity for the period of time of *[insert **number of months or years**]* starting on *[insert **date**]*, if we are in breach of our obligation(s) under the Tender conditions, because we;

- a) Have withdrawn our Tender during the period of Tender validity specified in the Form of Tender; or
- b) Having been notified of the acceptance of our Tender by the Procuring Entity during the period of Tender validity,
 - (i). Fail or refuse to execute the Contract, if required, or
 - (ii). Fail or refuse to furnish the Performance Security, in accordance with the ITT.

We understand this Tender Securing Declaration shall expire if we are not the successful Tenderer, upon the earlier of;

- 1) Our receipt of your notification to us of the name of the successful Tenderer; or
- 2) Thirty days after the expiration of our Tender.

Signed: *[insert signature of person whose name and capacity are shown]* In the capacity of *[insert legal capacity of person signing the Tender Securing Declaration]*

Name: *[insert **complete name of person signing the Tender Securing Declaration**]*

Duly authorized to sign the Tender for and on behalf of: *[insert **complete name of Tenderer**]*

Dated on _____ day of _____, _____ *[insert date of signing]*

Corporate Seal (where appropriate)

LETTER OF NOTIFICATION OF AWARD

Address of Procuring Entity

To: _____

RE: Tender No. _____

Tender Name _____

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

.

.

1. Please acknowledge receipt of this letter of notification signifying your acceptance.
2. The contract/contracts shall be signed by the parties within 30 days of the date of this letter but not earlier than 14 days from the date of the letter.
3. You may contact the officer(s) whose particulars appear below on the subject matter of this letter of notification of award.

(FULL PARTICULARS) _____

SIGNED FOR ACCOUNTING OFFICER

REPUBLIC OF KENYA
PUBLIC PROCUREMENT ADMINISTRATIVE REVIEW BOARD

APPLICATION NO.....OF.....20.....

BETWEEN

.....APPLICANT

AND

.....RESPONDENT (*Procuring Entity*)

Request for review of the decision of the..... (*Name of the Procuring Entity*) ofdated the...day of20.....in the matter of Tender No.....of20...

REQUEST FOR REVIEW

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

- 1.
- 2.
- etc.

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

- 1.
- 2.
- etc

SIGNED(Applicant)

Dated on.....day of/...20...

FOR OFFICIAL USE ONLY

Lodged with the Secretary Public Procurement Administrative Review Board on day of20.....

SIGNED
Board Secretary

ANNEX 1 – EVALUATION CRITERIA

PRELIMINARY EXAMINATION OF COMPLETENESS OF BID DOCUMENTS

A. MANDATORY REQUIREMENTS

- (a) copies of certificates of registration, and principal place of business;
- (b) Ensure your firm is e- citizen linked
- (c) Valid Tax Compliance Certificate
- (d) Copies of PIN Certificate
- (e) Copies of VAT Certificate
- (f) Valid Copies of CR 12
- (g) Copies valid AGPO Certificate
- (h) Dully completed , Signed & Stamped Tender Securing declaration
- (i) Dully filled, signed and stamped price schedules & Bill of quantities.
- (j) Bid Validity shall be 90 days
- (k) Power of attorney shall be required
- (l) Dully completed , Signed & Stamped Form of Tender
- (m) Dully completed , Signed & Stamped Business questionnaire
- (n) Copies of certificate of registration NCA 8 and above on water works
- (o) Document must be paginated
- (p) total monetary value of construction work performed for each of the last Three (3) years;
- (q) experience in works of a similar nature and size for each of the last Three (3) years, and clients who may be contacted for further information on these contracts;
- (r) major items of construction equipment owned or leased
- (s) qualifications and experience of key site management and technical personnel proposed for the Contract;
- (t) reports on the financial standing of the Tenderer, such as profit and loss statements and auditor's reports for the last two years;
- (u) Authority to seek references from the Tenderer's bankers.
- (v) Submit Anti-Corruption Declaration Commitment/ Pledge

B. QUALIFICATION CRITERIA

- a) Access to Liquid assets
- b) Minimum average annual construction turnover
- c) General construction experience
- d) Minimum contracts of similar experience
- e) Adequacy of technical proposal
- f) Key Personnel
- g) Equipment