



**REPUBLIC OF KENYA
MANDERA COUNTY GOVERNMENT**



TENDER DOCUMENT

FOR

**FRAMEWORK CONTRACT FOR DRILLING, EQUIPPING AND
CONSTRUCTION OF CIVIL WORKS AT VARIOUS
LOCATIONS IN MANDERA COUNTY (AS AND WHEN
REQUIRED)**

IN

MANDERA COUNTY

MCG/OT/04/2020-2021

AUGUST, 2020

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INTRODUCTION

- 1.1 This standard tender document for procurement of works has been prepared for use by procuring entities in Kenya in the procurement of works (i.e. Buildings and associated Civil Engineering Works).
- 1.2 The following guidelines should be observed when using the document:-
- (a) Specific details should be furnished in the Invitation to tender and in the special conditions of contract (where applicable). The tender document issued to tenderers should not have blank spaces or options.
 - (b) The instructions to tenderers and the General Conditions of Contract should remain unchanged. Any necessary amendments to these parts should be made through Appendix to instructions to tenderers and special conditions of contract respectively.
- 1.3
- (b) Information contained in the invitation to tender shall conform to the data and information in the tender documents to enable prospective tenderers to decide whether or not to participate in the tender and shall indicate any important tender requirements
 - (c) The invitation to tender shall be as an advertisement in accordance with the regulations or a letter of invitation addressed to tenderers who have been prequalified following a request for prequalification.
- 1.4 The cover of the document shall be modified to include:-
- I. Tender number.
 - II. Tender name.
 - III. Name of procuring entity.
 - IV. Delete name and address of PPOA.

SECTION I – INVITATION TO TENDER

Tender REF No. MCG/OT/04/2020-2021

Tender name FRAMEWORK CONTRACT FOR DRILLING, EQUIPPING AND CONSTRUCTION OF CIVIL WORKS AT VARIOUS LOCATIONS IN MANDERA COUNTY (AS AND WHEN REQUIRED)

- 1.1 The Mandera county government invites sealed tenders from eligible candidates for the **FRAMEWORK CONTRACT FOR DRILLING, EQUIPPING AND CONSTRUCTION OF CIVIL WORKS AT VARIOUS LOCATIONS IN MANDERA COUNTY (AS AND WHEN REQUIRED)**
- 1.2 Bidders may download the bid documents free of charge from www.mandera.go.ke but they will be required to register with the **Supply chain Management** office upon submitting the tender. Bidders who download the documents and fail to register with Mandera County may have their bids not opened and/ or evaluated.
- 1.3 **Complete set of tender document (in Original and 1 Copy)** should be enclosed in a plain sealed envelope marked with the tender name and reference number and be deposited in the tender box located at the County Supply Chain Office at the County Treasury so as to be received on or **before Friday 11nd September, 2020 at 10:00 am** East African Time. The tenders will be opened soon thereafter at the procurement office in the presence of bidders representatives who wish to attend.

Addressed to:

Accounting Officers

Mandera County Government

P.O Box 13-70300

Mandera, Kenya

County Head of Supply Chain Management

FOR: ACCOUNTING OFFICERS

SECTION II

INSTRUCTIONS TO TENDERERS

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INSTRUCTIONS TO TENDERERS.**1. General/Eligibility/Qualifications/Joint venture/Cost of tendering**

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

- (c) experience in works of a similar nature and size for each of the last five years, and details of work under way or contractually committed; and names and addresses of clients who may be contacted for further information on these contracts;
- (d) major items of construction equipment proposed to carry out the Contract and an undertaking that they will be available for the Contract.
- (e) qualifications and experience of key site management and technical personnel proposed for the Contract and an undertaking that they shall be available for the Contract.
- (f) reports on the financial standing of the tenderer, such as profit and loss statements and auditor's reports for the past five years;
- (g) evidence of adequacy of working capital for this Contract (access to line(s) of credit and availability of other financial resources);
- (h) authority to seek references from the tenderer's bankers;
- (i) information regarding any litigation, current or during the last five years, in which the tenderer is involved, the parties concerned and disputed amount; and
- (j) proposals for subcontracting components of the Works amounting to more than 10 percent of the Contract Price.

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

- (a) the tender shall include all the information listed in clause 1.5 above for each joint venture partner;
- (b) the tender shall be signed so as to be legally binding on all partners;

- (c) all partners shall be jointly and severally liable for the execution of the Contract in accordance with the Contract terms;
- (d) one of the partners will be nominated as being in charge, authorised to incur liabilities, and receive instructions for and on behalf of all partners of the joint venture; and
- (e) the execution of the entire Contract, including payment, shall be done exclusively with the partner in charge.

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

- (a) annual volume of construction work of at least 2.5 times the estimated annual cashflow for the Contract;
- (b) experience as main contractor in the construction of at least
- (c) two works of a nature and complexity equivalent to the Works over the last 10 years (to comply with this requirement, works cited should be at least 70 percent complete);
- (d) proposals for the timely acquisition (own, lease, hire, etc.) of the essential equipment listed as required for the Works;
- (e) a Contract manager with at least five years' experience in works of an equivalent nature and volume, including no less than three years as Manager; and
- (f) liquid assets and/or credit facilities, net of other contractual commitments and exclusive of any advance payments which may be made under the Contract, of no less than 4 months of the estimated payment flow under this Contract.

1.8 The figures for each of the partners of a joint venture shall be added together to determine the tenderer's compliance with the minimum qualifying criteria of clause 1.7 (a) and (e); however, for a joint venture to qualify, each of its partners must meet at least 25 percent of minimum criteria 1.7 (a), (b) and (e) for an individual tenderer, and the partner in charge at least 40 percent of those minimum criteria. Failure to comply with this requirement will result in rejection of the

joint venture's tender. Subcontractors' experience and resources will not be taken into account in determining the tenderer's compliance with the qualifying criteria, unless otherwise stated.

- 1.9 Each tenderer shall submit only one tender, either individually or as a partner in a joint venture. A tenderer who submits or participates in more than one tender (other than as a subcontractor or in cases of alternatives that have been permitted or requested) will cause all the proposals with the tenderer's participation to be disqualified.
- 1.10 The tenderer shall bear all costs associated with the preparation and submission of his tender, and the Employer will in no case be responsible or liable for those costs.
- 1.11 The tenderer, at the tenderer's own responsibility and risk, is encouraged to visit and examine the Site of the Works and its surroundings, and obtain all information that may be necessary for preparing the tender and entering into a contract for construction of the Works. The costs of visiting the Site shall be at the tenderer's own expense.
- 1.12 The procuring entity's employees, committee members, board members and their relative (spouse and children) are not eligible to participate in the tender.
- 1.13 The price to be charged for the tender document shall not exceed Kshs.5,000/=
- 1.14 The procuring entity shall allow the tenderer to review the tender document free of charge before purchase.

2. Tender Documents

- 2.1 The complete set of tender documents comprises the documents listed below and any addenda issued in accordance with Clause 2.4.
 - (a) These Instructions to Tenderers
 - (b) Form of Tender and Qualification Information
 - (c) Conditions of Contract
 - (d) Appendix to Conditions of Contract
 - (e) Specifications
 - (f) Drawings
 - (g) Bills of Quantities
 - (h) Forms of Securities

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

3. Preparation of Tenders

- 3.1 All documents relating to the tender and any correspondence shall be in English language.
- 3.2 The tender submitted by the tenderer shall comprise the following:
- (a) These Instructions to Tenderers, Form of Tender, Conditions of Contract, Appendix to Conditions of Contract and Specifications;
 - (b) Tender Security;
 - (c) Priced Bill of Quantities ;
 - (d) Qualification Information Form and Documents;

- (e) Alternative offers where invited; and
 - (f) Any other materials required to be completed and submitted by the tenderers.
- 3.3 The tenderer shall fill in rates and prices for all items of the Works described in the Bill of Quantities. Items for which no rate or price is entered by the tenderer will not be paid for when executed and shall be deemed covered by the other rates and prices in the Bill of Quantities. All duties, taxes, and other levies payable by the Contractor under the Contract, or for any other cause relevant to the Contract, as of 30 days prior to the deadline for submission of tenders, shall be included in the tender price submitted by the tenderer.
- 3.4 The rates and prices quoted by the tenderer shall only be subject to adjustment during the performance of the Contract if provided for in the Appendix to Conditions of Contract and provisions made in the Conditions of Contract.
- 3.5 The unit rates and prices shall be in Kenya Shillings.
- 3.6 Tenders shall remain valid for a period of sixty (60) days from the date of submission. However in exceptional circumstances, the Employer may request that the tenderers extend the period of validity for a specified additional period. The request and the tenderers' responses shall be made in writing. A tenderer may refuse the request without forfeiting the Tender Security. A tenderer agreeing to the request will not be required or permitted to otherwise modify the tender, but will be required to extend the validity of Tender Security for the period of the extension, and in compliance with Clause 3.7 - 3.11 in all respects.
- 3.7 The tenderer shall furnish, as part of the tender, a Tender Security in the amount and form specified in the appendix to invitation to tenderers. This shall be in the amount not exceeding 2 percent of the tender price
- 3.8 The format of the Tender Security should be in accordance with the form of Tender Security included in Section G - Standard forms or any other form acceptable to the Employer . Tender Security shall be valid for 30 days beyond the validity of the tender.
- 3.9 Any tender not accompanied by an acceptable Tender Security shall be rejected. The Tender Security of a joint venture must define as "Tenderer" all joint venture partners

and list them in the following manner: a joint venture consisting of".....", ".....", and ".....".

- 3.10 The Tender Securities of unsuccessful tenderers will be returned within 28 days of the end of the tender validity period specified in Clause 3.6.
- 3.11 The Tender Security of the successful tenderer will be discharged when the tenderer has signed the Contract Agreement and furnished the required Performance Security.
- 3.12 The Tender Security may be forfeited
- (a) if the tenderer withdraws the tender after tender opening during the period of tender validity;
 - (b) if the tenderer does not accept the correction of the tender price, pursuant to Clause 5.7;
 - (c) in the case of a successful tenderer, if the tenderer fails within the specified time limit to
 - (i) sign the Agreement, or
 - (ii) furnish the required Performance Security.
- 3.13 Tenderers shall submit offers that comply with the requirements of the tendering documents, including the basic technical design as indicated in the Drawings and Specifications. Alternatives will not be considered, unless specifically allowed in the invitation to tender. If so allowed, tenderers wishing to offer technical alternatives to the requirements of the tendering documents must also submit a tender that complies with the requirements of the tendering documents, including the basic technical design as indicated in the Drawings and Specifications. In addition to submitting the basic tender, the tenderer shall provide all information necessary for a complete evaluation of the alternative, including design calculations, technical specifications, breakdown of prices, proposed construction methods and other relevant details. Only the technical alternatives, if any, of the lowest evaluated tender conforming to the basic technical requirements shall be considered.
- 3.14 The tenderer shall prepare one original of the documents comprising the tender documents as described in Clause 3.2 of these Instructions to Tenderers, bound with the volume containing the Form of Tender,

and clearly marked “ORIGINAL”. In addition, the tenderer shall submit copies of the tender, in the number specified in the invitation to tender, and clearly marked as “COPIES”. In the event of discrepancy between them, the original shall prevail.

- 3.15 The original and all copies of the tender shall be typed or written in indelible ink and shall be signed by a person or persons duly authorised to sign on behalf of the tenderer, pursuant to Clause 1.5 (a) or 1.6 (b), as the case may be. All pages of the tender where alterations or additions have been made shall be initialled by the person or persons signing the tender.
- 3.16 Clarification of tenders shall be requested by the tenderer to be received by the procuring entity not later than 7 days prior to the deadline for submission of tenders.
- 3.17 The procuring entity shall reply to any clarifications sought by the tenderer within 3 days of receiving the request to enable the tenderer to make timely submission of its tender.
- 3.18 The tender security shall be in the amount of 0.5 – 2 per cent of the tender price.

4. Submission of Tenders

- 4.1 The tenderer shall seal the original and all copies of the tender in two inner envelopes and one outer envelope, duly marking the inner envelopes as “**ORIGINAL**” and “**COPIES**” as appropriate. The inner and outer envelopes shall:
 - (a) be addressed to the Employer at the address provided in the invitation to tender;
 - (b) bear the name and identification number of the Contract as defined in the invitation to tender; and
 - (c) provide a warning not to open before the specified time and date for tender opening.
- 4.2 Tenders shall be delivered to the Employer at the address specified above not later than the time and date specified in the invitation to tender. However, the Employer may extend the deadline for submission of tenders by issuing an amendment in accordance with Sub-Clause 2.5 in which case all rights and obligations of the Employer and the tenderers previously subject to the original deadline will then be subject to the new deadline.

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

5. Tender Opening and Evaluation

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

process until the award to the successful tenderer has been announced. Any effort by a tenderer to influence the Employer's officials, processing of tenders or award decisions may result in the rejection of his tender.

- 5.4 To assist in the examination, evaluation, and comparison of tenders, the Employer at his discretion, may ask any tenderer for clarification of the tender, including breakdowns of unit rates. The request for clarification and the response shall be in writing or by cable, telex or facsimile but no change in the price or substance of the tender shall be sought, offered, or permitted except as required to confirm the correction of arithmetic errors discovered in the evaluation of the tenders in accordance with Clause 5.7.
- 5.5 Prior to the detailed evaluation of tenders, the Employer will determine whether each tender (a) meets the eligibility criteria defined in Clause 1.7;(b) has been properly signed; (c) is accompanied by the required securities; and (d) is substantially responsive to the requirements of the tendering documents. A substantially responsive tender is one which conforms to all the terms, conditions and specifications of the tendering documents, without material deviation or reservation. A material deviation or reservation is one (a) which affects in any substantial way the scope, quality, or performance of the works; (b) which limits in any substantial way, inconsistent with the tendering documents, the Employer's rights or the tenderer's obligations under the Contract; or (c) whose rectification would affect unfairly the competitive position of other tenderers presenting substantially responsive tenders.
- 5.6 If a tender is not substantially responsive, it will be rejected, and may not subsequently be made responsive by correction or withdrawal of the nonconforming deviation or reservation.
- 5.7 Tenders determined to be substantially responsive will be checked for any arithmetic errors. Errors will be corrected as follows:
 - (a) where there is a discrepancy between the amount in figures and the amount in words, the amount in words will prevail; and
 - (b) where there is a discrepancy between the unit rate and the line item total resulting from multiplying the unit rate by the quantity, the unit rate as quoted will prevail, unless in the opinion of the Employer, there is an obvious typographical error, in which case the

adjustment will be made to the entry containing that error.

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

- (d) making appropriate adjustments to reflect discounts or other price modifications offered in accordance with clause 4.6
- 5.10 The Employer reserves the right to accept or reject any variation, deviation, or alternative offer. Variations, deviations, and alternative offers and other factors which are in excess of the requirements of the tender documents or otherwise result in unsolicited benefits for the Employer will not be taken into account in tender evaluation.
- 5.11 The tenderer shall not influence the Employer on any matter relating to his tender from the time of the tender opening to the time the Contract is awarded. Any effort by the Tenderer to influence the Employer or his employees in his decision on tender evaluation, tender comparison or Contract award may result in the rejection of the tender.
- 5.12 Firms incorporated in Kenya where indigenous Kenyans own 51% or more of the share capital shall be allowed a 10% preferential bias provided that they do not sub-contract work valued at more than 50% of the Contract Price excluding Provisional Sums to an non-indigenous sub-contractor.

6. Award of Contract

- 6.1 Subject to Clause 6.2, the award of the Contract will be made to the tenderer whose tender has been determined to be substantially responsive to the tendering documents and who has offered the lowest evaluated tender price, provided that such tenderer has been determined to be (a) eligible in accordance with the provision of Clauses 1.2, and (b) qualified in accordance with the provisions of clause 1.7 and 1.8.
- 6.2 Notwithstanding clause 6.1 above, the Employer reserves the right to accept or reject any tender, and to cancel the tendering process and reject all tenders, at any time prior to the award of Contract, without thereby incurring any liability to the affected tenderer or tenderers or any obligation to inform the affected tenderer or tenderers of the grounds for the action.
- 6.3 The tenderer whose tender has been accepted will be notified of the award prior to expiration of the tender validity period in writing or by cable, telex or facsimile. This notification (hereinafter and in all Contract documents called the "Letter of Acceptance") will state the sum (hereinafter and in all Contract documents called the "Contract Price") that the

Employer will pay the Contractor in consideration of the execution, completion, and maintenance of the Works by the Contractor as prescribed by the Contract. At the same time the other tenderers shall be informed that their tenders have not been successful.

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

- 6.4 The Agreement will incorporate all agreements between the Employer and the successful tenderer. Within 14 days of receipt the successful tenderer will sign the Agreement and return it to the Employer.
- 6.5 Within 21 days after receipt of the Letter of Acceptance, the successful tenderer shall deliver to the Employer a Performance Security in the amount stipulated in the Appendix to Conditions of Contract and in the form stipulated in the Tender documents. The Performance Security shall be in the amount and specified form
- 6.6 Failure of the successful tenderer to comply with the requirements of clause 6.5 shall constitute sufficient grounds for cancellation of the award and forfeiture of the Tender Security.
- 6.7 Upon the furnishing by the successful tenderer of the Performance Security, the Employer will promptly notify the other tenderers that their tenders have been unsuccessful.
- 6.8 Preference where allowed in the evaluation of tenders shall not be allowed for contracts not exceeding one year (12 months)
- 6.9 The tender evaluation committee shall evaluate the tender within 30 days of the validity period from the date of opening the tender.
- 6.10 The parties to the contract shall have it signed within 30 days from the date of notification of contract award unless there is an administrative review request.
- 6.11 Contract price variations shall not be allowed for contracts not exceeding one year (12 months)
- 6.12 Where contract price variation is allowed, the valuation shall not exceed 15% of the original contract price.
- 6.13 Price variation request shall be processed by the procuring entity within 30 days of receiving the request.

- 6.14 The procuring entity may at any time terminate procurement proceedings before contract award and shall not be liable to any person for the termination.
- 6.15 The procuring entity shall give prompt notice of the termination to the tenderers and on request give its reasons for termination within 14 days of receiving the request from any tenderer.
- 6.16 A tenderer who gives false information in the tender document about its qualification or who refuses to enter into a contract after notification of contract award shall be considered for debarment from participating in future public procurement.

7. Corrupt and Fraudulent practices

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

	oaths/advocates									
5	Valid current year tax compliance certificate certified by commissioner of oaths /advocates.	Mandatory (Yes/No)								
6	Certificate of incorporation certified by commissioner of oaths/advocates.	Mandatory (Yes/No)								
7	PIN/VAT certificate from KRA certified by commissioner of oaths/advocates	Mandatory (Yes/No)								
8	CR 12 form certified by commissioner of oaths/advocates	Mandatory (Yes/No)								
9	Serialization of the tender document	Mandatory (Yes/No)								
10	Submit tender document in original and copy	Mandatory (Yes/No)								
11	Must submit a copy of valid registration by the National Construction Authority (NCA 7 for water works and above) Certified By Registered Commissioner of Oath	Mandatory (Yes/No)								

KEY

Bidder 1: B1

Bidder 2: B2

Bidder 3: B3

Bidder 4: B4

Bidder 5: B5
 Bidder 6: B6
 Bidder 7: B7
 Bidder 8: B8

NB: At this stage, the tender's submission will either be responsive or non-responsive. The non-responsive submission will be eliminated from the entire evaluation process and will not be considered further.

TECHNICAL EVALUATION CRITERIA SUMMARY

		TECHNICAL	
		EVALUATION	
NO.	PARAMETER		MAXIMUM SCORE
1	Relevant Experience Experience as prime contractor in the construction of at least three (3) projects of similar nature and complexity of the works	Must attach copies of award letter and completion letter and any other proofs <ol style="list-style-type: none"> 1. Experience >3Projects – 30 marks 2. Experience 2 Projects – 20 Marks 3. Experience of 1 Project – 10 Marks 4. Experience of 0 project – 0 Marks 	30
		Total	30
2	EQUIPMENTS Rotary Drilling Rig, (10 marks) Truck (2 Marks), 4WD vehicle, (2 Marks) Water Booser (2 Marks), Mud pump(2Marks), Air compressor(2 Marks), Welding machine (2 Marks), Test pumping Unit(3Marks)	Proof of ownership Co-owned Leased agreement signed and deposited with commission of oath Proof of log books and lease agreement and proof of Mechanical Conditions of Plants and Equipment' required/attached. (maximum20mks)	25
		Total	25
KEY PERSONNEL			
SITE AGENT Maximum 10marks	QUALIFICATION	Degree	6
	Ground water technician/geologist	Diploma	3
	Relevant experience		

	(10years)	5-10 years	4
		1-5 years	2
TECHNICIANS Mechanics-2Marks Plumbers -2marks Welder/fabricators- 2marks (Maximum 6marks)	QUALIFICATION Artisan	Diploma	1 each
		Certificate	0.5 each
	Relevant experience	5-10 years	1 each
		1-5 years	0.5 each
DRILLER 4 marks	QUALIFICATION Technician Diploma in drilling technology	Diploma	3
		Certificate	2
	Relevant Experience	5-10 years	1
		1-5 years	1
			20marks
Financial capacity (maximum 25marks)	Audited accounts Financial capability the firm based on information provided in the last two years audited accounts 2018- 2019 Current Ratio = Current assets/Current liabilities (a ration of 1and above (2marks) Below 1 (1mark) For each year audited		10
	Line of credit of over 10Million		5
	Bank statement (last six months to date of tender		6
Proposed program (work methodology and schedule)			4
		Total	25
		GRAND TOTAL	100
Those who score below 70% will be eliminated at this stage from the entire evaluation process and will not be considered further. Financial evaluation will be based on the quote submitted for each item.			
The Authority will verify information submitted. Any form of forgery or misinformation will lead to cancellation of the bid.			

SECTION III CONDITIONS OF CONTRACT

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CONDITIONS OF CONTRACT

1. Definitions

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

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

“Compensation Events” are those defined in Clause 24 hereunder.

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

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

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

“The Contractor’s Tender” is the completed tendering document submitted by the Contractor to the Employer.

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

“Days” are calendar days; **“Months”** are calendar months.

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

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

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

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

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

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

“Equipment” is the Contractor’s machinery and vehicles brought temporarily to the Site for the execution of the Works.

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

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

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

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

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

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

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

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

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

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

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

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

2. Interpretation

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

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

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

3. Language and Law

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

4 Project Manager's Decisions

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

5 Delegation

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

6 Communications

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

7 Subcontracting

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

8 Other Contractors

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

9 Personnel

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

10 Works

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

11 Safety and Temporary Works

- 11.1 The Contractor shall be responsible for the design of temporary works. However before erecting the same, he shall

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

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

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

12. Discoveries

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

13. Work Program

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

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

14. Possession of Site

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

15. Access to Site

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

16. Instructions

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

17. Extension or Acceleration of Completion Date

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

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

18. Management Meetings

18.1 A Contract management meeting shall be held monthly and attended by the Project Manager and the Contractor. Its business shall be to review the plans for the remaining Work and to deal with matters raised in accordance with the early warning procedure. The Project Manager shall record the minutes of management meetings and provide copies of the

same to those attending the meeting and the Employer. The responsibility of the parties for actions to be taken shall be decided by the Project Manager either at the management meeting or after the management meeting and stated in writing to all who attended the meeting.

19. Early Warning

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

20. Defects

- 20.1 The Project Manager shall inspect the Contractor's work and notify the Contractor of any defects that are found. Such inspection shall not affect the Contractor's responsibilities. The Project Manager may instruct the Contractor to search for a defect and to uncover and test any Work that the Project Manager considers may have a defect. Should the defect be found, the cost of uncovering and making good shall be borne by the Contractor, However, if there is no defect found, the cost of uncovering and making good shall be treated as a variation and added to the Contract Price.
- 20.2 The Project Manager shall give notice to the Contractor of any defects before the end of the Defects Liability Period, which begins at Completion, and is defined in the Appendix to Conditions of Contract. The Defects Liability Period shall be extended for as long as defects remain to be corrected.
- 20.3 Every time notice of a defect is given, the Contractor shall correct the notified defect within the length of time specified by the Project Manager's notice. If the Contractor has not corrected a defect within the time specified in the Project Manager's notice, the Project Manager will assess the cost of having the defect corrected by other parties and such cost

shall be treated as a variation and be deducted from the Contract Price.

21. Bills Of Quantities

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

22. Variations

- 22.1 All variations shall be included in updated programs produced by the Contractor.
- 22.2 The Contractor shall provide the Project Manager with a quotation for carrying out the variations when requested to do so. The Project Manager shall assess the quotation, which shall be given within seven days of the request or within any longer period as may be stated by the Project Manager and before the Variation is ordered.
- 22.3 If the work in the variation corresponds with an item description in the Bills of Quantities and if in the opinion of the Project Manager, the quantity of work is not above the limit stated in Clause 21.2 or the timing of its execution does not cause the cost per unit of quantity to change, the rate in the Bills of Quantities shall be used to calculate the value of the variation. If the cost per unit of quantity changes, or if the nature or timing of the work in the variation does not correspond with items in the Bills of Quantities, the quotation by the Contractor shall be in the form of new rates for the relevant items of Work.
- 22.4 If the Contractor's quotation is unreasonable, the Project Manager may order the variation and make a change to the Contract price, which shall be based on the Project

Manager's own forecast of the effects of the variation on the Contractor's costs.

- 22.5 If the Project Manager decides that the urgency of varying the Work would prevent a quotation being given and considered without delaying the Work, no quotation shall be given and the variation shall be treated as a Compensation Event.
- 22.6 The Contractor shall not be entitled to additional payment for costs that could have been avoided by giving early warning.
- 22.7 When the Program is updated, the Contractor shall provide the Project Manager with an updated cash flow forecast.

23. Payment Certificates, Currency of Payments and Advance Payments

- 23.1 The Contractor shall submit to the Project Manager monthly applications for payment giving sufficient details of the Work done and materials on Site and the amounts which the Contractor considers himself to be entitled to. The Project Manager shall check the monthly application and certify the amount to be paid to the Contractor within 14 days. The value of Work executed and payable shall be determined by the Project Manager.
- 23.2 The value of Work executed shall comprise the value of the quantities of the items in the Bills of Quantities completed, materials delivered on Site, variations and compensation events. Such materials shall become the property of the Employer once the Employer has paid the Contractor for their value. Thereafter, they shall not be removed from Site without the Project Manager's instructions except for use upon the Works.
- 23.3 Payments shall be adjusted for deductions for retention. The Employer shall pay the Contractor the amounts certified by the Project Manager within 30 days of the date of issue of each certificate. If the Employer makes a late payment, the Contractor shall be paid simple interest on the late payment in the next payment. Interest shall be calculated on the basis of number of days delayed at a rate three percentage points above the Central Bank of Kenya's average rate for base lending prevailing as of the first day the payment becomes overdue.
- 23.4 If an amount certified is increased in a later certificate or as a result of an award by an Arbitrator, the Contractor shall be paid interest upon the delayed payment as set out in this clause. Interest shall be calculated from the date upon

which the increased amount would have been certified in the absence of dispute.

- 23.5 Items of the Works for which no rate or price has been entered in will not be paid for by the Employer and shall be deemed covered by other rates and prices in the Contract.
- 23.6 The Contract Price shall be stated in Kenya Shillings. All payments to the Contractor shall be made in Kenya Shillings and foreign currency in the proportion indicated in the tender, or agreed prior to the execution of the Contract Agreement and indicated therein. The rate of exchange for the calculation of the amount of foreign currency payment shall be the rate of exchange indicated in the Appendix to Conditions of Contract. If the Contractor indicated foreign currencies for payment other than the currencies of the countries of origin of related goods and services the Employer reserves the right to pay the equivalent at the time of payment in the currencies of the countries of such goods and services. The Employer and the Project Manager shall be notified promptly by the Contractor of an changes in the expected foreign currency requirements of the Contractor during the execution of the Works as indicated in the Schedule of Foreign Currency Requirements and the foreign and local currency portions of the balance of the Contract Price shall then be amended by agreement between Employer and the Contractor in order to reflect appropriately such changes.
- 23.7 In the event that an advance payment is granted, the following shall apply:-
- a) On signature of the Contract, the Contractor shall at his request, and without furnishing proof of expenditure, be entitled to an advance of 10% (ten percent) of the original amount of the Contract. The advance shall not be subject to retention money.
 - b) No advance payment may be made before the Contractor has submitted proof of the establishment of deposit or a directly liable guarantee satisfactory to the Employer in the amount of the advance payment. The guarantee shall be in the same currency as the advance.
 - c) Reimbursement of the lump sum advance shall be made by deductions from the Interim payments and where applicable from the balance owing to the Contractor. Reimbursement shall begin when the amount of the sums due under the Contract reaches

20% of the original amount of the Contract. It shall have been completed by the time 80% of this amount is reached.

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

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

Where:

- R = the amount to be reimbursed
- A = the amount of the advance which has been granted
- X¹ = the amount of proposed cumulative payments as a percentage of the original amount of the Contract. This figure will exceed 20% but not exceed 80%.
- X¹¹ = the amount of the previous cumulative payments as a percentage of the original amount of the Contract. This figure will be below 80% but not less than 20%.
- d) with each reimbursement the counterpart of the directly liable guarantee may be reduced accordingly.

24. Compensation Events

24.1 The following issues shall constitute Compensation Events:

- (a) The Employer does not give access to a part of the Site by the Site Possession Date stated in the Appendix to Conditions of Contract.
- (b) The Employer modifies the List of Other Contractors, etc., in a way that affects the Work of the Contractor under the Contract.
- (c) The Project Manager orders a delay or does not issue drawings, specifications or instructions required for execution of the Works on time.
- (d) The Project Manager instructs the Contractor to uncover or to carry out additional tests upon the Work, which is then found to have no defects.

- (e) The Project Manager unreasonably does not approve a subcontract to be let.
 - (f) Ground conditions are substantially more adverse than could reasonably have been assumed before issuance of the Letter of Acceptance from the information issued to tenderers (including the Site investigation reports), from information available publicly and from a visual inspection of the Site.
 - (g) The Project Manager gives an instruction for dealing with an unforeseen condition, caused by the Employer or additional work required for safety or other reasons.
 - (h) Other contractors, public authorities, utilities, or the Employer does not work within the dates and other constraints stated in the Contract, and they cause delay or extra cost to the Contractor.
 - (i) The effects on the Contractor of any of the Employer's risks.
 - (j) The Project Manager unreasonably delays issuing a Certificate of Completion.
 - (k) Other compensation events described in the Contract or determined by the Project Manager shall apply.
- 24.2 If a compensation event would cause additional cost or would prevent the Work being completed before the Intended Completion Date, the Contract Price shall be increased and/or the Intended Completion Date shall be extended. The Project Manager shall decide whether and by how much the Contract Price shall be increased and whether and by how much the Intended Completion Date shall be extended.
- 24.3 As soon as information demonstrating the effect of each compensation event upon the Contractor's forecast cost has been provided by the Contractor, it shall be assessed by the Project Manager, and the Contract Price shall be adjusted accordingly. If the Contractor's forecast is deemed unreasonable, the Project Manager shall adjust the Contract Price based on the Project Manager's own forecast. The Project Manager will assume that the Contractor will react competently and promptly to the event.
- 24.4 The Contractor shall not be entitled to compensation to the extent that the Employer's interests are adversely affected by the Contractor not having given early warning or not having co-operated with the Project Manager.

- 24.5 Prices shall be adjusted for fluctuations in the cost of inputs only if provided for in the Appendix to Conditions of Contract.
- 24.6 The Contractor shall give written notice to the Project Manager of his intention to make a claim within thirty days after the event giving rise to the claim has first arisen. The claim shall be submitted within thirty days thereafter.

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

25. Price Adjustment

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

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

26. Retention

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

27. Liquidated Damages

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

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

28. Securities

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

29. Dayworks

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

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

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

30. Liability and Insurance

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

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

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

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

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

The Contractor shall provide, in the joint names of the Employer and the Contractor, insurance cover from the Start

Date to the end of the Defects Liability Period, in the amounts stated in the Appendix to Conditions of Contract for the following events;

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

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

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

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

31. Completion and taking over

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

32. Final Account

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

Employer shall pay the Contractor the amount due in the Final Certificate within 60 days.

33. Termination

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

fundamental breaches of Contract shall include, but shall not be limited to, the following;

- (a) the Contractor stops work for 30 days when no stoppage of work is shown on the current program and the stoppage has not been authorised by the Project Manager;
- (b) the Project Manager instructs the Contractor to delay the progress of the Works, and the instruction is not withdrawn within 30 days;
- (c) the Contractor is declared bankrupt or goes into liquidation other than for a reconstruction or amalgamation;
- (d) a payment certified by the Project Manager is not paid by the Employer to the Contractor within 30 days (for Interim Certificate) or 60 days (for Final Certificate) of issue.
- (e) the Project Manager gives notice that failure to correct a particular defect is a fundamental breach of Contract and the Contractor fails to correct it within a reasonable period of time determined by the Project Manager;
- (f) the Contractor does not maintain a security, which is required.

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

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

33.4 If the Contract is terminated, the Contractor shall stop work immediately, make the Site safe and secure, and leave the Site as soon as reasonably possible. The Project Manager

shall immediately thereafter arrange for a meeting for the purpose of taking record of the Works executed and materials , goods, equipment and temporary buildings on Site.

34. Payment Upon Termination

- 34.1 If the Contract is terminated because of a fundamental breach of Contract by the Contractor, the Project Manager shall issue a certificate for the value of the Work done and materials ordered and delivered to Site up to the date of the issue of the certificate. Additional liquidated damages shall not apply. If the total amount due to the Employer exceeds any payment due to the Contractor, the difference shall be a debt payable by the Contractor.
- 34.2 If the Contract is terminated for the Employer's convenience or because of a fundamental breach of Contract by the Employer, the Project Manager shall issue a certificate for the value of the Work done, materials ordered, the reasonable cost of removal of equipment, repatriation of the Contractor's personnel employed solely on the Works, and the Contractor's costs of protecting and securing the Works.
- 34.3 The Employer may employ and pay other persons to carry out and complete the Works and to rectify any defects and may enter upon the Works and use all materials on the Site, plant, equipment and temporary works.
- 34.4 The Contractor shall, during the execution or after the completion of the Works under this clause remove from the Site as and when required, within such reasonable time as the Project Manager may in writing specify, any temporary buildings, plant, machinery, appliances, goods or materials belonging to or hired by him, and in default the Employer may (without being responsible for any loss or damage) remove and sell any such property of the Contractor, holding the proceeds less all costs incurred to the credit of the Contractor.
- Until after completion of the Works under this clause the Employer shall not be bound by any other provision of this Contract to make any payment to the Contractor, but upon such completion as aforesaid and the verification within a reasonable time of the accounts therefore the Project Manager shall certify the amount of expenses properly incurred by the Employer and, if such amount added to the money paid to the Contractor before such determination exceeds the total amount which would have been payable on due completion in accordance with this Contract the

difference shall be a debt payable to the Employer by the Contractor; and if the said amount added to the said money be less than the said total amount, the difference shall be a debt payable by the Employer to the Contractor.

35. Release from Performance

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

36. Corrupt gifts and payments of commission

The Contractor shall not;

(a) Offer or give or agree to give to any person in the service of the

Employer any gift or consideration of any kind as an inducement or reward for doing or forbearing to do or for having done or forborne to do any act in relation to the obtaining or execution of this or any other Contract for the Employer or for showing or forbearing to show favour or disfavour to any person in relation to this or any other contract for the Employer.

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

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

37. Settlement Of Disputes

37.1 In case any dispute or difference shall arise between the Employer or the Project Manager on his behalf and the Contractor, either during the progress or after the completion

or termination of the Works, such dispute shall be notified in writing by either party to the other with a request to submit it to arbitration and to concur in the appointment of an Arbitrator within thirty days of the notice. The dispute shall be referred to the arbitration and final decision of a person to be agreed between the parties. Failing agreement to concur in the appointment of an Arbitrator, the Arbitrator shall be appointed by the Chairman or Vice Chairman of any of the following professional institutions;

- (i) Architectural Association of Kenya
- (ii) Institute of Quantity Surveyors of Kenya
- (iii) Association of Consulting Engineers of Kenya
- (iv) Chartered Institute of Arbitrators (Kenya Branch)
- (v) Institution of Engineers of Kenya

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

- 37.2 The arbitration may be on the construction of this Contract or on any matter or thing of whatsoever nature arising thereunder or in connection therewith, including any matter or thing left by this Contract to the discretion of the Project Manager, or the withholding by the Project Manager of any certificate to which the Contractor may claim to be entitled to or the measurement and valuation referred to in clause 23.0 of these conditions, or the rights and liabilities of the parties subsequent to the termination of Contract.
- 37.3 Provided that no arbitration proceedings shall be commenced on any dispute or difference where notice of a dispute or difference has not been given by the applying party within ninety days of the occurrence or discovery of the matter or issue giving rise to the dispute.
- 37.4 Notwithstanding the issue of a notice as stated above, the arbitration of such a dispute or difference shall not commence unless an attempt has in the first instance been made by the parties to settle such dispute or difference amicably with or without the assistance of third parties. Proof of such attempt shall be required.
- 37.5 Notwithstanding anything stated herein the following matters may be referred to arbitration before the practical completion

of the Works or abandonment of the Works or termination of the Contract by either party:

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

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

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

37.5.4 Any dispute or difference arising in respect of war risks or war damage.

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

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

37.8 The Arbitrator shall, without prejudice to the generality of his powers,

have powers to open up, review and revise any certificate, opinion, decision, requirement or notice and to determine all matters in dispute which shall be submitted to him in the same manner as if no such certificate, opinion, decision requirement or notice had been given.

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

SECTION IV – APPENDIX TO CONDITIONS OF CONTRACT

THE EMPLOYER IS

Name: **GOVERNOR - Mandera County Government**
Address: **P.O Box 13, MANDERA**

Name of Authorized Representative: **CEC – WATER,ENERGY AND ENVIRONMENT**

Cell phone:
E-mail:/Fax:

Name of Alternative Representative: **Chief Officer – Water services**

Cell phone:
E-mail:/Fax:

The Project Manager is: **Chief Officer – Water services**

Address: **P.O. BOX 13, MANDERA**
Cell phone:

The name (and identification number) of the Contract is: **TENDER FOR SUPPLY AND DELIVERY OF UNIFORM FOR ENFORCEMENT OFFICERS**

The works consist of: **TENDER FOR SUPPLY AND DELIVERY OF UNIFORM FOR ENFORCEMENT OFFICERS**

The Start Date shall be **AGREED WITH THE PROJECT MANAGER**

The Intended Completion Date for the whole of the Works shall be **Sixteen (16) Weeks** from **the commencement date as agreed with the Project Manager.**

The following documents also form part of the Contract:
AS LISTED IN CLAUSE 2.3 OF CONDITIONS OF CONTRACT

The Contractor shall submit a revised program for the Works within **FOURTEEN(14)** days of delivery of the Letter of Acceptance.

The Site Possession Date shall be **AGREED WITH THE PROJECT MANAGER**

The Defects Liability period is **180** days

The minimum insurance covers shall be; “ALL RISKS INSURANCE”

The following events shall also be Compensation Events:

1. NONE (ONLY AS LISTED IN CLAUSE 24 OF THE CONDITIONS OF CONTRACT

- 2. _____
- 3. _____

4. _____

The period between Program updates is **15** days.

The amount to be withheld for late submission of an updated Program is

FULL CERTIFICATE

The proportion of payments retained is **10%** percent.

The Price Adjustment Clause **SHALL NOT** apply

The liquidated damages for the whole of the Works is Kshs. **1,000.00** (per week)

The Performance Security shall be for the following minimum amounts equivalent as a percentage of the Contract Price **10 percent (%)**

The Completion Period for the Works is **Sixteen (16) Weeks**

The rate of exchange for calculation of foreign currency payments is **not applicable**

The schedule of basic rates used in pricing by the Contractor is as attached [*Contractor to attach*].

Advance Payment **SHALL NOT be** granted.

The Bidder should submit **ONLY ONE (1 NO.) ORIGINAL AND A COPY** of the Bills of Quantities as indicated in Clause 4.1 of the Instruction to Tenderers.

SECTION V - SPECIFICATIONS

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 design and materials unless provided otherwise in the Contract. Where the Contractor is responsible for the design of any part of the permanent Works, the extent of his obligations must be stated.
- 2.0 Specifications from previous similar projects are useful and may not be necessary to re-write specifications for every Works Contract.
- 3.0 There are considerable advantages in standardizing **General Specifications** for repetitive Works in recognized public sectors, such as highways, urban housing, irrigation and water supply. The General Specifications should cover all classes of workmanship, materials and equipment commonly involved in constructions, although not necessarily to be used in a particular works contract. Deletions or addenda should then adapt the General Specifications to the particular Works.
- 4.0 Care must be taken in drafting Specifications to ensure they are not restrictive. In the Specifications of standards for materials, plant and workmanship, existing Kenya Standards should be used as much as possible, otherwise recognized international standards may also be used.
- 5.0 The Employer should decide whether technical solutions to specified parts of the Works are to be permitted. Alternatives are appropriate in cases where obvious (and potentially less costly)

alternatives are possible to the technical solutions indicated in tender documents for certain elements of the Works, taking into consideration the comparative specialized advantage of potential tenderers.

The Employer should provide a description of the selected parts of the Works with appropriate reference to Drawings, Specifications, Bills of Quantities, and Design or Performance criteria, stating that the alternative solutions shall be at least structurally and functionally equivalent to the basic design parameters and Specifications.

Such alternative solutions shall be accompanied by all information necessary for a complete evaluation by the Employer, including drawings, design calculations, technical specifications, breakdown of prices, proposed construction methodology, and other relevant details. Technical alternatives permitted in this manner shall be considered by the Employer each on its own merits and independently of whether the tenderer has priced the item as described in the Employer's design included with the tender documents.

TECHNICAL SPECIFICATIONS FOR DEVELOPMENT & REHABILITATION OF BOREHOLES

1. NATURE OF WORK

The Specifications are for the drilling of deep boreholes, equipping them with submersible pumps and genset or solar panels and civil works. Other works include borehole rehabilitation such as flushing/cleaning and fishing works.

Client would like to have term contract for drilling, equipping and construction civil works at borehole drilled sites for a period of 1 year. The Contractor shall provide all labor, transport, plant, tools, equipment and materials and appurtenances and shall perform all Works necessary to satisfactorily complete drilling of borehole such as lowering of borehole assembly with casing and Screen and end cap, gravel pack at appropriate intervals and back fill, cleaning and development of said boreholes, pump test for minimum of 24 hours, chlorinate borehole, and water quality testing both chemical and biological in accordance with this specification and to any further details as may be ordered by the Client. The contractor will also be required to carry out rehabilitation of existing boreholes i.e. flushing, cleaning and fishing as per the instruction provided by the client representative.

The Contractor shall employ only competent workmen for the execution of the Works, and all such Works shall be performed under direct supervision by Site Supervisor appointed by County Director of Water Services.

2. SCOPE OF THE WORKS

Scope of work includes drilling of boreholes equipping, flushing, cleaning, fishing and civil works.

The scope of works included in the contract consist of four (4) distinct categories. These are:-

2.1 CATEGORY - 1: DRILLING AND PUMP TESTING OF BOREHOLE(S) AS PER GIVEN ORDER:

The order for the Drilling & pump testing of Borehole(s) shall unless otherwise specified within the order comprise of:

Stage-1: Feasibility Studies & Authorizations

A. Hydrological Survey and EIA studies to confirm opportunity of borehole

Prior to commencing of borehole drilling works, the contractor shall be required to have a hydrological site survey by a registered hydrologist to establish the potential site for drilling. A detailed report of hydrological survey by hydrologists is to be submitted to the County Director of Water Services (CDWS) or his representative for approval. The report should clearly indicate if it is viable to drill the borehole(s). The contractor shall after receipt of approval of Hydro-geological survey report, go ahead and conduct an EIA study through a registered EIA lead expert/ firm and

submit a copy of the same again to the CDWS for a go ahead for the contractor to apply for statutory permits.

B. Formal Submittal of drilling permits governing agencies

Borehole Contractor will have to make applications and acquire permits for drilling a bore hole from relevant authorities. This include WRMA and NEMA licenses and all other necessary documents as per the local authority requirements at the time of application. This will necessitate the activity of the next event.

NOTE: - Stage-1 shall not fully apply where items A and B or any of these has already been done by the Employer (Mandera County Government) or any of its agents. Stage 2 (Borehole drilling, development & pump-testing) shall take place if items A and B in stage 1 are successful.

Stage BOREHOLE DRILLING, DEVELOPMENT AND PUMP-TESTING

a) SITE HANDING OVER:

The client (County Government of Mandera) shall handover the potential site for drilling to the contractor in accordance with terms of contract for the purpose of drilling. Upon taking over the site, the contractor will be fully possess and maintain the site until completion of all work. **Any changes or alternative sites will be with approval of the Client and designated representatives.**

b) CONTRACTOR EQUIPMENT

The Contractor shall specify in the Schedule of Drilling Equipment, borehole development and other accessory equipment, its type and capacity that is to be used to undertake this work. Its capacity shall be sufficient to cope with the Works as stated in the Contract. It shall at all times be kept in full working order and good repair.

If the Client considers that the drilling equipment or any accessories in use on the site of the Works is in any way unsuitable, inefficient or inadequate in capacity, the Client shall have the right to call upon the Contractor to put such equipment in good order within seven days or alternatively to remove such plant and replace it with additional plant or equipment which the Client considers necessary to meet the requirements of the Contract. In the event that this requirement of the Contract is not satisfied, the Client reserves the right to terminate the Contract immediately.

No extra payment shall be made for the Contractor's change of drilling equipment, labor or other equipment required to complete the Works specified, nor for any incidentals thereto, the cost being deemed to be included in the schedule of rates.

c) BOREHOLE CONSTRUCTION:

Basic methods of drilling are indicated below as a basic guide, mostly to maintain a few key dimensional specifications.

d) DRILLING METHODS:

The preferred method of drilling in consolidated compact formations is rotary percussion with air and/or foam flush. Boreholes shall be drilled with 225mm drill bits and reamed with a **minimum diameter of 200mm** and provision of 250mm service casing.

In unconsolidated loose, unstable, collapsing formations, rotary with appropriate drilling stabilizer to be used. starting with diameter large enough to lower temporary casing in upper collapsing formations and continue drilling with a **final minimum diameter of 225mm drilling bit**. If other chemical fluids or solids are used to arrest collapsing of formations, the Contractor has to use proper borehole development and cleaning methods to make the use of borehole water is safe for drinking purposes. The Contractor will use such fluids or solids with the agreement of the Client. **All cost of using proper drilling fluids and solids is included in the rate per meter quoted.** No additional payments will be made by client.

e) BOREHOLE DEPTH:

Boreholes shall be drilled to such depths as to penetrate in all recommended aquifers as recommended in hydrogeological survey and tap the first potential deeper aquifer or aquifers in confined/semiconfined conditions.

Borehole Diameter:

Boreholes will be drilled.

1. The first 6 meters from the surface will have concrete grouting for sanitary protection. For this the borehole will be reamed to a minimum diameter of 250mm and concrete grouting placed in the annular space between the casing and open borehole wall.
2. Borehole will be drilled with 225mm bit. The reaming diameter will be based on the type of temporary casing the contractor will use and not less than 200mm to install metallic casing of 150mm outside diameter for the total depth of the borehole.
3. The contractor must take into account the depths he has to drill and lower temporary casing to complete the drilling. This cost must be built in the quoted unit cost for drilling.

4. The client will not be responsible for any loss of temporary casing which the contractor is unable to pull out or lost due to snapping or breaking from the completed boreholes.

f) Screen:

1. The Contractor will use proprietary; factory-made metallic slotted screens, the slot size and screen length depending on the aquifer materials and aquifer thickness. The Contractor will take sole responsibility of designing the well assembly and placing screen and casing at appropriate depths to match the positioning of the aquifer(s). The slotted screens should meet ISO/KEBS Standards
2. The screens to be furnished and installed shall be of the pipe size variety having a minimum nominal diameter of 152mm and can be fabricated in three meter lengths. The screens shall be of continuous slot type and constructed entirely of stainless steel suitable for borehole installation. The screen shall have slot size opening of 1.4mm.

g) Casing:

1. The boreholes will be fully cased to bottom with casing with minimum diameter of 150mm and curved at the bottom and should meet ISO/KEBS Standards.
2. The Contractor will take all necessary precautions during the transportation and storage of casing pipes from their warehouse to drilling sites to prevent distortions, ending or deformation of the pipe that could result in eccentricity along the length of the pipe.
3. Casings to be used as part of the permanent borehole structure shall be synthetic/ steel suitable for borehole and having nominal diameter of 200mm.
4. If any casing other than that to be left permanently in the borehole is required temporarily for execution of work, it shall be supplied by the Borehole Contractor free of charge and,
5. The contractor is not required to case dry Boreholes. **Hence should the Borehole turn out to be dry, the site shall be abandoned by the contractor without undertaken all subsequent works. Payments to the contractor under the contract shall only cover the cost of drilling the Borehole. Amounts for Borehole casing, development, water quality analysis, equipping, e.t.c shall not be paid by the employer.**

h) Gravel Packing

1. The annular space between the casing and borehole wall is filled with filter packing materials in the screen intervals and back filling materials. The gravel packing mixture to be used depends on the sieve analysis results and the slot size of the screen. The contractor will do the sieve analysis and then determine the gravel pack materials. Gravel packing material will be stored in a way so as to avoid contamination or rain washing finer materials. Iron and Calcareous grains will not be included in the gravel pack materials.
2. Gravel packing is carried out as continuous feed operations done usually by two people filling uniformly around the circumference of the pipe. It is advisable to add some water with a pipe so that the gravel flows down. If the gravel gets inside the temporary casing, the casing is slowly pulled out and gentle well development is done to allow gravel to settle properly above the top of the screen interval. More gravel is added with development if the gravel settles down.
3. If filter gravel will be necessary, it will consist of durable, naturally rounded quartzitic particles properly washed and cleaned prior to insertion in the borehole. The gravel shall be introduced in the annular space between the wall of the borehole and the 200mm casing from the bottom to about 2 meters below surface. The final casing and screens must be centralized before gravel back and the Borehole Contractor must supply suitable equipment for lowering of gravel pack.

i) GROUTING

1. Grouting shall be done by either cement or bentonite to seal off unwanted upper aquifers under direction of the Site Engineer.
2. Backfilling and grouting is done and confirmed by development. The borehole cuttings or clayey soils are back filled up to 6 meters below the ground surface.
3. The grouting is done with a concrete mix in the ratio of 1:2:3 of cement sand and gravel respectively. The gravel size should be not more than 6mm. Insert a 3-meter Steel casing of 200mm diameter on to the metallic casing, both protruding above ground level.

j) BOREHOLE DEVELOPMENT:

On completion of drilling, the Contractor will choose a suitable and appropriate borehole development method. The borehole shall be developed for a period of at least four hours in order to obtain a maximum yield of water that is free of suspended matter.

Developing shall be carried out by airlift pumping and surging, jetting and block surging, or other techniques the contractor feels is more appropriate and efficient to suit the metallic casing, hydro-geological and drilling conditions prevailing in that borehole. All boreholes shall be presented for testing free of any bridging or obstruction to the total depth. The Contractor should provide the equipment required for verticality testing. Developing will be for a minimum period of 4 hours.

k) PUMPING AND RECOVERY TEST:

- i) A pumping test is required on a routine basis for each borehole. The Contractor will estimate the discharge from the air lifting rates or blow test during borehole development. Based on the estimated discharge, the Contractor will certify the borehole as either "successful" or "lost". For successful boreholes, the Contractor will undertake minimum of 24 hours pump testing of which the first one hour is a three step drawdown test. The discharges for the step drawdown test will be fixed by the contractor based on the well development results. After conducting the step drawdown tests the borehole should be allowed to recover almost to the original static water level (1 hour) before the constant yield test is undertaken continuously for 4 hours at the chosen/predetermined rate.
- ii) The first step could be minimum acceptable discharge. The second step will be at an estimated discharge from blow test (during the well development) and the third step will be 50 to 75% more than the estimated discharge from blow test and each step for 20 minutes (total 1 Hours) the continuous test of 4 hours will be carried out at a discharge at which the dynamic water level will stabilize.
- iii) Recovery test will be for one hour or such time when there is at least recovery of 80% of the static water level noted at the start of the pump test. The pump test data and the results of pump test is presented in the standard format.
- iv) The Contractor shall have on site a 90° V-notch weir, preceded by a tank with baffles, for the measurement of flows. Small flows can be measured by timing the filling of a vessel of known volume. The Contractor shall also have on site an operating electric dip meter, calibrated in centimeters, and with visual/audible indicator of when the water level is reached.
- v) Readings of flow and water level shall be taken at the intervals defined on the test pumping form. For accurate measurement, an electrical/ sonic water level indicator with graduated tape for taking water level readings should be utilized. Recovery readings shall be taken for a minimum of 1 hour, during which period pumping equipment shall **not** be removed from the borehole.

l) Construction of borehole gantry:

Fabrication and construction of Galvanized iron Borehole Gantry as per the order and,

m) WATER QUALITY TESTING :

1. The contractor shall, make sampling and quality analysis of water from every borehole.
2. The water quality test should be conducted at a competent testing laboratory that is authorized by the client.
3. The parameters to be tested are given in MWD design manual and standards will be according to MWS&I guidelines for drinking water quality.
4. *Water samples for chemical analysis should be collected at the end of the test pumping process and analyzed at the approved laboratory at the earliest possible time to facilitate timely handing over of the borehole for use by the community. Thus it should only be fitted after acceptable chemical analysis results. Samples for biological testing will be collected later in suitable batches so as to meet the time limit of 48 hours between collecting and analysis in the laboratory*

Submission of borehole completion report:

Submission of Borehole completion report comprising Borehole drilling completion record, test-pumping record and water quality analysis results record to the CDWS or representative for verification and approval,

2.2 CATEGORY - 2: EQUIPPING OF BOREHOLE(S) AS PER GIVEN ORDER:

The order for the Equipping of Borehole(s) shall unless otherwise specified within the order comprise of:

- (i) The supply and installation of a Diesel powered Generating Set complete as specified below.
- (ii) The supply and installation of a Submersible borehole pump-set, complete with cabling & necessary controls.
- (iii) Connection of the water from the borehole to the Rising main leading to the water storage tank and,
- (iv) Meeting project administration cost equivalent to 10% of total cost of all above works.

2.3 CATEGORY - 3: REHABILITATION OF BOREHOLE(S) AS PER GIVEN ORDER:

The order for the Rehabilitation of an existing Borehole(s) shall unless otherwise specified within the order comprise of:

- (i) The request for a Borehole status report from the CDWS and careful study of the report to implement its recommendations.
- (ii) The mobilization of necessary Borehole fishing materials and equipment
- (iii) The Lowering of a Borehole Camera to inspect conditions within the Borehole and submission of report to CDWS for consideration
- (iv) The Fabrication of appropriate Borehole fishing tools
- (v) The fishing out of the submersible pump-set, draw pipes and/ cabling and other materials within the Borehole.
- (vi) The flushing of the Borehole to achieve clear water discharge outcome
- (vii) Submission of Borehole rehabilitation report to the CDWS or representative for verification and approval
- (viii) The supply and installation of a new Submersible pump-set, complete with cabling & necessary controls,
- (ix) Connection of the water from the borehole to the Rising main leading to the water storage tank and,
- (x) Meeting project administration cost equivalent to 10% of total cost of all above works.

2.4 CATEGORY - 4: CONSTRUCTION OF CIVIL WORK(S) AS PER GIVEN ORDER:

The order for the construction of civil works (s) may as specified within the order comprise of:

- (i) The construction of a standard 4.700 x 3.810m Masonry Pump House.
- (ii) The construction of a standard ground level masonry/ concrete Water Storage Tank/ Elevated Steel water storage tank as specified within the employer's order
- (iii) The Laying of the Rising Main Pipeline between the Borehole and the Water Storage Tank
- (iv) The Laying of the water distribution Pipeline (s) as provided for by the order
- (v) The construction of masonry water kiosks as provided for by the order.
- (vi) The construction of masonry cattle troughs as provided for by the order,
- (vii) The fencing of the Borehole compound as provided for by the order and,
- (viii) Meeting project administration cost equivalent to 10% of total cost of all above works.

NOTE: - The attributes of any of the above works may be varied or altered through a written site instruction by the CDWS or Site Engineer depending on the actual conditions encountered in the process of executing of the works.

3. LOCAL CONDITIONS

The borehole will be drilled, constructed and test pump in both unconsolidated and consolidated formation and the Borehole Contractor must be prepared to carry out the required work through any type of formation in the project area.

4. BOREHOLE DATA

The Borehole completion report shall among other things provide the following data in the official reporting formats provided by WRMA: -

- (a) Total Borehole depth in metres
- (b) Borehole diameter in mm
- (c) Casings diameter in mm
- (d) Static water level in metres
- (e) Dynamic water level in metres
- (f) Recommended pumping rate in m³/hr
- (g) Pump setting level in metres and
- (h) The results of the Borehole water quality analysis

5. CONSTRUCTION METHOD

The borehole to be constructed shall be drilled by the combination air/hydraulic rotary method. The method of drilling shall be left to the discretion of the Borehole Contractor. After drilling to the final depth the Borehole Contractor shall proceed to insert permanent casings and screens as directed by the Site Engineer.

6. CEMENTATION

The space above the gravel pack shall be grouted with a mix of one part of cement to two parts of sand and two parts of ballast, in order of 1:2:2 concrete may be used near the surface to form an annular plug around the casing of dimensions 1.0 x 1.0 x 1.0 meters. There shall be 2000mm diameter concrete plinth on top of the borehole and shall be constructed as shall be directed by the Site Engineer and the Structural Engineer.

Any other cementation works to be done as directed by the Site Engineer.

7. FORMATION SAMPLES

The Borehole Contractor shall keep an accurate record of the top and bottom of each stratum penetrated and shall save and deliver to the Site Engineer a sample of materials taken from each 1m of formation, or at every change of formation and at such other intervals as may be ordered by the Site Engineer. Those samples shall be placed in approved Borehole Contractor supplied containers with labels which indicate the depth at which the sample was obtained.

8. REPORTS

The Borehole Contractor shall submit to the Site Engineer daily progress reports showing:-

- (i) The depth each day indicating drilling in meters per hour with comments on degree of hardness of materials being penetrated.
- (ii) Depth at which each water bearing zone is encountered and the rise and fall of water level in different formations.
- (iii) The full details of work carried out in respect of operations which are paid for at hourly rate.
- (iv) The full details of the number of hours worked each day.

9. CESSATION OF WORK

The Services Engineer reserves the rights to stop drilling operations if in his opinion:-

- (a) A sufficient supply of water has been obtained.
 - (b) The work is not being carried out in a satisfactory manner or
 - (c) Further drilling is unlikely to be advantageous or for any other reason
- In this event, payment shall be made only for the amount of work done up to the date of stoppage.**

10. SUPPLY AND INSTALLATION OF PUMP

The Borehole Contractor shall supply and install:-

- (a) One electric submersible pump which will conform to the specification stated, for operation on 415 volt, 3-phase.
- (b) All necessary electrical equipment for the pump such as control panel with starter, ammeter, single phasing cut-out, low voltage cut-out and all necessary cables for connection.
- (c) Suitable diameter Galvanized Steel Draw pipes, class 'C' to carry water to the surface/ to water storage tank, each supplied complete with a Galvanized steel steam socket.
- (d) Low level cut-out switch
- (e) Airline 20mm galvanized steel pipe for water level measurements
- (f) Pressure gauge
- (g) The gate valves, non-return valves before the master meter
- (h) Master meter for measuring the water from the borehole.

In addition the Borehole Contractor shall carry out 24 hours test run at the completion of the works. This test has to be certified by the Project Manager.

Note on Pump Installation

The Borehole Contractor shall install the borehole pump complete with all necessary accessories.

The Borehole Contractor shall make the necessary electrical connections and include in his prices all cable, starter-panel, switches etc. required to put the pump in operation while tendering for this part of the document and return it with full description literature and performance curves for the proposed equipment together with the tender for drilling works.

The installation of the submersible pump into the borehole shall be done immediately the borehole drilling is completed, test pumped and water

analyzed for suitability for human consumption. The final production pump to be installed in the newly drilled borehole shall be determined and installed as per the actual conditions encountered on completion of the drilling works. Hence the specifications given under the section of 'borehole data' are only for the purpose of quotation. After establishing the actual conditions of the drilled borehole, only the Services Engineer's approved submersible pump shall be installed.

11. ELECTRICAL WORKS

It shall be the responsibility of the Borehole Contractor to provide all electrical wiring between all items of his Contract to ensure the correct function of his equipment. The Borehole Contractor's electrical works shall start from the nearest electrical isolator which is available within the site or directly from a supplied Generating Set.

12. SUPPLY AND INSTALLATION OF GENERATOR SET

The contractor shall supply and install, a diesel powered Generating set comprising of diesel engine, alternator, control panel, automatic starting equipment, fuel tank and accessories whose technical attributes shall be as follows: -

12.1 Prime use rated power –

..... KVA as contained in the order

12.2 Engine: -

- ✓ Heavy duty Diesel Engine
- ✓ Water cooled with fresh water loop and a tropical Radiator
- ✓ Synchronous speed of up to 1,500RPM
- ✓ Mechanical speed Governor
- ✓ Heavy duty Air cartridge filter
- ✓ Cartridge Oil filter
- ✓ External Fuel filter
- ✓ Industrial Silencer
- ✓ Flexible exhaust piping up to 2.5m long
- ✓ Automatic electric starter system with starter motor, solenoid switch, Leads, Maintenance free Acid Battery and automatic Battery charging system,

12.3 Alternator: -

Alternator with synchronous and brushless automatic fast voltage regulator, maintaining the output within 2% under normal working conditions, screen protected CEE sockets, One 3 pole and another 5 pole

12.4 Panel Board: -

Panel Board made of steel sheets of appropriate thickness subjected to anti oxidizing treatment and covered with epoxy resin with protection factor and fitted with: -

- (a) Main switch/ Isolator
- (b) Automatic main circuit breaker
- (c) Metering devices to continuously measure: -
 - ✓ Phase specific as well as resultant voltages between phases
 - ✓ Phase specific as well as resultant current between phases
 - ✓ Hours run since last session as well as total hours run

(d) Change over switches fitting positions

12.5 Protection: -

The Generator set should be equipped with automatic shutdown equipment if fatal parameters are exceeded including low oil pressure, high engine temperature and speed limit.

12.6 Mounting: -

The Engine and alternator shall be connected with a heavy duty direct elastic coupling and shall be mounted on a common rigid base frame with anti-vibration shock dampers and lifting eyes flexible for transportation. Engine, Alternator and panel shall be one integrated unit mounted on skids.

12.7 Operating Environment to be compatible with: -

- ✓ Range of operating altitudes: - 200 – 400m asl
- ✓ Average annual temperature: -34°C
- ✓ Highest temperatures in hottest months: - 42°C
- ✓ Average 24 hour temperature: - 39°C
- ✓ Dust storm are normal

13. CONSTRUCTION OF CIVIL WORKS

1.1 General Description of the Works

The works to be undertaken under the civil works category of construction/Rehabilitation of a Borehole Water supply system comprises the following works:

ITEM	DESCRIPTION OF PROJECT WORKS
1.1.1	PRELIMINARIES & PROVISIONAL SUMS
1.1.2	BOREHOLE COMPOUND FENCING
1.1.3	CONSTRUCTION OF MASONRY PUMP HOUSE
1.1.4	CONSTRUCTION OF NEW WATER KIOSKS
1.1.5	REHABILITATION OF G.L. MASONRY/ ELEVATED STEEL TANKS
1.1.6	WATER RISING MAIN AND WATER DISTRIBUTION PIPELINES
1.1.7	CONSTRUCTION OF NEW WATER KIOSKS

1.2 Location of the Works

This will be as specified in works order given by the employer

1.3 Drawings and Documents

The drawings listed in Section 5 of the Tender Documents and any modifications to those drawings and any other drawings that may be prepared by the Contractor and approved by the Engineer shall subsequently become the Contract Drawings. For the purpose of carrying out the Contract, the Contractor will be provided with 2 sets of the Contract Documents and full size (A1) Contract Drawings.

1.4 Drawings Designed by the Contractor

All drawings, calculations, plans, reports, instruction manuals, pamphlets, data and all other documents required to be submitted by the Contractor under the Contract shall be clear and readable. The Contractor shall submit these drawings and documents in a logical order to the Engineer for review or approval at least fifty six (56) calendar days prior to execution of the Works.

All shop drawings, including field erection, layout and construction details shall be furnished by the Contractor for the approval of the Engineer. All the drawings and calculation to substantiate the design shall be checked, signed and approved by the Contractor prior to submission. The drawings shall also be signed by a qualified engineer responsible for the design.

Approval of the drawings by the Engineer shall not be construed as a complete check but will indicate only that the general method and detailing is satisfactory. The approval by the Engineer shall not relieve the Contractor of the requirements of the Contract or responsibility for correct installation and assembly of parts in final position or responsibility for the adequacy of the method of construction. All the cost thereof will be deemed to be included in the Contractor's unit rates and Contract Price.

1.5 Site Meetings

The Contractor shall be obliged to attend all meetings at the appointed time. The discussions of such meetings shall include but not be limited to the progress of work and problems having direct bearing on the immediate and long term activities (construction, procurement, transport, labour etc.). The Engineer shall invite the Employer for such meetings.

1.6 Progress Photographs

The Contractor shall furnish the Engineer with coloured photographs (not less 8 cm x 120 cm size) of the work in progress throughout the Contract period. The photographs shall be taken at the start, during and at the completion of each major task of the work as directed by the Engineer. A brief description and date of each photograph shall be included.

The Contractor shall make a soft copy of all the photos. This copy will be retained on the site and on completion of the Works the negatives shall become the property of the Employer. The Contractor shall supply cameras to the Engineer for taking of photographs.

1.7 Setting Out

The Contractor shall appoint and employ the necessary qualified and experienced staff to set out the Works accurately. The Contractor shall establish and locate all lines and levels and be responsible for the correct location of all Works. Where directed by the Engineer, the Contractor shall take such levels and dimensions as may be required for the purposes of measurements prior to disturbance of the ground. These

shall be agreed between the Contractor and the Engineer in writing before any of the surface is disturbed or covered up.

1.8 Construction and Checking of Work

The Contractor shall be solely responsible for and shall provide all labour, tools, lifting tackle and other equipment required for the construction and checking of the Works. No operatives shall be allowed to execute any type of work, which is normally carried out by a skilled tradesman, unless the operative is thoroughly experienced and proficient in the trade concerned. Supervisors and operatives may be required to demonstrate their proficiency or produce certificate of competence to the satisfaction of the Engineer. As each part of the work is carried out it shall be subject to the approval by the Engineer.

1.9 Supervision and Labour

The Contractor will be required to maintain a competent supervising Site Agent and staff on site throughout the construction period until completion of the Works, and thereafter as may be required during the period of maintenance. The Engineer shall give prior approval to the appointment of this supervising Site Agent and shall have authority to withdraw this approval at any time in accordance with the Conditions of Contract. All staff and labour employed on the Works shall be employed in accordance with the local labour and employment laws and regulations.

1.10 Works Executed by the Employer or by other Contractors

The Employer reserves the right to execute, on the site, works not included under this Contract and to employ for this purpose either his own employees or other Contractors who's Contracts may be either a sub-Contract under this Contract, or an entirely separate Contract. The Contractor shall ensure that neither his own operations nor trespass by his employees shall interfere with the operations of the Employer, or his Contractors employed on such works and the same obligations shall be imposed on the Employer or other Contractors in respect of work being executed under this Contract.

1.11 Possession of the Site

The Contractor shall restrict his activities to those areas of the Site adjacent to the works being executed and shall avoid any encroachment upon lands outside the areas for which possession has been given. Any trespass or damage or any claim arising from such encroachment shall be the Contractor's sole responsibility and he shall hold the Employer indemnified against all claims arising from such trespass or damage.

1.12 Interference with the Works

The Contractor shall not interfere in any way with any existing works, whether the property of the Employer or of a third party, whether or not the position of such works is indicated to the Contractor by the Engineer, except where such interference is specifically described as part of the Works, either in the Contract or in an instruction from the Engineer.

1.13 Material for the Works

All material shall comply with appropriate Standard Specifications unless otherwise required hereinafter. The Contractor shall, before placing any order of materials, manufactured articles or machinery for incorporation in the Works, submit for the approval of the Engineer the names of the suppliers from whom he proposes to obtain such materials, manufactured articles or machinery, together with a list of the same, giving the origin, quality, weight, strength, description and other relevant details. No materials, manufactured articles or machinery shall be ordered or obtained from any suppliers which the Engineer has not approved in writing. All materials shall be delivered to the Site a sufficient period of time before they are required for use in the Works, to enable the Engineer to take such samples as he may wish for testing and approval.

1.14 Rejected Materials and Defective Work

Materials or work which, in the opinion of the Engineer, do not comply with the Specification, shall be classified as rejected materials or defective work, and shall be cut out and removed from the Works and replaced as directed by the Engineer.

1.15 Existing Works and Services

The Contractor shall acquaint himself with the positions of all existing works and services including water mains, storm water drains, cables, and service poles before any excavation are commenced. The Contractor will be held responsible for any damage, however caused, in the course of the execution of the Works, to such existing works and services.

1.16 Existing Access

Existing access to lands, property and all other places shall be maintained by the Contractor during the continuance of the Works to the Engineer's satisfaction.

1.17 Liaison with Police and other Officials

The Contractor shall keep in close contact with the police and other officials in the areas concerned regarding their requirements for the control of workmen, movement of traffic, or other matters and shall provide all assistance and facilities which may be required by such officials in the execution of their duties.

1.18 Water and Power for Use on the Works

The Contractor shall be solely responsible for the location, procurement and maintenance of a water supply adequate in quality and quantity to meet his obligations under the Contract. The Contractor shall be solely responsible for the location and continuity of the supply of water for use on the Works. Supplies may be derived from rivers and streams, but shall in all cases be to the Engineer's approval, and the abstraction of water from any sources shall not interfere with any permanent water supply and be to the requirements and permitted by Water Resources Management Authority (WRMA). The Contractor shall be solely

Section One shall contain: Name of Financing Governments In white lettering on a blue background

The Second section shall bear the words: Names of the Program and Project In white lettering on a blue background

The Third section shall bear the words: Name of the Financier In white lettering on a blue background

The Fourth section shall bear the words: Name of the Employer In white lettering on a blue background

The Fifth section shall bear the words: Name of the Implementing Agency In white lettering on a blue background

The Sixth section shall bear the words: Name of the Executing Agency In white lettering on a blue background

The Seventh section shall bear the words: Name of the Contractor In white lettering on a blue background

The Eighth section shall bear the words: Name of Supervising Consultancy In white lettering on a blue background

Further boards may be added with the names of sub-Contractors. Lettering on these boards shall be as directed by the Engineer

2.0 EARTHWORKS

2.1 Site Clearance and Stripping

General clearance is defined as the clearing, grubbing, removal and disposal of all vegetation, grass, debris, bushes, dense bush, trees, hedges, undergrowth, stumps, roots, shrubs plants and backfilling of holes left by the removal of stumps and roots. The widths and length over which site clearance is to be carried out shall be instructed by the Engineer. Site clearance over the area of quarries, borrow pits, stockpiles and spoil tips shall be carried out where instructed by the Engineer. The Engineer may give instructions that specific trees, stumps or objects shall not be removed during site clearance operation. If termite moulds are excavated, the whole of the mould shall be removed. Where the Engineer instructs that site clearance is required, the entire area shall be cleared and all materials thus cleared shall become the property of the Employer. Unless otherwise instructed, vegetation and perishable materials shall be disposed of by burning. Where material or debris cannot be burnt, it shall be carted to spoil areas, which spoil areas shall be provided in accordance with requirement of this Specification.

2.2 Excavation General

Excavation shall be carried out with the allowances for working space given in the Method of Measurement to the Bill of Quantities, unless otherwise shown as lines, levels and profiles on the Drawings or to such other lines, levels and profiles as the Engineer may direct or approve in writing. The work shall be carried out by the Contractor in such a way as to avoid disturbance to the surrounding ground. Particular care shall be taken to maintain stability when excavating in close proximity to existing works. The work shall be carried out in a careful manner to ensure that the exposed surfaces are as sound as the nature of the material permits and that no point shall protrude inside the lines shown on the Drawings

except as otherwise specified or agreed by the Engineer. In soft excavation, which is to remain open permanently, exposed faces shall be formed accurately to the required slopes and profiles. Excavations in rock where the faces shall remain open permanently shall be trimmed so that no point protrudes within the required profile. The Contractor shall examine all excavated faces regularly and shall remove all insecure material or materials resulting from any falls. Where instructed in writing by the Engineer, the Contractor shall wash down exposed surfaces of excavated rock for inspection. The Contractor shall dispose of all material arising from excavations. If it is suitable and required for the Permanent Works it shall be placed directly in such Works or set aside for use as and when required in suitable approved dumps, otherwise it shall be removed to tips provided by the Contractor unless otherwise provided or directed by the Engineer. The Contractor shall be responsible for keeping all excavations free from water from whatever cause arising and shall provide such pumping capacity and other measures as may be necessary for this purpose. The Contractor shall make good any damage that may result from his failure to keep the excavations free from water.

All excavation shall be carried out with care and the method and plant to be used in execution thereof shall be to the satisfaction of the Engineer. The Contractor shall be responsible for the safety and security of all excavations at all times during the execution of the Contract and where necessary shall provide timbering, shoring or other measures required by the Engineer to prevent movement or loss of ground outside the boundaries, settlement of or damage to property, or injury to persons. The Contractor shall make good any damage to structures, services or other properties caused by such movement, loss of ground and settlement. The Contractor shall also take precautions to route his plant in such a manner as to minimise the likelihood of slips occurring due to vibration or surcharge from the working or movement of heavy machinery.

The Contractor will be permitted, subject to the approval of the Engineer, to adjust side slopes of excavations in soft materials which are to remain open temporarily in preference to shoring or strutting. However no payment shall be made for extra excavation volume as a result of these measures. The Contractor shall notify the Engineer without delay of any permeable strata, fissures or unusual ground encountered during excavation.

2.3 Approval of Excavation

When excavations have been taken out accurately to the profiles or dimensions required for the work the Contractor shall inform the Engineer who shall carry out an inspection of the excavation. If, after his inspection the Engineer requires additional excavation to be carried out, the Contractor shall do so to such new profiles or dimensions as the Engineer may direct.

2.4 Excavation for Structures

Open excavation to form a foundation for a structure shall be carried out to the lines necessary to permit the proper construction of the structure to the approval of the Engineer. Where a structure is to be founded on soft ground, the excavation shall be taken down until the required formation is exposed and prepared to the approval of the Engineer. Where concrete has to be placed on a soft foundation, the Engineer may direct that a blinding layer of lean concrete be placed beneath the structural concrete immediately after completion and approval of the excavation, or require the Contractor to remove the last 100 mm of excavation immediately prior to placing the concrete. If foundation conditions are very soft the Engineer may instruct that additional material be excavated and replaced with compacted gravel or hardcore. Where a structure is required to be founded on rock but is not required to penetrate into it, all soft overburden shall be removed and the surface of the rock cleared of any loose material by barring and wedging. Where the foundation is required to penetrate into the rock, excavation of the rock may be carried out by blasting but in such a manner as to prevent the shattering of the rock which is to remain. The Engineer may direct that the last 300 mm of rock be left and be removed by barring and wedging or by the use of approved pneumatic tools so that the exposed surface is sound. The Contractor shall report to the Engineer whenever excavations are ready to receive concrete. No concrete shall be placed in the foundations until the Contractor has obtained the Engineer's agreement that a secure foundation has been reached and that the excavation has been carried out to the lines and levels required.

2.5 Trench Excavation

Trench excavation shall be performed by the use of hand tools and approved mechanical equipment, in such manner as to minimise disturbance of the sides and bottom of the excavation. Trenches for pipes shall be excavated to a sufficient depth to enable the pipe and the specified joint, bedding, haunching and surround to be accommodated. Unless otherwise stated, the width of the trench shall be equal to the nominal diameter of the pipe plus 600 mm. The Contractor shall fill any over excavation beneath the pipe or bedding at his own cost with well rammed selected general excavation material as per requirement of this Specification. The Contractor shall dispose of surplus excavated material not required for backfill to spoil tips. The sides of trenches shall be adequately supported at all times. Alternatively where the Contractor has to excavate the trenches in open cut the Contractor shall ensure that the side slopes of the excavation are sufficient for stability.

Where rock or boulders are present in the sides or base of a trench in which a pipe is to be installed, the trench shall be trimmed so that when the pipeline is laid, no projection of rock comes within 200 mm of the outside of the pipe at any point. The over excavated portion shall be backfilled as set out in this Specification with approved granular material at the Contractor's expense. The Contractor shall be entirely responsible for the sufficiency of all temporary supports and side slopes to the

excavations. The excavation shall be carried out in such a way as to maintain the stability of all roads and other adjacent structures or works.

2.6 Disposal of Excavated Material

Material obtained from excavations which are suitable for forming embankments or other fill areas shall be placed directly in the Works or set aside for use as and when required in suitable approved dumps. Any such suitable material which may be surplus to the total requirements of the Works shall be taken to spoil in tips provided by the Contractor, unless otherwise provided or permitted by the Engineer. If the Contractor is permitted to remove suitable material from the site to suit his operational

procedure or to take such material for purposes other than forming embankments or other fill areas, he shall make good any consequent deficit of filling arising there from, unless otherwise agreed by the Engineer. All material not suitable for embankments or other filling shall, unless otherwise directed by the Engineer, be taken to separate spoil tips provided by the Contractor. The cost of disposal of surplus or unsuitable materials shall be deemed to be included in the respective unit rates for the excavation work and the Contract Sum.

2.7 Spoil Tips

The Contractor shall be responsible for the provision and sufficiency of tips for the permanent disposal of spoil and shall select their location within the general areas as designated or approved by the Engineer. The Contractor shall submit his proposals for the locations and detailed treatment of tips to the Engineer for approval, which will in no way relieve the Contractor of his responsibilities and obligations under the Contract, whether or not locations are shown on the Drawings or otherwise designated.

No spoil shall be permanently deposited elsewhere than on approved spoil tips unless approved by the Engineer. Spoil tips shall be built up and compacted and trimmed and regulated to levels and profiles approved by the Engineer. Where directed by the Engineer, upper surfaces and slopes of the tips shall be soiled to specified thickness.

3.0 CONCRETE

3.1 Concrete General

Concrete shall consist of cement, graded aggregate (coarse and fine) and water carefully proportioned, thoroughly mixed, placed and compacted as specified. The Contractor shall obtain formal approval from the Engineer before pouring any concrete for the permanent works. The Engineer shall allow concreting after ascertaining the required lines and levels, suitability of formwork, availability of required plant and labour, proper fabrication and spacing of the steel bars and quality and quantity of cement and aggregates.

3.2 Cement

Cement for use in the permanent works shall be Ordinary Portland Cement from approved manufacture and shall comply with BS 12. Where

sulphate-resisting cement is specified, it shall comply with BS.4027. All cements shall be certified by the manufacturers as complying with the requirements of the specification. Before orders are placed the Contractor shall submit details of the proposed supplier(s) together with such information on the proposed methods of transport, storage and certification so that the Engineer may satisfy himself that the quantity and quality required can be supplied and maintained throughout the construction period. Where necessary the Engineer may require representative samples of the proposed cement to be taken and forwarded to a nominated laboratory for analysis and testing before the source is approved. No cement shall be used in the Works until deemed satisfactory by the Engineer.

3.3 Supply of Cement

Cement shall be obtained from one manufacturer unless otherwise authorised by the Engineer. Should the use of cement from different manufacturers be authorised, the different supplies of cement shall be stored separately and shall not be mixed. The Contractor shall supply to the Engineer copies of the manufacturer's test certificates certifying that each consignment of cement has been tested and analysed in accordance with Clause 3.5 of the specifications, and that the results comply in all respects with the above standards. Each certificate shall state clearly the date of despatch and the number of bags despatched in each consignment.

Bagged cement shall be delivered in sealed 50 kilogramme sacks. Each bag shall be marked with the parcel number of the cement contained. Bagged cement shall be transported so that at no time is it exposed to damp and so that moisture cannot be absorbed from the atmosphere. Cement in bulk shall be transported in totally enclosed water tight and sealed containers. If cement is obtained from an intermediate agent, such agent's arrangements for transporting and storing cement shall be to the approval of the Engineer.

3.4 Storage of Cement

The Contractor shall provide sufficient storage capacity on Site to ensure that his anticipated programme of work is not interrupted due to lack of cement. Factors outside the Contractor's control such as transport, weather conditions, holidays and breakdowns shall be taken into account. Cement delivered to the Site in bulk shall be stored in dry, well ventilated weather proof silos or bins which shall be self-clearing. Cement delivered to the Site in bags shall be stored in dry, weather-proof sheds which shall have floors of damp proof construction raised at least 150 millimetres above the surrounding ground.

Cement of different consignments shall be stored separately and consignments shall be used in the same order as they are delivered to the site. No cement shall be stored on the site for longer than three months from the date of despatch by the manufacturer. If not used within that period, the cement shall be removed from the site. Any bag of cement

which is damaged or found to contain cement which has set or partly set, shall be discarded and not used in the permanent works.

3.5 Testing of Cement

Cement shall be tested by the manufacturer. If the manufacturer's test certificate is not made available, representative samples shall be taken from different bags or containers of each consignment. They shall be suitably packed and sent to an approved laboratory for testing to prove the cement's compliance with the specified standards.

The Engineer may require cement to be tested after its delivery to the site. Any cement which has been in store at the site for longer than one month shall be re-tested.

The Engineer may take samples of cement from cement bins or bagged cement, from a parcel of cement after its delivery to the site, or from a parcel of cement which has been stored at the site for longer than one month.

In addition to the manufacturer's tests the Engineer may require the following tests to be carried out:

- (a) Comprehensive strength on mortar cubes in accordance with Method 1 of Clause 6A of BS.12
- (b) Soundness in accordance with Clause 9 of BS.12.

Any cement which fails to meet the specified requirements shall not be used in the Permanent Works.

3.6 Aggregate for Concrete

3.6.1 General

Aggregates for concrete shall comply with BS 822, and shall be obtained from a source or sources approved by the Engineer and shall be transported and stored in such a manner as will prevent:

- (a) Contamination of the aggregates from the ground, rubbish, vegetation, dust or any other foreign material.
- (b) Segregation.
- (c) Intermixing of aggregates of differing characteristics.

Before aggregates from each source are approved for use in the Permanent Works, tests shall be carried out at an approved testing laboratory on representative samples submitted by the Contractor to check that the aggregates comply with the requirements of the Specification. During concreting operations, tests shall be carried out to check that aggregates delivered for use in the Permanent Works comply with the requirements of the Specification.

Sampling and testing of aggregates for concrete shall be carried out in accordance with the requirements of BS 812 except where described otherwise. Moisture contents of aggregates shall be determined as the

moisture content of the aggregate compared with that of the aggregate in the saturated surface-dry condition. Specific gravities of aggregate shall be determined on aggregate in the saturated surface-dry condition.

Aggregates shall be stored on a clean, free draining surface. The various types and sizes of aggregates shall be kept separate from each other and each stockpile shall be kept as large as possible to maintain a reasonably uniform content in the aggregate.

3.6.2 Fine Aggregates

Fine aggregates shall be clean and durable and shall be natural sand, crushed gravel sand or crushed rock sand complying with BS 882. All the material shall pass through a 5 millimetre BS sieve and the grading shall be in accordance with Zones 1, 2 or 3 of BS 882. In order to achieve an acceptable grading, it may be necessary to blend materials from more than one source.

As an alternative, fine aggregate for mortar only shall comply with BS 1199 and 1200. The fine aggregate shall not contain iron pyrites or iron oxides. It shall not contain mica, shale, coal or other laminar, soft or porous materials unless the Contractor can show by tests on finished concrete as set out in BS 1881 that the presence of such materials does not adversely affect the properties of the concrete. The proportion of clay, silt and other impurities passing a 75 microns BS sieve shall not exceed three per cent for natural or crushed gravel sand or 15 per cent for crushed rock sand. The shell content shall not exceed 15 per cent by weight.

Chlorides soluble in a 10 per cent solution by weight of nitric acid shall not exceed 0.05 per cent by weight expressed as chloride ion when tested as set out in BS 812, subject to the further restriction given in the note on total chloride content in Sub-Clause 3.5.5.

Soundness: After five cycles of the test set out in ASTM C88-76, the aggregate shall not show a weight loss of more than 10 per cent. Samples taken from the fine aggregate shall pass the colour test for organic impurities described in Sub-Clause 3.6.4. Tests on fine aggregates shall be carried out daily or as required by the Engineer on site during concreting operations as follows:

- (a) Sieve analysis
- (b) Moisture content. An approved "rapid" test may be used for this test.
- (c) Percentage of material passing a 75 microns BS sieve by the Field Settling Test, checked when necessary by the Decantation Method.
- (d) Test for organic impurities as described in Sub-Clause 3.6.4. The Contractor shall arrange to carry out the following tests when requested by the Engineer:
- (e) Specific gravity and water absorption.
- (f) Bulk density.
- (g) Other tests described in BS 812.

3.6.3 Coarse Aggregates

Coarse aggregates shall be clean, hard and durable crushed rock, crushed gravel or natural gravel complying with the requirements of BS 882. The material shall be frost resistant and shall not contain any iron pyrites, iron oxides, flaky or laminated material, hollow shells, coals or other soft or porous material, or organic matter. The pieces shall be predominantly angular, rounded or irregular as defined in BS 812. Coarse aggregate shall be supplied in the nominal sizes called for in the Contract and shall be graded in accordance with BS 882 for each nominal size. The proportions of clay, silt and other impurities passing a 75 microns BS sieve shall be not more than one per cent by weight. The content of hollow and flat shells shall not be such as will adversely affect the concrete quality when tested as set out in BS 1881.

The total shell content shall not be more than the following:

40mm nominal size and above 2 per cent of dry weight

20mm nominal size 5 per cent of dry weight

10mm nominal size 15 per cent of dry weight

Chlorides soluble in a 10 percent solution by weight of nitric acid shall not exceed 0.03 per cent by weight, expressed as chloride ion when tested as set out in BS 812 but subject also to the further restriction on total chloride content given in Sub-Clause 3.5.5. When tested in accordance with ASTM C289, the aggregate shall be non-reactive. Soundness: After 5 cycles of the test set out in ASTM C88-76, the aggregate shall not show a weight loss of more than 12 per cent. Flakiness Index: When tested in accordance with BS 812 shall be as set out hereunder: 40mm nominal size and above Not more than 40 20mm nominal size and below Not more than 34

If the flakiness index of the coarse aggregate varies more than five units from the average value of the aggregate used in the approved trial mix, a new set of trial mixes shall be carried out in the workability of the mixes have been adversely affected by such variation. Impact Value: Not more than 45 per cent when tested in accordance with BS 812. Ten per cent fines value: Not less than 50 kilonewtons when tested in accordance with BS 812. Shrinkage: When mixed with other ingredients in the approved proportions for concrete and tested as set out in BS 1881, the shrinkage factor shall not exceed 0.05 per cent. Water absorption: The aggregate shall not have a water absorption of more than 2.5 per cent when tested as described in BS 812.

Tests on coarse aggregate shall be carried out daily or as required by the Engineer on site during concreting operations as follows:

(a) Sieve analysis

(b) Moisture content: An approved "rapid" test may be used for this test.

(c) Percentage of materials passing a 75 microns BS sieve by the Field Settling Test, checked when necessary by the Decantation Method.

The Contractor shall arrange to carry out the following tests when requested by the Engineer:

- (d) Determination of flakiness index.
- (e) Specific gravity and water absorption.
- (f) Determination of "ten per cent fines" and of Los Angeles Abrasion.
- (g) Other tests described in BS 812.

3.6.4 Test for Organic Impurities

Aggregates shall be tested for organic impurities by means of discoloration of a sodium hydroxide solution as follows:

A 340 millilitres graduated prescribed bottle shall be filled to the 123 millilitres mark with a sample of the aggregate to be tested. A 3 per cent solution of sodium hydroxide in water shall be added until the volume of the aggregate and liquid after shaking gives a total volume of 194 millilitres. The bottle shall be stoppered, shaken thoroughly and allowed to stand for 24 hours. Should the liquid then be darker than the standard colour solution the aggregate shall not be used for making of concrete. The standard colour solution shall be prepared in a 340 millilitres prescription bottle as follows: 2.5 millilitres of a 2 per cent solution of tannic acid in 10 per cent alcohol shall be added to 97.5 millilitres of a 3 per cent solution of sodium hydroxide in water. The mixture shall be shaken and allowed to stand for 24 hours. A glass of the standard colour may be used in place of the standard solution.

3.6.5 Total Chloride and Sulphate Contents

The total chloride content arising from all ingredients in a mix, expressed as chloride ions as a percentage of the weight of cement in a mix, shall not exceed 0.5 per cent in any one sample nor 0.3 per cent in 95 per cent of the samples tested. For pre-stressed concrete, steam cured concrete or concrete containing sulphate resisting cement or super sulphated cement, the total chloride content shall not exceed 0.5 per cent of the weight of cement in the mix.

The total sulphate content arising from all ingredients in a mix shall not exceed 0.4 per cent by weight of the aggregates or 4 per cent of the weight of cement in the mix, whichever is less. For this purpose the sulphate contents shall be expressed as SO₃ and shall be calculated from the sulphate contents of the cement, aggregates and any admixtures. Where applicable, sulphate contents shall be determined in accordance with tests described in BS 1047 and 3892.

Pulverised fuel ash shall not be used in conjunction with a cement complying with the requirements of BS 4027 in concrete required to be resistant to sulphates.

3.7 Admixtures

Admixtures for improving workability, accelerating or retarding setting of concrete, or for any other purpose, shall only be used with the Engineer's written approval. Calcium chloride or admixture containing chlorides will, however, not be approved.

The Contractor shall submit samples of the admixtures he proposes to use to the Engineer for testing. If an admixture is approved for use it shall be obtained from an approved supplier and the Contractor's arrangement for measuring, mixing and adding the admixture to the concrete batch shall be strictly in accordance with the manufacturer's instructions or recommendations and subject to the approval of the Engineer. The proportions of the concrete mixes and water/cement ratio shall be adjusted to the satisfaction of the Engineer so that the strength of the concrete with admixture is at least equal to the strength of the equivalent concrete without admixture.

3.8 Water for Concrete

Clean fresh water is to be used for the mixing of all concrete and mortar, and is to be from a source approved by the Engineer. If required by the Engineer, samples shall be taken from the proposed source of supply and submitted to a nominated laboratory for testing in accordance with BS 3148, "Methods of test for water for making concrete" and on the results of these tests the Engineer will decide whether the source is acceptable.

3.9 Concrete Mixes

The design of concrete mixes shall be the sole responsibility of the Contractor, but may be undertaken in conjunction with the Engineer. Concrete mixes shall be designed mixes in accordance with the requirements of BS 5328 having the characteristics specified in Table 3.1 of this Specification. Concrete for use in water retaining structures shall comply with BS 8007. Evidence shall be submitted to the Engineer, for all classes of concrete to be used, showing that at the intended workability the proposed mix proportions and production methods will produce concrete of the required quality. The following information shall be provided before any designed mix is supplied:

- (a) Nature and source of each material.
- (b) Full details of tests on trial mixes including workability.
- (c) Proposed quantities of each ingredient for one cubic metre of fully compacted concrete.

No change in the approved mix design will be permitted, unless the Contractor carries out trials on the proposed mix design to show that compliance with this Specification can be maintained. Mix design shall in all cases be subject to the approval of the Engineer, but such approval shall in no way relieve the Contractor of his responsibility for the design and production of concrete in compliance with this Specification.

3.11 Testing of Concrete

3.11.1 General

All concrete shall be sampled and tested in accordance with the requirements of BS 1881 unless otherwise stated in this Specification or instructed by the Engineer. The Contractor shall allow for all the necessary labour, materials, plant and equipment necessary for the regular sampling and testing of concrete to be placed in the Works.

3.11.2 Cement Content

Tests shall be carried out as required by the Engineer to determine the cement content of the mix. The cement content of any batch of concrete shall not be less than the specified minimum value minus 5 per cent of that value nor more than the specified maximum value plus 5 per cent of that value.

3.11.3 Workability

The workability of the concrete shall be measured as required by the Engineer by slump tests or compaction factor tests and shall be within the following limits:

Slump + 25mm or + one third of required value whichever is greater.

Compacting + 0.03 where required value is 0.90 or more

Factor + 0.04 where required value is 0.90 to 0.80 + 0.05 where required value is 0.80 or less

The required value shall be that which has been accepted under Clause 3.8 of this Specification.

3.11.4 Water/Cement Ratio

The water/cement ratio shall be determined as required by the Engineer and shall not exceed the specified maximum value by more than 5 per cent of that value.

3.12 Failure to Comply with Specified Requirements

Failure of concrete to comply with the specified requirements will result in it being classified as defective work. Immediately on notification by the Engineer that concrete work is defective, the Contractor shall take all measures necessary to improve concrete quality before further concrete is placed in the Works. If required by the Engineer, the rate of sampling of concrete shall be increased until adequate control is again established. Tests shall be carried out on the defective concrete or test cores taken from it to establish its in-situ strength. If the results of these tests satisfy the Engineer that the defective concrete will fulfil its design function then it may be accepted. If not, the Contractor shall propose strengthening or remedial work where possible or shall remove the defective concrete from the Works.

3.13 Concrete Returns and Records

The Contractor shall send weekly to the Engineer a return showing the quantities of cement and the number of mixings of each class of concrete used in each section of the Works. Records shall be kept by the Contractor of the positions in the Works of all batches of concrete, of their class and of all test cubes or other specimens taken from them. Copies of these records shall be supplied to the Engineer.

3.14 Plant, Equipment and Construction Procedure

The design, layout, installation and operation of plant and equipment for processing, handling, transporting, storing and proportioning concrete

ingredients and for mixing, transporting and placing concrete shall be to the satisfaction of the Engineer. Before the plant and equipment is ordered or delivered to site, the Contractor shall submit to the Engineer drawings showing the proposed arrangements of the plant together with detailed descriptions of the equipment proposed

3.15 Batching

The aggregates and cement shall be proportioned by means of efficient weigh batching machines except when the Engineer has approved the use of volume batching. The machines shall be carefully maintained and cleaned and they shall be provided with simple and convenient means of checking the accuracy of the weighing mechanism, and they shall be checked when required by the Engineer. **For volume batching suitable gauge boxes shall be used.**

3.16 Mixing Concrete by Machine

Where the concrete is to be mixed in machines, these shall be of the batch mixing or other approved type. The machines shall ensure that all the concreting materials including the water are thoroughly mixed together before any portion of the mixture is discharged. The mixing time shall not be less than thirty seconds per cubic foot (30sec/cft) of concrete, with a minimum of three minutes (3min) mixing time per batch. The machines must be capable of discharging their contents while running.

3.17 Mixing Concrete by Hand

Where it is not possible to employ machine mixing and approval has been obtained from the Engineer, concrete shall be mixed by hand as near as practicable to the site where it is to be deposited. Clean mixing bankers or platforms of sufficient area for the proper execution of the work shall be provided. These platforms if constructed of timber shall consist of planks closely jointed so as to avoid the loss of any grout or liquid from the wet concrete. The whole of the aggregate and cement shall be turned over on the banker in a dry state at least twice. The water shall then be added gradually through a rose head, after which the materials shall again be entirely turned over in a wet state at least three times.

3.18 Preparation of Surface to Receive Concrete

Foundations which are to receive concrete shall be properly drained and dewatered so that no water runs over or stands on a surface on which concrete is being placed. If required by the Engineer drains provided through or beneath concrete for the temporary conveyance of water shall afterwards be completely sealed to the Engineer's approval. Before deposition of concrete against rock, the rock surface shall be thoroughly wetted and cleaned by the application of water, or of water and air, under pressure. No concrete shall be deposited until the surface has been cleaned and passed as satisfactory by the Engineer. Faults or seams in the rock shall be cleaned to a depth satisfactory to the Engineer and if necessary stemmed with cement mortar of an approved mix.

Before any steel reinforcement is embedded in the concrete any loose mill scale, loose rust and any oil, grease or other deleterious matter shall be removed. Partially set concrete which may adhere to the exposed bars during concreting operations shall likewise be removed.

3.19 Authority to Commence Placing of Concrete

The Contractor shall give the Engineer at least 24 hours' notice of his intention to place concrete in a particular section of the Works. Before concrete is placed the Contractor shall apply to the Engineer for approval of the cleanliness, alignment and suitability of surfaces against which the new concrete is to be placed and of the fixing of formwork, reinforcement, embedded parts and the like and he shall obtain written permission from the Engineer to proceed with concreting. The Contractor shall carefully plan his concreting operation to ensure, where possible, that these operations are completed within the normal working day.

3.22 Distribution and Spreading of Concrete

Concrete shall be placed in layers not exceeding 500 millimetres in depth approximately parallel to the horizontal or inclined construction joint planes. These layers shall be deposited from one face to the other until the full height of the lift is reached. Each layer shall be deposited on the previous one before the latter has taken its initial set and the exposed area of fresh concrete shall be maintained to the practical minimum. In order to accomplish this timing a new layer may be started before the previous layer is completed. The face from which placing of concrete is to commence shall be selected so that if an emergency should occur which prevents the layer being completed the vertical construction joint will be formed in a structurally acceptable position. Concrete shall not be placed during rain sufficiently heavy or prolonged to wash mortar from coarse aggregate on the exposed sloping faces of fresh concrete unless adequate shelter is provided.

Concrete shall not be placed against any surface (including formwork, reinforcement, embedded steelwork, adjacent concrete or rock) which during hot weather is not adequately dampened to prevent excessive absorption of water from the fresh concrete. Once commenced, concreting shall be carried on as continuous operation between pre-arranged construction, expansion or Contraction joints save only if an emergency occurs and interruption is unavoidable. The Contractor shall have readily available suitable prefabricated formwork for stop ends to form emergency vertical construction joints and, in the event of such an interruption occurring, the concrete already placed shall be properly finished up to the stop end and to a horizontal or inclined surface as directed by the Engineer. In water retaining structures the Contractor shall propose methods of making the joint watertight. Concrete shall be placed carefully so as not to displace the formwork or reinforcement.

3.23 Compaction of Concrete

The Contractor shall thoroughly compact all concrete immediately after it has been placed in position. Unless otherwise authorised by the

Engineer, compaction shall be accomplished with the aid of immersion vibrators as specified below, together, if necessary, with rods, shovels and the like. Particular care shall be taken to fill all voids and to work the concrete against rock and existing concrete surfaces, round any reinforcement and embedded fixtures and into the corners of the formwork. If the Contractor does not wish to use immersion vibrators for any portion of the works he shall submit his proposals for alternative vibrators or compaction equipment and shall receive the Engineer's approval to the equipment before commencing to concrete the portion concerned. Vibrators shall be of a type and size adequate for the portion placed. Vibrators shall operate at a frequency of between 7000 and 10000 impulses per minute. The Contractor shall ensure that vibrators are operated at pressures and voltages not less than those recommended by the manufacturer in order to ensure that the compactive effort is not reduced.

A sufficient number of vibrators shall be operated to enable the entire quantity of concrete being placed to be vibrated for the necessary period and in addition stand-by vibrators shall be available for instant use at each concreting place. The length and diameter of the vibrating element of immersion vibrators shall be sufficient to penetrate through the layer of concrete being placed and re-vibrate the upper portion of the underlying layer of concrete. Only men experienced in the use of vibrators shall be employed on this type of work.

Vibration shall be continued at each point until the concrete ceases to Contract, a thin layer of mortar has appeared on the surface and air bubbles have ceased to appear. The period of vibration necessary shall be determined by trial in the presence of the Engineer. Vibration shall then be continued for this period at each point before any further concrete is superimposed. Immersion vibrators shall be inserted vertically to penetrate into the layer underneath at regular intervals, which shall not exceed the distance from the element over which vibration is visibly effective and in any case shall not exceed 700 millimetres. Vibrators shall not be used to move concrete laterally and shall be withdrawn slowly to prevent the formation of voids. Vibrators shall not be applied to reinforcement or other embedded items.

3.28.1 Concrete works

Concrete works in lining shall be carried out in accordance with the provisions of this Specification covering Concrete Works. Special attention shall be paid to the concrete mix to ensure that it is properly controlled to avoid it creeping downward from the sides. The thickness of the concrete lining shall be 75mm or as directed by the Engineer. Where a completed section has a thickness less than that specified, it will be removed and replaced. Plastering or other methods of building up the lining thickness will not be allowed. Concrete canal linings will be placed in-situ and in panels of 2 - 3 m lengths and be constructed in alternate bays, so that at least 24 hours elapse between the completion of one panel and the start of lining of an adjacent panel. This will be in order to

maintain uniform spacing for the joints. Screed guides shall be used to maintain the desired grade and thickness of the lining during laying of the concrete. Any other method of constructing the lining will require the approval of the Engineer. In forming the concrete (screeding operation) at least three passes with a wooden plank, or any other method chosen by the Contractor and approved by the Engineer, are necessary in order to maintain the shape and the inside of the canal. After completing the required number of passes, the concrete will be immediately floated (smoothing of the surface with a wooden plank) and towelled to produce the specified finish. Striking off, or removal of any concrete from the consolidated surface by means other than those used in the construction, will not be permitted. **Curing of concrete shall be carried out in accordance with the provisions of this Specification covering Concrete Works (proper curing by keeping the concrete damp by sprinkling or by covering with wet gunny bags).**

3.28.2 Expansion and shrinkage joints

Expansion and shrinkage joints shall be formed at 2 - 3m intervals in the position and manner shown on the Drawings or as directed by the Engineer. Grooves shall be formed on the joints as shown in the drawings. The minimum Width: Depth (W/D) ratio of the sealant material shall be 2:1. The remaining thickness shall be filled with joint filler material as shown in the drawings. The edges of the previously laid concrete shall first be painted with a suitable sealing compound preferably Sika Primer 3 or equivalent to prevent bonding. After the curing period, the grooves shall be filled with the hot sealing compound (Sikaflex-11FC or equivalent) at the rate of about 0.25 litres per square metre over a primer coat. After the sealant has been applied to the joint, it can be smoothed using a spatula lubricated with diluted washing-up liquid (10:1 dilution).

3.32 Curing and Protection

Concrete shall be protected during the first stage of hardening from the harmful effects of sunshine, drying winds, cold, rain or running water. The Contractor shall pay particular attention to the need to protect concrete immediately after the finishing operation and prior to its final set and shall submit their proposals to achieve this protection for the Engineer's approval. Protection of concrete which has achieved its final set shall consist of one or more of the following:

(a) A layer of sacking, canvas, hessian, straw mats or similar absorbent material or a layer of sand, kept constantly moist by spraying with water as necessary for fourteen (14) days or such periods as may be directed by the Engineer.

(b) After thoroughly wetting, a layer of approved waterproof paper or plastic membrane kept in contact with the concrete for fourteen (14) days or such period as may be directed by the Engineer.

The use of saline water for curing purposes will not be permitted.

3.33 Steel Reinforcement

3.33.1 Materials

Unless otherwise directed or otherwise shown on the Drawings, hot rolled high yield reinforcement shall be used throughout the works. Where required, mild steel reinforcement, medium tensile steel reinforcement and high tensile steel reinforcement shall comply with BS 4449. Cold twisted steel wire for the reinforcement of concrete shall comply with BS 4482.

All reinforcement shall be sourced from an approved manufacturer and, if required by the Engineer, the Contractor shall submit a test certificate of the rollings. The Contractor shall, when requested by the Engineer, provide sample pieces 1.0 metre long for testing. Tying wire shall be 1.6 mm diameter soft annealed iron wire.

Before any steel reinforcement is embedded in the concrete any loose mill scale, loose rust and any oil, grease or other deleterious matter shall be removed. Partially set concrete which may adhere to the exposed bars during concreting operations shall likewise be removed.

3.33.2 Fabricating Reinforcement

Bar reinforcements shall be bent to the shapes shown on the Drawings and bending schedules. All bars shall be bent cold, unless otherwise permitted by the Engineer. All hooks, bends, and the like, unless otherwise shown on the Drawings, shall be to BS 8666. The Contractor shall satisfy himself as to the accuracy of any bar bending schedules supplied and shall provide all reinforcement in accordance with the Drawing. Bar reinforcement shall be bundled and each bundle of steel shall be tagged with identifying tags, showing the size and mark of the bar. The bundles shall be stacked clear of the ground in easily accessible positions that do not in any way hinder the progress of work and shall be kept clean.

3.33.3 Fixing Reinforcement

When placed in the work reinforcement shall be free from coatings or dirt, detrimental scale, paint, oil or other foreign substances. When steel has on its surface rust, loose scale and dust which is easily removable, it may be cleaned by a method approved by the Engineer. All reinforcing bars, ties, links and fabric shall be fixed in the positions shown on the Drawings within the tolerances specified in BS 8666. In no case shall the cover specified on the Drawings be increased by more than 5 millimetres. Displacement of reinforcement beyond the specified tolerance shall be prevented by supporting the bars sufficiently and securely fixing them together at intersections where necessary. The ends of all tying wires shall be turned into the body of the concrete and not allowed to project towards the surfaces of the concrete. Spacers shall be used to maintain the cover to all steel and shall be made of dense cement mortar of one part cement and two parts sand. Spacers shall be triangular in section and only one acute edge shall bear against the formwork, the flat side shall bear against the steel. Wire cast into the blocks to fix them to the

reinforcement shall be 1.6 millimetres diameter soft annealed iron. Spacers shall not be used on the wet face of water retaining or water excluding structures. Chairs, stools, etc. shall be used to maintain clearance between two or more layers of reinforcement.

Nothing shall be allowed to interfere with the specified position of reinforcement. The fixing of reinforcement shall be checked before and during concreting, and particular attention shall be given to the position of top steel in cantilever sections. During concrete placing a competent steel fixer shall be in attendance to adjust and correct the position of any reinforcement which may be displaced.

3.34 Cover to reinforcement

The concrete cover to reinforcement shall be 50 mm unless otherwise shown on the Drawings. The Contractor shall provide any necessary concrete pads for ensuring the cover is attained and in no case shall timber packing be used.

3.35 Formwork

3.35.1 Definitions

Forms, formwork or shuttering shall mean all temporary moulds forming the concrete to the required shape together with any special lining that may be required to produce the concrete finish specified. False work or centering shall mean the furnishing, placing and removal of all temporary construction such as framing, props and struts required for the support of forms.

3.35.2 Materials

The formwork may be of seasoned, planed, tongued and grooved timber, plywood, block board, tempered hardboard, steel or as specified on the Drawings. All timber used for formwork shall be sound wood, well-seasoned and free from loose knots, shakes, large checks, warping and other defects. Before use on the work, it shall be properly stacked and protected from injury from any source. Any timber which becomes badly warped or cracked, prior to the placing of concrete shall be rejected. All formwork for outside surfaces before final ground level shall be either tongued and grooved or provided with a suitable lining to produce a smooth surface finish.

3.35.3 Forms

All forms shall be of wood or metal and shall be built grout-tight and of sufficient rigidity to prevent distortion due to the pressure of the concrete and other loads incidental to the construction operations. Forms shall be constructed and maintained so as to prevent warping and the openings of joints due to shrinkage of the timber. The forms shall be substantial and unyielding and shall be so designed that the finished concrete will conform to the proper dimensions and contours. The design of the forms shall take into account the effect of vibration of concrete as it is placed. All formwork shall, unless otherwise directed, be provided with 25 millimetres by 25 millimetres angle fillets (chamfers) so as to form splays

on internal and external angles. A grout check formed from 25 millimetres square hardwood timber shall be incorporated in the formwork to provide a clean, level, horizontal joint on exposed concrete surfaces at the top of each lift. All joints in the formwork shall be either horizontal or vertical. End formwork shall be square across the mass of concrete. Where concrete is to be deposited to a slope steeper than 20 degrees to the horizontal, top formwork shall be used to enable the concrete to be properly compacted unless the Engineer agrees otherwise. Openings for the inspection and cleaning of the inside of formwork for walls, piers and columns shall be formed in such a way that they can be closed conveniently before commencing to place concrete. Form clamps, tie bolts and anchors shall be used to fasten forms. The use of wire ties to hold forms in position during placing of concrete will not be permitted. Tie bolts and clamps shall be positive in action and of sufficient strength and number to prevent spreading or springing of the forms. They shall be of such type that no metal part shall be left within the specified concrete cover. For water retaining sections, methods of fixing the forms which result in holes through the concrete section when the formwork is removed shall not be used and built-in wall ties shall be fitted with water baffles. All forms for outside surfaces shall be constructed with stiff Wales at right angles to the studs and all form clamps shall extend through and fasten such Wales. The shape, strength, rigidity, grout tightness and surface smoothness of forms which are re-used shall be maintained at all times. Any warped, bulged or otherwise damaged timber shall be replaced. Forms which are unsatisfactory shall not be re-used. If the surface finish on the formed concrete deteriorates as a result of deterioration of the faces of the forms, the Engineer shall instruct that forms be resurfaced, or discarded. All forms shall be treated with approved mould or similar oil or be soaked with water immediately before placing concrete to prevent adherence of concrete. Any materials which adhere to or discolour concrete shall not be used. All forms shall be set and maintained true to the line designated until the concrete is sufficiently hardened. Forms shall remain in place for periods which shall be as specified in Clause 3.34.

When forms appear to be unsatisfactory in any way, either before or during the placing of concrete, the Engineer shall order the work stopped until the defects have been corrected. All formwork shall be approved by the Engineer before concrete is placed within it. The Contractor shall, if required by the Engineer, provide copies of calculations of the strength and stability of the formwork and false work. Notwithstanding the Engineer's approval of these calculations, the Contractor shall be held responsible for the safety and adequacy of formwork.

3.35.4 False work and Centering

Detailed plans for a false work or centering shall be supplied by the Contractor to the Engineer at least 14 days in advance of the time the Contractor begins construction of the false work. Notwithstanding the approval of the Engineer of any designs for false work submitted by the Contractor, the Contractor shall be solely responsible for the strength,

safety and adequacy of the false work or centering. All false work shall be designed and constructed to provide the necessary rigidity and to support the loads from the weight of green concrete and shuttering and incidental construction loads. False work or centering shall be founded upon a solid footing safe against undermining and protected from softening. False work which cannot be founded on satisfactory footings shall be supported on piling which shall be spaced, driven and removed in a manner approved by the Engineer. The Engineer may require the Contractor to employ screw jacks, or hard wood wedges to take up any settlement in the formwork either before or during the placing of concrete. False work shall be set to give the finished structure the required grade and camber shown on the Drawings.

3.35.5 Forms for Joints

Where permanent or temporary joints are to be made in horizontal or inclined members, stout stopping off boards shall be securely fixed across the mould to form a water-tight joint. The form of the permanent joint shall be as shown on the Drawings. Where reinforcement or water stops pass through the face of a joint the stopping off board shall be drilled so that the bars or water stop can pass through, or the board shall be made in sections with a half round indentation in the joint faces for each bar so that when placed the board is neat and accurate fit and no grout leaks from the concrete through the bar holes, joints or around the water stop.

3.35.6 Release Agents

Only approved chemical release agents, mould creams (emulsions of water in oil) or oils containing a proportion of surfactant not exceeding 2 percent will be permitted. Water soluble emulsions and oils without surfactant shall not be used. Oil based release agents shall be applied at a rate of 7 square metres per litre one day in advance of concreting, preferably by spray or roller. Chemical release agents shall be applied in accordance with the manufacturer's recommendations. New timber face work shall be given three coats of release agent before use on the work to ensure uniformity of porosity on the surface. On no account shall the release agent come into contact with the reinforcement.

3.36 Removal of Formwork

Formwork shall be carefully removed without shock or disturbance to the concrete. No formwork shall be removed until the concrete has gained sufficient strength to withstand safely any stresses to which it may thereby be subjected. The minimum periods which shall elapse between completion of placing concrete and removal of forms are given in the following Table 3.2, and apply to ambient temperatures higher than 10oC. At lower temperatures or if cements other than ordinary Portland are involved, the Engineer may instruct longer periods. Compliance with these requirements shall not relieve the Contractor of his obligation to delay removal of formwork until such removal can be completed without damage to the concrete.

Table 3.2 – Formwork striking time

Position of formwork**Striking Time**

Beam sides, walls and columns

1 to 2 day

Slab soffits - props remain undisturbed

4 days

Beam soffits - props remain undisturbed

7 days

Removal of slab props

14 days

Removal of beam props

21 days

3.37 Surface Finishes**3.37.1 General**

After removal of the formwork no treatment of any kind other than that required for curing the concrete shall be applied to the concrete faces until after inspection by the Engineer. All honeycombed areas, deformed surfaces or other defective surfaces shall then be repaired at the direction of the Engineer. Immediately following the Engineer's inspection of surface finish, all tie bolt cavities shall be filled with sand cement mortar and the surface left smooth, sound, even and uniform in colour. Should the finishes surface either as-stuck or after repair exhibit a non-uniform colour or texture, the Engineer shall have the right to order that the surface be given a skim coat and then painted.

3.37.2 Formed Surfaces

All joints between panels shall be vertical and horizontal unless otherwise directed. Suitable joints shall be provided between sheets to maintain accurate alignment in the plane of the sheets. For warped surfaces, facings shall be built up of laminated splines cut to make a tight surface which shall then be dressed and sanded to the required curvature.

Type F1: This finish is for surfaces against which backfill or further concrete will be placed. Formwork shall consist of sawn boards, sheet metal or any other suitable material which will prevent the loss of grout when the concrete is being placed.

Type F2: This finish is for surfaces which are permanently exposed to view but where the highest standard of finish is not required. Forms to provide a Type F2 finish shall be faced with wrought thicknesses tongued and grooved boards with square edges arranged in a uniform pattern and close jointed or with suitable sheet material. The thickness of boards or sheets shall be such that there shall be no visible deflection under the pressure exerted by the concrete placed against them. Joints between boards or panels shall be horizontal and vertical unless otherwise directed. This finish shall be such as to require no general filling of surface pitting, but fins, surface discoloration and other minor defects shall be remedied by methods agreed by the Engineer.

Type F3: This finish is for surfaces which will be in contact with water flowing at high velocity and for surfaces permanently exposed to view where good appearance and alignment are of importance. To achieve this finish, which shall be free of board marks, the formwork shall be faced with plywood complying with BS 1088 or equivalent material in large sheets. The sheets shall be arranged in an approved, uniform pattern. Wherever possible, joints between sheets shall be arranged to coincide with architectural features or changes in direction of the surface. Suitable joints shall be provided between sheets to maintain accurate alignment in the place of the sheets. Unfaced wrought boarding or standard steel panels will not be permitted for Type F3 finish. The Contractor shall ensure that the surface is protected from rust marks, spillages and stains of all kinds.

Type F4: This finish is similar to that required for type F3 but is used in places where a first class alignment and a dense surface free from air holes and other defects is required, suitable for the application of decorative finishes, in very high velocity water channels and in other similar circumstances.

3.37.3 Unformed Surfaces

Type U1: This is screed finish for surfaces of roads of foundations, beds, slabs, and structural members to be covered by backfill, subsequent stages of construction, bonded concrete topping or cement mortar beds to receive pavings, and on exposed surfaces of paving where a superior finish is not required. It is also the first stage of Type U2 and U3 finishes. The finishing operations shall consist of levelling and screeding the concrete to produce a uniform, plane or ridged surface, surplus concrete being struck off by a straight edge immediately after compaction.

Type U2: This is a floated finish for exposed surfaces where a hard smooth steel trowelled surface is not required. Floating shall be done only after the concrete has hardened sufficiently, and may be by hand or machine. Care should be taken that the concrete is worked no more than is necessary to produce a uniform surface free from float marks.

Type U3: This is a hard smooth steel trowelled finish for surfaces exposed to water flowing at high velocity. Trowelling shall not commence until the moisture film has disappeared and the concrete has hardened sufficiently to prevent excess laitance from being worked to the surface. The surface shall be trowelled under firm pressure and left free from trowel marks.

Type U4: This finish is similar to Type U3 finish but the permissible tolerances are smaller.

3.38 Conduits, Box-outs and Apertures

The layout of conduits, box-outs, grooves, apertures and the like shall be as shown on the Drawings or as directed by the Engineer, and shall be subject to inspection and approval by the Engineer before commencing

concreting. Conduits shall be placed as near the centres of members as possible and sufficient space shall be provided between adjacent conduits to prevent difficulties in the placing of concrete. Box-outs, holes grooves, apertures and the like shall be accurately set out in the formwork prior to placing the concrete. Fixing blocks, ends of brackets, bolts and, where possible, built in parts shall be cast into the concrete at the time of placing. No part of the concrete works shall be cut out for any such item, or for any other reason, without the Engineer's permission. The Contractor shall ensure that all sub-Contractors are informed of his programme for the structural works at the commencement of the Contract and that such sub-Contractor's requirements relating to concrete members are approved well in advance. The Contractor shall obtain from all such sub-Contractors complete information of their requirements regarding conduits, pipes, fixing blocks, ducts, holes and any other items to be cast into or formed in the concrete members. Failure of a sub-Contractor to supply such information shall not be allowed to delay the progress of the Works.

3.39 Construction joints

Concreting shall be carried out continuously up to construction joints, the position and arrangement of which shall be as indicated on the Drawings or as previously approved by the Engineer. The Contractor is to allow for working beyond the ordinary working hours where necessary in order that each section of concrete may be completed without any lapse while the work is in hand. All construction joints are to be formed square to the work. Where vertical construction joints are required, the joint face of the first stage concrete shall be finished against a stopping-off board, or vertical end shutter, suitably notched to pass the reinforcement. When the concrete is hard and the shutter is removed, the whole joint surface shall be thoroughly hacked and roughened or scabbled with suitable tools so that no smooth skin of concrete is visible and that all aggregates and solid matrix around them is exposed. For horizontal or slightly inclined construction joints, the surfaces shall preferably be prepared when the concrete has set but not hardened by jetting with a fine spray of water and brushing with a stiff brush to remove the smooth skin and expose the aggregate without disturbing it. Where this treatment is impractical and work is resumed after the concrete surface has hardened, a similar procedure shall be adopted as on vertical joints. If, in the opinion of the Engineer, any deleterious material has come into contact with the concrete of the construction joint or if the concrete is honeycombed or unsound for any reason, the concrete shall be cut back to such a depth as the Engineer shall order and the roughened surfaces shall be thoroughly cleaned by compressed air and water jets or other approved means. Immediately before concreting is resumed, the roughened joint surface shall be thoroughly cleaned with compressed air and water jets and slightly wetted and cement grout placed. The Contractor shall take precaution to avoid segregation of the concrete along the joint plane and to obtain thorough compaction.

3.42 Breaking out Existing Concrete or Block work

Well in advance of the commencement of the work the Contractor shall seek the approval of the Engineer regarding the proposed method of breaking out existing concrete or block work in the positions shown on the Drawings or as directed by the Engineer.

3.43 Cement Grout

Cement grout for general purposes shall consist of Portland cement and water mixed in the proportion of one (1) part by volume of cement and one and a half (1.5) parts by volume of water. The grout shall be used within one hour (1hr) of mixing.

3.44 Cement Mortar

Cement mortar shall be machine mixed and unless otherwise specified, consist of three (3) parts of sand to one (1) part of Ordinary Portland cement mixed and thoroughly incorporated together. Just enough water will be added to give a workability appropriate to its use. The above proportions are by volume. Mortar shall be used whilst freshly mixed and no softening or re-tempering will be allowed.

3.45 Concrete Block and Bricks Masonry

Concrete blocks and bricks shall comply with BS 6073: Part 1 and shall have a minimum 28 days compressive strength of 3.5N/mm² and 7 N/mm² respectively. The concrete blocks and bricks shall be laid in a staggered pattern such that the vertical joints between two consecutive layers are offset by half a block length. Joints on the inside faces shall be rendered in which case the joints shall be raked out at a depth of 5 mm. Rendering shall consist of 1:2 mortar applied to a thickness so as to ensure professional finish. The mix used to manufacture concrete blocks shall not be leaner than 1:9 by volume and the maximum size of aggregate shall be 10mm. The standard size of the concrete block shall be 400 mm x 200 x 200 mm and 300 x 100 x 100 for bricks. However blocks and bricks of other sizes may be used if approved by the Engineer for proper bonding at corners and openings. The concrete blocks and bricks shall be wetted before laying and shall be set in mortar, which complies with the specifications given in Clause 3.42. Unless otherwise stated, the maximum joint thickness shall be 12 mm and the horizontal and vertical joints shall be filled with mortar. Joints shall be finished flush with the face of the blocks and bricks. The Concrete block and brick masonry shall be cured for a period of seven days by covering the work with two layers of Hessian, which is kept permanently saturated. Provision shall be made to clean all exposed faces both as the work proceeds and on completion so that they are left in a neat, tidy and clean condition. Building masonry will not be permitted in heavy rain without the approval of the Engineer. In such instances the Contractor shall make provision to protect materials and the newly placed mortar from the rain. Concrete blocks shall either be obtained from an approved manufacture or made on site in approved block making machines. When casting of the concrete blocks is done at site, these shall be removed from the casting machine and deposited on edge on covered racks and left for 3 days, during which time they shall be kept constantly wet. Afterwards they may

be placed on racks in the open provided they are protected by Hessian cloth or similar and kept wet for a further 5 days. Thereafter they shall not be moved or used in the works until they are 28 days old. Chambers shall be constructed after pipes have been laid, except the bases may be constructed earlier to avoid deterioration of the formation. Backfilling around completed chambers shall be with suitable material deposited equally all round and compacted in accordance with the Specifications. Where any pipes are built into concrete or block work the pipe shall be surrounded in two layers of polythene sheeting unless a puddle flange has been shown on the Drawings.

3.46 Rendering Work

3.46.1 Material

Cement, water and fine aggregate shall conform to the requirements specified in the concrete works. Mesh reinforcement shall be plain diamond expanded steel lathing to BS 1369 where specified. Lime shall be to BS 980 and shall be mixed with water and allowed to stand prior to use according to the manufacturer's recommendations. The mix proportion of the cement mortar by volume shall be as follows:

- . For rendering coat, Cement : Sand = 1:3
- . For finishing coat, Cement : Sand = 1:3

Lime putty may be mixed in mortar for finishing coat at 10% of sand by volume.

3.46.2 Waterproof cement mortar

Waterproof mortar shall be made by mixing a waterproof agent into ordinary cement mortar. The Contractor shall be responsible for selection and quality of the waterproof agent and this shall be approved by the Engineer before use. The mixing and application shall be in accordance with the manufacturer's instructions.

3.46.3 Application

The surfaces which are to receive a rendering coat shall be free from all laitance, scum, loose carbonate scale, loose aggregate dirt and other foreign matters. Concrete block, brick or stone surfaces shall be sufficiently and uniformly damped immediately before application of mortar. Concrete surfaces shall be kept thoroughly wet for 24 hours prior to the application of mortar. Where shown on the drawings or directed by the Engineer, steel wire lath shall be fixed to the brick, concrete block or concrete walls before applying cement mortar plaster. Cement mortar shall be used within 30 minutes from the time of mixing. Re-tempering shall not be permitted. The total thickness of rendering plus finishing coat shall be 30 mm for the floors and 20 mm for wall. Cement mortar finish shall be trowel finished unless otherwise specified. When the finishing coat is applied, the entire surface of floor or wall shall be finished in one operation in order to minimise joint marks. When expansion and control joints exist in the base structure, provision shall be made to prevent cracking of the mortar by inserting metal expansion beads within the coating thickness in a manner approved by the

Engineer. The finished surface shall be perfectly plumb or level as the case may be except where otherwise specified without any bulging, runs, bruises or stains. After application of the finishing coat, the surfaces shall be kept continuously damp for not less than 48 hours and then allowed to become thoroughly dry. Moistening shall be started as soon as the surface has hardened sufficiently not to cause displacement or damage.

3.47 In Situ Concrete Chambers

In situ concrete chambers shall be constructed generally in accordance with Section 3 of this Specification.

3.48 Chamber Covers and Slabs

Covers and slabs shall be the type, size and weight shown in the drawings. Care shall be taken to see that slabs are even so that the cover can seat without rocking. Covers and frames shall be provided as shown on the drawings. The tops of the covers shall be flush at all points with the surrounding surface of paved areas or as directed in unpaved areas. Any slight adjustment of the slab level which may be necessary to accomplish this shall be effected by topping the side walls with concrete.

4. STONEMWORK

4.1 Stones

Stone for all purposes shall be the best of its kind, sound and durable, free from flaws and from soft, weathered or decomposed parts. The stone and the quarry from which it is obtained shall be subject to the approval of the Engineer, samples shall be submitted by the Contractor of the stone he proposes to use in the Works and the Engineer's approval shall be obtained before

such stone is used or any order is placed. The stone used shall be clean and must be washed if deemed necessary in the opinion of the Engineer. Stones for face work shall be as far as possible quarry split and not bullnosed or hammer dressed. A moderate amount of dressing to trim off large projections will however be permitted. Exposed faces of stones for masonry shall be free from tool marks except such as are inherent in the nature of any dressing that may be specified. In rock-faced work the roughness on the surface shall not project more than 40 mm for stone less than 0.3 m² face area and not more than 60 mm for large stones.

4.2 Stone Masonry

Masonry shall be built to the lines and levels shown on the Drawings. For face work the stones shall show a face of not less than 0.025 m² and not more than 0.1 m² in area and none shall be less than 100 mm in depth; they shall be laid to give a uniformly random appearance and shall be selected in laying so as to present an even distribution of large and small stones on the face. For the arises, stones shall be roughly squared, quarry split and of a size to give out bands varying from 300 mm to 500 mm in length and in bands from 150 mm to 250 mm. The alignment of arises shall be set true to the required lines. The stones shall be set in mortar with their natural bedding plane (if any) as near normal as

possible to the face or normal to the line of thrust in the case of load bearing structures. Particular care must be given to obtaining a sound bond both longitudinally and transversely and there shall be at least one bond or length not less than two-thirds of the wall thickness, in each square yard of wall face. The mortar, unless otherwise specified, shall be machine mixed cement and sand in the proportion of one part to three (1:3) parts generally as described in the specification. Mortar shall completely fill all interstices between the stones. The face joints in rubble masonry may vary in thickness from 10 mm to 20 mm. They shall be finished as a neat weathered joint with mortar while the work proceeds where the masonry is specified to be "un-pointed". Where pointing is specified, the joints in each day's work shall be raked out to a depth of not less than 25 mm before the mortar has set. Subsequently the joint shall be filled with mortar and finished in accordance with Clause 4.6. The face of the masonry is to be kept wet while the pointing is proceeding. Provision shall be made to clean all exposed faces both as work proceeds and on completion so that they are left in a neat, tidy and clean condition. Building of masonry will not be allowed in heavy rain without the written consent of the Engineer. Building shall only proceed when suitable precautions to the satisfaction of the Engineer shall be taken against the action of rain on newly placed mortar. If for any reason of urgency the consent of the Engineer should be desired to a departure from these provisions, the Contractor shall submit to the Engineer for approval their proposals for protecting the materials and work from the weather.

4.3 Types of Masonry

The arrangement of the stones on the exposed face or faces of the masonry shall be as described below according to which type is called for on the Drawings.

(a) Random rubble un-coursed masonry shall be built with stones of irregular shapes taken generally as they come from the quarry, preparation being limited to the removal of inconvenient corners and excrescences. They shall be selected as the work proceeds to give a uniformly random appearance and no attempt shall be made to form courses.

(b) Random rubble masonry brought to courses shall be generally as the preceding type except that it shall be levelled up to courses between 300 mm to 400 mm in depth and coinciding with the quoin stones.

(c) Squared rubble coursed masonry shall be built in courses between 100 mm to 250 mm in depth of stones squared to rectangular shapes and selected so that all stones in one course are of approximately the same height.

4.4 Bedding of Stone Masonry

Unless otherwise directed by the Engineer, all masonry stones, when incorporated in the Works shall be laid on its natural bed, except in the case of arches where the natural bed shall be radial.

4.5 Special Stonework

Special stonework shall consist of approved stones dressed to the shapes and dimensions and with the faces tooled, all as shown on the Drawings. All stones shall be laid true to line and centre with mortar joints as shown on the Drawings.

4.6 Pointing of Joints in Masonry

Unless otherwise shown on the Drawings, pointing to masonry joints shall be flush and shall be formed by raking the joint clean and then filling it with pointing consistency mortar which shall be given a flush face with a steel trowel.

4.7 Hand Placed Rubble Filling

Hand placed rubble filling shall consist of stones individually selected and placed by hand firmly in place in bearing contact with each other or with the sides of the space to be filled; the voids shall be carefully filled with small rocks and spalls wedged together to form a compact mass. The sides of stones shall be roughly trimmed if necessary with a spalling hammer to obtain a reasonably close fit. On the exposed face the stones shall be placed with their flattened sides uppermost and in the plane of the face.

4.8 Hardcore

Hardcore shall consist of broken rock, concrete or other approved hard material, clean and free from extraneous matter, having a maximum particle size of 100 mm. It shall be spread and levelled, watered and compacted, and then blinded with a layer of fine material of grading 3 mm to dust, watered and compacted all to the Engineer's approval.

5. PIPEWORK

5.1 General

The Contractor shall construct pipelines to the lines and levels using grades, classes, or designs of pipe, bedding, haunching and surrounding as shown on the Drawings or directed by the Engineer. Unless otherwise described in the Contract or agreed by the Engineer only one type of pipe shall be used within any individual length. All materials shall be subject to the approval of the Engineer prior to procurement and delivery. Upon delivery, the Engineer shall inspect the delivered material for compliance with the specifications. In case of non-conformity, the Contractor shall replace the material at his own cost. The pipes and fittings shall comply in all respects with British Standards and jointing of pipes and fittings shall be carried out in accordance with the manufacturers' instructions and to the approval of the Engineer.

5.2 Storage and Protection of Materials

Pipes shall be stacked on a firm base using two timber packers only under the barrel of rigid pipes such as concrete or steel. Flexible pipes such as uPVC shall be stacked closely side by side on a firm plane base so that the whole length of the barrel is uniformly supported and sockets

are clear of the ground. Each succeeding layer shall be placed at right angles to the previous layers. The height of any stack shall be not more than six layers of pipes and in the case of steel, not more than two layers. Fittings and specials of any type shall be stored in a single layer only. Pipes and fittings shall at all times be adequately protected from damage during transport, storage and handling. Cracked or chipped pipes shall not be used in the permanent works. Steel and large diameter plastic pipes shall be fitted in the factory with end caps or reinforcement adequate to prevent distortion during transport, storage and handling. Plastic pipes and fittings shall be protected from direct sunshine and excessive heat. Deformed pipes and fittings shall not be used in the permanent works. Rubber rings and other pipe jointing material shall be stored under cover from direct sunshine. Granular bedding shall be stored on a firm impermeable base so that it does not become contaminated with deleterious matter.

5.5 Pipes and Fittings

5.5.1 Steel pipes

Steel pipes and specials for water and sewerage shall comply with BS 534. Galvanised mild steel pipes and fittings shall comply with BS 1387 Class B or "Medium Grade" and complying with ISO 65. Threading for screwed and socketed joints shall be in accordance with the requirements of BS 21. Joints shall be made with an approved pipe-jointing compound in accordance with the manufacturer's instructions. Red lead compounds shall not be used. Joints in underground piping shall be coated with bitumen or other approved composition. All underground sections of pipework to be protected against corrosion by treating with "COLAS" primer, and wrapped with fibreglass and coated with two coats of 'COLAS' bituminous tap coats all to manufacturers specification.

The bituminous paint is to be manufactured to ASTM D1187-82. All fittings for galvanised steel water pipework shall be galvanised heavy weight fittings in accordance with BS 1740, BS 5153 and BS 5154. All fittings shall be subject to the approval of the Engineer. Brass or gunmetal fittings shall be subject to the approval of the Engineer.

5.5.2 UPVC pipes

Un-plasticized Polyvinyl Chloride (uPVC) pressure pipe shall have outside diameters complying with ISO 161, laying lengths complying with ISO 264 and wall thicknesses complying with ISO 4065. The uPVC pipes shall comply with BS 3505 Class C (0.9 bar working pressure). Joints shall be of the spigot and integral socket type. Solvent weld joints are not permitted in buried uPVC

Pipe lines. Fittings for use with uPVC pressure pipe shall be manufactured from either uPVC or cast iron with socketed joints and shall comply with ISO 727. Cast iron fittings shall be bitumen coated. Aluminium alloy fittings are not permitted. The metal adaptor fittings shall comply with ISO 4132.

5.6 Valves

5.6.1 Gate valves

Gate valves shall conform to BS 5153 for cast iron and BS 5154 for copper alloy “valves for general purposes”. All gate valves shall close in a clockwise direction and the direction of opening and closing shall be cast on the hand wheels or valve casing with the words 'OPEN' and 'CLOSE' respectively. All gate valves shall be capable of being operated manually with a maximum applied torque of 100 Nm for valves with a nominal diameter less than 450mm. The Contractor shall ensure that the gate valves supplied are fitted with appropriate thrust bearing guides and gearing to fulfil these requirements, ensuring that when reduction gearing is employed, the gear ratio shall not exceed 4:1. Isolating gate valves shall permit manual closing off of the raw water supply.

5.6.4 Float ball valves

Float operated valves shall comply with BS 1212 and BS 1968 and BS 2456 “specifications for float ball valves”. Ball valves shall be the plastic diaphragm type or similar approved with seatings to suit the working pressure of 5 bars with plastic float to BS 2456 and internal overflow.

5.6.5 Painting of valves

All valves shall be painted internally and externally to give the same standard of protection as for steel pipes and fittings. Surface protection shall be all to the approval of the Engineer.

5.7 Laying Pipes in Trenches and Headings

Immediately before pipes are placed in any trench, the bottom shall be cleared of all stones and other debris and shall be in a condition acceptable to the Engineer. Prior to placing in the trench, all pipes shall be inspected for damage. Damaged pipes which in the opinion of the Engineer cannot satisfactorily be made good shall not be used in the permanent works. End caps or discs placed on the pipes for protection during transit shall not be removed until immediately before the pipes are jointed. Pipes shall be laid in straight lines unless otherwise shown on the drawings. No pipe shall deviate from the true line and level by more than 5 mm. Pipes shall be firmly bedded throughout their length to the required alignment and level so that they are concentric at each joint. All pipes shall be suitably wedged, shored or otherwise restrained to prevent movement during testing and backfilling but such restraints shall not be left in place permanently unless instructed or agreed by the Engineer. Pipes which are to receive a concrete bed and haunch or surround shall be set on suitable concrete blocks or bricks with a pad of Hessian based damp proof course two millimetres thick interposed between the pipe and the block. Setting blocks shall not be used with other forms of bedding. Unless otherwise agreed by the Engineer a close fitting brush or swap shall be placed in pipelines having nominal diameters of 650 mm or less and shall be drawn forward progressively as pipe laying proceeds by means of a suitable rope which shall be threaded through each pipe as it is laid. Pipelines having nominal diameters greater than 650 mm shall be kept clean by suitable means as pipe laying proceeds. No debris of any kind shall be allowed to remain in the pipeline. Where the pipeline has

internal lining, persons entering shall wear rubber boots and equipment trolleys shall have rubber tyred wheels. Pipes and joints shall be kept free of dirt, mud and other deleterious matter at all times. If pipe laying is stopped at any time, a cap shall immediately be placed on the end of the last pipe laid to exclude dirt. Suitable precautions shall be taken to prevent the floating of pipes due to flooding of trenches. If floating should occur, the whole of the pipe run affected shall be removed and trench prepared again. No pipes shall be re-laid in trenches which have flooded until the trenches and the pipes have been inspected by the Engineer. The Contractor shall be entirely responsible for the sufficiency of all temporary supports and side slopes to the excavations. The excavation shall be carried out in such a way as to maintain the stability of all roads and other adjacent structures or works. Pipes having integral sockets shall be laid with sockets facing upstream unless otherwise agreed or instructed by the Engineer. Pipes in headings shall be laid in accordance with the requirements of this Clause but pipe lengths shall not exceed 1.5 m unless otherwise agreed by the Engineer.

5.8 Pipes Laid on Natural Ground

Filling shall commence with selected fill consisting of easily compacted material from which all stones larger than 25 mm and all lumps of clay larger than 75 mm have been removed. The selected fill shall be deposited equally on each side of the pipe carefully compacted in layers not more than 150 mm thick. Care shall be taken to ensure that no voids are left under the pipe. The filling shall be continued to a level of 300 mm above the crown of the pipe. In the case of steel, ductile iron and plastic pipes, the Contractor shall ensure that no distortion of the pipe takes place during the backfilling operation. The remainder of the trench shall be filled with excavated material and compacted in 150 mm thick layers by means of a vibrating plate compactor or a mechanical rammer. The trench shall be filled flush with the surrounding ground surface.

5.9 Pipes laid on Granular Bedding

Granular bedding material shall be placed and compacted generally on both sides of the pipe up to the horizontal diameter of the pipe. Care shall be taken to ensure that no voids are left under the pipe. Thereafter the selected fill shall be as described in Clause 5.8 above.

5.11 Joints in Pipelines

5.11.1 Concrete pipes

(a) Rigid Joints

When laying rigidly jointed pipelines with pipes having integral sockets, before entering a pipe spigot into its socket, both spigot and socket shall be clean and free from mud, oil, grease or other deleterious matter. A gasket of tarred hemp yarn, cut to length so that it forms a butt joint at the crown of the pipe shall be wrapped round the spigot which shall then be fully entered into the socket and the gasket caulked up hard into the joint. The joint shall then be filled completely with a plastic mortar composed of one part of cement to two parts of sand. The pipes shall not be pressure tested or disturbed in any way for at least 48 hours after

jointing. Rigidly jointed sleeves used to join two spigots shall be jointed in the same manner as integral sockets. If the drawings require ogee jointed pipes to be laid with a mortar joint, the joint shall be made at the time of laying. Mortar as described above shall be applied to the lower semi-circumference of the socket and to the upper semi circumference of the spigot and the pipe shall be drawn hard into the socket. Excess mortar squeezed out of the joint shall be removed from both the inside and outside of the joint.

(b) Flexible Joints

Flexible joints between pipes having integral socket may be formed by a shaped rubber gasket fitted within the socket or by a rubber ring of circular cross section (O-ring) placed on the pipe spigot. The type of flexible joint to be used shall be subject to the approval of the Engineer and shall be made strictly in accordance with the manufacturer's recommendations.

5.11.2 UPVC pipes

Flexible jointed uPVC pipes shall be jointed in accordance with the manufacturer's instructions. Solvent welded joints shall be made strictly in accordance with the manufacturer's instructions using solvent supplied by him for exposed pipes.

5.11.3 Steel pipes

These shall be caulked in thread seal for rigid joints. Flexible joints incorporating rubber O-rings shall be made in accordance with the manufacturer's instructions. Joints incorporating bolted or screwed glands or couplings shall be made in accordance with the manufacturer's instructions. Components of flexible joints from different manufacturers shall not be used together.

5.12 Connections to Existing Pipelines

Where a connection is to be made to an existing water pipe other than that at a chamber, a pipe saddle of the correct size shall be used for this purpose. The hole in the pipe shall be cut precisely to fit the saddle. Saddles for uPVC pipes shall be made of the same material as the pipes and shall be fixed with a solvent in accordance with the manufacturer's instructions.

5.13 Pipes through Structures

Where a pipeline passes into or out of a structure, including a manhole cover or similar chamber, two flexible joints shall be formed. The flexible joint shall consist of a 500 mm long pipe section connected along the main pipe, with the nearest end 500 mm from the face of the structure. One joint will be made on the incoming pipe and another joint on the outgoing pipe. When the structure is less than one pipe length wide, the above requirement shall not apply and a sleeve shall be formed through the structure so that there is a clear space at least 75 mm wide all-round the pipe. Adequate means shall be provided to prevent soil from entering this gap.

5.14 Pipelines within Concrete Structures

Sections of pipelines which are to be cast into concrete may be installed in advance of the remaining parts of the pipeline subject to the agreement of the Engineer. Such sections shall be placed accurately into position and fixed so that they cannot move during placing of concrete around them.

5.15 Pipes under Roads

All pipes at the crossing of driveways and roads shall be surrounded with concrete for the entire length of crossing before trench backfilling. Concrete surround shall be approved by the Engineer on satisfactory compliance with protection of pipes as detailed in Section 5.9.

5.16 Cleaning

The insides of all pipes, valves, tanks and fittings shall be clean, smooth, and free from blister, loose scale and dirt when erected. All lines shall be cleaned after all installation work. When pipes are installed all ends shall be suitably plugged until final fixing of fixtures can be carried out. Pieces of cloth or stone will not be permitted.

5.17 Pressure Testing of Pipelines

As the installation of the pipework proceeds, the various sections shall be tested before they are built in, concealed, or finally connected. The Contractor shall advise the Engineer in writing at least three days in advance of the carrying out of such tests, and such tests shall, if considered necessary by the Engineer, be carried out in his presence. All tests shall be at the expense of the Contractor and it shall be the responsibility of the Contractor to make all necessary records of the tests and results and submit these to the Engineer in the final form agreed. All pipe systems shall be tested hydraulically for a period of one hour to not less than one and a half times the design working pressure. Testing shall comply with BS 8010 for standard field testing of pipelines. If preferred, the Contractor may test the pipelines in sections. Any such section found to be satisfactory need not be the subject of a further test when the system has been completed, unless specifically requested by the Engineer. During the test, each branch and joint shall be examined carefully for leaks and any defects observed shall be made good by the Contractor and the section re-tested.

5.18 Painting of Exposed Pipes and Fittings

All metal surfaces within chambers shall be mechanically wire brushed to remove all loose scale, grease etc. Within two hours of cleaning a primer shall be applied, followed after two hours by a first coat of heavy consistency bitumen paint all to the approval of the Engineer. A second coat of the heavy consistency paint shall be applied after 24 hours. The final coating thickness shall not be less than 250 microns. Preparation and application of the coating system shall be strictly in accordance with the Manufacturer's instructions. This Clause shall not be applied to chemically or thermally bonding coatings on steel pipes.

5.19 Marker Posts

Precast concrete marker posts shall be set in concrete and fixed near valves, fire hydrants, washouts, changes in direction of the mains and where directed by the Engineer. The posts shall be detailed as directed by the Engineer.

5.20 Water Tanks

5.20.1 Pressed Steel Tanks

The pressed steel tank shall comply with the BS 1564. The material thickness of the tank panels shall be 5 mm. The assembly of the tank shall be done in accordance with the manufacturer's recommendations. The tank shall be provided with a cover which shall have a square manhole of at least 460 mm that give access to the interior of the tank. The tank cover shall be fitted with a suitable vent that is fitted with a suitable screen as recommended by the manufacturer to prevent the entry of insects and small animals. A tank shall be fitted with external ladder, the length of which would be as shown on the drawings or as determined on site. Each panel shall be clearly and indelibly marked to indicate its position in the tank.

6. STEELWORK

6.1 General

Except where otherwise specified, structural steel shall be Grade 43, complying with BS 7668, "Specification for weldable structural steels". All structural rolled steel members shall comply in dimension, weight and tolerance with that shown on the drawings and with BS 4, "Structural steel sections" and BS EN 10056, 10067 and 10210.

6.2 Bolts, nuts and fastenings

Bolts, studs, nuts and washers etc, shall be of mild steel unless otherwise specified. The dimensions and tolerances of nuts and bolts shall comply with BS 4190, "Specification for ISO metric black hexagon bolts, screws and nuts" or where specified to BS 3692, "Specification for ISO metric precision hexagon bolts, screws and nuts" and the threads shall be to BS 3643, "ISO metric screw threads". The heads of the bolts shall be forged out of the solid bar and the ends shall be cleanly cut with standard threads and the nuts must fit the bolts accurately and tightly. Washers of the shape and type indicated on the drawings shall comply with BS 4320, "Specification for metal washers for engineering purposes". Where nuts, bolts and washers are required to be galvanized, the galvanizing shall be to BS 3382, "Specification for electroplated coatings on threaded components".

6.3 Electrodes

Electrodes used in welding mild steel shall comply with the requirements of BS 639, "Specification for covered carbon and carbon manganese steel electrodes for manual metal-arc welding".

6.4 Contractor's Shop Drawings

Where the Contractor is required to undertake the detailed design of the steelwork components, he shall provide the Engineer with copies of detailed shop drawings for approval at least fourteen (14) days before commencing fabrication. The Contractor shall be responsible for the detailed design of all connections and these shall be fully detailed on the shop drawings together with all dimensions, clearances, welding details and procedures, machining, marking, etc. The Contractor shall not commence fabrication until he has received the Engineer's written approval of the shop drawings. Approval of such drawings shall in no way relieve the Contractor of his responsibility for accuracy or the correct operation of the component.

6.5 Fabrication and Erection of Steelwork

The standard of workmanship and engineering practices to be adopted for fabrication and erection shall conform to BS 449, "Specification for the use of structural steel in building" and BS 5531, "Code of practice for safety in erecting structural frames". The Contractor shall supply samples of materials and standards of workmanship as required by the Engineer. All samples approved by the Engineer shall be retained and shall be considered as setting the standard for all subsequent work. Inspection of work will be carried out by the Engineer and the Contractor shall give sufficient notice of the date when fabricated steelwork is ready for inspection. The Contractor shall provide particulars of places and dates of manufacture of all materials for the Permanent Works and the names of the manufactures. Copies in duplicate of all orders for materials shall be sent to the Engineer at the time of placing such orders. The Contractor shall ensure that all foundation bolts and supports including built-in bolts, etc

upon which the steelwork is to be erected are in the correct position and that the steelwork fits correctly in required positions without forcing or straining in any way. Any check by the Engineer of the Contractor's measurements shall not relieve him of his responsibility for obtaining this fit unless any errors in position are clearly not attributable to him. No permanent bolting or site welding shall be done until proper alignment has been obtained. The Contractor may use temporary jigs, anchors or supports during erection, but must allow for thermal movement to take place freely at all times. If the Contractor wishes to drill holes in or fix attachments to the steelwork to carry temporary work such as shuttering, he shall obtain the Engineer's approval of the positions and details of all such holes or attachments and shall close such holes and remove the attachments to the satisfaction of the Engineer. On completion of erection of any part of the steelwork on which the Contractor wishes to add further works, such as roofing, he shall first obtain the Engineer's approval of the steelwork and remedy any defects required by the Engineer. Any approval given shall in no way relieve the Contractor of his responsibility for ensuring the subsequent correct positioning and behaviour of the steel work of other parts of the structure.

6.6 Welding

All shop welds shall be carried out by qualified welders who shall be under competent supervision. All welding is to be carried out in accordance with BS 5135, "Specification for arc welding of carbon and carbon manganese steels". The Contractor's proposals for welding shall be submitted to the Engineer for approval before any work is undertaken. The Engineer may call for a test of a welder's capabilities in accordance with BS 4872, "Specification for approval testing of welders when welding procedure is not required". In the case of site welds, the welding procedure for making each type of joint shall be approved by the Engineer before the work is commenced and the Contractor shall make such trial welds as the Engineer may require to demonstrate the soundness of the proposed method and the competence of his workmen. Where site welding is used all welded joints shall be subject to inspection by the Engineer. Any welds that are in the opinion of the Engineer defective shall be cut out and the welds remade to the satisfaction of the Engineer. The cost of such corrective measures including any resultant delays shall be borne by the Contractor.

6.7 Painting General

The Contractor shall submit to the Engineer for his approval details of the types and manufacturers of paints he is proposing to use, together with the manufacturer's recommendations concerning preparation of surfaces, primers and undercoats, application methods, safety precautions and drying times for each type of paint. All paints used in the Works must be supplied ready-mixed in unbroken, sealed containers, which clearly show the type, colour and manufacturer of the paint and carry detailed "instructions for use". All metal surfaces on which paint is to be applied shall be blast cleaned as laid down in BS 7079, "Preparation of steel substrates before application of paints and related products", or other mechanical means and fully prepared in accordance with the manufacturer's recommendations. Applications of paint coatings on external work shall not be carried out or continued in mist, rain or excessively damp conditions. The Contractor shall take all necessary precautions to prevent dust and dirt coming into contact with freshly applied paint before it has dried. Paints shall be applied either by brushing or spraying in accordance with the manufacturer's instructions. The thinning of paints shall not be permitted without the approval of the Engineer. Unless otherwise recommended by the manufacturer, the minimum interval between the application of a first coat of paint and the second shall be twenty four hours (24hrs). Special care shall be taken to ensure complete coverage of all corners, arises and openings without causing an excessive build-up of paint and avoiding runs. Steelwork to be painted shall be clean and free from all rust, grease, oil and mill scale. The Contractor Shall provide all the relevant employees, visitors and any other persons who shall be exposed to the painting works, with personal protective equipment for the entire duration of their exposure to the paint works. No separate payment will be made for the dust abatement measures and the costs thereof shall be deemed to be included in the respective unit rates and the Contract Sum

6.8 Painting Steelwork Immersed in Water

Steelwork subject to immersion in water shall be blast cleaned or thoroughly mechanically cleaned by an approved alternative process and immediately coated before leaving the factory with zinc phosphate or similar compatible metallic inhibitive primer with a minimum dry film thickness of 50 microns. Following drying of the primer, the steelwork shall be coated with one coat of non-toxic, non-tainting, high build bituminous paint to BS 3416, "Specification for bitumen-based coating for cold application, suitable for use in contact with potable water", having a minimum dry film thickness of 100 microns. After erection, damaged areas of steelwork shall be mechanically cleaned and touched up with primer and bituminous paint to fully restore the factory applied coating system and thickness.

. Finally, two overall finish coats of bituminous paint with a minimum dry film thickness per coat of 100 microns giving an overall minimum dry film thickness of the complete coating system of 350 microns.

6.9 Painting other steelwork

Where steelwork, which is not galvanized and not subject to immersion in water is required to be painted, it shall be thoroughly cleaned and painted prior to leaving the factory with:

- (a) one coat of zinc phosphate or similar compatible metallic inhibitive primer with a minimum dry film thickness of 50 microns.
- (b) one coat of red lead primer with a minimum dry film thickness of 50 microns.
- (c) two coats of micaceous iron oxide undercoat paint with a minimum dry film thickness per coat of 50 microns.

After erection, damaged areas of steelwork shall be mechanically cleaned and touched up with primer and under coat to fully restore the factory applied coating system and thickness. Finally, one overall finish coat of enamel gloss micaceous iron oxide paint with a minimum dry film thickness of 50 microns giving an overall minimum dry film thickness for the complete coating system of 250 microns.

6.10 Galvanising

All steel and ironwork of whatever kind required to be galvanised is to be pickled in dilute hydrochloric acid and then washed, fluxed and stoved and coated with zinc by dipping in a bath of molten zinc. All components are to be immersed in the bath only for the time sufficient for them to attain the temperature of the bath, they are then to be withdrawn at such a speed that a coating of 80 microns thickness is achieved, or such other practical maximum thickness for the component as defined in BN EN ISO 1461:1999, "Specification for hot dip galvanised coatings on iron and steel articles". The galvanising is to be carried out after all drilling, chipping, trimming, filing; fitting and bending operations are complete and shall cover all faces evenly. After erection of galvanised steel components, damaged or welded areas shall be painted immediately after cleaning with two coats of metallic zinc primer with each coat having a thickness of 50 microns. The paint shall be applied strictly on accordance

with the manufacturer's instructions and shall be compatible with any subsequent paint systems to be applied.

6.11 Galvanised handrails

Handrail tubes shall be 38 mm nominal diameter steel tube to BS 1387, "Specification for screwed and socketed steel tubes and tubulars and for plain end steel tubes suitable for welding or for screwing to BS 21 pipe threads". The top and bottom rails shall be 900 mm and 450 mm respectively above floor level. The rails and vertical standards shall be connected using screwed steel pipe fittings to BS 1740, "Specification for wrought steel pipe fittings (screwed BS 21 R-series threads)", where practical with the final connections being welded in accordance with Clause 6.6. The handrail assembly shall be securely mounted on base plates fabricated of mild steel and attached to the base or foundation slab in a manner to be approved by the Engineer. All sharp edges and rough areas shall be carefully ground off and the entire handrail assembly cleaned and galvanised in accordance with Clause 6.10.

6.12 Gates

Gates of the types and sizes shown on the drawings shall be supplied and installed where indicated on the drawings. The gate shall be drop-tight and shall be suitable in all respects for use in raw water. The gates shall have flush invert. Gates shall be supplied complete with all frames, cills, seals, spindles, hand wheels and headstocks as required. The frames and gates shall be fabricated in galvanized steel as per WATERMAN Industries Ltd, or equivalent approved. The contact address for WATERMAN Industries as at the time of this Tender are:

WATERMAN Industries, P O Box 458, Exeter, CA 93221, USA.

Web site: www.watermanusa.com

All gates shall have rising spindles with protection tubes, headstock, hand wheel etc. and intermediate supports where the spindle is longer than 1500 mm. Intermediate guide brackets are to be located 600 mm above the gate frame, 400 mm below the base of the headstock and at a maximum spacing of 1500 mm, to suit or as recommended by the manufacturer and as approved by the Engineer. All gates on structures in the link, main and branch canals having a base gate width of 500mm or more shall be of Type A (Sluice gate with a control rising spindle and wheel) as shown on the book of drawings. All gates on structures in the link, main and branch canals with a base gate width of less than 500mm shall be of Type B (slide gate or "Hand pull") as shown on the book of drawings. All gates on structures on the main feeder canals shall be Type B. The gates shall conform to the following specifications or equivalent:

- . Self-contained frame;
- . Rising stainless steel frame;
- . Flat back for wall mounting
- . Maximum on seating pressure, measured from invert – 1.5 m
- . Material for leaf, arms, hoist is: carbon steel Din 17100 St. 37-2(EN 10025 S235 JR)
- . Non- geared hand wheel manual lift, mounted on the top of the frame

- . Material of side rubbing plates, sill plate and pivot pins: Stainless steel ASTM A-276 type 304
- . Side and bottom seals: Neoprene to ASTM D-200
- . Mill finish on all stainless steel surfaces
- . Epoxy paint on carbon steel surfaces

The Contractor shall examine gate shape, measure and confirm all gate sizes on site. The Contractor shall then obtain approval of the Engineer prior to purchase of the gates.

6.13 Stop-logs

Where shown on drawings, the stop-logs shall be hardwood of the stated dimensions and shall be approved by the Engineer before supplying to site. Where shown on the drawings stop logs shall be bolted to steel frames of stated dimensions to form hardwood gates.

7. BUILDINGS

7.1 Demolitions and Alterations

7.1.1 Demolition

Demolitions, taking out and cutting away shall be carefully performed and every precaution shall be taken to ensure the safety of the works. If damage should occur in the carrying out of the demolitions or alterations the Contractor shall reinstate and make good the same at his own expense.

7.1.2 Protection

Supply, erect and maintain during the cutting of openings etc., all necessary protection to the existing premises against damage by weather or other causes.

7.1.3 Laying the dust

Allow for laying the dust as far as possible during the alteration by watering with a hose or other means.

7.1.4 Making good

All making good of block work, building up of openings etc., shall be in solid block work unless otherwise described, in cement mortar (1:4) properly cut, toothed and bonded and pinned up to existing work and pointed where necessary.

7.1.5 Credit for Materials

Unless otherwise specified materials arising from the demolitions and alterations will become the property of the Contractor. If the Contractor wishes to allow a credit for any such materials the appropriate allowance should be included in the 'credit' column of the Bills of Quantities. In the event that the Employer wishes to take possession of any such materials the Contractor will only be entitled to receive compensation to the amount of credit indicated.

7.2 Materials

8.2.1 Submission of Samples

As soon as possible after the Contract has been awarded, the Contractor shall submit to the Engineer a list of the suppliers from whom he proposes to purchase the materials necessary for the execution of the Works. Each supplier shall be willing to admit the Engineer, or his representative, to his premises during ordinary working hours for the purpose of obtaining samples of the materials in question. Alternatively, if desired by the Engineer, the Contractor shall deliver the samples of the materials to the Engineer's office, without charge. Samples of materials to be used as aggregates shall be taken and tested in accordance with the provisions of British Standard 812:

7.3 Masonry and Block work

7.3.1 General

All masonry work shall be constructed from building stone as specified in Part 4 or approved concrete block work as specified in Part 4. For culvert headwalls and other small works, the stone shall, unless otherwise, be rough dressed. For walls, facing and other exposed works the stone shall, unless otherwise specified, be medium chisel-dressed.

7.3.2 Workmanship

All masonry work is to be constructed in compliance with BS 5. The Contractor shall provide and use proper setting-out rods for all work. Stones and blocks shall be well soaked before use and the tops of walls shall be kept wet as the work proceeds. The stones and blocks shall be properly bonded so that no vertical joint in a course is within 115mm of a joint in the previous course. Alternate courses of walling at angles and intersections shall be carried through the full thickness of the adjoining walls. All perpendics; reveals and other angles of the walling shall be built strictly true and square. The stones and blocks shall be bedded, jointed and pointed in mortar (1:3) in accordance with Part 4, with beds and joints 9mm thick flushed up and grouted solid as the work proceeds. All work shall be cured in accordance with the relevant requirements of Part 4.

7.4 Walling

7.4.1 Materials

(a) Cement

Cement used for making mortar shall be as described in the Engineering specifications for "Materials".

(b) Lime

The lime for making mortar shall be obtained from an approved source and shall comply with BS 890 Class A for non-hydraulic lime. The lime to be run to putty in an approved lined pit or container. The water to be first run into the pit or container and the lime to be added until it is completely submerged, stirred vigorously until all lumps are disintegrated and shall be kept constantly covered with water and regularly stirred for at least four weeks. The resulting milk-lime then to be run through a fine sieve and run into a pit or other container and kept clean and moist for not less than two weeks before being used in the works.

(c) Sand

Sand used for making mortar shall be clean well graded siliceous sand of good sharp hard quality equal to samples which shall be deposited with and approved by the Architect. It shall be free from lumps of stone, earth, loam, dust, salt, organic matter and other deleterious substances, passed through a fine sieve and washed with clean water if so directed by the Architect.

(d) Water

Shall be as described in "Concrete Work".

(e) Concrete Blocks

Concrete blocks shall comply with the requirements of BS 2028, 1384 except where amended or extended by the following Clause. Blocks shall have square arises and corners. For fair faced work damage to arises and corners shall not exceed the removal of 6 mm of the blocks depth or thickness. Concrete blocks shall have a minimum crushing strength of 3.5 N/mm² except when below the damp course level or in contact with soil when they shall have a minimum crushing strength of 7 N/mm², unless noted otherwise on drawings. Hollow concrete blocks shall not be used below the damp course level or in contact with soil. Concrete blocks used for external walls shall be Class 'A' and for internal load bearing walls they shall be at least Class 'B'. Class 'C' blocks shall only be used for non-load bearing partitions. No pre-cast blocks shall be incorporated into the works unless approved by the Architect. The delivery of present blocks from which samples tested do not comply with this specification shall be deemed defective. Any work constructed with blocks from which samples tested do not comply with this specification shall be deemed to be defective. From every 1,000 pre-cast concrete blocks delivered to site ten blocks samples shall be provided for testing. The pre-cast block samples shall be selected in accordance with BS 2028, 1364. Samples of pre-cast concrete blocks for testing shall be tested for the following properties in accordance with the methods given in BS 2028, 1364 and the test results shall comply with the requirements of BS 2018, 1364 except where amended by this specification:-

(a) Drying shrinkage

(b) Compressive strength or transverse breaking load (as applicable)

(c) Wetting expansion *

(d) Density

(e) Dimensional Tolerance

(f) Cavity size

*Test only applicable for concrete blocks made with clinker aggregate.

Blocks shall also be tested to determine the suction rate. The test shall consist of weighing the block, placing in a tray of water such that only 3 mm of the block side is immersed for a period of sixty seconds +/- 2 seconds; quickly wiping off excess water and reweighing. The suction rate is the increase in weight due to water absorbed and shall not exceed

2kg/m²/minute. Blocks which have a suction rate exceeding 2kg/m²/minute may be used if the Contractor uses an approved water reactive additive in the mortar or can show that the blocks are wetted such that the blocks will have a suction rate not exceeding 2kg/m²/minute for a period of 24 hours from being laid and provided the blocks comply with all other requirements. Concrete blocks shall be stacked on prepared dry areas free of clinker, ashes and sulphate bearing strata. Blocks of different strengths shall be stacked separately and clearly marked to differentiate the strengths. Blocks shall not be used for a minimum of 7 days after manufacture and shall not be loaded for at least 14 days after laying. For the first 7 days after manufacture, blocks shall be cured by maintaining in a damp condition, e.g. covering with polythene sheeting after wetting blocks.

(f) Hollow Clay Blocks

Hollow clay partition blocks shall comply with the provisions of BS 1190 Section 1 and are to be hard, well burnt, true to size and shape and with sharp arrises and keyed faces and joints and are to be obtained from an approved manufacturer and to be equal in every respect to a sample to be deposited with, and approved by, the Architect. Blocks are to be 190 mm high (to give 200 mm course height including the joint) and of the thickness given herein. Cutting of blocks is to be avoided wherever possible and full use is to be made of quarter, half and three-quarter blocks, and blocks with conduit recesses.

(g) Louvre Block Walling

(a) To be pre-cast concrete mix 1:1.5:3 or 25 N/mm² (12 mm aggregate) but with 10 mm finished fair on all exposed surfaces, built in cement and sand (1:5) mortar with straight horizontal and vertical joints to flush pointed both sides.

(b) Each block to be size 200 mm x 400 mm x 200 mm high and consisting of two ends each 200 mm x 200 mm x 50 mm thick joined with a 50 mm thick twice cranked louvre with top end of louvre projecting 40 mm above top of block.

(h) Stone

All stone shall comply with the requirements of CP 121.202 for masonry and rubble walls respectively except where amended or extended by the following Clauses. Unless otherwise noted, all masonry walls shall be coursed squared rubble walling with mortar joints. The size of stones for rubble walling shall be such that the length of stone does not exceed three times its height. For coursed squared rubble walls blocks shall not exceed 300 mm in height and shall be not less than 150 mm in height. Where snecked rubble walls are specified, the snecks shall not be less than 100 mm square on the exposed face. Stone for masonry shall have a minimum compressive strength of 10 N/mm². (Stone shall not be required to be tested to failure). The density of stone for masonry shall be not less than 2300 kg/m³. The drying shrinkage of stone shall not exceed 0.05% Samples of stone provided for testing shall be tested for the

following in accordance with the methods given in BS 2028, 1364 and the test results shall comply with the requirements of this specification.

- (a) Compressive strength
- (b) Density
- (c) Drying shrinkage

The colour and texture of stone shall be uniform and consistent. Prior to delivering any stone to site, the Contractor shall supply the Architect with a sample of stone in order that he may approve the colour and texture. The Contractor shall ensure that sufficient suitable stone is available for the whole of the project prior to ordering the stone. Where cast stone including stone described as artificial stone, reconstructed stone, etc., is specified the stone shall comply with the requirements of BS 1217. Masonry shall be of stone, having no irregular faces and only the back face if not visible shall be left as from the saw. Prior to ordering dry stone the Contractor shall demonstrate that the stone is durable. This may be done by supplying details of buildings constructed with stone from the same quarry and which has been exposed to the same environmental condition for at least ten years. The maximum projection from the face of stone for rubble walls shall be 20 mm beyond the specified face of the wall. The Contractor shall provide six samples of stone measuring 150 mm x 150 mm for testing prior to delivering any stone to site. As work proceeds the Contractor shall provide six samples 150 x 150 x 150 mm for testing from every 300 m² of work. All stone shall be stacked on prepared dry areas free of clinker, ashes and sulphate bearing strata.

- (i) Fire Bricks

Clay fire bricks shall be obtained from an approved source and shall be hard, sound, square and clean well burnt and in respect of size shall comply with BS 3921: 1974 Section 2.

- (j) Wall Reinforcement

100mm Thick walls and where described other walls and partitions shall be reinforced with a 25 mm wide strip of No. 20 S.W.G. hoop iron built into alternate horizontal joints in the wall centre. The reinforcement shall be lapped and hooked at running joints, angles and intersections and carried at least 115 mm into abutting walls at junctions.

- (k) Wall Ties

To be 3 mm diameter galvanized mild steel wire twisted butterfly wall ties.

- (l) Damp-Proof Courses

The bituminous felt sheeting for damp-proof courses shall be hessian based bituminous felt complying with BS 743 type 4A weighing not less than 3.85 Kgs. per square metre. The sheeting is to be lapped 150 mm at running joints and the full width of walls at angles.

7.4.2 Workmanship

- (a) Cement Mortar

Mortar described as cement mortar 1:4 shall be composed of 1 cubic metre (1498 Kgs.) of Portland cement and 4 cubic metres of sand. Other mixes such as 1:3, 1:5 etc. shall be similarly construed.

(b) Mixing of Mortar

The constituent materials shall be measured separately when dry in specially prepared gauge boxes of sizes to give the proportions specified without consolidation of the contents by ramming and shaking. The mortar shall be mixed in an approved power driven mixer for not less than two minutes per batch and using the minimum quantity of water necessary to obtain a working consistency. The mixer shall be used as close as practicable to the works and mortar shall be used within 30 minutes of mixing. No partially or wholly set mortar will be allowed to be used or re-mixed.

(c) General Construction

(i) Setting out

The Contractor shall provide proper setting out rods and set out all work on same for course, openings, heights etc., and shall build the walls, piers etc., to the widths, depths and heights indicated on the Drawings and as directed by the Architect.

(ii) Building in Wood Frames

Openings for doors, ventilators etc., are to be set out and left un-built until the wooden frames have been fixed in position.

(iii) Building in Metal Windows and Doors

Openings for metal frames are to be wide enough for the frames to fit without being forced into position. Build the lugs into the joints of the walling and fill in the space between the walling and frame with cement mortar well tamped into the channel of the frames and point all round externally. All frames must be set plum and level and free from twist.

(iv) Walls to Receive Plaster & Similar Finishes

All faces of walls to be plastered etc., to have all projections dressed off and joints raked out as key.

(d) Building Walling

(i) Laying and Jointing

All blocks shall be well wetted before being laid and the top of walling where left off shall be well wetted before commencing building. Walls to be kept wet three days after building. All walls throughout the works shall be carried up evenly in 200 mm courses except where courses of less depth are required to bring walling up to level of floors, windows and the like and where otherwise described, no part being allowed to be carried up more than one metre higher at one time than any other part and in such cases the joining shall be made in long steps so as to prevent cracks arising and all walls shall be levelled round at each stage. Not more than 3 metre height of wall shall be laid in any one day.

(ii) Bonding

The blocks shall be properly bonded together and in such manner that no vertical joint in any one course shall be within 115 mm of a similar joint in the courses immediately above or below. All walling of 300 mm thickness or less shall be built in single thickness of blocks. Walling exceeding 300 mm in thickness shall be built with through bonders not more than 1070 mm apart in each course as directed by the Architect. Alternate courses of walling at all angles and intersections shall be carried through the full thickness of the adjoining wall. All perpend, reveals and other angles of the walling shall be built strictly true and square.

(iii) Tolerances

All courses of walls shall be level with a maximum deviation of +/- 3 mm in any one metre length and a maximum overall deviation of 10 mm for lengths of wall exceeding 3 metres. Walls shall be plumb with a maximum deviation of +/- 3 mm in any metre height of wall with a maximum deviation of +/- 10 mm in the total height of the wall or any storey. All corners of walls which are shown as being at right angles shall be square with a maximum deviation of 3 in 1000. All walls shall be straight with a maximum deviation of +/- 3 mm in any one metre length and a maximum overall deviation of 10 mm in any length exceeding 3 metres. All bed and vertical joints shall be an average of 10 mm thick with a maximum deviation of +/- 3 mm of block work, and stone rubble walls. Joints for stone masonry walls shall be 6 mm +/- 1 mm thick.

(iv) Curing

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

(v) Cavities

Cavity walls shall be of the overall thickness shown on the drawings. Cavities above ground level between leaves of block or masonry shall be free of mortar droppings or other debris. The Contractor shall take proper precautions to prevent mortar or debris entering the cavity. Cavities below ground level shall be filled with mortar for cavities up to 75 mm wide and for cavities over 75 mm wide filling shall be concrete mix 1:3:6. Cavities shall be filled such that there is maximum of three times the thickness of the thinner leaf of the wall filled with wet mortar or concrete unless the wall is continuously supported for the depth.

(vi) Backfilling

Earth backfilling against walls shall be carried out such that the level of the backfill is always equal on each side of the wall. When a wall has filling material on one side only to a fill width of more than three times the wall thickness, the wall shall be continuously supported during

backfilling. Backfilling shall not be carried out until at least seven days have elapsed since the laying of the blocks or stone.

(e) Reinforced Walls

Steel reinforcing bars in walls shall be carefully placed and spacers used to ensure that a minimum of 20 mm cover is given to the reinforcement unless otherwise specified. Horizontal reinforcement in mortar joints shall be laid such that the reinforcement is not in contact with the blocks or stone.

(f) Wall Ties

Wall ties shall be provided to connect walls to steel or concrete columns and beams to connect two unbounded leaves of wall. Wall ties shall be provided at 450 mm centres both vertically and 900 mm centres horizontally and shall be staggered when used to connect two leaves of un-bonded wall. Wall ties shall be embedded into each material by a minimum of 50 mm.

(g) Fair Face

All concrete and hollow clay block work described as finished with a fair face is to be built to a true and even face with the joints finished as specified hereinafter.

(h) Pointing

Pointing of walls shall be carried out as the work proceeds wherever possible. When coloured mortar is specified for pointing only the pointing shall be carried out after work has been completed. Existing walls shall be prepared for pointing by raking out all loose friable material to a minimum depth of 15 mm to form a square recess. The joints shall then be wetted and new mortar shall be forced into the joints and finished as directed.

(i) Holes, Cutting and Chasing

(a) putlog holes shall be not less than one course deep and carefully filled with a block cut to fit size of opening with beds and joints filled with mortar well tamped in after scaffolding is removed, and if in faced walls to match facing.

(b) Where walling is cut, holed or chased for conduits, pipes and the like all such cuttings etc., shall be filled in solid with cement mortar (1:4) prior to the application of finishes.

8.5 Painting and Decorating

8.5.1 Materials

(a) Manufacturers

Except where stated all materials shall be obtained from approved manufacturers.

The Contractor shall state the name and address of the manufacturer whose materials he proposes to use. Once approval has been given the

Contractor shall not obtain materials from other sources without the prior written agreement of the Architect.

(b) General

Each succeeding coat of priming, undercoating and finishing (pigment) or clear coating shall be sufficiently different in colour as to be readily distinguishable. All primers and paints in one system upon a particular surface shall be obtained from the same manufacturer. The mixing of paints, etc., of difference brands before or during application will not be permitted.

(c) Emulsion paints

Emulsion paints shall be matt or satin finish vinyl emulsion paint. Silk vinyl finish shall be used where specified. The first (mist) coat shall be thinned in accordance with the manufacturer's instructions.

(d) Gloss paint

Gloss paint shall be hard gloss finish oil paint.

(e) Bituminous solution

Bituminous solution for use on coated pipes, RC and block work faces beneath ground level shall be obtained from a manufacturer approved by the Architect.

(f) Primers and undercoats

Unless otherwise specified, primers and undercoats shall be the type recommended by the manufacturer of the finishing coats specified for a particular surface. Primer for external bare metalwork surfaces shall comply with B.S. 2523.

(g) Fillers

The fillers for internal joinery shall be the type recommended by the paint manufacturer for use with his type of paint or lacquer. Stopper and fillers shall be tinted to match the undercoat, and shall be compatible with both undercoats and primers. All materials shall be used strictly in accordance with the manufacturer's instructions.

(h) Cleanliness

All brushes, tools, pails, kettles and equipment shall be clean and free from foreign matter. They shall be thoroughly cleaned after use and before being used for different colours, types or classes of material. Painting shall not be carried out in the vicinity of other operations that may cause dust. Waste liquids, oil soaked rag, etc., shall be removed from the building each day. Waste liquids shall not be thrown down in any sanitary fittings or drains.

7.6 Painting

7.6.1 General

The Contractor shall supply all paints, primers, varnishes, distemper, oil, etc. ready mixed in original sealed containers bearing the brand maker's name identifying the contents and giving directions for its proper use.

Painting materials shall be of the best quality products of recognised manufacturers, and shall be subject to the approval of the Architect. The quality of the finishing colours shall be capable of giving three years' minimum satisfactory performance under tropical conditions with high temperatures and humidity, and capable of withstanding temperatures of up to 60 Deg. C for long periods without colour change. Paints shall also be resistant to oils, acids and alkalis.

All surfaces to be painted shall be adequately cleaned and prepared to the satisfaction of the Engineer's Representative and shall be dry and free from any oils, greases, stains or other marks prior to being painted. The paint shall be well and evenly applied. Where sprays are used, markings of the edges of the painted area shall be carried out to provide a definite edge. Brushes and sprays shall be the correct size and type for the work being executed. For painting applied in several coats each coat shall be of a different shade or colour from the others. Each coat shall be allowed to dry thoroughly and sufficiently harden before the next coat is applied. All colours shall be selected and approved by the Architect.

All hardware and furniture for doors and windows, together with any exposed electrical installation in walls shall be removed before painting commences. Upon completion of all paintwork all such hardware and furniture etc. shall be re-installed and left in good working order. Floors shall be covered as protection against staining by paint.

7.6.2 Block Work

Surfaces of concrete and rendering to be painted shall first be washed down and then allowed to dry. Any efflorescence present shall be thoroughly removed, and the areas so affected shall be given a coat of porous alkali-resistant primer. After any traces of grease have been removed the surfaces shall be painted with two coats of emulsion paint of the copolymer acrylic type. Any cracks in walls shall be cleaned, filled and puttied up then left to dry before application of paint.

Plastered surfaces shall be left as long as possible to dry out before being painted and after any efflorescence has ceased to form and has been removed, they shall be painted with two coats of an approved porous emulsion paint. When a gloss paint finish is called for, this coat or coats should only be applied over the emulsion paint after an interval of at least six months.

7.6.3 Woodwork

Woodwork to be painted shall be reasonably dry and its surfaces shall be cleaned and made smooth by the use of fine sand paper obliquely across the grain. The surfaces shall then be dusted off with a dusting brush. Knots shall be sealed with knotting putty to BS 1336, unless very

resinous, when they shall be cut out and the depressions filled after priming. The work shall then be thoroughly primed by brush with a priming paint to BS 5082 and 5358, end grain being given two coats. Cracks, holes and open joints shall be stopped with a mixture of equal parts of hard stopping and linseed oil putty. Two coats of undercoating of approved manufacture shall be applied, the surfaces being rubbed down between coats. The surfaces on being dry shall then be painted with a final coat of gloss paint leaving no brush traces or irregularities.

Hardwood surfaces shall not be painted but shall instead be treated with two coats of linseed oil, of the clear boiled type. The linseed oil shall be well rubbed in, until the surface of the wood is clearly capable of not absorbing any further linseed oil. The second coat shall be applied between 8 and 12 days after the application of the first coat.

7.6.4 Metalwork

Galvanised metal surfaces shall first be treated with one coat of mordant solution which shall in due time be carefully washed off. The surface shall then be primed with a calcium plumbate primer. When this has dried thoroughly, the surfaces shall be given one coat of undercoat and one of a gloss finishing paint. All metalwork shall be cleaned free from all rust, scales, grease, oils and any other surface stains, and shall be given one coat of an approved primer compatible with the metal to be painted, two applications of undercoat and one application of a gloss finishing coat. The Contractor shall seek specific instructions to paint any non-ferrous metal surface.

All metalwork which has been supplied with bituminous protection or painting prior to despatch from the place of manufacture, such as pipes, tubes, valves, manhole covers, etcetera, shall have all exposed surfaces painted after erection. The manufacturer's primer or coating shall be made good to the same standard and specification as supplied, and shall then be given two coats of paint as follows:-

(a) Pipes, valves, manhole covers, and fittings, etc. exposed to view shall be painted with two coats of an approved "bitumastic aluminium paint" or similar approved paint.

(b) Pipes, valves and fittings, etcetera in manholes, or chambers shall be painted with two coats of bitu-mastic paint or other approved paint.

7.6.5 Structural Steelwork

All surfaces to be painted shall be dried and cleansed free of all oil, grease, dirt or other extraneous matter by the use of white spirit, water or other appropriate cleaning material.

Where surfaces have been damaged in transit they shall be made good to the same standard to which they were originally protected. Where as a result of such damage the metal has been bared, the paint immediately adjacent to the affected area shall be trimmed down, the affected area

cleaned by wire brushing and the protective paint system restored, to provide a coat by coat lapping at the junction of the new and old paint systems. Where welding has been carried out on site, the welds shall be de-slagged and wire brushed, and a protective paint system applied similar to that of the surrounding steel surfaces. Where surfaces have been left unpainted and are to be connected by High strength friction grip bolts they shall be cleaned as specified in Specifications Section 20 and the contact surfaces brought together without further treatment. After bolting up, those surfaces which, being exposed are not protected, shall be wire brushed, primed and painted to the requirements of Specifications Section 20 to give a coat by coat lapping with adjoining painted surfaces. Where surfaces have been left unpainted and are to be completely embedded in concrete they shall be cleaned of all oil, grease millscale or other extraneous matter immediately prior to concreting but shall otherwise be left untreated. Where steelwork is to be partially embedded in concrete the paint system shall be continued into the concrete for a distance equal to the least lateral dimension of the concrete forming the surround.

Unless otherwise specified the final coat of finishing paint Specifications Section 20 shall be applied to the immediate area of all steelwork connections after completion of erection. The main body of the steelwork, however, may be painted on site before erection, in which case any damage sustained during the course of erection shall be made good to the satisfaction of the Engineer. Painting will not be permitted when the temperature is below 3 C or when Relative Humidity is in excess of 85% or during wet weather.

7.6.6 Galvanising

Galvanising shall be hot dip galvanising conforming to the requirements of BS 729. Galvanising shall be applied at the rate of 610 g/m² of surface area in a uniform covering of 100 microns thickness.

7.6.7 Finishing Off

All surfaces including window panes shall be left clean and doors and window hinges lubricated.

7.7 Finishes

7.7.1 General

(a) Other specifications

All other specifications of this Contract where applicable are deemed to apply equally to the finishings specifications.

(b) Samples

The Contractor shall prepare at his own cost sample areas of the paving, plastering and rendering as directed until the quality, texture and finish required is obtained and approved by the Architect after which all work executed shall conform with the respective approved samples.

(c) Finished thicknesses

The thicknesses of floor finishes quoted in this section of the specification shall be the minimum requirements.

Suspended floors shall have a constant structural thickness and have level top surfaces. The finished floor surface will equally have a constant level and any adjustment needed to achieve this effect with the varying floor finish materials is to be made in the screeds beneath the same.

Slabs bearing on the ground may be cast to varying levels, and be of constant thickness with varying formation levels, or have varying thicknesses at the option of the Contractor. This stipulation in no way relieves the Contractor of the requirements of the specification for structural work.

(d) Materials generally

All materials shall be of high quality, obtained from manufacturer's to be approved by the Architect. Cement, sand and water shall be as described under Concrete Work and Block work.

(e) Bonding

Bonding compounds, etc., for use in applying plaster and similar finishes direct to surfaces without the use of backings or screeds are only to be used if approved by the Architect and are to be used strictly in accordance with the manufacturer's printed instructions.

(f) Chases, openings and holes

All chases, holes and the like which were not formed in the concrete or walling shall be cut, and all service pipes shall be fixed and all holes and chases filled with mortar before paving and plaster work is commenced. In no circumstances will the Contractor be permitted to cut chases, holes and the like in finished paving or plasterwork.

7.7.2 In-situ Finishing

(a) Generally

The term plastering refers to the operation internally and rendering to the same operation externally but for ease of reference the term plastering has generally been used in this specification to describe both operations.

(b) Mixes

The methods of measuring and mixing plaster shall be as laid down under Concrete Work and the proportions and minimum thickness of finished plaster shall be in accordance with the following:-

Item of Work	Mix	Minimum Thickness and Finish
Internal	1 part cement ¼ part	12 mm finish to walls and ceilings steel

Plaster	lime 4 parts sand	trowelled finish unless otherwise specified
External Render	1 part cement 4 parts sand	12 mm finish with wood float finish unless otherwise specified
Tyrolean finish	Ditto	6 mm finished thickness in two coats on 10 mm plastered backing

To obtain greater plasticity a small quantity of lime may be added to the mixes for external plastering at the Architect's discretion but in any case this is not to exceed 1/4 part lime to 1 part cement.

With regard to the lime mortars gauged with cement, the addition just before use, of the cement to small quantities of the lime/sand mix shall preferably take place in a mechanical mixer and mixing shall continue for such time as will ensure uniform distribution of materials and uniform colour and consistency. It is important to note that the quantity of water used shall be carefully controlled. Plaster may be mixed either in a mechanical mixing machine or by hand. Hand mixed plaster shall first be mixed in the dry state being turned over at least three times. The required amount of water should then be added and the mix again turned over three times or until such time as the mass is uniform in colour and homogeneous. The plaster shall be completely used within thirty minutes of mixing and hardened plaster shall not be remixed but removed from the site.

(c) Preparation of surfaces for plaster etc.

Irregularities in the surfaces to be plastered or rendered shall be filled with mortar, without lime, twenty four hours before plastering is commenced. Joints in block work, etc., are to be well raked out before plastering to form a good key. Smooth concrete surfaces to be plastered shall be treated with an approved proprietary bonding agent or hacked to provide an adequate key for the plaster. All surfaces to be plastered or rendered shall be clean and free from dust, loose mortar and all traces of salts. All surfaces shall be thoroughly sprayed with water and all free water allowed to disappear before plaster is applied. As far as practical, plastering shall not be commenced until all mechanical and electrical services, conduits, pipes and fixtures have been installed. Before plastering is commenced all junctions between differing materials shall be reinforced. This shall apply where walls join columns and beams, particularly where flush, and similar situations where cracks are likely to develop and as directed by the Architect. The reinforcement shall consist of a strip of galvanised wire mesh 'Expamet' or equal approved 15 cm wide which shall be plugged, nailed or stapled as required at intervals not exceeding 45 mm at both edges. The surfaces to which such mesh shall be applied shall be painted with one coat bituminous paint prior to fixing the mesh.

(d) Application of plaster and render

After preparation of the surfaces a key coat of cement slurry shall be applied to the wetted surface to be plastered. When this coat is dry the plaster coat shall be applied, by means of a trowel, between screeds laid, ruled and plumbed as necessary. This coat which shall be to the required thickness shall be allowed to set hard and then cured as described. Surfaces are to be finished with a wood or steel float to a smooth flat surface free from all marks. All plastering and rendering shall be executed in a neat workmanlike manner. All faces except circular work shall be true and flat and angles shall be straight and level or plumb. Plastering shall be neatly made good around pipes or fittings. Angles shall be rounded to 6 mm radius. All tools, implements, vessels and surfaces shall be at all times kept scrupulously clean and strict precautions shall be taken to prevent the plaster or other materials from being contaminated by pieces of partially set material which would tend to retard or accelerate the setting time.

(e) Curing of plaster

Each coat of plaster is to be maintained in a moist condition for at least three days after it has developed enough strength not to be damaged by water.

(f) Plaster stops

Where shown on details, plasterwork shall be stopped against "Expamet" galvanized steel plaster stop, reference 565 which shall be securely nailed to walls in the positions indicated on the drawings.

(g) Cement and sand screeds

Screeds shall be mixed and formed as described.

(j) Rates of in-situ work

The rates for in-situ work shall include for raking out joints of block work or bonding coat or spraying cement slurry on new concrete surfaces to form key, for work in narrow widths, small and isolated areas, rounded arrises, fair and chamfered edges, for making good up to boundaries of other work for making good and working around pipes, brackets etc., and for all other incidental labours. Rates shall also include for masking before the application of spray finishes work executed overhead, temporary rules, supports, screeds and templates.

8. CONSTRUCTION TOLERANCES

8.1 General

The following are the tolerances within which the works are to be executed or as directed by the Engineer:

10.1.1 Earthworks

Top level of Embankments after compaction +100/ -0 mm

Sides of Embankments over a 10 m length +100/ -0 mm

Channel or Excavation cutting +20/ -20 mm

Channel Water Way Area - 0

Horizontal Alignment of Channels: Maximum 300 mm

Over 20 m length 100 mm

Formation Level for Structures +0/ -ve filled with concrete

Formation Level for Gabions +0/ -100 mm

8.1.2 Concrete Structures

The following tolerances shall apply to all wrought formed and fair or fine unformed finishes.

Tolerance from Specified Position

Maximum departure of plan position of structure 150 mm

Tolerance from Specified Dimension

Maximum departure in thickness, cross-sectional dimension or position of columns, beams, walls, footings and the like +25/ -10 mm

Surface Tolerance on Straightness or Departure from Specified Curve

General Surfaces

Maximum deviation in horizontal or vertical direction

- Gradual over a 10m length 25 mm
- Abrupt 10 mm.

Surfaces in Contact with Flowing Water

Maximum deviation in direction of flow or normal to flow

- Gradual over a 10m length 15 mm
- Abrupt 5 mm

Reinforcement

Maximum departure in required spacing 15 mm

Minimum lap length shall be:

- In the case of mild steel reinforcing 40 times bar diameter
- in the case of high yield steel reinforcing 50 times bar diameter

8.1.3 Stonework

Pitching and Masonry over a 2 m length +100/ -25 mm

Face of gabion basket + 75/ -25 mm

Thickness of tipped rock or filter layer +100/ - 0 mm

SECTION VI - DRAWINGS

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

SECTION VII - BILL OF QUANTITIES

Notes for preparing Bills of Quantities

- 1.0 The objectives of the Bills of Quantities are;
 - (a) to provide sufficient information on the quantities of Works to be performed to enable tenders to be prepared efficiently and accurately; and
 - (b) when a Contract has been entered into, to provide a priced Bill of Quantities for use in the periodic valuation of Works executed.

In order to attain these objectives, Works should be itemized in the Bill of Quantities in sufficient detail to distinguish between the different classes of Works, or between Works of the same nature carried out in different locations or in other circumstances which may give rise to different considerations of cost. Consistent with these requirements, the layout and content of the Bill of Quantities should be as simple and brief as possible.

- 2.0 The Bills of Quantities should be divided generally into the following sections:

(a) Preliminaries.

The preliminaries should indicate the inclusiveness of the unit prices, and should state the methods of measurement which have been adopted in the preparation of the Bill of Quantities and which are to be used for the measurement of any part of the Works.

The number of preliminary items to be priced by the tenderer should be limited to tangible items such as site office and other temporary works, otherwise items such as security for the Works which are primarily part of the Contractor's obligations should be included in the Contractor's rates.

(b) Work Items

- (i) The items in the Bills of Quantities should be grouped into sections to distinguish between those parts of the Works which by nature, location, access, timing, or any other special characteristics may give rise to different methods of construction, or phasing of the Works, or considerations of cost. General items common to all parts of the Works may be grouped as a separate section in the Bill of Quantities.
- (ii) Quantities should be computed net from the Drawings, unless directed otherwise in the Contract, and no allowance should be made for bulking, shrinkage or waste. Quantities should be rounded up or down where appropriate.
- (iii) The following units of measurement and abbreviations are recommended for use.

<i>Unit</i>	<i>Abbreviation</i>	<i>Unit</i>	<i>Abbreviation</i>
cubic meter	m ³ or cu m	millimeter	mm
hectare	ha	month	mon
hour	h	number	nr
kilogram	kg	square meter	m ² or sq m
lump sum	sum	square millimeter	mm ² or sq mm
meter	m	week	wk
metric ton (1,000 kg)	t		

- (iv) The commencing surface should be identified in the description of each item for Work involving excavation, boring or drilling, for which the commencing surface is not also the original surface. The excavated surface should be

identified in the description of each item for Work involving excavation for which the excavated surface is not also the final surface. The depths of Work should be measured from the commencing surface to the excavated surface, as defined.

(c) Daywork Schedule

A Daywork Schedule should be included if the probability of unforeseen work, outside the items included in the Bill of Quantities, is relatively high. To facilitate checking by the Employer of the realism of rates quoted by the tenderers, the Daywork Schedule should normally comprise:

- (i) a list of the various classes of labour, and materials for which basic Day work rates or prices are to be inserted by the tenderer, together with a statement of the conditions under which the Contractor will be paid for Work executed on a Day work basis; and
- (ii) a percentage to be entered by the tenderer against each basic Day work Subtotal amount for labour, materials and plant representing the Contractor's profit, overheads, supervision and other charges.

(d) Provisional Quantities and Sums

- (i) Provision for quantity contingencies in any particular item or class of Work with a high expectation of quantity overrun should be made by entering specific “Provisional Quantities” or “Provisional Items” in the Bill of Quantities, and not by increasing the quantities for that item or class of Work beyond those of the Work normally expected to be required. To the extent not covered above, a general provision for physical contingencies (quantity overruns) should be made by including a “Provisional Sum” in the Summary of the Bill of Quantities. Similarly, a contingency allowance for possible price increases should be provided as a “Provisional Sum” in the Summary of the Bill of Quantities. The inclusion of such provisional sums often facilitates budgetary approval by avoiding the need to request periodic supplementary approvals as the future need arises.

- (ii) Provisional sums to cover specialized works normally carried out by Nominated Sub Contractors should be avoided and instead Bills of Quantities of the specialised Works should be included as a section of the main Bills of Quantities to be priced by the Main Contractor. The Main Contractor should be required to indicate the name (s) of

the specialised firms he proposes to engage to carry out the specialized Works as his approved domestic sub-contractors. Only provisional sums to cover specialized Works by statutory authorities should be included in the Bills of Quantities.

(e) Summary

The Summary should contain a tabulation of the separate parts of the Bills of Quantities carried forward, with provisional sums for Daywork, for

physical (quantity) contingencies, and for price contingencies (upward price adjustment) where applicable.

2020/22FY TERM CONTRACT FOR DEVELOPMENT & REHABILITATION OF BOREHOLES

PRICING SCHEDULE No.1: FOR DRILLING & PUMP TESTING OF A BOREHOLE IN MANDERA COUNTY

Item No.	Description	Unit	Qty	Rate (Kshs)	Amount (Kshs)
A1	BOREHOLE DRILLING				
A.1.0	Carry out Hydro-geological Survey	L/S	1		
A.1.1	Mobilisation, transportation of machinery, erection of Camps, sanitary facilities & de-mobilisation to and from site within the same zone	L/S	1		
A.1.2	Mobilisation from site within the same zone	L/S	1		
A.1.3	Mobilization from one zone to other zone	L/S	1		
A.1.4	Erection and dismantling of the drilling equipment and allied machinery at the site	L/S	1		
A.1.5	Drilling of Borehole with minimum diameter of 205mm through all type of strata including disposal of excavated materials taking any remedial measures to overcome caving in or over drilling to accommodate sloughed materials and keeping drilling records as specified between ground level and 100m b.g.l.	M	1		
A.1.5a	Ditto item A.1.5 but between 100 & 200m b.g.l	M	1		
A.1.5b	Ditto item A.1.5 but between 200 & 300m b.g.l	M	1		
A.1.5c	Ditto Item A.1.5 but between 300 & 325m b.g.l	M	1		
A.1.6	Supply and install 152mm dia. Plain steel casings	M	1		
A.1.7	Supply and install 152mm dia. Slotted steel casings	M	1		
A.1.8	Allow for taking of drilling cutting samples at 2m intervals	L/S	1		
A.1.9	Supply & install gravel pack (rounded 2-4mm diameter)	Ton	1		
A.1.10	Grout between casings and the Borehole for the top 10m	L/S	1		
A.1.11	Physical and chemical development of the Borehole including inserting & removal of development equipment				
A.1.11 a	Physical Development of Borehole	Hours	1		
A.1.11 b	Chemical Development of Borehole	Hours	1		
A.1.12	Undertake constant discharge test as specified	Hours	1		
A.1.13	Undertake water level observation & record recovery	Hours	1		
A.1.14	Carry out Borehole Sterilization	L/S	1		
A.1.15	Install Well head, Well Cap, Serial Number & cement with slab of dimensions 1x1x1m around well head	L/S	1		
A.1.16	Supply of Water & drilling fluids for drilling operations and field camp uses	L/S	1		
A.1.17	Supply and install approved Borehole Gantry	L/S	1		

A.1.18	Allow for making good and surface reinstatement at the Borehole site to project Managers satisfaction	L/S	1		
A.1.19	Supervision of works	L/S	1		
A.1.20	Conduct EIA study of the project and acquire NEMA license prior to drilling	L/S	1		
A.1.21	Apply for a drilling permit and submit permit to County Director prior to drilling	L/S	1		

PRICING SCHEDULE No. 2 FOR EQUIPPING OF NEW BOREHOLES IN MANDERA COUNTY

NO	ITEM DESCRIPTION	UNIT	QNTY	RATE	REMARKS
<i>Borehole Equipping Bill of Quantities (Rates should be all inclusive; materials, equipment, labour, taxes, insurance and all other incidental costs)</i>					
1	Preliminary items				
1.1	Mobilisation of materials, equipments and personnel	Kms	1		
1.2	Provide 152mm internal diameter threaded Borehole cap with 50mm diameter pipe threaded on both ends welded to it at the centre to receive 50mm draw pipes and rising main and 20mm provision to receive Air line	No	1		
1.3	Provide a standard steel Borehole draw pipes assembly clamp	No	1		
1.4	Provide all other electrical, mechanical and plumbing tools and accessories (e.g. Insulation tapes, thread tapes, bitumen, welding rods, bolts and nuts, e.t.c) required for fabrication & erection of Borehole Gantry and the equipping of the Borehole)	Item	L/S		
2.0.	Electro-mechanical works				
2.1	Supply and instal AC powered Submersible pump-set complete with 3-phase motor and accessories including motor control panel with overload, phase failure, water level control relays				
	1. 5.5kw	Set	1		
	2. 7.5KW	Set	1		
	3. 11KW	Set	1		
	4. 15KW	Set	1		
	5. 22KW	Set	1		
	6. 30KW	Set	1		
2.2	Supply and instal a compartible Diesel powered 3-phase Generator-set supplied complete with accessories, change-over switch and 3 months service fuel, oil and Air cleaner filter elements kits				
	15KVA	Set	1		
	18KVA	Set	1		

	20KVA	Set	1		
	24KVA	Set	1		
	30KVA	Set	1		
	45KVA	Set	1		
	60KVA	Set	1		
2.4	At least 16mm ² 3-phase dual core motor cable	M	1		
2.5	1.5mm ² to 2.5mm ² twin insulated water level relay cables	M	1		
2.6	Water level control electrodes	No	1		
2.7	Water proof jointing/ Splicing Kit	No	1		
2.8	Dual core armoured cable	M	1		
3.0.	<i>Plumbing/ Pipefitting Works</i>				
3.1	Supply and install 50mm diameter, standard 6m long each GS class "C" draw pipes with ditto submersible pump (Each pipe should have Steam Sockets)	Lengths	1		
3.2	Supply and fit 50mm diameter GI Unions on rising main between Master meter and non-return valve	No	1		
3.3	Supply and fit 50mm diameter Master meter	No	1		
3.4	Supply and fit 50mm diameter Non-return valve	No	1		
3.5	Supply and fit 50mm diameter 90 Degree, M-F GI Elbows	No	1		
2.1.3	Supply and fit 50mm diameter GI Plain Nipples	No	1		

PRICING SCHEDULE 3. REHABILITATION & RE-EQUIPING OF BOREHOLE IN THE COUNTY

ITEM	ITEM DESCRIPTION		QUANTITY	RATE	REMARKS
1	Allow for finding well log ie depth, casing, original water static level	LS	LS		
2	<u>PLANTS AND EQUIPMENTS MOBILIZATION</u>				
2.1	<i>Mobilization of drilling equipment, accessories, materials & personnel to and from site</i>	KM	LS		
2,2	Provide for the setting up of drilling equipment on site and dismantle & demobilize on successful completion of the borehole flushing reinstating ground to its original status	LS	1		
2.3	Provide rotary rig for fishing out draw pipes , pump and cable. Rate to include relevent personels , fuel and lubricants as directed by the Enginneer on site.	days	1		
2.4	provide borehole camera including personel for runing the camera as directed by the Enginner on ste.	days	1		
2.5	provide fishing tools and fabrication of fishing tools as directed by the Engineer on site.	LS	LS		
2.6	<u>FLUSHING AND CLEANING</u>				
2.7	Provide sufficient water for cleaning & site	LS	LS		

	use				
3	Carry out physical cleaning of borehole and casing to remove microbial , biostems and dispose as directed	LS		LS	
3.1	Carry out surging and aggitation of water in the borehole, followed by pumping using high capacity pump to stir and remove silt and debris from the bottom of the well or using water jetting as recommended and ensure pumping is continued untill muddy water turns clear to the satisfaction of the supervising officer	LS		LS	
3.2	carry out well disinfection of the well using chlorine	LS		LS	
4	<u>PUMP TESTING AND EQUIPING</u>				
4.1	Mobilization of test pumping equipment, accessories, materials & personnel to and from site	KM		1	
4.2	Carry out pump testing & recovery test of the Borehole by insertion and removal of the test pumping equipment	HRS		1	
4.3	provide and install submersible pump Set complete with appropriate motor and control pannel, cabling and GS Draw pipes with steam sockets	No		1	
4.4	Construct well head with concrete around the surface casing with dimension of 1mx1mx1m and grouting of top 3m annular space between the surface casing & borehole	LS		LS	
4.5	Allow for making good and surface reinstatement at the borehole to the supervisors satisfaction	LS		LS	

4	PRICING SCHEDULE FOR BOREHOLE CIVIL WORKS				

SCHEDULE No. 4.1: CONSTRUCTION OF STANDARD 3.71X4.88M MASONRY PUMP HOUSE

ITEM	DESCRIPTION	UNITS	QTY	RATE (Kshs)	REMARKS
I)	3.71 x 4.88M MASONRY PUMP HOUSE				
A	EXCAVATIONS & EARTHWORKS; -				
1	Excavation of over site soils and foundations	CM	1		
2	Backfilling and removal of extra excavated earth	CM	1		
B	SUBSTRUCTURE AND WALLING				
1	Ordinary Portland Cement	Bags	1		
2	Sand	Tonnes	1		
3	Ballast	Tonnes	1		

4	Approved Hardcore	Tonnes	1		
5	Approved Murram	Tonnes	1		
6	200mm thick x 300mm long Quarry Stone Blocks	No	1		
7	8mm dia. M.S. reinforcement bars	Length	1		
8	12mm dia. M.S. reinforcement bars	Length	1		
9	Anti-Termite Oil	Lts	1		
10	BRC Mesh fabric 125	LM	1		
11	DPC	LM	1		
12	12mm dia x 300mm long Anchor bolts	No	1		
C	SUPERSTRUCTURE				
1	150 X 25mm sawn timber formwork	LM	1		
2	100 x 50mm Wall plates	LM	1		
3	100 x 50mm Poles	LM	1		
4	100 x 50mm Braces	LM	1		
5	25 x 50mm Battens	LM	1		
6	50 x 50mm B.S. 125 weld mesh	SM	1		
7	Hoop iron	LM	1		
D	ROOF CONSTRUCTION USING SAWN, CELCURED SECOND GRADE CYPRESS; -				
1	100 x 50mm Rafters	LM	1		
2	100 x 50mm Ceiling joists	LM	1		
3	100 x50mm Purlins	LM	1		
4	12.5 x 200mm Facial board	LM	1		
5	25 x 100mm Steel plates	No	1		
E	28 GAUGE, G.C.I. ROOFING;				
1	2.5 m Corrugated galvanized iron sheets Gauge 28	No	1		
2	1.5 m long galvanized iron Cap ridges, Gauge 28	No	1		
F	FIXTURES AND IRON MONGERIES;				
1	1200 x 2100mm wooden double door in one section side slung, opening outwards, ledged, braced & complete with frame and padlock	No	1		
2	200mm Pressed steel tower bolts	Pairs	1		
3	125mm barrel bolts	No	1		
4	10mm dia. Prefabricated foundation bolts cast within 'ditto'	No	1		
G	FINISHES;				
1	Plastic emulsion paint	Lts	1		
2	Gloss enamel paints	Lts	1		
3	Wood Preservative	Lts	1		
H	MISCELLENOUS:				
1	Assorted Nails	Kgs	1		

SCHEDULE No. 4.2: CONSTRUCTION OF STEEL PRESSED WATER TANKS					
Item	Description	QTY	Units	Rate	Amount
	Design to BS1564 , fabrication,supply of steel components, and construction pressed steel water tank on foundation C25RC complete with the following: (i) complete with access ladders ladder . (ii) Internal access ladder into the tank (iii) standard finish of 1 u/c zinch chromate and 2 f/c aluminium paint on external surfaces of tank, (iv) 3 coats of non-toxic bituminous paint finish to interior surfaces of tank , and stays (v) water level indicator(vii) GI piping 2" dia. (vii) manhole cover (Vii) foundation				
	STEEL PRESSED GROUND WATER TANKS				
1	Ditto 150m3 low level steel water tank on a dwarf wall	NO	1		
2	Ditto 100m3 low level steel water tank on a dwarf wall	NO	1		
3	Ditto 50m3 low level steel water tank on a dwarf wall	NO	1		
4	Ditto 20m3 low level steel water tank on a dwarf wall	NO	1		
	STEEL PRESSED ELEVATED WATER TANKS				
	Ditto 150M3 on 18m high steel tower	NO	1		
	Ditto 100M3 on 18m high steel tower	NO	1		
	Ditto 50M3 on 18m high steel tower	NO	1		
	Ditto 150M3 on 12m high steel tower	NO	1		
	Ditto 100M3 on 12m high steel tower	NO	1		
	Ditto 50M3 on 12m high steel tower	NO	1		
	Ditto 150M3 on 9m high steel tower	NO	1		
	Ditto 100M3 on 9m high steel tower	NO	1		
	Ditto 50M3 on 9m high steel tower	NO	1		

SCHEDULE No. 4.3: CONSTRUCTION OF MASONRY WATER KIOSK

ITEM	DESCRIPTION	UNITS	QTY	RATE	REMARKS
	EXCAVATIONS & EARTHWORKS;				
	Excavate over site not exceeding 150mm deep, remove and deposit as directed.	CM	1		
	Excavate foundation trench not exceeding 0.8m deep	CM	1		
	Extra over "ditto" for excavation within rocky formation	CM	1		
	Backfill and ram	CM	1		
	Cart away remaining excavated earth material and deposit within site as directed.	CM	1		
	SUB-STRUCTURE;				
	STRIP FOUNDATIONS 600mm WIDE & 150mm THICK;				
	Reinforced concrete 1:2:4 in foundations	CM	1		
	10mm dia. Rod reinforcements	Length	1		
	8mm rod reinforcements	Length	1		
	WALLING IN 1:3 GAUGED MORTAR;				
	225mm thick Concrete Block walling	SM	1		
	Hoop iron belt reinforcement	Kgs	1		
	FLOOR SLAB;				
	250mm thick, approved hardcore	CM	1		
	50mm thick, mass concrete 1:4:8 blinding	CM	1		
	100mm thick mass concrete 1:2:4 floor slab	CM	1		
	Damp Proof Membrane	SM	1		
	Form work to sides of floor slab	SM	1		
	WALLING;				
	D.P.C. under walling	LM	1		
	225mm thick Concrete Block walling	SM	1		
	1,700x400x300mm Mass Concrete raised Apron	CM	1		
	Waste water collection and drainage area walling	SM	1		
	ROOFING;				
	200 X 300mm Reinforced Concrete Ring Beams	CM	1		
	12mm diaMs Reinforcement bars	Length	1		
	8mm diaMs Reinforcement bars	Length	1		
	Provide for form work along soffit and sides of ring beams	SM	1		
	150mm thick, reinforced concrete roofing	CM	1		
	12mm diaMs Reinforcement bars at 200mm centre to centre	Length	1		
	Provide for form work along soffit and sides	SM	1		

	of R.C roof				
	PVC Tank mounted over R. C. Roof and accessories:				
	Supply and install at least 4,900 Cubic metres Plastic tank over reinforced concrete roof	Item	L/s		
	Excavate and cover with a RC slab a 1000x1000x2000mm soak pit	Item	L/s		
	Provide 1 coarse of 225mm walling over roof slab to guard Plastic Tank installed	SM	1		
	Construct one, 1700x500x75mm RC Kiosk counter reinforced with 50x50mm wire mesh	Item	L/s		
	FIXTURES:				
	Doors & windows: -				
	Standard 850 x 2100mm steel casement door complete with frame and locks	No	1		
	Upward opening 1000high x 800mm wide steel casement window that opens and closes in vertical swing motion complete with frame, protective burglar proofing and locks	No	2		
	FINISHES:				
	20mm cement sand 1:3 plaster applied in 3 layers	SM	1		
	50mm cement:sand 1:3 floor screed placed in 2 layers	SM	1		
	Include red oxide powder	SM	1		
	Red oxide floor polish	SM	1		
	Emulsion paints	SM	1		
	Enamel paints	SM	1		
	Artwork and sign writing as illustrated by drawings	Item	1		
	PLUMBING & PIPE FITTING;				
	Connection of the following pipes, fittings, and appurtenances				
	50mm dia. G.I. tee	No	1		
	'Ditto' nipples	No	1		
	'Ditto' union	No	1		
	50 x25mm dia. Reducing bush	No	1		
	25mm dia. G.I. nipple	No	1		
	'Ditto' Gate valve	No	1		
	'Ditto' Union	No	1		
	'Ditto' class 'B' pipe	Length	1		
	'Ditto' 90° bends, M-F	No	1		
	25 x20mm dia. G.I. Reducing bush	No	1		
	20mm dia. G.I. nipples	No	1		
	'Ditto' Unions	No	1		

	'Ditto' Sockets	No	1		
	'Ditto' Tees	No	1		
	'Ditto' Gate valves	No	1		
	'Ditto' Plug	No	1		
	'Ditto' class 'B' pipe	Length	1		
	'Ditto' 90° Elbows, F-F	No	1		
	Allow for connection of Water Kiosk to the new 6 Inch Water Distribution Pipeline	Item	L/S		

SCHEDULE No. 4.4: CONSTRUCTION OF G.L. MASONRY WATER STORAGE TANK					
ITEM NO.	ITEM DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT (KSh)
6.01	Excavate for above tank in soil for tank foundation to a depth not exceeding 1.5m	m ³	1		
	MASONRY WALL				
6.02	Supply material and construct a 225mm circular masonry wall	m ²	1		
6.03	Ditto but 450mm circular masonry wall	m ²	1		
6.04	Supply all material and plaster inside of tank with 15.0mm water proof sand/cement screed	m ²	1		
6.05	Provide and fix 200mm thick boulder at wall and floor interface	Ls	1		
	CONCRETE WORK				
6.07	Supply all material and place all class 30 concrete work to cover the foundation, beams, and cover slab Rate to Include formwork.	m ³	1		
6.08	Supply, lay and compact hardcore for wall foundation and base slab.	m ³	1		
6.09	Supply all material and place class 15(20) concrete blinding	m ³	1		
	STEEL REINFORCEMENT				
6.1	Supply, cut and place the following				

	steel reinforcement to BS 4466				
	(l) Y8	Kg	1		
	(ii) Y12	Kg	1		
	(iii) Y10	Kg	1		
	PIPE WORK AND FITTINGS				
6.11	Supply and fix all pipe fittings as				
	shown below				
	(i) 75mm dia GS VJ flanged adapter	No.	1		
	(ii) 75mm dia G.I. Flanged gate valve	No.	1		
	(iii) 75mm dia GS flanged pipe 1m long	No.	1		
	(iv) 75mm dia GS flanged long radius	No.	1		
	90° bend				
	(v) 75mm dia GS flanged Pipe 2.2m long	No.	1		
	(vi) 75mm dia GS flanged pipe 1m long				
	with paddle flange	No.	1		
	(vii) 75mm dia flanged Glenfield ball				
	float valve	No.	1		
	(viii) 75mm dia GS flanged bell mouth	No.	1		
	(ix) 75mm dia GS flanged shovel				
	radius 90° bend	No.	1		
	(x) 75mm dia uPVC-B 6m outfall pipe	No.	1		
	(xi) 75mm dia GS flanged spigot 1m long	No.	1		
	(xii) 75x75mm dia GS flanged Tee	No.	1		
	(xiii) 75mm dia flanged pipe 3m long	No.	1		
	(xiv) 75mm dia flanged pipe 1.5m long	No.	1		
	(xv) 75mm dia GS male threaded pipe				
	with paddle flange 400mm long	No.	1		
	(xvi) 75mm dia GS 90° bend female				
	threaded	No.	2		
	(xvii) 75mm dia GS male threaded nipple	No.	1		
	(XVIII) 75 x 50mm GS Reducing Bushes	No.	1		
6.12	Supply all material and construct				
	outlet valve chambers as per the Engineers				
	instruction	No.	1		
6.13	Supply all material and construct scour				
	and over flow valve chamber as per	No.	1		

6.14	Supply all material and construct inside tank ladder	No	1		
6.15	Ditto but outside ladder	No.	1		
6.16	Supply and install 5mm galvanized wire mesh on air vent pipe as per	Ls	1		
6.17	Test water tank for leakages as described in the specifications, disinfect and commission	Ls	1		
6.18	Reinstate ground at tank site	Ls	1		
	Subtotal For pipework and fittings				

SCHEDULE No. 4.5: CONSTRUCTION OF STANDARD 30FT LONG LIVESTOCK TROUGH

ITEM NO	DESCRIPTION	QTY	UNIT	RATE (Ksh)	REMARKS
	Excavations				
	Excavation including maintaining and supporting sides and keeping free from water, mud and fallen materials by bailing , pumping or otherwise				
1	Excavate bulk for pit 0.00-1.5 metres	1	CM		
2	Remove surplus excavated material from site	1	CM		
	Hardcore filling				
3	Supply, fill and ram 300mm thick approved Hardcore	1	Ton		
	Concrete work				
	Concrete in foundations				
4	mass concrete in Strip foundations	1	CM		
5	10mm diameter reinforcement bars 150mm centre to centre	1	lengths		
6	100mm thick reinforced concrete slab	1	CM		
7	Timber shattering provided to sides of floor slab	1	M		
8	Weld mesh Reinforcement	1	SM		
	SUBSTRUCTURES SUB-TOTAL				
	(II) SUPERSTRUCTURES				
	Walling				

9	225 mm Thick (building stones /rubble/interlocking soil blocks) walling in cement and sand mortar (1:3)	1	SM		
	Finishes				
	Cement:sand (1:3) render as described in:				
10	13mm Thick with finish to masonry walling	1	SM		
11	25mm thick floor finish	1	SM		
12	Prepare and apply three coats plastic emulsion paint to wall surfaces	1	SM		
	50mm diameter GI pipes and fittings				
13	50mm GI class B pipe	1	lengths		
14	50mm GI Barrel Nipples	1	No		
15	50mm GI Sockets	1	No		
16	50mm GI Unions	1	No		
17	50mm GI Gate Valves	1	No		
18	50mm GI Ball valve	1	No		
19	50mm GI Elbows	1	No		

SCHEDULE No. 4.6: RISING AND DISTRIBUTION PIPELINES

ITEM	ITEM DESCRIPTION	UNIT	QNTY	RATE	REMARKS
<i>Preparation, Excavation, Pipe laying, joining and fittings</i>					
1	Carry out bush clearing along rising main route 500mm wide	SM	1		
2	Excavate and backfill pipeline trench (after laying of pipe) 450mm wide and between 0.6m and 1.5m deep (50% in very rocky ground)	m.	1		
3	Provide, lay and join 75mm HDPE 6 Bar (Class B) pipes	m	1		
4	Provide the following fittings for joining of the pipes				
	i) Master meter 50mm diameter	No.	1		
	ii) 75mm Valve Sockets	No	1		
	iii) 75mm GI Nipple (Provisional)	No	1		

	iv) 75mm GI 90 degrees Tees	No	1		
	v) 50mm GI Non return Valve	No	1		
	vi) 75 x 50mm GI Reducing Bushes	No	1		
	vii) 75 x 20mm GI Reducing Bushes	No	1		
	viii) 75mm GI Gate Valves	No	1		
5	Provide, lay and join 50mm HDPE 6 Bar (Class B) pipes	m	1		
6	Provide the following fittings for joining of the pipes				
	i) Master meter 50mm diameter	No.	1		
	ii) 50mm Valve Sockets	No	1		
	iii) 50mm GI Nipple (Provisional)	No	1		
	iv) 50mm GI 90 degrees Tees	No	1		
	v) 50mm GI Non return Valve	No	1		
	vi) 50 x 50mm GI Reducing Bushes	No	1		
	vii) 50 x 20mm GI Reducing Bushes	No	1		
	viii) 50mm GI Gate Valves	No	1		
	ix) 50mm GI Sockets	No	1		
7	Provide & fit 50mm dia GI Elbows	No	1		
8	Provide & fit 20mm Air Valves	No	1		
9	Provide & fit 20mm dia GI Gate Valves	No	1		
10	Provide & fit 20mm dia GI Barrel Nipples	No	1		
11	Provide & fit 20mm dia GI Sockets	No	1		
12	Provide & fit 20mm dia pieces of class A pipes 300mm long each and threaded on both ends to hold Air Valves	No	1		
13	Construct Valve Chambers for Air Valves and Wash-outs of size 1mx1mx1m	No	1		
14	Disinfect and test the pipeline	Item	L/S		

SCHEDULE No. 4.7: BOREHOLE COMPOUND PERIMETER FENCE CONSTRUCTION					
ITEM	DESCRIPTION	UNITS	QTY	RATE	REMARKS
3.1 Compound Fencing					
1	Bush clearing of area along the girth of the fence 2m wide	M2	1		
2	Excavate Pits for fencing Posts 100mm in diameter & 0.5m deep	No	1		
3	2.5M long 63mm Angle Line Fencing posts including Bracing Posts fabricated & with 8 No 10mm diameter holes drilled at same points on each fencing post to receive strainer wires	No	1		
4	Use Mass Concrete 1:2:4 in Pits to firmly hold Angle line Fencing Posts	M3	1		
5	Chain link to posts through drilled holes using binding wire	M2	1		
6	16gauge barbed wire as strainers and tied to chainlink using Binding wire	Roll	1		
7	Standard mesh steel double swing gate with locks with lockable pedestrian inlet	Item	1		

In words Kenya Shillings

.....

Contractor:

VAT Registration No:

Pin No:

Address:

Signature: Date:

Witness:

Address:

Signature: Date:

SECTION VIII – STANDARD FORM

- (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) Bank Guarantee for Advance Payment
- (viii) Qualification Information
- (ix) Tender Questionnaire
- (xi) Confidential Business Questionnaire
- (x) Statement of Foreign Currency Requirement
- (xi) Details of Sub-Contractors
- (x) 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 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,

_____ Authorised Signature

_____ *Name and Title*

FORM OF TENDER

TO: MANDERA COUNTY GOVERNMENT _____[Date]
FRAMEWORK CONTRACT FOR DRILLING, EQUIPPING AND CONSTRUCTION OF
CIVIL WORKS AT VARIOUS LOCATIONS IN MANDERA COUNTY (AS AND WHEN
REQUIRED. MCG/OT/04/2020-2021

Dear Sir,

1. In accordance with the Conditions of Contract, Specifications, Drawings and Bills of Quantities for the execution of the above named Works, we, the undersigned offer to construct, 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 Project Manager'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 Employer]
of _____ [Address of Employer]

Witness; Name _____

Address _____

Signature _____

Date _____

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 Part I
 - (iv) Conditions of Contract Part II and Appendix to Conditions of Contract
 - (v) Specifications
 - (vi) Drawings
 - (vii) Priced Bills of Quantities
3. In consideration of the payments to be made by the 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:

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

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

This guarantee will remain in force up to and including thirty (30) days after the period of tender validity, and any demand in respect thereof should reach the 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 cavil or argument, any sum or sums within the limits of Kenya Shillings _____ (*amount of Guarantee in words*) as aforesaid without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the 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 _____

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 (attach copy or Incorporation Certificate);

Place of registration: _____

Principal place of business _____

Power of attorney of signatory of tender _____

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

Year	Volume	
	Currency	Value

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

Project name	Name of client and contact person	Type of work performed and year of completion	Value of Contract
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

1.4 Major items of Contractor’s Equipment proposed for carrying out the Works. List all information requested below.

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

(etc.)			
--------	--	--	--

1.5 Qualifications and experience of key personnel proposed for administration and execution of the Contract. Attach biographical data.

Position	Name	Years of experience (general)	Years of experience in proposed position
Project Manager			
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
(etc.)			

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

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

1.8 Name, address and telephone, telex and facsimile numbers of banks that may provide reference if contacted by the Employer.

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

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

2 Joint Ventures

- 2.4 The information listed in 1.1 – 1.10 above shall be provided for each partner of the joint venture.
- 2.5 The information required in 1.11 above shall be provided for the joint venture.
- 2.6 Attach the power of attorney of the signatory(ies) of the tender authorizing signature of the tender on behalf of the joint venture
- 2.7 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 address 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*)

CONFIDENTIAL BUSINESS QUESTIONNAIRE

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

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

Part 1 – General

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

Part 2(c) – Registered Company:

STATEMENT OF FOREIGN CURRENCY REQUIREMENTS

(See Clause 23] of the Conditions of Contract)

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

(Figures)..... (Words).....

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

Currency in which foreign exchange element is required:

.....

Date: The Day of 20.....

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

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

(Signature of Tenderer)

DETAILS OF SUB-CONTRACTORS

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

Failure to comply with this requirement may invalidate the tender.

(1) Portion of Works to be sublet:

[i] Full name of Sub-contractor and address of head office:
.....

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

(2) Portion of Works to sublet:

(i) Full name of sub-contractor and address of head office:
.....
.....

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

[Signature of Tenderer)

Date

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

FORM RB 1

REPUBLIC OF KENYA
PUBLIC PROCUREMENT ADMINISTRATIVE REVIEW BOARD

APPLICATION NO.....OF.....20.....

BETWEEN

.....APPLICANT

AND

.....RESPONDENT (*Procuring Entity*)

Request for review of the decision of the..... (*Name of the Procuring Entity*) of
.....dated the...day of20.....in the matter of Tender No.....of
.....20...

REQUEST FOR REVIEW

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

- 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

FORM OF POWER OF ATTORNEY

(All bidders shall complete this form otherwise, their bids shall be considered non-responsive)

We _____ (Name of Bidder)

having our offices located in _____ (Name of
Town and Building) duly authorise
_____ (Name of person appointed to act for
and on behalf of the bidder) to act for and on our behalf on all matters pertaining to the execution of
supply of good as stipulated under

**TENDER FOR FRAMEWORK CONTRACT FOR DRILLING, EQUIPPING AND
CONSTRUCTION OF CIVIL WORKS AT VARIOUS LOCATIONS IN MANDERA
COUNTY (AS AND WHEN REQUIRED)**

Duly signed and delivered:

Name of appointed attorney: _____

Signature of appointed attorney: _____

Witnessed by:

1. Name of First Company Director: _____

Signature: _____

2. Name of Second Company Director: _____

Signature: _____

Company Seal:
