MANDERA WATER AND SEWERAGE CO. LTD.
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TENDER DOCUMENT FOR

PROPOSED IMPROVEMENT OF BORDER POINT 1 WATER PROJECT IN MANDERA EAST SUBCOUNTY

TENDER NO. MCG/MANDWASCO/WSTF/ONT/01/2022-2023

ISSUED: August, 2022

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ABBREVIATIONS AND ACRONYMS

CDS	Contract Data Sheet
GCC	General Conditions of Contract
IFT	Invitation for Tender
ITT	Instruction to Tenderers
PE	Procuring Entity
PM	Project Manager
PPADA 2015	Public Procurement and Assets Disposal Act, 2015
PPDR 2006	Public Procurement and Disposal Regulations, 2006
PPOA	Public Procurement Oversight Authority
STD	Standard Tender Documents
SOR	Statement of Requirements
SP	Service Provider
TDS	Tender Data Sheet
VAT	Value Added Tax

SECTION I: INVITATION FOR TENDERS (IFT)

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TENDER REF NUMBER: **MCG/MANDWASCO/WSTF/ONT/01/2022-2023**

PROPOSED IMPROVEMENT OF BORDER POINT 1 WATER PROJECT IN MANDERA EAST SUBCOUNTY .

The Mandera Water and Sewerage Company (MANDWASCO) invite sealed tender from eligible candidates for **PROPOSED IMPROVEMENT OF BORDER POINT 1 WATER PROJECT IN MANDERA EAST SUBCOUNTY .**

1.1 Interested eligible candidates may obtain further information from the procurement office MANDWASCO Head office located at the **New County Headquarters, Mandera town** during normal working hours or visit our website https:// www.mandera.go.ke

2.1 A complete set of tender documents shall be made available on the Mandera county website: https://www.mandera.go.ke and obtained by interested candidates without paying any fee.

3.1 Prices quoted should be net inclusive of all taxes, must be in Kenya Shillings and shall remain valid for **180 days** from the closing date of the tender.

4.1 Completed tender documents are to be enclosed in plain sealed envelopes marked with tender reference number and be deposited in the Tender Box which is located at **MANDWASCO Head Office** at the **New County Headquarters, Mandera town** in Mandera or be addressed to the address given below so as to be received on or before **Tuesday, 6th September, 2022 at 10:00 am**

Chief Executive Officer
Mandera Water and Sewerage Company (MANDWASCO)
P. O. Box 341-70300,
Mandera.

Tenders will be opened immediately thereafter in the presence of bidders or their representatives who choose to attend in MANDWASCO Board room.

SECTION II: INSTRUCTIONS TO TENDERERS (ITT)

Table of Clauses

A. Introduction

1. Scope of Tender

1.1 The **Mandera Water and Sewerage Company Ltd** (MANDWASCO) invites Tenders for the construction of works as specified in the **Tender Data Sheet** and Sections VI (Technical Specifications) and VII (Drawings).

1.2 The successful Tenderer will be expected to complete the works by the required completion date specified in the **Tender Data Sheet.**

1.3 The objectives of the works are listed in the **Tender Data Sheet**. These are mandatory requirements. Any subsequent detail is offered to support these objectives and must not be used to dilute their importance.

2. Source of Funds

2.1 The **Mandera Water and Sewerage Co. Ltd** has received grant from **Water Services Trust Fund** towards the cost of the Project named in the **Tender Data Sheet** and intends to apply part of the proceeds of this grant to payments under the Contract described in the **Tender Data Sheet**.

2.2 Payments will be made directly by the **Mandera Water and Sewerage Co. Ltd** upon request to pay and will be subject in all respects to the terms and conditions of the resulting contract.

3. Eligible Tenderers

3.1 A Tenderer may be a natural person, private or public company, government-owned institution, subject to sub-Clause 3.4 or any combination of them with a formal intent to enter into an agreement or under an existing agreement in the form of a joint venture, consortium, or association. In the case of a joint venture, consortium, or association, unless otherwise specified in the **Tender Data Sheet**, all parties shall be jointly and severally liable.

3.2 The Invitation for Tenders is open to all suppliers as defined in the Public Procurement and Disposal Act, 2015 and the Public Procurement and Disposal Regulations, 2020 except as provided hereinafter.

3.3 National Tenderers shall satisfy all relevant licensing and/or registration with the appropriate statutory bodies in Kenya, such as the Ministry of Public Works or the Energy Regulatory Commission. etc

3.4 A Tenderer shall not have a conflict of interest. All Tenderers found to have a conflict of interest shall be disqualified. A Tenderer may be considered to have a conflict of interest with one or more parties in this Tendering process, if they:

a) Are associated or have been associated in the past directly or indirectly with employees or agents of the Procuring Entity or a member of a board or committee of the Procuring Entity;

b) Are associated or have been associated in the past, directly or indirectly with a firm or any of its affiliates which have been engaged by the Procuring Entity to provide consulting services for the preparation of the design, specifications and other documents to be used for the procurement of the works under this Invitation for Tenders;

c) Have controlling shareholders in common; or

d) Receive or have received any direct or indirect subsidy from any of them; or

e) Have the same legal representative for purposes of this Tender; or

f) Have a relationship with each other, directly or through common third parties, that puts them in a position to have access to information about or influence on the Tender of another Tenderer, or influence the decisions of the Procuring Entity regarding this Tendering process; or

g) Submit more than one Tender in this Tendering process, however, this does not limit the participation of subcontractors in more than one Tender, or as Tenderer and subcontractor simultaneously.

3.5 A Tenderer will be considered to have a conflict of interest if they participated as a consultant in the preparation of the design or technical specification of the project and related services that are the subject of the Tender.

3.6 Tenderers shall not be under a declaration of ineligibility for corrupt and fraudulent practices issued by the Government of Kenya in accordance with GCC sub-Clause 3.2.

3.7 Government owned enterprises in Kenya may participate only if they are legally and financially autonomous, if they operate under commercial law, are registered by the relevant registration board or authorities and if they are not a dependent agency of the Government.

3.7 Tenderers shall provide such evidence of their continued eligibility satisfactory to the Procuring Entity, as the Procuring Entity shall reasonably request.

4. One Tender per Tenderer

4.1 A firm shall submit only one Tender, in the same Tendering process, either individually as a Tenderer or as a partner in a joint venture pursuant to ITT Clause 5.

4.2 No firm can be a subcontractor while submitting a Tender individually or as a partner of a joint venture in the same Tendering process.

4.3 A firm, if acting in the capacity of subcontractor in any Tender, may participate in more than one Tender but only in that capacity.

4.4 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 Tenders in which the Tenderer has participated to be disqualified.

5. Alternative Tenders by Tenderers

5.1 Tenderers shall submit offers that comply with the requirements of the Tendering documents, including the basic Tenderer's technical design as indicated in the specifications and Drawings and Bill of Quantities. Alternatives will not be considered, unless specifically allowed for in the **Tender Data Sheet**. If so allowed, sub-Clause 5.2 and 5.3 shall govern.

5.2 When alternative times for completion are explicitly invited, a statement to that effect will be included in the **Tender Data Sheet** as will the method of evaluating different times for completion.

5.3 If so allowed in the **Tender Data Sheet**, 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 specifications. In addition to submitting the basic Tender, the Tenderer shall provide all information necessary for a complete evaluation of the alternative by the Procuring Entity, including technical specifications, breakdown of prices, and other relevant details. Only the technical alternatives, if any, of the lowest evaluated Tenderer conforming to the basic technical requirements shall be considered by the Procuring Entity.

6. Cost of Tendering

6.1 The Tenderer shall bear all costs associated with the preparation and submission of its Tender, and the Procuring Entity shall in no case be responsible or liable for those costs, regardless of the conduct or outcome of the Tendering process.

7. Site Visit and Pre-Tender Meeting

7.1 The Tenderer, at the Tenderer's own responsibility and risk, is advised to visit and examine the Site of 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.

7.2 The Procuring Entity may conduct a site visit and a pre-Tender meeting. The purpose of the pre-Tender meeting will be to clarify issues and to answer questions on any matter that may be raised at that stage.

7.3 The Tenderer's designated representative is invited to attend a site visit and pre-Tender meeting which, if convened, will take place at

the venue and time stipulated in the **Tender Data Sheet**.

7.4 The Tenderer is requested as far as possible, to submit any questions in writing or by electronic means to reach the procuring Entity before the pre-Tender meeting. It may not be practicable at the meeting to answer all questions, but questions and responses will be transmitted in accordance with sub-Clause 7.5.

7.5 Minutes of the pre-Tender meeting, including the text of the questions raised and the responses given together with any responses prepared after the pre-Tender meeting will be transmitted within the time stated in the **Tender Data Sheet** to all purchasers of the Tendering documents. Any modification of the Tendering documents listed in sub-Clause 8.1 that may become necessary as a result of the pre-Tender meeting shall be made by the Procuring Entity exclusively through the issue of an Addendum pursuant to ITT sub Clause 10.2 and not through the minutes of the pre-Tender meeting.

7.6 Non-attendance during the site visit or pre-Tender meeting will not be a cause for disqualification of a Tenderer unless specified to the contrary in the **Tender Data Sheet**.

B. Tendering Documents

8. Content of Tendering Documents

8.1 The works required, Tendering procedures, and contract terms are prescribed in the Tendering Documents. In addition to the Section I Invitation for Tenders, Tendering documents which should be read in conjunction with any addenda issued in accordance with ITT sub Clause 10.2 include:

Section II Instructions to Tenderers
Section III Tender Data Sheet
Section IV General Conditions of Contract
Section V Contract Data Sheet
Section VI Specifications
Section VII Drawings
Section VIII Bill of Quantities
Section IX Forms of Tender
- Form of Tender
- Appendix to Tender
- Confidential Business Questionnaire
- Integrity Declaration
- Letter of Acceptance
- Form of Contract Agreement

Section X Forms of Security
- Tender Security Form
- Tender Securing Declaration
- Performance Bank or Insurance Guarantee

8.2 The number of copies to be completed and returned with the Tender is specified in the **Tender Data Sheet.**

8.3 The Invitation for Tenders (Section I) issued by the Procuring Entity is not part of the Tendering Documents and is included for reference purposes only. In case of discrepancies between the Invitation for Tenders and the Tendering Documents listed in sub-Clause 8.1 above, the said Tendering Documents will take precedence.

8.4 The Procuring Entity is not responsible for the completeness of the Tendering Documents and their addenda, if they were not obtained directly from the authorized staff of the Procuring Entity.

8.5 The Tenderer is expected to examine all instructions, forms, terms and specifications in the Tendering documents. Failure to furnish all information required by the Tendering Documents or to submit a Tender substantially responsive to the Tendering documents in every respect will be at the Tenderer's risk and may result in the rejection of its Tender.

9. Clarification of Tendering Documents

9.1 A prospective Tenderer requiring any clarification of the Tendering documents may notify the Procuring Entity in writing, e-mail or facsimile at the Procuring Entity's address indicated in the **Tender Data Sheet**.

9.2 The Procuring Entity will within the period stated in the **Tender Data Sheet** respond in writing to any request for clarification provided that such request is received no later than the period indicated in the **Tender Data Sheet** prior to the deadline for the submission of Tenders prescribed in sub-Clause 22.1.

9.3 Copies of the procuring entity's response will be forwarded to all Purchasers of the Tendering documents, including a description of the inquiry, but without identifying its source.

9.4 Should the Procuring Entity deem it necessary to amend the Tendering documents as a result of a clarification, it shall do so following the procedure under ITT Clause 10.

10. Amendments of the Tendering Documents

10.1 Before the deadline for submission of Tenders, the Procuring Entity may, for any reason, whether at its own initiative or in response to a clarification requested by a prospective Tenderer, modify the Tendering documents by issuing addenda.

10.2 Any addendum issued shall be part of the Tender documents

pursuant to sub-Clause 8.1 and shall be communicated in writing, by e-mail or facsimile to all who have obtained the Tendering documents directly from the Procuring Entity.

10.3 In order to allow prospective Tenderers reasonable time in which to take an addendum into account in preparing their Tenders, the Procuring Entity at its discretion shall extend, as necessary, the deadline for submission of Tenders, in accordance with sub-Clause 22.2

C. Preparation of Tenders

11. Language of Tender

11.1 The Tender, and all correspondence and documents related to the Tender exchanged by the Tenderer and the Procuring Entity shall be written in the Tender language stipulated in the **Tender Data Sheet**. Supporting documents and printed literature furnished by the Tenderer may be in another language provided they are accompanied by an accurate translation of the relevant passages in the above stated language, in which case, for purposes of interpretation of the Tender, the translation shall prevail.

12. Documents Constituting the Tender

12.1 The Tender submitted by the Tenderer shall consist of the following components:

a) The Form of Tender (in the format indicated in Section IX) completed in accordance with ITT Clause 15, 16 and 17;

b) Information requested by Instructions to Tenderers ITT sub-Clause 13.2; 13.3 and 13.4;

c) Tender Security or Tender Securing Declaration in accordance with Instructions to Tenderers ITT Clause 19;

d) Priced Bill of Quantities;

e) Qualification Information Form and Documents;

f) Written confirmation authorizing the signatory of the Tender to commit the Tenderer in accordance with Instructions to Tenderers ITT sub Clause 19.2; and

g) And any information or other materials required to be completed and submitted by Tenderers, as specified in the **Tender Data Sheet**.

13. Documents Establishing

13.1 Pursuant to ITT Clause 13, the Tenderer shall furnish, as part of its Tender, documents establishing the Tenderer's eligibility to Tender and its qualifications to perform the contract if its

Eligibility and Qualifications of the Tenderer

Tender is accepted.

13.2 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 their Tenders with any information updating the 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. The update or confirmation should be provided in Section IX.

13.3 If the Procuring Entity has not undertaken pre-qualification of potential Tenderers, to qualify for award of the contract, Tenderers shall meet the minimum qualifying criteria specified in the **Tender Data Sheet**:

13.4 Tenders submitted by a joint venture of two or more firms as partners shall comply with the following requirements, unless otherwise stated in the **Tender Data Sheet**:

a) The Tender shall include all the information listed in the **Tender Data Sheet** pursuant to sub-Clause 13.3 above for each joint venture partner;

b) The Tender shall be signed so as to be legally binding on all partners;

c) One of the partners will be nominated as being in charge, and this authorization shall be evidenced by submitting a power of attorney signed by legally authorized signatories of all the partners;

d) The partner in charge shall be authorized to incur liabilities and receive instructions for and on behalf of any and all partners of a joint venture and the entire execution of the Contract, including payment, shall be done exclusively with the partner in charge;

e) All partners of the joint venture shall be liable jointly and severally for the execution of the contract in accordance with the contract terms and a statement to this effect shall be included in the authorization mentioned under (c) above as well as in the Tender and in the Agreement (in case of a successful Tender); and

f) A copy of the joint venture agreement entered into by all partner shall be submitted with the Tender. Alternatively, a Letter of Intent to execute a joint venture agreement in the event of a successful Tender shall be signed by all

partners and submitted with the Tender, together with a copy of the proposed Agreement.

g) The Tender Security and Tender Securing Declaration as stated in accordance with ITT Clause 19, and in case of a successful Tender, the Agreement, shall be signed so as to be legally binding on all partners.

14. Lots Package

14.1 When Tendering for more than one contract under the lots arrangements, the Tenderer must provide evidence that it meets or exceeds the sum of all the individual requirements for the lots being tendered in regard to:

a) Average annual turnover;
b) Particular experience including key production rates;
c) Financial means, etc;
d) Personnel capabilities; and
e) Equipment capabilities.

14.2 In case the Tenderer fail to fully meet any of these criteria, it may be qualified only for those lots for which the Tenderer meets the above requirement.

15. Form of Tender

15.1 The Tenderer shall fill the Form of Tender furnished in the Tendering Documents. The Form of Tender must be completed without any alterations to its format and no substitute shall be accepted.

16. Tender Prices

16.1 The Contract shall be for the whole Works, as described in sub-Clause 1.1, based on the priced Bill of Quantities submitted by the Tenderer.

16.2 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 by the Procuring Entity when executed and shall be deemed covered by the other rates and prices in the Bill of quantities.

16.3 All duties, taxes and other levies payable by the Contractor under the Contract, or for any other cause, as of the date 15 days prior to the deadline for submission of Tenders, shall be included in the rates, prices and total Tender price submitted by the Tenderer.

16.4 The rates and prices quoted by the Tenderer shall be subject to adjustment during the performance of the Contract if provided for in the **Tender Data Sheet** and the provisions of the Conditions of Contract. The Tenderer shall submit with the Tender all the information required under the **Contract Data Sheet**.

17. Tender Currencies

17.1 The unit rates and prices shall be quoted by the Tenderer in the currency as specified in the **Tender Data Sheet.**

17.2 Tenderers shall indicate details of their expected foreign currency requirements in the Tender, if any. The rates of exchange to be used by the Tenderers in arriving at the local currency equivalent shall be the selling rates for similar transactions established by the authority specified in the **Tender Data Sheet** prevailing on the date 28 days prior to the latest deadline for submission of Tenders. These exchange rates shall apply for all payments so that no exchange risk will be borne by the Tenderer. In any case, payments will be computed using the rates quoted in the Tender.

17.3 Tenderers may be required by the Procuring Entity to clarify their foreign currency requirements and to substantiate that the amounts included in the rates and prices and in the Contract Data Sheet are reasonable and responsive to sub-Clause 17.1.

18. Tender Validity Period

18.1 Tenders shall remain valid for the period specified in the **Tender Data Sheet** after the Tender submission deadline prescribed by the Procuring Entity, pursuant to ITT Clause 22. A Tender valid for a shorter period shall be rejected by the Procuring Entity as non-responsive.

18.2 In exceptional circumstances, prior to expiry of the original Tender validity period, the Procuring Entity 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 or by cable. A Tenderer may refuse the request without forfeiting its Tender Security or causing to be executed its Tender Securing declaration. 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 its Tender Security or Tender Securing declaration for the period of the extension, and in compliance with ITT Clause 19 in all respects.

18.3 In the case of fixed price contracts, if the award is delayed by a period exceeding sixty (60) days beyond the expiry of the initial Tender validity period, the contract price will be increased by a factor specified in the request for extension. The Tender evaluation shall be based on the Tender price without taking into consideration on the above correction.

19. Tender Security and Tender Securing

19.1 Pursuant to ITT Clause 12, where required in the **Tender Data Sheet**, the Tenderer shall furnish as part of its Tender, a Tender Security in original form and in the amount and currency specified in the **Tender Data Sheet** .

Declaration

A Tender Securing Declaration as specified in the **Tender Data Sheet** in the format provided in section X shall be provided as a mandatory requirement.

19.2 The Tender Security or Tender Securing Declaration is required to protect the Procuring Entity against the risk of Tenderer's conduct which would warrant the security's forfeiture, pursuant to ITT sub-Clause 19.9.

19.3 The Tender Security shall be denominated in the currency of the Tender and shall be in one of the following forms:

a) Cash;

b) A Bank Guarantee;

c) An Insurance Bond issued by an insurance firm approved by the PPOA located in Kenya;

d) An irrevocable letter of credit issued by a reputable bank.

19.4 The Tender Security shall be in accordance with the Form of the Tender Security included in Section X or another form approved by the Procuring Entity prior to the Tender submission.

19.5 The Tender Security shall be payable promptly upon written demand by the Procuring Entity in case any of the conditions listed in sub-Clause 19.8 are invoked.

19.6 Any Tender not accompanied by a Tender Security in accordance with sub-Clauses 19.1 or 19.3 shall be rejected by the Procuring Entity as non-responsive, pursuant to ITT Clause 28.

19.7 The Procuring Entity shall immediately release any Tender Security if:

a) The procuring proceedings are terminated;

b) The Procuring Entity determines that none of the submitted Tenders is responsive;

c) A contract for the procurement is entered into.

19.8 The Tender Security shall be forfeited and the Tender Securing Declaration executed if the Tenderer:

a) Withdraws its Tender after the deadline for submitting Tenders but before the expiry of the period during which

Tenders must remain valid;

b) Rejects a correction of an arithmetic error pursuant to sub-Clause 29.2;

c) Refuse to enter into a written contract in accordance with ITT Clause 40;

d) Fails to furnish the Performance Security in accordance with ITT Clause 41.

19.9 The Tender Security and Tender Securing Declaration of a joint venture must be in the name of the joint venture submitting the Tender.

19.10 A Tenderer shall be suspended from being eligible for Tendering in any contract with the Procuring Entity for the period of time indicated in the Tender Securing Declaration:

a) If the Tenderer withdraws its Tender, except as provided in ITT sub-Clauses 18.2 and 29.2; or

b) In the case of a successful Tenderer, if the Tenderer fails within the specified time limit to:

(i) Sign the contract; or

(ii) Furnish the required Performance Security.

20. Format and Signing of Tender

20.1 The Tenderer shall prepare one original of the documents comprising the Tender as described in ITT Clause 12 of these Instructions to Tenderers, with the Form of Tender, and clearly marked **"ORIGINAL"**. In addition, the Tenderer shall submit copies of the Tender, in the number specified in the **Tender Data Sheet**, and clearly marked as **"COPIES"**. In the event of discrepancy between them, the original shall prevail.

20.2 The original and all copies of the Tenders shall be typed or written in indelible ink and shall be signed by a person or persons duly authorized to sign on behalf of the Tenderer. This authorization shall consist of a written confirmation as specified in the **Tender Data Sheet** and shall be attached to the Tender. The name and position held by each person signing the authorization must be typed or printed below the signature. All pages of the Tender, except for un-amended printed literature, shall be initialled by the person or persons signing the Tender.

20.3 Any interlineations, erasures, or overwriting shall be valid

only if they are initialled by the person or persons signing the Tender.

20.4 The Tenderer shall furnish information as described in the Form of Tender on commissions or gratuities, if any, paid or to be paid to agents relating to this Tender and to contract execution if the Tenderer is awarded the contract

D. Submission of Tenders

21. Sealing and Marking of Tenders

21.1 The Tenderer shall seal the original and each copy of the Tender in separate envelopes, duly marking the envelopes as **"ORIGINAL"** and **"COPY"**. The envelopes shall then be sealed in an outer envelope securely sealed in such a manner that opening and resealing cannot be achieved undetected.

21.2 The inner and outer envelopes shall:

a) Be addressed to the Procuring Entity at the address given in the **Tender Data Sheet**; and

b) Bear the Project name indicated in the **Tender Data Sheet**, the Invitation for Tenders (IFB) title and number indicated in the **Tender Data Sheet**, and a statement: **"DO NOT OPEN BEFORE,"** to be completed with the time and the date specified in the **Tender Data Sheet**, pursuant to ITT sub-Clause 22.1.

21.3 In addition to the identification required in sub-Clause 21.2, the inner envelopes shall also indicate the name and address of the Tenderer to enable the Tender be returned unopened in case it is declared late, pursuant to sub-Clause 22.1 and for matching purpose under ITT Clause 23

21.4 If the outer envelope is not sealed and marked as required by ITT sub clause 21.2, the Procuring Entity shall assume no responsibility for misplacement or premature opening of the Tender.

22. Deadline for Submission of Tenders

22.1 Tenders shall be received by the Procuring Entity at the address specified under ITT sub-Clause 21.2 no later than the date and time specified in the **Tender Data Sheet.**

22.2 The Procuring Entity may, in exceptional circumstances and at its discretion, extend the deadline for the submission of Tenders by amending the Tendering documents in accordance with ITT Clause 9, in which case all rights and obligations of the Procuring Entity and Tenderers previously subject to the deadline will thereafter be subject to the new deadline.

22.3 The extension of the deadline for submission of Tenders shall not be made later than the period specified in the **Tender Data Sheet** before the expiry of the original deadline.

23. Late Tenders

23.1 The Procuring Entity shall not consider for evaluation any Tender that arrives after the deadline for submission of Tenders, in accordance with ITT Clause 22.

23.2 Any Tender received by the Procuring Entity after the deadline for submission of Tenders shall be declared late, rejected and returned unopened to the Tenderer

24. Modification, Substitution and Withdrawal of Tenders

24.1 A Tenderer may modify or substitute or withdraw its Tender after it has been submitted, provided that written notice of the modification, including substitution or withdrawal of the Tender, is received by the Procuring Entity prior to the deadline prescribed for submission of Tenders prescribed under ITT sub-Clause 22.1.

24.2 The Tenderer's modification or substitution or withdrawal notice shall be prepared, sealed, marked, and dispatched in accordance with the provisions of ITT Clauses 20 and 21 with the outer and inner envelopes additionally marked "**MODIFICATION**" or **SUBSTITUTION** or "**WITHDRAWAL"** as appropriate. The notice may also be sent by electronic mail and facsimile, but followed by a signed confirmation copy, postmarked not later than the deadline for submission of Tenders.

24.3 No Tender may be withdrawn, replaced or modified in the interval between the deadline for submission of Tenders and the expiration of the period of Tender validity specified by the Tenderer on the Tender Form. Withdrawal of a Tender during this interval shall result in the Tenderer's forfeiture of its Tender Security or execution of Tender Securing Declaration, pursuant to the ITT sub-Clause 19.9.

24.4 Withdrawal of a Tender between the deadline for submission of Tenders and the expiration of the period of Tender validity specified in the **Tender Data Sheet** or as extended pursuant to sub-Clause 22.2 shall result in the forfeiture of the Tender Security and execution of Tender Securing Declaration pursuant to ITT sub-Clause 19.9.

24.5 Tenderers may only offer discounts to, or otherwise modify the prices of their Tenders by submitting Tender modifications in accordance with this Clause, or included in the original Tender submission.

E. Opening and Evaluation of Tenders

25. Opening of Tenders

25.1 The Procuring Entity will open all Tenders including modifications, substitution or withdraw notices made pursuant to ITT Clause 24, in public, in the presence of Tenderers or their representatives who choose to attend and other parties with legitimate interest and Tender proceedings, at the place on the date and at time specified in the **Tender Data Sheet**. The Tenderers' representatives who are present shall sign a register as proof of their attendance.

25.2 Envelopes marked **"WITHDRAWAL"** shall be opened and read out first. Tenders for which an acceptable notice of withdrawal has been submitted pursuant to ITT Clause 24 shall not be opened but returned to the Tenderer. If the withdrawal envelope does not contain a copy of the "Power of Attorney" confirming the signature as a person duly authorized to sign on behalf of the Tenderer, the corresponding Tender will be opened. Subsequently, all envelopes marked **"MODIFICATION"** shall be opened and the submissions therein read out in appropriate detail. Thereafter all envelopes marked or **"SUBSTITUTION"** opened and the submissions therein read out in appropriate detail.

25.3 All other envelopes shall be opened one at a time. 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, the presence or absence of Tender security, and such other details as the appropriate tender opening committee may consider appropriate, will be announced by the Secretary of the Tender Opening Committee at the opening.

25.4 Tenders or modifications that are not opened and not read out at Tender opening shall not be considered further for evaluation, irrespective of the circumstances. In particular, any discount offered by a Tenderer which is not read out at Tender opening shall not be considered further.

25.5 Tenderers are advised to send in a representative with the knowledge of the content of the Tender who shall verify the information read out from the submitted documents. Failure to send a representative or to point out any un-read information by the sent Tenderer's representative shall indemnify the Procuring Entity against any claim or failure to read out the correct information contained in the Tenderer's Tender.

25.6 No Tender will be rejected at Tender opening except for late Tenders which will be returned unopened to the Tenderer, pursuant to ITT Clause 23.

25.7 The Secretary of the appropriate tender opening committee shall prepare minutes of the Tender opening. The record of the Tender opening shall include, as a minimum: the name of the Tenderers and whether or not there is a withdrawal, substitution or modification, the Tender price per Lot if applicable, including any discounts and alternative offers and the presence or absence of a Tender Security or Tender Securing Declaration.

25.8 The Tenderers' representatives who are present shall be requested to sign the record. The omission of a Tenderer's signature on the record shall not invalidate the contents and affect the record.

25.9 A copy of the minutes of the Tender opening shall be furnished to individual Tenderers upon request.

26. Confidentiality

26.1 Information relating to the examination, clarification, evaluation, and comparison of Tenders and recommendations for the award of a 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.

26.2 Any effort by a Tenderer to influence the Procuring Entity's processing of Tenders or award decisions may result in the rejection of his Tender.

26.3 Notwithstanding sub-Clause 26.2, from the time of Tender opening to the time of Contract award, if any Tenderer wishes to contact the Procuring Entity on any matter related to the Tendering process, it should do so in writing.

27. Clarification of Tenders

27.1 To assist in the examination, evaluation, comparison of Tenders and post-qualification of the Tenderer, the Procuring Entity may, at its discretion, ask a Tenderer for clarification of its Tender including breakdown of prices. Any clarification submitted by a Tenderer that is not in response to a request by the Procuring Entity shall not be considered.

27.2 The request for clarification and the response shall be in writing. No change in the prices or substance of the Tender shall be sought, offered, or permitted except to confirm the correction of arithmetic errors discovered by the Procuring Entity in the evaluation of Tenders in accordance with ITT Clause 29.

27.3 From the time of Tender opening to the time of Contract award if any Tenderer wishes to contact the Procuring Entity on any matter related to the Tender it should do so in writing.

28. Preliminary Examination of Tenders

28.1 Prior to the detailed evaluation of Tenders, the Procuring Entity will determine whether:

a) The Tender has been submitted in the required format;

b) Any Tender Security submitted is in the required form, amount and validity period;

c) The Tender has been signed by the person lawfully authorized to do so;

d) The required number of copies of the Tender have been submitted;

e) The Tender is valid for the period required;

f) All required documents and information have been submitted; and

g) Any required samples have been submitted.

28.2 The Procuring Entity will confirm that the documents and information specified under ITT Clause 12 and ITT Clause 13 have been provided in the Tender. If any of these documents or information is missing, or is not provided in accordance with the Instructions to Tenderers, the Tender shall be rejected.

28.3 The Procuring Entity may waive any minor informality, nonconformity, or irregularity in a Tender which does not constitute a material deviation, provided such waiver does not prejudice or affect the relative ranking of any Tenderer

28.4 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 that:

a) Affects in any substantial way the scope, quality, or execution of the Works;

b) Limits in any substantial way, inconsistent with the Tendering documents, the Procuring Entity's rights or the Tenderer’s obligations under the Contract; or

c) If rectified, would affect unfairly the competitive position of other Tenderers presenting substantially responsive Tenders.

28.5 If a Tender is not substantially responsive, it will be rejected by the Procuring Entity, and may not subsequently be made

responsive by correction or withdrawal of the non-conforming deviation or reservation.

29. Correction of Errors

29.1 Tenders determined to be substantially responsive will be checked by the Procuring Entity for any arithmetic errors. Errors will be corrected by the Procuring Entity as follows:

a) If there is a discrepancy between unit prices and the total price that is obtained by multiplying the unit price and quantity, the unit price shall prevail, and the total price shall be corrected, unless in the opinion of the Procuring Entity there is an obvious misplacement of the decimal point in the unit price, in which the total price as quoted shall govern and the unit price shall be corrected;

b) If there is an error in a total corresponding to the addition or subtraction of subtotals, the subtotals shall prevail and the total shall be corrected; and

c) Where there is a discrepancy between the amounts in figures and in words, the amount in words will govern.

29.2 The amount stated in the Tender will, be adjusted by the Procuring Entity in accordance with the above procedure for the correction of errors and, with, the concurrence of the Tenderer, shall be considered as binding upon the Tenderer. If the Tenderer does not accept the corrected amount, its Tender will then be rejected, and the Tender Security may be forfeited and the Tender Securing Declaration may be executed in accordance with sub-Clause 19.9.

30. Conversion to Single Currency

30.1 To facilitate the evaluation and comparison, the Procuring Entity will convert all Tender prices expressed in the amounts in various currencies in which the Tender prices are payable to Kenya Shillings at the selling exchange rate established for similar transactions by the Central Bank of Kenya ruling on the date specified in the **Tender Data Sheet**.

31. Comparison of Tenders

31.1 The Procuring Entity shall evaluate and compare only the Tenders determined to be substantially responsive in accordance with ITT Clause 28.

31.2 In evaluating the Tenders, the Procuring Entity will determine for each Tender the evaluated Tender price by adjusting the Tender price as follows:
Making any correction for errors pursuant to ITT Clause 29;
Excluding provisional sums and the provision, if any for contingencies in the Bill of Quantities, but including Day work , where priced competitively ; and
Making appropriate adjustments to reflect discounts or other

price modifications offered in accordance with sub-Clause 24.5.

31.3 The Procuring Entity may waive any minor informality or non-conformity, which does not constitute a material deviation, provided such waiver does not prejudice or affect the relative standing of any Tenderer. Variations, deviations, and alternative offers and other factors, which are in excess of the requirements of the Tendering documents or otherwise result in unsolicited benefits for the Procuring Entity will not be taken into account in Tender evaluation.

32. National Preference

32.1 In the evaluation of Tenders the Procuring Entity shall apply exclusive preference to citizens of Kenya where:

a) The funding is 100% from the Government of Kenya or a Kenyan body;

b) The amounts are below the prescribed threshold of KShs.200 million;

32.2 To qualify for the preference the candidate shall provide evidence of eligibility by:

a) Proving Kenyan citizenship by production of a Kenyan Identity Card; or

b) Providing proof of being a "citizen contractor" in terms of section 3(1) of the Act, i.e. being a natural person or an incorporated company wholly owned and controlled by persons who are citizens of Kenya.

32.3 The Minister of Finance may prescribe additional preference and/or reservation schemes, for example for procurements above these thresholds. If such additional preference schemes apply, details will be given in the **Tender Data Sheet**.

33. Determination of the Lowest Evaluated Tender

33.1 The Tender with the lowest evaluated price from among those which are eligible, compliant and substantially responsive shall be the lowest evaluated Tender.

34. Post-qualification of Tenderer

34.1 If specified in the **Tender Data Sheet**, post-qualification shall be undertaken.

34.2 The Procuring Entity will determine to its satisfaction whether the Tenderer that is selected as having submitted the lowest evaluated responsive Tender is qualified to perform the contract satisfactorily, in accordance with the criteria listed in sub-Clause 13.3.

34.3 The determination will take into account the Tenderer's

financial, technical, and production capabilities. It will be based upon an examination of the documentary evidence of the Tenderer's qualifications submitted by the Tenderer, pursuant to sub-Clause 13.3, as well as such other information as the Procuring Entity deems necessary and appropriate. Factors not included in these Tendering documents shall not be used in the evaluation of the Tenderer's qualifications.

34.4 An affirmative determination will be a prerequisite for award of the contract to the Tenderer. A negative determination will result in rejection of the Tenderer's Tender, in which event the Procuring Entity will proceed to the next lowest evaluated Tender to make a similar determination of that Tenderer's capabilities to perform satisfactorily.

F. Award of Contract

35. Criteria of Award

35.1 Subject to ITT Clause 35 and 36, the Procuring Entity will award the Contract 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 provisions of ITT Clause 3;

b) Is determined to be qualified to perform the Contract satisfactorily;

c) Successful negotiations have been concluded.

35.2 If, pursuant to sub-Clause 14.1, this Contract is being awarded on a "lot and package" basis, the lowest evaluated Tender price will be determined when evaluating this Contract in conjunction with other Contracts to be awarded concurrently, taking into account any discounts offered by the Tenderer for award of more than one Contract.

36. Clarifications

36.1 Clarifications may be undertaken with the lowest evaluated Tenderer relating to the following areas:

a) A minor alteration to the technical details of the statement of requirements;

b) Reduction of quantities for budgetary reasons, where the reduction is in excess of any provided for in the Tendering documents;

c) A minor amendment to the Contract Data Sheet;

d) Finalizing payment arrangements;

e) Mobilization arrangements;

f) Agreeing final delivery or work schedule to accommodate any changes required by the Procuring Entity;

g) The methodology or staffing; or

h) Clarifying details that were not apparent or could not be finalized at the time of Tendering.

36.2 Clarifications shall not change the substance of the tender.

37. Procuring Entity's Right to Accept any Tender and to Reject any or all Tenders

37.1 Notwithstanding ITT Clause 35, the Procuring Entity 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.

37.2 Notice of the rejection of all Tenders shall be given promptly within 14 days to all Contractors that have submitted Tenders.

37.3 The Procuring Entity shall upon request communicate to any Tenderer the grounds for its rejection of its Tenders, but is not required to justify those grounds.

38. Procuring Entities Right to Vary Quantities at the Time of Award

38.1 The Procuring Entity reserves the right at the time of contract award to increase or decrease the quantity of goods or related services originally specified in these Tendering documents (schedule of requirements) provided this does not exceed by the percentage indicated in the **Tender Data Sheet**, without any change in unit price or other terms and conditions of the Tender and Tendering documents.

39. Notification of Award

39.1 The Tenderer whose Tender has been accepted will be notified of the award by the Procuring Entity prior to expiration of the Tender validity period by e-mail or facsimile confirmed by registered letter. This letter (hereinafter and in the Conditions of Contract called the "Letter of Acceptance") will state the sum that the Procuring Entity will pay the Contractor in

consideration of the provision and maintenance of the Work(s) as prescribed by the Contract (hereinafter and in the Contract called the "Contract Price").

39.2 The notification of award will constitute the formation of the Contract, subject to the Tenderer furnishing the Performance Security in accordance with ITT Clause 41 and signing the Contract in accordance with sub-Clause 40.2

39.3 At the same time as the person submitting the successful Tender is notified, the Procuring Entity will notify each unsuccessful Tenderer, the name of the successful Tenderer and the Contract amount and will discharge the Tender Security and Tender Securing Declaration of the Tenderer pursuant to ITT sub Clause 19.7.

39.4 If, after notification of award, a Tenderer wishes to ascertain the grounds on which it's Tender or application for pre-qualification was unsuccessful, it should address its request to the secretary of the Tender Committee that authorized the award of contract. The secretary of the Tender Committee shall, within fourteen days after a request, provide written reasons as to why the Tender, proposal or application to be pre-qualified was unsuccessful. However, failure to take this opportunity to clarify the grounds for rejection does not affect the Tenderer's right to seek immediate review by the Public Procurement Administrative Review Board under Clause 45.

40. Signing of Contract

40.1 Promptly, and in no case later than 14 days, after notification, Procuring Entity shall send the successful Tenderer the Agreement and Contract Data Sheet, incorporating all agreements between the parties obtained as a result of Contract negotiations.

40.2 Within the period specified in the notification or Tender Data Sheet but not earlier than fourteen (14) days since notification of award of contract, the successful Tenderer shall sign and date the contract and return it to the Procuring Entity.

41. Performance Security

41.1 Within thirty (30) days but after 14 days after receipt of the Letter of Acceptance, the successful Tenderer shall deliver to the Procuring Entity a Performance Security in the amount and in the form stipulated in the Tender Data Sheet and the Contract Data Sheet,

denominated in the type and proportions of currencies in the Letter of Acceptance and in accordance with the Conditions of Contract.

41.2 If the Performance Security is provided by the successful Tenderer in the form of a Bank Guarantee or Insurance Bond, it shall be issued either:

a) At the Tenderer's option, by a bank or insurance firm located in Kenya, or a foreign bank or insurance firm through a correspondent bank or insurance firm located in Kenya;

b) With the consent of the Procuring entity, directly by a foreign bank acceptable to the Procuring entity.

41.3 Failure of the successful Tenderer to comply with the requirement of sub-Clause 41.1 shall constitute sufficient grounds for the annulment of the award and forfeiture of the Tender Security, in which event the Procuring Entity may make the award to the next lowest evaluated Tenderer or call for new Tenders.

42. Advance Payment

42.1 The Procuring Entity will provide an Advance Payment as stipulated in the Conditions of Contract, as stated in the Tender Data Sheet.

42.2 The Advance Payment request shall be accompanied by an Advance Payment Security (Guarantee) in the form provided in Section X. For the purpose of receiving the Advance Payment, the Tenderer shall make an estimate of, and include in its Tender, the expenses that will be incurred in order to commence work. These expenses will relate to the purchase of equipment, machinery, materials, and on the engagement of labour during the first month beginning with the date of the Procuring Entity's "Notice to Commence" as specified in the Contract Data Sheet.

43. Adjudicator

43.1 The Procuring Entity proposes the person named in the Tender Data Sheet to be appointed as Adjudicator under the Contract, at an hourly fee specified in the Tender Data Sheet, plus reimbursable expenses. If the Tenderer disagrees with this proposal, the Tenderer should so state in the Tender. If, in the Letter of Acceptance, the Procuring Entity has not agreed on the appointment of the Adjudicator, the Adjudicator shall be appointed by the Appointing Authority

designated in the Contract Data Sheet at the request of either party.

G. Review of Procurement Decisions

44. Right to Review

44.1 A Tenderer who claims to have suffered or risk suffering, loss or damage or injury as a result of breach of a duty imposed on a Procuring Entity or an Approving Authority by the Public Procurement and Disposal Act, 2005 and the Public Procurement and Disposal Regulations 2006, the procurement proceedings or processes, may seek administrative review as prescribed by the Act. The following matters, however, shall not be subject to the administrative review:

a) The choice of procurement method;

b) a decision by the Procuring Entity to reject all Tenders, proposals or quotations;

c) Where a contract is signed in accordance to Section 68 of the Public Procurement and Disposal Act,2005;

d) Where an appeal is frivolous.

45. Time Limit on Review

45.1 The Tenderer shall submit an application for review in the number of copies and pay fees as prescribed by the Public Procurement and Disposal Regulations 2006 within fourteen (14) days of the time the Tenderer became or should have become aware of the circumstances giving rise to the complaint or dispute.

46. Submission of Applications for Review by the Public Procurement Administrative Review Board

46.1 Any application for administrative review shall be submitted in writing to the Secretary, Public Procurement Administrative Review Board on Form RB 1 at the address shown in the Tender Data Sheet. The secretary to the review board shall immediately after filing of the request, serve a copy thereof on the Procuring Entity or Director-General as the case may be.

46.2 The application for administrative review shall be in accordance with the requirements of Regulation 73 of the Public Procurement and Disposals Regulations,2006, including:

a) Reasons for the complaint, including any alleged breach of the Act or Regulations;

b) An explanation of how the provisions of the Act and or Regulation has been breached or omitted, including the

dates and name of the responsible public officer, where known;

c) Statements or other evidence supporting the complaint where available as the applicant considers necessary in support of its request;

d) Remedies sought;

e) Any other information relevant to the complaint.

47. Decision by the Public Procurement Administrative Review Board

47.1 The Administrative Review Board shall within thirty days after receipt of an application for administrative review deliver a written decision which shall indicate:

a) Annulling anything the Procuring Entity has done in the procurement proceedings, including annulling the procurement proceedings in their entirety;

b) Giving directions to the Procuring Entity with respect to anything to be done or redone in the procurement proceedings;

c) Substituting the decision of the Review Board for any decision of the Procuring Entity in the procurement proceedings;

d) Order the payment of costs as between parties to the review.

47.2 The decision made by the Review Board shall, be final and binding on the parties unless judicial review thereof commences within fourteen (14) days from the date of the Review Board's decision.

48. Appeal on the decision of the Review Board

48.1 Any party to the review aggrieved by the decision of the Review Board may appeal to the High Court and the decision of the High Court shall be final.

SECTION III: TENDER DATA SHEET

Tender Data Sheet (TDS)

Instructions to Tenderers Clause Reference

TDS Reference Number	ITT Clause Number	Amendments of, and Supplements to, Clauses in the Instruction to Tenderers
A. Introduction		
1.		The Procuring Entity is **MANDERA WATER AND SEWERAGE COMPANY LTD (MANDWASCO)**
2.		NAME OF PROJECT: **PROPOSED IMPROVEMENT OF BORDER POINT 1 WATER PROJECT IN MANDERA EAST SUBCOUNTY**
3.	**1.2**	The expected completion time of the works is **April 2023**
4.	**1.3**	The Objectives of the works are: I. To improve current service levels of weater serrvices to the urban poor. II. To Improve service delivery presence of the water utilities. III. Reduce reliance on alternative and unsafe water sources for the residents. IV. To reduce Non-Revenue Water (NRW)
5.	**2.1**	Name of financing institution is **WATER SECTOR TRUST FUND AND MANDERA COUNTY GOVERNMENT** under **URBAN PROJECT CONCEPT (UPC) PROGRAMME** Name of the Procuring Entity is **MANDERA WATER AND SEWERAGE COMPANY LIMITED** Financial Year: **2022/2023** Description of works under the contracts: **PROPOSED IMPROVEMENT OF BORDER POINT 1 WATER PROJECT IN MANDERA EAST SUB COUNTY.**
6.	**3.1**	Eligibility requirements as provided in the Public Procurement and Assets disposal Act 2015: a) Bidder to provide self-declaration that the person/tenderer is not debarred in the matter of the Public Procurement and Asset Disposal Act 2015 (As per section 62 of the Act) b) Bidder to provide self-declaration that the person/tenderer will not engage in any corrupt or fraudulent practice c) Audited Financial Accounts for the last three years: (2019 – 2021)

		d) Certified Copy of Certificate of Incorporation/Registration e) Certified Copy of Current Tax Compliance certificate from Kenya Revenue Authority f) Certified Copy of Valid and Current Business Permit from the Mandera County Government. g) Disclosure of business ownership (Directors/ Partners /Sole Proprietor). Attach a certified copy of CR12 Form h) Certified copy of National Construction Authority (NCA) registration Certificate for at least Class 7 and above which must be in Water Works and Buidling Works category.
7.	**5.1**	Alternative Tenders are ***NOT ALLOWED*** in this Tender.
8.	**5.2**	Alternative time for completion NOT **APPLICABLE**
9.	**7.3**	**Site Visit shall be held on** **Date: 26th August,2022** **Time: 9.00am** Assembly point: MANDWASCO Main Office (Mandera Town) Interested bidders should cater for pre-site visit logistics.
10.	**7.5**	Not applicable
	7.6	Non-attendance at the Site visit **will not** result in disqualification

	B. Tendering Documents	
11.	**8.2**	The number of copies to be completed and returned with the Tender is **TWO**
12.	**9.1**	Address for clarification of Tendering Document is: **THE CHIEF EXECUTIVE OFFICER** **MANDERA WATER AND SEWERAGE COMPANY LIMITED** **P. O. BOX 341-70300,** **MANDERA** **EMAIL:** mandawasco@gmail.com
13.	**9.2 and**	Period to Respond to request for clarification by the **Mandera Water** **Sewerage Co. Ltd: 2 (Two) DAYS** Period Prior to deadline for submission of Tenders for Tenderers to request clarification 9**(Nine) DAYS**

C. Preparation of Tenders		
14.	**11.1**	Language of Tender and all correspondence shall be ***ENGLISH***
15.	**13.3**	Other information or materials required to be completed and submitted by Tenderers: a) Copies of original documents defining the constitution or legal status, place of registration, and principal, place of business; written power of attorney authorizing the signatory of the Tender to commit the Tenderer. b) The minimum required annual volume of Water and sanitation works for the successful Tenderer in any of the last 2 years shall be: Kenya Shillings Twenty Million, (KES.20, 000,000). c) Experience as prime contractor in the construction of at least one project of a nature and complexity equivalent to the Works the last 2 years or the period stated in a) above (to comply with this requirement, works cited should be at least 70 percent complete). d) The essential equipment to be made available for the Contract by the successful Tenderer (proposals for timely acquisition or own, lease, hire, etc) shall be as attached in the Evaluation Criteria e) Evidence of adequate working capital for this contract.
16.	**13.4**	This Item is not applicable
17.	**16.4**	The price shall be **FIXED** Information to be submitted with the Tender are: **NONE**
18.	**17.1**	The currency in which the prices shall be quoted shall be **KENYA SHILLING**
19.	**18.1**	The Tender validity period shall be **ONE HUNDRED AND EIGHTY (180)** days.
20.	**19.1**	The amount of Tender Security shall be **Ksh 200,000 (Two hundred thousand shillings only)**. In form of a **banker's cheque or bank guarantee** from a reputable bank.

21.	**20.1**	In addition to the original of the Tender, the Tenderer should submit **1 (ONE)** copy of the Tender.

D. Submission of Tenders		
22.	**21.2 a)**	Tenders shall be submitted to*:* **THE CHIEF EXECUTIVE OFFICER** **MANDERA WATER AND SEWARAGE COMPANY** **P.O. BOX 341- 70300, MANDERA.** **LOCATED AT MANDWASCO HEAD OFFICE, NEW MANDERA COUNTY HEADQUATERS IN MANDERA TOWN.**
26.	**21.2 b)**	Project name: **PROPOSED IMPROVEMENT OF BORDER POINT 1 WATER PROJECT IN MANDERA EAST SUBCOUNTY** Tender number: **MCG/MANDWASCO/WSTF/ONT/01/2022-2023** Time and date for submission: **6 th September 2022 , at 10.00am**
27.	**22.1**	The deadline for Tender submission is a) Day ……**Tuesday** b) Date……6**th September, 2022** c) Time **10.00am**
28.	**22.3**	The extension of the deadline for submission of Tenders shall be made not later than **SEVEN (7) DAYS** before the expiry of the original deadline.
29	**24.4**	Expiry of Tender validity is **180 DAYS FROM DATE OF OPENING.**

E. Opening and Evaluation of Tenders		
30.	**25.1**	The Tender opening shall take place at: **MANDWASCO BOARDROOM** Street address **LOCATED AT MANDWASCO HEAD OFFICE, NEW MANDERA COUNTY HEADQUATERS IN MANDERA TOWN.** City/Town **MANDERA** Country **KENYA** Date 6**th September, 2022**Time: **10.00am**
31	**29.1**	Correction of errors **NOT** allowed and prices shall be used as quoted.
32	**30.1**	Conversion of currency shall **NOT** be applied
33.	**32.3**	Additional Preference ***NONE***
34	**34.1**	Detailed evaluation criteria is attached as annex in the last page of this document.
35.	**35.1**	Post- qualification will **BE UNDERTAKEN** to validate information provided on responsiveness requirements and result shall be documented. Any contrary findings during post-qualification will lead to

		disqualification of the tenderer**.**
38.	**38.1**	Percentage for quantities increase or decrease is not applicable.
F. Award of Contract		
41.	**41.1**	The amount of Performance Security shall be **[*10% of the contract price]***
42.	**42.1**	The Advance Payment shall be **ZERO (0**) *percent of the Contract Price*.
43.	**43.1**	The proposed adjudicator for the project is: **Water Services Trust Fund.**
G. Review of Procurement Decisions		
46.	**46.1**	The address for submitting appeals to Administrative Review Board: The Secretary, Public Procurement Administrative Review Board, The Public Procurement Oversight Authority, 10th Floor, National Bank House, P.O. Box 58583-00200, NAIROBI, Kenya. Tel: +254 (0) 20 3244000 Email: info@ppra.go.ke Website: www.ppra.go.ke

SECTION IV: GENERAL CONDITIONS OF CONTRACT

Table of Clauses

A. General

1. Definitions

1.1 Boldface type is used to identify defined terms.

The **Adjudicator** is the person appointed jointly by the Procuring Entity and the Contractor to resolve disputes in the first instance, as provided for in Clauses 27 and 28 hereunder.

Bill of Quantities means the priced and completed Bill of Quantities forming part of the Tender.

Compensation Events are those defined in Clause 47 hereunder.

The **Completion Date** is the date of completion of the Works as certified by the Project Manager, in accordance with Sub-Clause 58.1.

The **Contract** is the Contract between the Procuring Entity and the Contractor to execute, complete, and maintain the Works. It consists of the documents listed in Clause 2.3 below.

The **Contractor** is a person or corporate body whose Tender to carry out the Works has been accepted by the Procuring Entity.

The **Contractor"s Tender** is the completed Tendering document submitted by the Contractor to the Procuring Entity.

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.

Dayworks are varied work inputs subject to payment on a time basis for the Contractor's employees and Equipment, in addition to payments for associated Materials and Plant.

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

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

The **Defects Liability Period** is the period named in the **Contract Data Sheet** 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.

The **Procuring Entity** 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 to construct the Works.

The **Initial Contract Price** is the Contract Price listed in the Procuring Entity's Letter of Acceptance.

The **Intended Completion Date** is the date on which it is intended that the Contractor shall complete the Works. The Intended Completion Date is specified in the **Contract Data Sheet**. 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.

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

The **Site** is the area defined as such in the **Contract Data Sheet**.

Site Investigation Reports are those that were included in the Tendering documents and are factual and interpretative reports about the surface and subsurface conditions at the Site.

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

The **Start Date** is given in the **Contract Data Sheet**. It is the latest date when the Contractor shall commence execution of the Works. It does not necessarily coincide with any of the Site Possession Dates.

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 that are needed for construction or installation of the Works.

A **Variation** is an instruction given by the Project Manager that varies the Works.

The **Works** are what the Contract requires the Contractor to construct, install, and turn over to the Procuring Entity, as

defined in the **Contract Data Sheet**.

"**Force Majeure**" means an event which is beyond the reasonable control of a Party and which makes a Party's performance of its obligations under the Contract impossible or so impractical as to be considered impossible under the circumstances.

2. Interpretation

2.1 In interpreting these Conditions of Contract, singular also means plural, male also means female or neuter, and the other way round. Headings have no significance. Words have their normal meaning under the language of the Contract 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 **Contract Data Sheet**, references 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 Completion Date and Intended Completion Date for the whole of the Works).

2.3 The documents forming the Contract shall be interpreted in the order of priority given in the **Contract Data Sheet**:

(1) Agreement;

(2) Letter of Acceptance;

(3) Contract Data Sheet;

(4) Conditions of Contract;

(5) Technical Specifications;

(6) Contractor's Tender;

(7) Drawings;

(8) Bill of Quantities; and

(9) Any other document listed in the **Contract Data Sheet** as forming part of the Contract.

3. Language, Law, Fraud and Corruption

3.1 The language of the Contract and the law governing the Contract are stated in the **Contract Data Sheet**.

3.2 The Government requires that Procuring Entities (including beneficiaries of Government funded projects) as well as Tenderers/Suppliers/Contractors under Government financed contracts, observe the highest standard of ethics during the procurement and execution of such contracts. It is the responsibility of the Procuring Entity to ensure that Tenderers, suppliers, and contractors and their subcontractors observe the highest standard of ethics during the procurement and

execution of such contracts. In pursuance of this policy:

For the purpose of this provision, the following definitions are provided:

(i). "**Corruption**" has the meaning assigned to it in the Anti-Corruption and Economic Crime Act 2003 and includes the offering, giving, receiving or soliciting of anything of value to influence the action of a public official in the procurement or disposal process or in contract execution;

(ii). "**Fraudulent Practice**" includes a misrepresentation of fact in order to influence a procurement or disposal process or the execution of a contract to the detriment of the Procuring Entity and includes collusive practices amongst Tenderers prior to or after Tender submission designed to establish Tender prices at artificial non-competitive levels and deprive the Procuring Entity of the benefits of free and open competition;

(iii). **"Collusive Practice"** means an arrangement between two or more suppliers, contractors and subcontractors designed to achieve an improper purpose, including to influence improperly the actions of the Procuring Entity prior to or after Tender submission, designed to establish Tender prices at artificial non-competitive levels and to deprive the Procuring Entity of the benefit of free and open competition;

(iv). **"Coercive Practice"** means impairing or harming, or threatening to impair or harm, directly or indirectly a supplier, contractor or subcontractor or the property of any of them to influence improperly the actions of a Procuring Entity;

(v). **"Obstructive Practice"** means deliberately destroying, falsifying, altering or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede an investigation into allegations of a corrupt, fraudulent, coercive or collusive practice; and /or threatening, harassing or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation.

A Procuring Entity has the right to require that Tenderers, suppliers, and contractors and their subcontractors permit persons duly appointed by KACC/PPOA/KNAO to inspect their accounts and records and other documents relating to

the Tender submission and contract performance;

The Procuring Entity will reject a proposal for award if it determines that the Tenderer recommended for award has engaged in corrupt, fraudulent practices or others stated under Clause 44.1.a in competing for the contract;

In pursuit of the policy defined in sub-Clause 44.1 the Procuring Entity will cancel the portion of the funds allocated to a contract for goods, works, or services if it at any time determines that corrupt or fraudulent practices were engaged in by representatives of the Procuring Entity or Approving Authority or of a beneficiary of the funds during the procurement or the execution of that contract;

In the event that the Procuring Entity or Approving Authority does not take timely and appropriate action satisfactory to the Government of Kenya to remedy the situation, then the Director-General may order an investigation of procurement proceedings for the purpose of determining whether there has been a breach of the Public Procurement and Disposal Act, 2005.

3.3 The Director-General may, on the advice of the Advisory Board, debar a person from participating in procurement proceedings on the ground that the person has committed an offence under the Public Procurement and Disposal Act, 2005. A debarment shall be for a period of time of not less than five years. Before a person is so debarred, he/she will be given an opportunity to make representations to the Director-General and may request the Review Board to review the debarment.

3.4 Any communication between the Tenderers and the Procuring Entity related to matters of alleged fraud or corruption must be made in writing.

4. Confidentiality

4.1 The Service Providers, their Subcontractors, and the Personnel of either of them shall not disclose any proprietary or confidential information relating to the Project, the Services, this Contract, or the Procuring Entity's business or operations without the prior written consent of the Procuring Entity.

5. Project Manager"s Decisions

5.1 Except where otherwise specifically stated, the Project Manager will decide contractual matters between the Procuring Entity and the Contractor in the role representing the Procuring Entity.

6. Delegation

6.1 The Project Manager may delegate any of his duties and responsibilities to other people except to the Adjudicator, after notifying the Contractor, and may cancel any delegation after notifying the Contractor.

7. Communication

7.1 Communications between parties that are referred to in the

s

Conditions shall be effective only when in writing. A notice shall be effective only when it is delivered.

8. Subcontracting

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

9. Other Contractors

9.1 The Contractor shall cooperate and share the Site with other contractors, public authorities, utilities, and the Procuring Entity between the dates given in the Schedule of Other Contractors, as referred to in the **Contract Data Sheet**. The Contractor shall also provide facilities and services for them as described in the Schedule. The Procuring Entity may modify the Schedule of Other Contractors, and shall notify the Contractor of any such modification

10. Personnel

10.1 The Contractor shall employ the key personnel named in the Schedule of Key Personnel, as referred to in the **Contract Data Sheet**, who shall be appropriately qualified and registered with the appropriate bodies to carry out the functions stated in the Schedule 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 Schedule.

10.2 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.

11. Procuring Entity"s and Contractor"s Risks

11.1 The Procuring Entity carries the risks which this Contract states are Procuring Entity's risks, and the Contractor carries the risks which this Contract states are Contractor's risks.

12. Procuring Entity"s Risks

12.1 From the Start Date until the Defects Correction Certificate has been issued, the following are Procuring Entity'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 Procuring Entity 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 Procuring Entity or in the Procuring Entity's design, or due to war or radioactive contamination directly affecting the country where the Works are to be executed.

12.2 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 an Procuring Entity's risk except loss or damage due to:

(a) A Defect which existed on the Completion Date;

(b) An event occurring before the Completion Date, which was not itself an Procuring Entity's risk; or

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

13. Contractor"s Risks

13.1 From the Starting 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 Procuring Entity's risks are Contractor's risks.

14. Insurance

14.1 The Contractor shall provide, in the joint names of the Procuring Entity and the Contractor, insurance cover from the Start Date to the end of the Defects Liability Period, in the amounts and deductibles stated in the **Contract Data Sheet** for the following events which are due to the Contractor's risks:

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

(b) Loss of or damage to Equipment;

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

(d) Personal injury or death.

14.2 Policies and certificates for insurance shall be delivered by the Contractor to the Project Manager for the Project Manager's approval before the Start Date. All such insurance shall provide for compensation to be payable in the types and proportions of currencies required to rectify the loss or damage incurred.

14.3 If the Contractor does not provide any of the policies and certificates required, the Procuring Entity may effect the insurance which the Contractor should have provided and recover the premiums the Procuring Entity has paid from

payments otherwise due to the Contractor or, if no payment is due, the payment of the premiums shall be a debt due.

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

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

15. Site Investigation Reports

15.1 The Contractor, in preparing the Tender, shall rely on any Site Investigation Reports referred to in the **Contract Data Sheet**, supplemented by any information available to the Tenderers.

16. Queries about the Contract Data Sheet

16.1 The Project Manager will clarify queries on the **Contract Data Sheet**.

17. Contractor to Construct the Works

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

18. Commencement and Completion

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

19. Approval by the Project Manager

19.1 The Contractor shall submit Specifications and Drawings showing the proposed Temporary Works to the Project Manager, who is to approve them if they comply with the Specifications and Drawings.

19.2 The Contractor shall be responsible for the design of Temporary Works.

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

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

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

20. Protection of the Environment

20.1 The Contractors shall take all reasonable steps to protect the environment and to limit damage and nuisance to people and property resulting from pollution, noise and other results of his operations.

20.2 The Contractors shall ensure that emissions, surface discharges and effluent from his activities shall not exceed prescribed

values in the environmental laws.

21. Labour Laws

21.2 The Contractor shall comply with all the relevant labour laws applicable in the Country, including laws relating to workers employment, working hours, health, safety, welfare, and immigration, and shall allow them all their legal rights.

21.2 The Contractor shall require his employees to obey all applicable laws, including those concerning safety at work.

22. Health and Safety

22.1 The Contractor shall at all times take all reasonable precautions to maintain the health and safety of his personnel.

22.2 The Contractor shall ensure that first aid facilities are available at all times at the site and that suitable arrangements are made for all necessary welfare and hygiene requirements and for the prevention of epidemics.

22.3 The Contractor shall notify the Procuring Entity details of any accident as soon as practicable after its occurrence. The Contractor shall maintain records and make reports concerning health, safety, and welfare of persons, and damage to the property, as the Procuring Entity may reasonably require.

22.4 The Contractor shall conduct an HIV-Aids awareness programme, and shall take other such measures as specified in the **Contract Data Sheet** to reduce the risk of transfer of HIV virus between and among Contractor personnel, the Procuring Entity's Staff and the surrounding community.

23. Discoveries

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

24. Possession of the Site

24.1 The Procuring Entity 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 **Contract Data Sheet**, the Procuring Entity will be deemed to have delayed the start of the relevant activities, and this will be a Compensation Event.

25. Access to the Site

25.1 The Contractor shall allow the Project Manager and any person authorized 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.

26. Instructions, Inspections and Audits

26.1 The Contractor shall carry out all instructions of the Project Manager which comply with the applicable laws where the Site is located.

26.2 The Contractor shall permit the Kenya Government to inspect the Contractor's accounts and records relating to the performance of the Contractor and to have them audited by auditors appointed by the Kenya Government

27. Disputes

27. 1 If the Contractor believes that a decision taken by the Project Manager was either outside the authority given to the Project Manager by the Contract or that the decision was wrongly taken, the decision shall be referred to the Adjudicator within 14 days of the notification of the Project Manager's decision.

28. Procedure for Disputes

28.1 The Adjudicator shall give a decision in writing within 28 days of receipt of a notification of a dispute.

28.2 The Adjudicator shall be paid by the hour at the rate specified in the **Tender Data Sheet** and **Contract Data Sheet**, together with reimbursable expenses of the types specified in the **Contract Data Sheet**, and the cost shall be divided equally between the Procuring Entity and the Contractor, whatever decision is reached by the Adjudicator. Either party may refer a decision of the Adjudicator to an Arbitrator within 28 days of the Adjudicator's written decision. If neither party refers the dispute to arbitration within the above 28 days, the Adjudicator's decision will be final and binding.

28.3 The arbitration shall be conducted in accordance with the arbitration procedure published by the institution named and, in the place, shown in the **Contract Data Sheet**.

29. Replacement of Adjudicator

29.1 Should the Adjudicator resign or die, or should the Procuring Entity and the Contractor agree that the Adjudicator is not functioning in accordance with the provisions of the Contract, a new Adjudicator will be jointly appointed by the Procuring Entity and the Contractor. In case of disagreement between the Procuring Entity and the Contractor, within 30 days, the Adjudicator shall be designated by the Appointing Authority designated in the **Contract Data Sheet** at the request of either party, within 14 days of receipt of such request.

B. Time Control

30. Programme

30.1 Within the time stated in the **Contract Data Sheet**, the Contractor shall submit to the Project Manager for approval a Programme showing the general methods, arrangements, order, and timing for all the activities in the Works.

30.2 An update of the Programme shall be a programme 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.

30.3 The Contractor shall submit to the Project Manager for approval an updated Programme at intervals no longer than the period stated in the **Contract Data Sheet**. If the Contractor does not submit an updated Programme within this period, the Project Manager may withhold the amount stated in the **Contract Data Sheet** from the next payment certificate and continue to withhold this amount until the next payment after the date on which the overdue Programme has been submitted.

30.4 The Project Manager's approval of the Programme shall not alter the Contractor's obligations. The Contractor may revise the Programme and submit it to the Project Manager again at any time. A revised Programme shall show the effect of Variations and Compensation Events

31. Extension of the Intended Completion Date

31.1 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.

31.2 The Project Manager shall decide whether and by how much to extend the Intended Completion Date within 21 days of the Contractor asking the Project Manager for a decision upon the effect of a Compensation Event or Variation and submitting full supporting information. If the Contractor has failed to give early warning of a delay or has failed to cooperate in dealing with a delay, the delay by this failure shall not be considered in assessing the new Intended Completion Date.

32. Acceleration

32.1 When the Procuring Entity wants the Contractor to finish before the Intended Completion Date, the Project Manager will obtain priced proposals for achieving the necessary acceleration from the Contractor. If the Procuring Entity accepts these proposals, the Intended Completion Date will be adjusted accordingly and confirmed by both the Procuring Entity and the Contractor.

32.2 If the Contractor's priced proposals for acceleration are accepted by the Procuring Entity, they shall be incorporated in the Contract Price and treated as a Variation.

33. Delays Ordered by the Project Manager

33.1 The Project Manager may instruct the Contractor to delay the start or progress of any activity within the Works.

34. Management Meetings

34.1 Either the Project Manager or the Contractor may require the other to attend a management meeting. The business of a management meeting shall be to review the plans for remaining work and to deal with matters raised in accordance with the early warning procedure.

34.2 The Project Manager shall record the business of management meetings and provide copies of the record to those attending the meeting and to the Procuring Entity. The responsibility of the parties for actions to be taken shall be decided by the Project Manager either at the management meeting or after the management meeting and stated in writing to all who attended the meeting.

35. Early Warning

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

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

C. Quality Control

36. Identifying Defects

36.1 The Project Manager shall check the Contractor's work and notify the Contractor of any Defects that are found. Such checking shall not affect the Contractor's responsibilities. The

Project Manager may instruct the Contractor to search for a Defect and to uncover and test any work that the Project Manager considers may have a Defect.

37. Tests

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

38. Correction of Defects

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

38.2 Every time notice of a Defect is given, the Contractor shall correct the notified Defect within the length of time specified by the Project Manager's notice.

38.3 If the Contractor has not corrected a defect within the time specified in the Procuring Entity's notice, a penalty for lack of performance will be paid by the Contractor. The amount to be paid will be calculated as a percentage of the cost of having the defect correct, assessed as described in Clause 39.

39. Uncorrected Defects

39.1 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, and the Contractor will pay this amount.

D. Cost Control

40. Bill of Quantities

40.1 The Bill of Quantities shall contain items for the construction, installation, testing, and commissioning work to be done by the Contractor.

40.2 The Bill of Quantities is used to calculate the Contract Price. The Contractor shall be paid for the quantity of the work done at the rate in the Bill of Quantities for each item.

41. Changes in the Quantities

41.1 If the final quantity of the work done differs from the quantity in the Bill of Quantities for the particular item by more than 25 percent, provided the change exceeds 1 percent of the Initial Contract Price, the Project Manager shall adjust the rate to allow for the change.

41.2 The Project Manager shall not adjust rates from changes in quantities if thereby the Initial Contract Price is exceeded by more than 15 percent, except with the prior approval of the

Procuring Entity.

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

42. Variations

42.1 All Variations shall be included in the updated Programmes produced by the Contractor.

43. Payments for Variations

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

43.2 If the work in the Variation corresponds with an item description in the Bill of Quantities and if, in the opinion of the Project Manager, the quantity of work is above the limit stated in Sub-Clause 41.1 or the timing of its execution do not cause the cost per unit of quantity to change, the rate in the Bill of Quantities shall be used to calculate the value of the Variation. If the cost per unit of quantity changes, or if the nature or timing of the work in the Variation does not correspond with items in the Bill of Quantities, the quotation by the Contractor shall be in the form of new rates for the relevant items of work.

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

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

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

44. Cash Flow Forecasts

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

45. Payment Certificates

45.1 The Contractor shall submit to the Project Manager monthly statements of the estimated value of the work executed less the cumulative amount certified previously.

45.2 The Project Manager shall check the Contractor's monthly

statement and certify the amount to be paid to the Contractor within twenty-eight 28 days of receipt of the certificate from the contractor.

45.3 The value of work executed shall be determined by the Project Manager.

45.4 The value of work executed shall comprise the value of the quantities of the items in the Bill of Quantities completed.

45.5 The value of work executed shall include the valuation of Variations and Compensation Events.

45.6 The Project Manager may exclude any item certified in a previous certificate or reduce the proportion of any item previously certified in any certificate in the light of later information.

45.7 The Project Manager shall not be bound to certify any payment, if the net amount, after all retentions and deductions would be less than minimum amount of Interim Payment Certificate stated in the **Contract Data Sheet.**

46. Payments

46.1 Payments shall be adjusted for deductions for advance payments and retention. The Procuring Entity shall pay the Contractor the amounts certified by the Project Manager within 28 days of the date of each certificate. If the Procuring Entity makes a late payment, the Contractor shall be paid interest on the late payment in the next payment Interest shall be calculated from the date by which the payment should have been made up to the date when the late payment is made at the prevailing rate of interest for commercial borrowing for each of the currencies in which payments are made as indicated in the **Contract Data Sheet.**

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

46.3 Unless otherwise stated, all payments and deductions will be paid or charged in the proportions of currencies comprising the Contract Price.

46.4 Items of the Works for which no rate or price has been entered in will not be paid for by the Procuring Entity and shall be deemed covered by other rates and prices in the Contract.

47. Compensation Events

47.1 The following shall be Compensation Events:

(a) The Procuring Entity does not give access to a part of the Site by the Site Possession Date stated in the **Contract Data Sheet**.

(b) The Procuring Entity modifies the Schedule of Other Contractors in a way that affects the work of the Contractor under the Contract.

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

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

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

(f) Ground conditions are substantially more adverse than could reasonably have been assumed before issuance of the Letter of Acceptance from the information issued to 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 Procuring Entity, or additional work required for safety or other reasons.

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

(i) The advance payment is delayed.

(j) The effects on the Contractor of any of the Procuring Entity's Risks.

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

(l) Other Compensation Events described in the Contract or determined by the Project Manager shall apply.

47.2 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.

47.3 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.

47.4 The Contractor shall not be entitled to compensation to the extent that the Procuring Entity's interests are adversely affected by the Contractor's not having given early warning or not having cooperated with the Project Manager.

48. Taxes

48.1 The Project Manager shall adjust the Contract Price if taxes, duties, and other levies are changed between the date 28 days before the submission of Tenders for the Contract and the date of the last Completion certificate. The adjustment shall be the change in the amount of tax payable by the Contractor, provided such changes are not already reflected in the Contract Price or are a result of Clause 50.

49. Currencies

49.1 Where payments are made in currencies other than the Kenya Shillings, the exchange rates used for calculating the amounts to be paid shall be the exchange rates stated in the Contractor's Tender.

50. Price Adjustment

50.1 The amounts payable to the Contractor, in various currencies pursuant to Sub-Clause 45.1, shall be adjusted in respect of the rise or fall in the cost of labour, Contractor's Equipment, Plant, materials, and other inputs to the Works, by applying to such amounts the formulae prescribed in this clause based on the prevailing consumer price index obtained from the Central Bureau of Statistics or the monthly inflation rate issued by the Central Bank of Kenya.

50.2 To the extent that full compensation for any rise or fall in costs to the Contractor is not covered by the provisions of this or other clauses in the Contract, the unit rates and prices included in the Contract shall be deemed to include amounts to cover the contingency of such other rise or fall of costs.

50.3 The adjustment to be applied to amount payable to the Contractor as certified in Payment Certificates shall be determined formulae for each of the currencies in which the Contract Price is payable. No adjustment is to be applied to work valued on the basis of

Cost or current prices. The formulae shall be as follows;

$$Pn = a + b\frac{Ln}{Lo} + c\frac{Mn}{Mo} + d\frac{En}{Eo} + \text{etc.}$$

where;

Pn is a price adjustment factor to be applied to the amount in each specific currency for the payment of the work carried out in the subject month, where such variations and day work are not otherwise subject to adjustment;

a is a constant, specified in the **Appendix to Tender**, representing the nonadjustable portion in contractual payments;

b, c, d, etc., are weightings or coefficients representing the estimated proportion of each cost element (labour, materials, equipment usage, etc.) in the Works or sections thereof, net of Provisional Sums, as specified in the **Appendix to Tender**; the sum of a, b, c, d, etc., shall be one;

Ln, Mn, En, etc., are the current cost indices or reference prices of the cost elements in the specific currency of origin for month "**n,**" determined pursuant to Sub-Clause 50.5, applicable to each cost element; and

Lo, Mo, Eo, etc., are the base cost indices or reference prices corresponding to the above cost elements at the date specified in Sub-Clause 50.5

The value of net work done, certified by the Project Manager, in any monthly Interim or Final Certificate as payable by the Procuring Entity to the Contractor before deduction of any retention money shall be increased or decreased by an amount of **„F".**

$$F = PnxPc$$

where;

The effective value **Pc** of work done which is to be subjected to increase or decrease shall be the difference between:

(i) the amount which, in the opinion of the Project Manager, is due to the Contractor under Clause 45 (before deduction of retention money and before deducting sums previously paid on account) less:

- any amount for payment or repayment of any advance payment;
- any amount for materials on site (if any);

- any amounts for nominated sub-contractors (if any)
- any amounts for any other items based on actual cost or current prices; or
- any sums for increase or decrease in the Contract Price paid under this Sub-Clause

and

(ii) the amount calculated in accordance with (i) above of this Sub-clause and included in the last preceding statement.

50.4 The sources of indices shall be those listed in the **Appendix to Tender**, as approved by the Engineer. Indices shall be appropriate for their purpose and shall relate to the Contractor's proposed source of supply of inputs on the basis of which his Contract Price and expected foreign currency requirements shall have been computed. As the proposed basis for price adjustment, the Contractor shall have submitted with his Tender the tabulation of Weightings and Source of Indices in the **Appendix to Tender**, which shall be subject to approval by the Engineer.

50.5 The base cost indices or prices shall be those prevailing on the day 28 days prior to the latest date for submission of Tenders. Current indices or prices shall be those prevailing on the day 28 days prior to the last day of the period to which a particular Interim Payment Certificate is related. If at any time the current indices are not available, provisional indices as determined by the Engineer will be used, subject to subsequent correction of the amounts paid to the Contractor when the current indices become available.

50.6 If the Contractor fails to complete the Works within the time for completion prescribed under Clause 58 adjustment of prices thereafter until the date of completion of the Works shall be made using either the indices or prices relating to the prescribed time for completion, or the current indices or prices, whichever is more favourable to the Procuring Entity, provided that if an extension of time is granted pursuant to Clause 28, the above provision shall apply only to adjustments made after the expiry of such extension of time.

50.7 The weightings for each of the factors of cost given in the **Appendix to Tender** shall be adjusted if, in the opinion of the Engineer, they have been rendered unreasonable, unbalanced, or inapplicable as a result of varied or additional work already executed or instructed under Clause 43 or for any other reason.

51. Retention

51.1 The Procuring Entity shall retain from each payment due to the Contractor the proportion stated in the **Contract Data Sheet** until Completion of the whole of the Works.

51.2 On completion of the whole of the Works, half the total amount retained shall be repaid to the Contractor and the other half when the Defects Liability Period has passed and the Project Manager has certified that all Defects notified by the Project Manager to the Contractor before the end of this period have been corrected.

51.3 On completion of the whole Works, the Contractor may substitute retention money with an "on demand" Bank guarantee.

52. Liquidated Damages

52.1 The Contractor shall pay liquidated damages to the Procuring Entity at the rate per day stated in the **Contract Data Sheet** for each day that the Completion Date is later than the Intended Completion Date. The total amount of liquidated damages shall not exceed the amount defined in the **Contract Data Sheet**. The Procuring Entity may deduct liquidated damages from payments due to the Contractor. Payment of liquidated damages shall not affect the Contractor's liabilities.

52.2 If the Intended Completion Date is extended after liquidated damages have been paid, the Project Manager shall correct any overpayment of liquidated damages by the Contractor by adjusting the next payment certificate. The Contractor shall be paid interest on the overpayment, calculated from the date of payment to the date of repayment, at the rates specified in Sub-Clause 46.1.

52.3 If the Contractor has not corrected a defect within the time specified in the Procuring Entity's notice, the Procuring Entity will assess the cost of having the defect corrected, the Contractor will pay this amount, and a penalty for lack of performance calculated as described in Clause 38.

53. Bonus

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

54. Advance Payment

54.1 The Procuring Entity shall make advance payment to the Contractor of the amounts stated in the **Contract Data Sheet** by the date stated in the **Contract Data Sheet**, against provision by the Contractor of an Unconditional Bank Guarantee in a form and by a bank acceptable to the Procuring Entity in amounts and currencies equal to the advance payment. The Guarantee shall remain effective until the advance payment has been repaid, but the amount of the Guarantee shall be progressively reduced by the amounts repaid by the Contractor. Interest will not be

charged on the advance payment.

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

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

55. Performance Securities

55.1 The Performance Security shall be provided to the Procuring Entity no later than the date specified in the Letter of Acceptance and shall be issued in an amount and form and by a bank or surety acceptable to the Procuring Entity, and denominated in the types and proportions of the currencies in which the Contract Price is payable. The Performance Security shall be valid until a date 28 days from the date of issue of the Certificate of Completion in the case of a Bank Guarantee, and until one year from the date of issue of the Completion Certificate in the case of a Performance Bond.

56. Day works

56.1 If applicable, the Day works 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.

56.2 All work to be paid for as Day works 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.

56.3 The Contractor shall be paid for Day works subject to obtaining signed Day works forms.

57. Cost of Repairs

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

E. Finishing the Contract

58. Completion

58.1 The Contractor shall request the Project Manager to issue a certificate of Completion of the Works, and the Project Manager

Certificate will do so upon deciding that the work is completed.

59. Taking Over

59.1 The Procuring Entity shall take over the Site and the Works within seven days of the Project Manager's issuing a certificate of Completion.

60. Final Account

60.1 The Contractor shall supply the Project Manager with a detailed account of the total amount that the Contractor considers payable under the Contract before the end of the Defects Liability Period. The Project Manager shall issue a Defects Liability Certificate and certify any final payment that is due to the Contractor within 56 days of receiving the Contractor's account if it is correct and complete. If it is not, the Project Manager shall issue within 56 days a schedule that states the scope of the corrections or additions that are necessary. If the Final Account is still unsatisfactory after it has been resubmitted, the Project Manager shall decide on the amount payable to the Contractor and issue a payment certificate.

61. Operating and Maintenance Manuals

61.1 If "as built" Drawings and/or operating and maintenance manuals are required, the Contractor shall supply them by the dates stated in the **Contract Data Sheet**.

61.2 If the Contractor does not supply the Drawings and/or manuals by the dates stated in the **Contract Data Sheet**, or they do not receive the Project Manager's approval, the Project Manager shall withhold the amount stated in the **Contract Data Sheet** from payments due to the Contractor.

62. Termination

62.1 The Procuring Entity or the Contractor may terminate the Contract if the other party causes a fundamental breach of the Contract.

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

(a) The Contractor stops work for 28 days when no stoppage of work is shown on the current Programme and the stoppage has not been authorized by the Project Manager;

(b) The Project Manager instructs the Contractor to delay the progress of the Works, and the instruction is not withdrawn within 28 days;

(c) The Procuring Entity or the Contractor is made bankrupt or goes into liquidation other than for a reconstruction or amalgamation;

(d) A payment certified by the Project Manager is not paid by the Procuring Entity to the Contractor within 84 days of the date of the Project Manager's certificate;

(e) The Project Manager gives Notice that failure to correct a particular Defect is a fundamental breach of Contract and the Contractor fails to correct it within a reasonable period of

time determined by the Project Manager;

(f) The Contractor does not maintain a Security, which is required; and

(g) The Contractor has delayed the completion of the Works by the number of days for which the maximum amount of liquidated damages can be paid, as defined in the **Contract Data Sheet**.

(h) If the Contractor, in the judgment of the Procuring Entity has engaged in corrupt or fraudulent practices in competing for or in executing the Contract.

For the purpose of this paragraph:

"corrupt practice" means the offering, giving, receiving or soliciting of anything of value to influence the action of a public official in the procurement process or in contract execution and includes inter alia, bribery and extortion or coercion which involves threats of injury to person, property or reputation, and.

"fraudulent practice" means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of the Procuring Entity, and includes collusive practice among Tenderers (prior to or after Tender submission) designed to establish Tender prices at artificial non-competitive levels and to deprive the Procuring Entity of the benefits of free and open competition.

62.3 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 Sub-Clause 62.2 above, the Project Manager shall decide whether the breach is fundamental or not.

62.4 Notwithstanding the above, the Procuring Entity may terminate the Contract for convenience.

62.5 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.

63. Payment upon Termination

63.1 If the Contract is terminated because of a fundamental breach of Contract by the Contractor, the Project Manager shall issue a certificate for the value of the work done and Materials ordered less advance payments received up to the date of the issue of the certificate and less the percentage to apply to the value of the work not completed, as indicated in the **Contract Data Sheet**. Additional Liquidated Damages shall not apply. If the total amount due to the Procuring Entity exceeds any payment due to the Contractor, the difference shall be a debt payable to the Procuring Entity.

63.2 If the Contract is terminated for the Procuring Entity's convenience or because of a fundamental breach of Contract by the Procuring Entity, the Project Manager shall issue a certificate for the value of the work done, Materials ordered, the reasonable cost of removal of Equipment, repatriation of the Contractor's personnel employed solely on the Works, and the Contractor's costs of protecting and securing the Works, and less advance payments received up to the date of the certificate.

64. Property

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

65. Release from Performance

65.1 If the Contract is frustrated by the outbreak of war or by any other event entirely outside the control of either the Procuring Entity or the Contractor, the Project Manager shall certify that the Contract has been frustrated. The Contractor shall make the Site safe and stop work as quickly as possible after receiving this certificate and shall be paid for all work carried out before receiving it and for any work carried out afterwards to which a commitment was made.

66. Suspension of Financing

66.1 In the event that the source of financing is suspended to the Procuring Entity, from which part of the payments to the Contractor are being made:

(a) The Procuring Entity is obligated to notify the Contractor of such suspension within 7 days of having received the financing agency's suspension notice.

(b) If the Contractor has not received sums due it within the 28 days for payment provided for in Sub-Clause 46.1, the Contractor may immediately issue a 14-day termination notice.

SECTION V: CONTRACT DATA SHEET (CDS)

Contract Data Sheet

Instructions for completing the Contract Data Sheet

CDS Clause	GCC Clause	Description
		A. General
1	**1.1**	**(Itemise Definitions to take the same meaning as per the General Conditions)**
		The Procuring Entity is ***THE CHIEF EXECUTIVE OFFICER*** ***MANDERA WATER AND SEWERAGE COMPANY LTD*** ***POBOX 341-70300*** ***MANDERA.***
		The Adjudicator is ***WATER SECTOR TRUST FUND*** The Defects Liability Period is ***180*** **days.** The Project Manager is ***TECHNICAL SERVICES MANAGER*** ***MANDERA WATER AND SEWERAGE COMPANY*** ***PO BOX 341-70300 MANDERA***
		The name and identification number of the Contract is ***PROPOSED IMPROVEMENT OF BORDER POINT 1 WATER PROJECT IN MANDERA EAST SUB COUNTY.*** ***MCG/MANDWASCO/WSTF/ONT/01/2022-2023***
		The Works consist of ➢ *Rehabilitation of existing water supply system* ➢ *Extension of 90mm Dia. rising main, approx. 0.4KM* ➢ *Construction of 1 No. 100M^3 elevated steel tank* ➢ *Laying of gravity water distribution mains approx. 2KM* ➢ *Construction of 4 No. closed water Kiosks.* ➢ *50 No. consumer connections.*

	1.2	**Objectives of the project**, The Objectives of the works are: *I. To improve current service levels pf weater serrvices to the urban poor.* *II. To Improve service delivery presence of the water utilities.* *III. Reduce reliance on alternative and unsafe water sources for the residents.* *IV. To reduce non-revenue water(NRW)*
2	**2.3**	In addition to the listed documents in section 2.3 correspondences and minutes drawn for the purpose of the contract shall be also be part of the contract.
3.	**3.1**	The language of the Contract documents is ***ENGLISH*** The law that applies to the Contract is the kenyan Law.
10.	**10.1**	Include the Schedule of Key Personnel. ***1. Site agent*** ***2. foreman*** ***3. plumbers*** ***4. Stonemasonry***
24.	**24.1 & 47.1**	The Site Possession Date shall be ***SPECIFIED BY THE PROJECT MANAGER***
12.	**28.3**	Arbitration will take place at *[insert the place]* in accordance with

		rules and regulations published by …….. [*state the institutions*] *and [insert rules and regulations]*
13.	**29.1**	Appointing Authority for the Adjudicator: *[Insert the name of Authority]*
B. Time Control		
30.	**30.1**	The Contractor shall Submit a Programme for the Works within **7** days of delivery of the Letter of Acceptance.
31.	**30.3**	The period between Programme updates is ***30*** days.
		The amount to be withheld by the Project Manager in case the contractor does not submit an updated programme is **NONE**
C. Quality Control		
32.	**38.1**	The Defects Liability Period is ***90***days.
D. Cost Control		
33. ***20.***	**45.7** **47.1(a)**	Minimum Amount of Interim Payment Certificate will be ***30 per cent of contract price*** The Site Possession Date shall be ***SPECIFIED BY THE PROJECT MANAGER***
21.	**50**	The contract ***IS NOT*** subject to price adjustment in accordance with Clause 50 of the General Conditions of Contract.
22.	**51.1**	The amount of retention is **10 %** of value of works of Interim Payment Certificate'.
		Limit of retention will be ***10%*** of contract price.
53.	**53.1**	The bonus for early completion is **NOT APPLICABLE**
54.	**54.1**	The amount of advance payment shall be **ZERO**
55.	**55.1**	The Performance Security shall be **10 percent of the contract price.**

SECTION VI: TECHNICAL SPECIFICATIONS

SECTION 1

GENERAL AND SPECIFIC SPECIFICATIONS

1. CLEARING SITE

101. CLEARING SITE

The Contractor shall demolish, break up and remove buildings, walls, gates, fences, advertisements and other structures and obstructions, grub up and remove trees, hedges, bushes and shrubs and clear the site of the works at such time and to the extent required by the Engineer but not otherwise, subject to the provisions of Clause 27 of the Conditions of Contract: the materials so obtained shall so far as suitable be reserved and stacked for further use; all rubbish and materials for use shall be destroyed or removed from the site, as directed by the Engineer.

Where top soil has to be excavated this shall be removed and stacked on site. After completion of construction, it shall be spread over the disturbed ground, any surplus being disposed of as directed by the Engineer.

Underground structures and chambers where required to be demolished, shall be demolished to depths shown on drawings or as directed. They shall be properly cleaned out and backfilled and compacted with suitable material to the direction and approval of the Engineer.

102. VEGETATION

No allowance will be made for the cutting and removal of crops, grass, weeds and similar vegetation. The cost of all such work will be held to be included in the rates entered in the Bill of Quantities.

103. BUSHES AND SMALL TREES

All bushes and small trees, the main stem of which is less than 500mm girth at 1 metre above ground level shall be uprooted (unless otherwise directed by the Engineer) and burnt or otherwise disposed off as directed by the Engineer.

104. HEDGES

Where directed by the Engineer, hedges shall be uprooted and disposed off by burning.

105. FELLING TREES

Where shown on the drawings or directed by the Engineer, trees shall be uprooted or cut down as near to ground level as is possible. The rates entered in the Bill of Quantities shall include for cutting down, removing branches and foliage, cutting useful timber into suitable lengths, loading, transporting not more than 1 km. and stacking or disposing off all as directed by the Engineer.

For the purpose of measurement trees cut down shall be classified according to their girth at 1 metre above ground level, the cost of grubbing up roots shall be deemed to be covered by the rate for felling trees.

106. GRUBBING-UP ROOTS

Stumps and tree roots shall, unless otherwise directed, be grubbed up, blasted, burnt or removed and disposed of in approved dumps to be provided by the Contractor. Where directed by the Engineer, the holes resulting from grubbing up shall be filled with approved materials, which shall be deposited and compacted in layers not exceeding 225mm loose depth, to the same dry density as that of the adjoining soil. For the purpose of measurement, tree roots shall be classified according to the mean diameter of the stump measured across the cut.

107. WEED CONTROL

The Contractor shall take all necessary precautions against the growth on the site of weeds and remove them as necessary throughout the period of works and maintenance.

The finished base of all footways and elsewhere as directed shall be sprayed with an approved persistent total herbicide at the rate recommended by the manufacturer. The application shall be by an even spray in a high volume of water at about 0.7 to 0.11 litres per square metre. After this application the footways shall receive at least two further waterings before the surface is sealed.

2. EXCAVATION

201. DEFINITION AND CLASSIFICATION OF EXCAVATED MATERIALS

Excavation in the Bills of Quantities shall be classified in two categories:-

1) Common Excavation

Any material which in the opinion of the Engineer can be excavated by use of pick axes and hand levers shall be classified as common excavation. Water logged material shall be included in this class. Murram in any form shall be classified as common excavation.

2) Rock

The decision of the Engineer in classifying rock shall be final and binding.

Rock in the Bill of Quantities will be itemised in three classes:-

Class 'A'

Soft rock of the type known locally as 'tuff' which in the opinion of the Engineer cannot be considered as hard rock but which considerably increases the amount of labour needed for its removal shall be known as Class 'A' rock.

Class 'B'

Very weathered phonolite lava containing many fissures and faults shall be known as hard rock. This type of rock contains stones and boulders of unweathered or incompletely formed blacktrap or lava. A boulder or outcrop of hard rock 1.5 cubic metres or less and grey or green building stone in a formation which is massive and geologically homogeneous, will be deemed to be Class 'B' rock.

Class 'C'

Phonolite in a formation which is massive and geologically homogeneous shall be known as Class 'C' rock.

202. STORAGE AND HANDLING OF EXPLOSIVES AND BLASTING

The removal of hard materials by use of explosives will normally be permitted subject to compliance by the Contractor in all respects with the Explosives Laws of Kenya.

In the Bill of Quantities hard material is classified as rock where blasting will be permitted subject to this clause.

The Contractor shall provide proper buildings or magazines in suitable positions for the storage of explosives in manner and quantities to be approved; he shall also be responsible for the prevention of any unauthorised issue or improper use of any explosives brought on the works and shall employ only licensed and responsible men to handle explosives for the purpose of the works.

The shots shall be properly loaded and tamped and where necessary, the Contractor shall use heavy mesh blasting nets. Blasting shall be restricted to such periods and such parts of the works as the Engineer may prescribe. If, in the opinion of the Engineer, blasting would be dangerous to persons or property or to any finished work or is being carried out in a reckless manner, he may prohibit it, and order the rock to be excavated by other means and payment will be made at the rate for rock for excavation where blasting is permitted. The use of explosives by the Contractor in large blasts, as in seams, drifts, pits, or large holes, is prohibited unless authorized in writing by the Engineer. In the event of wasting of rock through any such blasting, the Contractor shall if required by the Engineer, furnish an equivalent amount of approved materials for fill, 1 cubic metre of rock in-situ being taken to equal 1.5 cubic metre of material in embankment.

203. EXCAVATION FOR FILL

Where excavation reveals a combination of suitable and unsuitable materials, the Contractor shall, wherever the Engineer considers it practicable, carry out the excavation in such a manner that the suitable materials are placed separately for use in the works without contamination by the unsuitable materials.

If any suitable material excavated from within the site is, with the agreement of the Engineer, taken by the Contractor for his use, sufficient suitable filling material to occupy after specified compaction, a volume corresponding to that which the excavated material occupied, shall, unless otherwise directed by the Engineer be provided by the Contractor from his own sources.

No excavated material shall be dumped or run to spoil except on the direction or with the permission of the Engineer who may require material which is unsuitable to be retained on site. Material used for haul roads shall not be re-used without the permission of the Engineer.

204. COMPACTION OF FILL

All materials used in fill shall be compacted to specification by plant approved by the Engineer for that purpose. Maximum compacted thickness of such layers shall not be more than 200mm.

Work on the compaction of plastic materials for fill shall proceed as soon as practicable after excavation and shall be carried out only when the moisture content is not greater than 2 per cent above the plastic limit for that material. Where the moisture content of plastic material as excavated is higher than this value the material shall be run to spoil and an equal volume of material suitable for filling shall be replaced, unless the Contractor prefers, at his own expense, to wait until the material has dried sufficiently for acceptance again as suitable material.

Nevertheless, if with any material the Engineer doubts whether compaction will be obtained within the above moisture limits he may require compaction to proceed only when the limits of moisture content for the compaction of non-plastic materials are within the range of the optimum moisture content and 3 per cent below the optimum moisture content as determined by the laboratory compaction test method described in British Standard 1377: Methods of Test for Soil Classification and Compaction.

If any such non-plastic material on excavation is too wet for satisfactory compaction and the Engineer orders the moisture content to be lowered or raised, such work shall be treated as included in the rates. All adjustments of moisture content shall be carried out in such a way that the specified moisture content remains uniform throughout compaction.

Work shall be continued until a state of compaction is reached throughout the fill, which shall have relative compaction determined according to B.S. 1377 not less than 85% of maximum dry density at optimum moisture contents. For excavation under Roads, House Drives and Car Parks the backfilling shall be compacted in 150mm layer to 100% maximum dry density.

If with non-plastic materials the compacted material has become drier in the interval between the completion of compaction and the measurement of the state of compaction, then the moisture content to be used for the calculation of the air content shall be the mean moisture content for the compaction of such materials as specified above.

205. EMBANKMENTS OVER SEWERS

In carrying embankments over sewer pipes, care shall be taken by the Contractor to have the embankments brought up equally on both sides and over the top of any such structures. Earth embankments shall be formed and compacted in layers of 200mm as the Engineer may direct. The filling immediately adjacent to structures shall be deposited and compacted in accordance with the drawings and approved by the Engineer. The cost of these works shall be included in the prices entered in the Bill of Quantities for the excavations from which embankments are formed.

206. STONE REVETMENTS (STONE PITCHING)

Where shown on the drawings, the slopes of embankments, rivers, streams, watercourses and other surfaces shall be protected against water or other action by hand-set stone facing set on end. The larger stones shall be roughly dressed on the bed and face, and roughly square to the full depth of the joints. No rounded boulder shall be used, or stones less than 225mm in depth of 0.05 cubic metre in volume. The stones shall be laid to break bond, and shall be well bedded on to a 75mm layer of gravel or fine rubble rammed to a uniform surface and the whole work finished to the satisfaction of the Engineer. Where required, a trench shall be excavated at the bottom of the slope to such a depth as will ensure a safe foundation for the revetment.

207. TIPPED REFUSE ON SITE

Tipped refuse other than artificial deposits of industrial waste or shale found on the site shall be removed and disposed off in a spoil heap to be provided by the Contractor.

208. REMOVAL OF INDUSTRIAL WASTE, ETC.

Artificial deposits of industrial waste or shale found on the site shall be removed and disposed off as directed by the Engineer. Should any particular deposits consist of or contain material which in the opinion of the Engineer is suitable for incorporation in fills, all such material shall be used accordingly and deposited in layers and compacted as specified. The prices entered in the Bill of Quantities for the excavation of the material shall include loading, transportation, disposal and compaction of same as and where directed.

209. LAND SLIPS

Remedial works and/or the removal of materials in slips, slides or subsidences and overbreaks of rock extending beyond the lines and slopes, or below the levels shown on the drawings or required by the Engineer, will not be paid for.

210. CLASSIFICATION OF MATERIAL FROM SLIPS

The classification of material from slips or slides will be in accordance with its condition at the time of removal, regardless of prior condition. Measurement of overbreak in rock excavation shall be that of the space originally occupied by the material before the slide occurred and regardless of its subsequent classification.

211. BORROW PITS

Where for any reason, it becomes necessary to form borrow pits, these shall be located and the work executed in all respects to the instructions of the Engineer. They shall be regular in width and shape and admit of ready and accurate measurement, and shall be properly graded and drained and finished with neatly trimmed slopes.

212. STREAMS, WATERCOURSES AND DITCHES

Excavations carried out in the permanent diversion, enlargement, deepening, or straightening of streams, watercourses, or ditches shall be performed as directed by the Engineer. The rates for such excavations shall include for excavated materials and all pumping, timbering works, and materials necessary for dealing with the flow of water.

213. FILLING OLD WATERCOURSES

Where watercourses have to be diverted from the sites of embankments or other works, the original channels shall be cleared of all vegetable growths and soft deposits and carefully filled in with approved materials deposited and compacted as directed by the Engineer.

214. OPEN DITCHES

Open ditches for drainage purposes shall be cut where and of such cross section as the Engineer shall direct and where so required by him they shall be constructed before the cuttings are opened or the embankments begin. The sides shall be

dressed fair throughout and the bottom accurately graded so as to carry off the water to the outlet to be provided. The material excavated from the ditches shall be disposed of as directed by the Engineer.

215. CLEARING EXISTING DITCHES

Where directed by the Engineer, existing ditches shall be cleared by removing vegetable growths and deposits. The sides shall be shaped fair throughout and the bottoms properly graded. Material removed from existing ditches shall be disposed of in tips provided by the Contractor. The rates included in the Bill of Quantities for clearing ditches shall include for maintaining and keeping clean until and up to maintenance period.

216. EXCAVATION FOR FOUNDATIONS BELOW OPEN WATER

The rates for excavation for foundations below the water level shall include for the cost of all temporary close timbering and shoring, sheet piling, coffer dams, caissons, pumps and other special appliances required and for the draining of any water in the excavation.

217. TRENCHES OF GREATER WIDTH AND DEPTH THAN NECESSARY

The Contractor shall not be entitled to payment in respect of excavation to any greater extent, whether horizontally or vertically, than is necessary to receive any structure for which the excavation is intended, except where a separate item is provided for additional excavation for working space, timbering, or other temporary work. Excavation to a greater depth or width than directed shall be made good with suitable materials to the satisfaction of the Engineer and at the Contractor's cost.

218. SUPPORTS FOR TRENCHES

The sides of trenches shall where necessary be adequately supported to the satisfaction of the Engineer by timber or other approved means.

219. PROVISION OF SPOIL HEAPS

The Contractor shall provide spoil heaps at his own expense for the disposal of surplus material and all rubbish collected when clearing the site and during the construction of the works. The sites for these shall be approved by the Engineer.

220. USE OF VIBRATORY COMPACTION PLANT

Where vibratory rollers or other vibratory compaction plant is used, the mechanism for vibration shall be kept working continuously during compaction operations, except during periods when the Engineer permits or directs discontinuance of vibration.

Unless otherwise permitted by the Engineer, the frequency for vibration shall be maintained within the range of amplitude and frequency recommended by the manufacturers of the plant for the material to be compacted. The frequency shall be recorded by a tacheometer indicating speed of rotation of any shaft producing vibrations.

221. WATER IN EXCAVATIONS

All excavations shall be kept free from water, from whatever source, at all times during construction of works until in the opinion of the Engineer, any concrete or other works therein are sufficiently set. The Contractor's rates are deemed to cover compliance with this requirement.

The Contractor shall construct any sumps or temporary drains that the Engineer may deem necessary and shall be responsible for the removal and disposal of all water entering the excavations from whatever source and shall deal with and dispose of such water in a manner approved by the Engineer so as to ensure that excavations are kept dry.

The Contractor shall provide all plant, labour and materials required for such work and all costs incurred shall be deemed to be included in his rates for excavation.

3. CONCRETE

SCOPE OF SECTION

This section covers the materials, design of mixes, mixing, transport, placing, compaction and curing of concrete and mortar required in the Works. It also covers formwork and reinforcement for concrete.

DEFINITIONS

Structural concrete is any class of concrete which is used in reinforced, prestressed or unreinforced concrete construction, which is subject to stress.

Non-structural concrete is composed of materials complying with the Specification but for which no strength requirements are specified and which is used only for filling voids, blinding foundations and similar purposes where it is not subjected to significant stress.

A **formed surface** is a face which has been cast against formwork.

An **unformed surface** is a horizontal or nearly horizontal surface produced by screeding or trowelling to the level and finish required.

A **pour** refers to the operation of placing concrete into any mould, bay or formwork, etc. and also to the volume which has to be filled. Pours in vertical succession are referred to as lifts.

301. THE DESIGN OF CONCRETE MIXES

a) Cement

Cement for structural concrete shall be CEM I – 42.5 to KS EAS 18-1 and KS EAS 183

b) Classes of Concrete

The classes of structural concrete to be used in the works shall be those shown on the Drawings and designated in Table 4.1, in which the class designation includes two figures. The first figure is the nominal strength at 28 days expressed in N/mm^2 and the second figure is the maximum nominal size of aggregate in the mix expressed in millimetres.

c) Design of Proposed Mixes

The Contractor shall design all the concrete mixes called for on the Drawings, making use of the ingredients which have been approved by the Engineer for use in the Works and in compliance with the following requirements:-

Table 4.1 - CONCRETE CLASSES AND STRENGTHS

Class of Concrete	Nominal Strength N/mm²	Maximum Nominal Size of Aggregate mm	Maximum Water / Cement Ratio		Trial Mixes Target Mean Strength (Clause 401 c) N/mm²	Early Works Test Cubes (Clause 401 d)	
			A	B		Any one Cube N/mm²	Average of any Group of 4 Cubes N/mm²
10/75	10	75	0.60	0.55	13.5	8.5	13.3
15/75	15	75	0.60	0.50	21.5	12.8	20.0
15/40	15	40	0.60	0.50	21.5	12.8	20.0
15/20	15	20	0.57	0.50	21.5	12.8	20.0
20/40	20	40	0.55	0.48	31.5	17.0	27.5
20/20	20	20	0.53	0.48	31.5	17.0	27.5
20/10	20	10	0.50	0.48	31.5	17.0	27.5
25/40	25	40	0.52	0.46	36.5	21.3	32.5
25/20	25	20	0.50	0.46	36.5	21.3	32.5
25/10	25	10	0.48	0.46	36.5	21.3	32.5
30/40	30	40	0.50	0.45	41.5	25.5	37.5
30/20	30	20	0.48	0.45	41.5	25.5	37.5
30/10	30	10	0.47	0.45	41.5	25.5	37.5
40/20	40	20	0.46	0.43	51.5	34.0	47.5
40/10	40	10	0.45	0.43	51.5	34.0	47.5

NOTES: 1. Under water/cement ratio, column A applies to moderate and intermediate exposure, and column B applies to severe exposure. See NOTE after Table 4.2.

2. In case of concrete having a maximum aggregate size of 40mm or less, 150mm cubes should be used.

   In case of concrete having a 75mm or larger aggregate, 200mm cubes should be used.

i) The aggregate portion shall be well graded from the nominal maximum size of stone down to the 150 micron size.

ii) The cement content shall be such as to achieve the strengths called for in Table 4.1 but in any case not less than the minimum necessary for impermeability and durability shown in Table 4.2.

iii) The workability shall be consistent with ease of placing and proper compaction having regard to the presence of reinforcement and other obstructions.

iv) The water/cement ratio shall be the minimum consistent with adequate workability but in any case not greater that that shown in Table 4.1 taking due account of any water contained in the aggregates. The Contractor shall take into account that this requirement may in certain cases require the inclusion of a workability agent in the mix.

v) The drying shrinkage determined in accordance with BS 1881 shall not be greater than 0.05 percent.

Table 4.2 - MINIMUM CEMENT CONTENT

Minimum Cement Content - kg/m³ of Compacted Concrete			
Class of Concrete	**Moderate Exposure**	**Intermediate Exposure**	**Severe Exposure**
10/75,15/75	200	220	270
15/40, 20/40, 25/40, 30/40	240	270	290
15/20, 20/20, 25/20, 30/20	260	300	330
40/20	300	320	330
20/10, 25/10, 30/10	300	340	390
40/10	310	340	390

Note: the minimum cement contents shown in the above table are required in order to achieve impermeability and durability. In order to meet the strength requirements in the Specification higher contents may be required.

The categories applicable to the Works are based broadly on the factors listed hereunder:

Moderate exposure Surface sheltered from severe rain;
buried concrete, concrete continuously under water

Intermediate exposure Surface exposed to driving rain; alternate wetting and drying;
traffic; corrosive fumes; heavy condensation

Severe exposure	Surface exposed to sea water, moorland water having a pH of 4.5 or less, groundwater containing sulphates.

c) Trial Mixes

At least six weeks before commencing placement of concrete in the Permanent Works trial mixes shall be prepared for each class of concrete specified.

For each mix of concrete for which the Contractor has proposed a design, he shall prepare three separate batches of concrete using the materials which have been approved for use in the works and the mixing plant which he proposes to use for the Works. The volume of each batch shall be the capacity of the concrete mixer proposed for full production.

Samples shall be taken from each batch and the following action taken, all in accordance with BS 1881:-

i) The slump of the concrete shall be determined.

ii) Six test cubes shall be cast from each batch. In the case of concrete having a maximum aggregate size of 40mm or less, 150mm cubes shall be used. In the case of concrete containing 75mm or larger aggregate, 200mm cubes shall be used and in addition any pieces of aggregate retained on a 53mm BS sieve shall be removed from the mixed concrete before casting the cubes.

iii) Three cubes from each batch shall be tested for compressive strength at seven days and the remaining three at 28 days.

iv) The density of all the cubes shall be determined before the strength tests are carried out.

Subject to the agreement of the Engineer, the compacting factor apparatus may be used in place of a slump cone. In this case the correlation between slump and compacting factor shall be established during preparation of the trial mixes.

The average strength of the nine cubes tested at 28 days shall be not less than the target mean strength shown in Table 4.1.

The Contractor shall also carry out tests to determine the drying shrinkage of the concrete unless otherwise directed by the Engineer.

Based on the results of the tests on the trial mixes, the Contractor shall submit full details of his proposals for mix design to the Engineer, including the type and source of each ingredient, the proposed proportions of each mix and the results of the tests on the trial mixes.

If the Engineer does not agree to a proposed concrete mix for any reason, the Contractor shall amend his proposals and carry out further trial mixes. No mix shall be used in the works without the written consent of the Engineer.

d) Quality Control of Concrete Production

i) Sampling

For each class of concrete in production at each plant for use in the works, samples of concrete shall be taken at the point of mixing and/or of deposition as instructed by the Engineer, all in accordance with the sampling procedures described in BS 1881 and with the additional requirements as set out below.

Six number 150mm or 200mm cubes as appropriate shall be made from each sample and shall be cured and tested all in accordance with BS 1881, two at seven days and the other four at 28 days.

Each sample shall be taken from one batch selected at random and at intervals such that each sample represents not more than $20m^3$ of concrete unless the Engineer agrees to sampling at less frequent intervals.

Until compliance with the Specification has been established the frequency of sampling shall be three times that stated above or such lower frequency as may be instructed by the Engineer.

ii) Testing

1) The slump or compacting factor of the concrete shall be determined for each batch from which samples are taken and in addition for other batches at the frequency instructed by the Engineer.

The slump of the concrete in any batch shall not differ from the value established by the trial mixes by more than 25mm or one third of the value, whichever is the greater.

The variation in value of the compacting factor, if used in place of a slump value, shall be within the following limits:

For value of 0.9 or more	+0.03
For value of between 0.8 and 0.9	+0.04
For values of 0.8 or less	+0.05

2) The water/cement ratio as estimated from the results of (a) above, determined by samples from any batch shall not vary by more than five per cent from the value established during the trial mixes.

3) The air content of air entrained concrete in any batch shall be within 1.5 units of the required value and the average value of four consecutive measurements shall be within 1.0 unit of the required value, expressed as a percentage of the volume of freshly mixed concrete.

4) Until such time as sufficient test results are available to apply the method of control described in (e) below, the compressive strength of the concrete at 28 days shall be such that no single result is less than the value shown in Table 4.1 under the heading early works test cubes' and also that the average value of any four consecutive results is not less than the value shown in Table 4.1 under the same heading.
The 7-day cube result may be used as an early strength indicator, at the discretion of the Engineer.

5) When test cube results are available for at least 20 consecutive batches of any class of concrete mixed in any one plant, the average of any four consecutive results at 28 days shall exceed the nominal strength by not less than half the current margin (Table 4.3) and each individual result shall not be less than 85 per cent of the nominal strength.

The current margin shall be defined as 1.64 times the standard deviation of cube tests on at least 20 separate consecutive batches produced from one plant over a period exceeding five days but not exceeding six months or on at least 50 separate consecutive batches produced from one plant over a period not exceeding 12 months. If both figures are available, the smaller shall be taken.

The current margin shall in any case not be less than the figure given below:-

Table 4.3 - MINIMUM CURRENT MARGIN FOR TEST CUBES

	Minimum Current Margin for		
	10N/mm²	**15N/mm² & above**	**20N/mm²**
After 20 batches	3.3	5	7.5
After 50 batches	1.7	2.5	3.8

Failure to comply with requirements:

If any one test cube result in a group of four consecutive results is less than 85% of the nominal strength but the average of the group of which it is part satisfies the strength requirement, then only the batch from which the failed cube was taken shall be deemed not to comply with the Specification.

If more than one cube result in a group of four consecutive results is less than 85% of the nominal strength or if the average

strength of the group fails to satisfy the strength requirement then all the batches between those represented by the first and last cubes in the group shall be deemed not to comply with the Specification, and the Specification, and the Contractor shall immediately adjust the mix design subject to the agreement of the Engineer to restore compliance with the Specification. After adjustment of the mix design the Contractor will again be required to comply with sub-clauses 401(b) and 401(c) of this Section of the Specification.

The Contractor shall take necessary action to remedy concrete which does not comply with this Specification. Such action may include but is not necessarily confined to the following:-

i) Increasing the frequency of sampling until control is again established.

ii) Cutting test cores from the concrete and testing in accordance with SRN 117.

iii) Carrying out strengthening or other remedial work to the concrete where possible or appropriate.

iv) Carrying out non-destructive testing such as load tests on beams.

v) Removing the concrete.

302. MIXING CONCRETE

Before any plant for batching, mixing, transporting, placing, compacting and finishing concrete is ordered or delivered to site, the Contractor shall submit to the Engineer full details including drawings of all the plant which he proposes to use and the arrangements he proposes to make.

Concrete for the Works specifically for Treatment Works Units and Storage Reservoirs shall be and mixed using an automatic batching plant in one or more central location. If the Contractor proposes to use ready mixed concrete he shall submit to the Engineer for his approval full details and test results of the concrete mixes. The Engineer may approve the use of ready mixed concrete provided that:

a) the proposed mixes, the material to be used and the method of storage and mixing comply with the requirements of the Specification; and

b) adequate control is exercised during mixing.

Approval for the use of ready mixed concrete may be withdrawn if the Engineer is not satisfied with the control of the materials being used and control during mixing.

The mixing of concrete shall be carried out at central plant located at a site remote from place of discharge of mixed concrete. The mixed concrete shall be transported from the central plant using transit lorry mixers and/or agitator trucks.

Batching and mixing plants shall be modern efficient equipment complying with the requirements of SRN 118 and capable of producing a uniform distribution of the ingredients throughout the mass. Truck mixes shall comply with the requirements of SRN 121 and shall only be used with the prior agreement of the Engineer. If the plant proposed by the Contractor does not fall within the scope of SRN 118, it shall have been tested in accordance with SRN 119 and shall have a mixing performance within the limits specified in SRN 118.

All mixing operations shall be under the control of an experienced supervisor.

The aggregate storage bins shall be provided with drainage facilities arranged so that drainage water is not discharged to the weigh hoppers. Each bin shall be drawn down at least once per week and any accumulations of mud or silt removed.

Cement and aggregate shall be batched by weight. Water may be measured by weight or volume.

The weighing and water dispensing mechanisms shall be maintained in good order. Their accuracy shall be maintained within the tolerances described in SRN 118 and checked against accurate weighs and volumes when required by the Engineer.

The weighs of cement and of each size of aggregate as indicated by the mechanisms employed shall be within a tolerance of plus or minus two percent of the respective weights per batch agreed by the Engineer.

The Contractor shall provide standard test weights at least equivalent to the maximum working load used on the most heavily loaded scale and other auxiliary equipment required for checking the satisfactory operation of each scale or other measuring device. Tests shall be made by the Contractor at least once a week or at intervals to be determined by the Engineer and shall be carried out in his presence. For the purpose of carrying out these tests, there shall be easy access for personnel to the weigh hoppers. The Contractor shall furnish the Engineer with copies of the complete results of all check tests and shall make any adjustments, repairs or replacements necessary to ensure satisfactory performance.

The nominal drum or pan capacity of the mixer shall not be exceeded. The turning speed and the mixing time shall be as recommended by the manufacturer, but in addition, when water is the last ingredient to be added, mixing shall continue for at least one minute after all the water has been added to the drum or pan.

The blades of pan mixers shall be maintained within the tolerances specified by the manufacturer of the mixer and the blades shall be replaced when it is no longer possible to maintain the tolerances by adjustment.

Mixers shall be fitted with an automatic recorder registering the number of batches discharged.

The water to be added to the mix shall be reduced by the amount of free water contained in the coarse and fine aggregates. This amount shall be determined by the Contractor by a method agreed by the Engineer immediately before mixing begins each day and thereafter at least once per hour during concreting and for each delivery of aggregates during concreting. When the correct quantity of water,

determined as set out in the Specification, has been added to the mix, no further water shall be added, either during mixing or subsequently.

After mixing for the required time, each batch shall be discharged completely from the mixer before any materials for the succeeding batch are introduced.

Mixers which have been out of use for more than 30 minutes shall be thoroughly cleaned before any fresh concrete is mixed and thereafter the first batch of concrete through the mixers shall contain only half the normal quantity of coarse aggregate. This batch shall be mixed for one minute longer than the time applicable to a normal batch.
Mixers shall be cleaned out before changing to another type of cement.

303. HAND-MIXED CONCRETE

Concrete for structural purposes shall not be mixed by hand. Where non-structural concrete is required, hand mixing may be carried out subject to the agreement of the Engineer.

The mixing shall be done on a hard impermeable surface. The materials shall be turned over not less than three times dry, water shall then be sprayed on and the materials again turned over not less than three times in a wet condition and worked together until a mixture of uniform consistency is obtained.

For hand mixed concrete the specified quantities of cement shall be increased by 10% and not more than 0.5 cubic metre shall be mixed at one time. During windy weather efficient precautions shall be taken to prevent cement from being blown away during the process of gauging and mixing.

304. TRANSPORT OF CONCRETE

The concrete shall be discharged from the mixer and transported to the Works by means which shall prevent adulteration, segregation or loss of ingredients, and which shall ensure that the concrete is of the required workability at the point and time of placing. The loss of slump between discharge from the mixer and placing shall not exceed 25mm. The mixed concrete shall be transported using agitator trucks or transit truck mixers. The agitating speed of the drum shall be between 2 and 4 rpm. The interval between feeding of water into the mixer drum and final discharging of the concrete shall not exceed one hour.

The time elapsed between mixing and placing a batch of concrete shall be as short as practicable and in any case not longer than will permit completion of placing and compaction before the onset of initial set. If the placing of any batch of concrete is delayed beyond this period, the concrete shall not be placed in the Works.

305. PLACING OF CONCRETE

a) Consent for Placing

Concrete shall not be placed in any part of the Works until the Engineer's consent has been given in writing, and the Contractor shall give the Engineer at least 1 full working day's notice of his intention to place concrete.

If concrete placing is not commenced within 24 hours of the Engineer's consent the Contractor shall again request consent as specified above.

b) Preparation of Surface to Receive Concrete

Excavated surfaces on which concrete is to be deposited shall be prepared as set out in Section 3 of this Specification.

Existing concrete surfaces shall be prepared as set out in Clause 414. Before deposition of further concrete they shall be clean, hard and sound and shall be wet but without any free-standing water.

Any flow of water into an excavation shall be diverted through proper side drains to a sump, or be removed by other suitable methods which will prevent washing away the freshly deposited concrete or any of its constituents. Any underdrains constructed for this purpose shall be completely grouted up when they are no longer required by a method agreed by the Engineer.

Unless otherwise instructed by the Engineer surfaces against which concrete is to be placed shall receive a prior coating of mortar mixed in the proportions similar to those of the fines portion in the concrete to be placed. The mortar shall be kept ahead of the concrete. The mortar shall be well worked into all parts of the excavated surface and shall not be less than 5mm thick.

If any fissures have been cleaned out as described in Section 3 of this Specification they shall be filled with mortar or with concrete as instructed by the Engineer.

The amount of mortar placed at any one time shall be limited so that it does not dry out or set before being covered with concrete.

c) Chutes

In general, transportation of concrete by the use of chutes will not be permitted unless approved by the Engineer. The chute shall have a section with round corners and shall have a proper fixed slope so as to allow the concrete to flow satisfactorily and without segregation. The lower end of chute shall be provided with a drop chute not less than 0.6m in height to avoid segregation of falling concrete. The height of drop shall not exceed 1.5m. Chutes shall be protected from direct sunlight, wind and rain.

d) Concrete Pump or Placer

The type and capacity of pump shall be determined to meet the specified requirements, taking into account the placing speed, construction schedule, quality of concrete, location to which concrete is poured, etc. Diameter of the delivery pipes shall be not smaller than 3 times of the maximum size of aggregates to be used in the concrete.

Delivery pipes shall be so installed as to permit easy removal. Before starting the pump or placer operation, about one cubic metre of mortar with the same proportion of water, admixture, cement and fine aggregate as

designated for the regular concrete mix shall be passed through the pipe. The pipe shall be set as straight and horizontally as possible to prevent clogging of the concrete mix in the pipe. The supports of the pipe line shall be stiff enough to fix the pipes firmly without adverse effect on forms and reinforcing steel already set in position. Care shall be taken to prevent leakage of the concrete mix from the pipe line or any other part.

Air boosters shall not be used except in conditions where the outlet of the pipe is completely embedded at least 2 metres in fresh concrete.

e) Placing Procedures

The concrete shall be deposited as nearly as possible in its final position. It shall be placed so as to avoid segregation of the concrete and displacement of the reinforcement, other embedded items, or formwork. It shall be brought up in layers approximately parallel to the construction joint planes and not exceeding 500mm in compacted thickness unless otherwise permitted or directed by the Engineer, but the layers shall not be thinner than four times the maximum nominal size of aggregate.

Layers shall be placed so that they do not form feather edges nor shall they be placed on a previous layer which has taken its initial set. In order to comply with this requirement, a layer may be started before completion of the preceeding layer.

All the concrete in a single bay or pour shall be placed in a continuous operation. It shall be carefully worked round all obstructions, irregularities in the foundations and the like so that all parts are completely full of compacted concrete with no segregation or honeycombing. It shall also be carefully worked round and between waterstops, reinforcement, embedded steelwork and similar items which protrude above the surface of the completed pour.

All work shall be completed on each batch of concrete before its initial set commences and thereafter the concrete shall not be disturbed before it has set hard. No concrete that has partially hardened during transit shall be used in the Works and the transport of concrete from the mixer to the point of placing shall be such that this requirement can be complied with.

Concrete shall not be placed during rain which is sufficiently heavy or prolonged as to wash mortar from coarse aggregate on the exposed faces of fresh concrete. Means shall be provided to remove any water accumulating on the surface of the placed concrete. Concrete shall not be deposited into such accumulation of water.

In drying weather, covers shall be provided for all fresh concrete surfaces which are not being worked on. Water shall not be added to concrete for any reason.

When concrete is discharged above its place of final deposition, segregation shall be prevented by the use of chutes, downpipes, trunking, baffles or other appropriate devices, as approved by the Engineer.

Forms for walls, columns and other thin sections of significant height shall be provided with openings or other devices that will permit the concrete to be placed in a manner that will prevent segregation and accumulations of hardened concrete on the formwork or reinforcement above the level of the placed concrete.

When it is necessary to place concrete under water the Contractor shall submit to the Engineer his proposals for the method and equipment to be employed. The concrete shall be deposited either by bottom-discharging watertight containers or through funnel-shaped tremies which are kept continuously full with concrete up to level above the water and which shall have the discharging bottom fitted with a trapdoor and immersed in the concrete in order to reduce to a minimum the

contact of the concrete with the water. Special care shall be taken to avoid segregation.

If the level of concrete in a tremie pipe is allowed to fall to such an extent that water enters the pipe, the latter shall be removed from the pour and filled with concrete before being again lowered into the placing position. During and after concreting under water, pumping or dewatering in the immediate vicinity shall be suspended if there is any danger that such work will disturb the freshly placed concrete.

f) Interruptions to Placing

If concrete placing is interrupted for any reason and the duration of the interruption cannot be forecast or is likely to be prolonged, the Contractor shall immediately take the necessary action to form a construction joint so as to eliminate as far as possible feather edges and sloping top surfaces and shall thoroughly compact the concrete already placed in accordance with Clause 406. All work on the concrete shall be completed while it is still plastic and it shall not thereafter be disturbed until it is hard enough to resist damage. Plant and materials to comply with this requirement shall be readily available at all times during concrete placing.

Before concreting is resumed after such an interruption the Contractor shall cut out and remove all damaged or uncompacted concrete, feather edges or any other undesirable features and shall leave a clean sound surface against which the fresh concrete may be placed.

If it becomes possible to resume concrete placing without contravening the Specification and the Engineer consents to a resumption, the new concrete shall be thoroughly worked in and compacted against the existing concrete so as to eliminate any cold joints.

g) Dimensions of Pours

Unless otherwise agreed by the Engineer, pours shall not be more than two metres high and shall as far as possible have a uniform thickness over the plan area of the pour. Concrete shall be placed to the full planned height of all pours except in the circumstances described in sub-clause 405(d).

The Contractor shall plan the dimensions and sequence of pours in such a way that cracking of the concrete does not take place due to thermal or shrinkage stresses.

h) Placing Sequence

The Contractor shall arrange that as far as possible the intervals between placing successive lifts of concrete in one section of the Works are of equal duration. This duration shall normally be not less than three or more than seven days under temperate weather conditions unless otherwise agreed by the Engineer.

Where required by the Engineer to limit the opening of construction joints due to shrinkage, concrete shall not be placed against adjacent concrete which is less than 21 days old.

When the drawings call for contraction gaps in concrete, these shall be of the widths and in the locations shown on the drawings and they shall not be filled until the full time interval shown on the drawings has elapsed.

306. COMPACTION OF CONCRETE

The concrete shall be fully compacted throughout the full extent of the placed layer. It shall be thoroughly worked against the formwork and around any reinforcement and other embedded items, without displacing them. Particular care shall be taken at arises and other confined spaces. Successive layers of the same pour shall be thoroughly worked together.

Concrete shall be compacted with the assistance of mechanical immersion vibrators, unless the Engineer agrees to another method.

Immersion vibrators shall operate at a frequency of between 7,000 and 10,000 cycles per minute. The Contractor shall ensure that vibrators are operated at pressures and voltages not less than those recommended by the manufacturer in order 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, standby vibrators shall be available for instant use at each place where concrete is being placed.

Where the concrete contains aggregate with a nominal size of 75mm or more, vibrators with a diameter of 100mm or more shall be used.

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. Vibrators shall not be used to move concrete laterally and shall be withdrawn slowly to prevent the formation of voids.

Vibration shall not be applied by way of reinforcement nor shall vibrators be allowed to touch reinforcement or other embedded items. The vibrators shall be inserted vertically into the concrete to penetrate the layer underneath at regular spacing. The spacing shall not exceed the distance from the vibrator over which vibration is visibly effective.

307. CURING OF CONCRETE

a) General

Concrete shall be protected during the first stage of hardening from loss of moisture and from the development of temperature differentials within the concrete sufficient to cause cracking. The methods used for curing shall not cause damage of any kind to the concrete.

Curing shall be continued for as long as may be necessary to achieve the above objectives but in any case for at least seven days or until the concrete is covered by later construction whichever is the shorter period.

The above objectives are dealt with in sub-clause 407(b) and (c) but nothing shall prevent both objectives being achieved by a single method where circumstances permit.
The curing process shall commence as soon as the concrete is hard enough to resist damage from the process, and in the case of large areas or continuous pours, shall commence on the completed section of the pour before the rest of the pour is finished.
Details of the Contractor's proposals for curing concrete shall be submitted to the Engineer before the placing of concrete commences in the Works.

Formed surfaces may be cured by retaining the formwork in place for the required curing period.

If the use of the foregoing methods is inappropriate, surfaces which will not have further concrete bonded to them and which are not to receive an application of a finish may be cured by the application of a curing compound having an efficiency index of at least 90 percent. Curing compounds shall contain a fugitive dye to enable the extent of the spread to be seen easily.

Curing compound is used on surfaces exposed to the atmosphere shall contain sufficient finely divided flake aluminium in suspension to produce a complete coverage of the surface with a metallic finish when applied at the rate recommended by the manufacturer.

Curing compounds shall become stable and impervious to the evaporation of water from the concrete surface within 60 minutes of application. The material shall not react chemically with the concrete surfaces for at least the first four days of the curing period.

If instructed by the Engineer, the Contractor shall, in addition to the curing provisions set out above provide a suitable form of shading to prevent the direct rays of the sun reaching the concrete surfaces for at least the first four days of the curing period.

b) Loss of Moisture

Exposed concrete surfaces shall be closely covered with impermeable sheeting, properly secured to prevent its removal by wind and the development of air spaces beneath it. Joints in the sheeting shall be lapped by at least 300mm.

If for some reason it is not possible to use impermeable sheeting, the Contractor shall keep the exposed surfaces continuously wet by means of a water spray or by covering with a water absorbent material which is kept wet, unless this method conflicts with sub-clause 407(c).

Water used for curing shall be of the same quality as that used for concrete mixing as stated in Clause 724 g).

c) Limitation of Temperature Differential

The Contractor shall limit the development of temperature differentials in concrete after placing by any means appropriate to the circumstances including the following:

i) limiting concrete temperatures at placing as set out in sub-clause 409(b);

ii) use of low heat cement, subject to the agreement of the Engineer;

iii) insulation of exposed concrete surface by insulating blankets. Such blankets shall have an insulation value at least equivalent to 50mm of dry mineral wool;

iv) leaving formwork in place during the curing period. Steel forms shall be suitably insulated on the outside;

v) preventing rapid dissipation of heat from surfaces by shielding from wind;

vi) avoiding the use of water sprays when such use would cause rapid cooling of the surface.

308. PROTECTION OF FRESH CONCRETE

Freshly placed concrete shall be protected from rainfall and from water running over the surface until it is sufficiently hard to resist damage from these causes.

No traffic shall be allowed on any concrete surface until such time as it is hard enough to resist damage by such traffic.

Concrete placed in the Works shall not be subjected to any loading until it has attained at least its nominal strength as defined in Clause 401.

If the Contractor desires to impose loads on newly-placed concrete, he shall make at least three test cubes and cure them in the same conditions as the concrete they represent. These cubes shall be tested singly at suitable intervals in order to estimate the time at which the nominal strength is reached.

309. CONCRETING IN HOT WEATHER

a) General

The Contractor shall prevent damage to concrete arising from exposure to extreme temperatures, and shall maintain in good working order all plant and equipment required for this purpose.

In the event that conditions become such that even with the use of the equipment the requirements cannot be met, concrete placing shall immediately cease until such time as the requirements can again be met.

b) Concrete Placing in Hot Weather

During hot weather the Contractor shall take all measures necessary to ensure that the temperature of concrete at the time of placing in the Works does not exceed 30 degrees centigrade and that the concrete does not loose any moisture during transporting and placing.

Such measures may include but are not necessarily limited to the following:-

i) Shielding aggregates from direct sunshine.

ii) Use of a mist water spray on aggregates

iii) Sun shields on mixing plants and transporting equipment.

iv) Cooling the mixing water. If ice is used for this purpose it should preferably be in flake form. Lump ice shall not be allowed to enter the tank supplying the mixer drum.

v) Covering skips closely with polythene sheet so that the latter is in contact with the concrete.

Areas in which concrete is to be placed shall be shielded from direct sunshine and rock or concrete surfaces shall be thoroughly wetted to reduce absorption of water from the concrete placed on or against them.

After concrete in any part of an area has been placed, the selected curing process shall be commenced as soon as possible. If any interval occurs between completion of placing and start of curing, the concrete shall be closely covered during the interval with polythene sheet to prevent loss of moisture.

310. FINISHES ON UNFORMED SURFACES

Horizontal or nearly horizontal surfaces which are not cast against formwork shall be finished to the class shown on the drawings and defined hereunder.

UF 1 Finish

All surfaces on which no higher class of finish is called for on the drawings or instructed by the Engineer shall be given a UF 1 finish.

The concrete shall be levelled and screeded to produce a uniform plain or ridged surface, surplus concrete being struck off by a straight edge immediately after compaction.

UF 2 Finish

This is a floated finish for roof or floor slabs and other surfaces where a hard trowelled surface is not required.

The surface shall first be treated as a Class UF 1 finish and after the concrete has hardened sufficiently, it shall be floated by hand or machine sufficiently only to produce a uniform surface free from screed marks.

UF 3 Finish

This is a hard trowelled surface for use where weather resistance or appearance is important, or which is subject to high velocity water flow.

The surface shall be floated as for a UF 2 finish but to the tolerance stated below. When the moisture film has disappeared and the concrete has hardened sufficiently to prevent laitance from being worked to the surface, it shall be steel trowelled under firm pressure to produce a dense, smooth uniform surface free from trowel marks.

Table 4.4 - SURFACE TOLERANCES

Class of Finish	Tolerance in mm. See notes		
	A	B	C
UF 1	N/A	10	+ 20 or - 10
UF 2	Nil	10	+ 20 or - 10
UF 3	Nil	5	+ 12.5 or -7.5

Notes:

1. Col. A is the maximum allowable value of any sudden change of level in the surface.

2. Col. B is the maximum allowable value of any gradual irregularity of the surface, as indicated by the gap between the surface and a three metre long straight edge or correctly shaped template placed on the surface.

3. Col. C is the maximum allowable value of the difference in level or position between a three metre long straight edge or correctly shaped template placed on the surface and the specified level or position of that surface.

Where dimensional tolerances are given on the drawings or in this Special Specification they shall take precedence over those given in Table 4.4.

311. MORTAR

This clause covers mortar for use ahead of concrete placing, and other uses not covered elsewhere in the Specification.

Mortar shall be composed of fine aggregate complying with Clause 724 c) and ordinary Portland cement complying with SRN 103. The mix proportions shall be as stated on the drawings or elsewhere in this Specification or if not stated shall be one part of cement to two parts of fine aggregate by weight.

Small quantities of mortar may be hand mixed but for amounts over 0.5 cubic metre a mechanical mixer shall be used.

The water content of the mortar shall be as low as possible consistent with the use for which it is required but in any case the water/cement ratio shall not be more than 0.5.

Mortar which is specified as 'dry pack' shall be mixed with sufficient water for the mix to become cohesive but not plastic when squeezed in the hand. Dry pack mortar shall be rammed into the cavity it is required to fill, using a hand rammer with sufficient force to ensure full compaction.

312. CONCRETE FOR SECONDARY PURPOSES

a) Non-structural concrete (NS concrete) shall be used only for non-structural purposes where shown on the drawings.

NS concrete shall be composed of ordinary Portland cement complying with SRN 103 and aggregates complying with SRN 108-111 including all-in aggregate within the grading limits of SRN 109 and SRN 111.
The weight of cement mixed with 0.3 cubic metres of combined or all-in aggregate shall not be less than 50 kg. The mix shall be proportioned by weight or by volume. The maximum aggregate size shall be 40mm nominal.

The concrete shall be mixed by machine or by hand to a uniform colour and consistency before placing. The quantity of water used shall not exceed that required to produce a concrete with sufficient workability to be placed and compacted where required.

The concrete shall be compacted by hand or by mechanical vibration.

b) No Fines concrete (NF concrete) is intended for use where a porous concrete is required and shall only be used where shown on the drawings or instructed by the Engineer.

The mix shall consist of ordinary Portland cement complying with SRN 115. The aggregate size shall be 40mm to 10mm only. The weight of cement mixed with 0.3 cubic metre of aggregate shall not be less than 50 kg. The quantity of water shall not exceed that required to produce a smooth cement paste which will coat evenly the whole of the aggregate.

313. RECORDS OF CONCRETE PLACING

Records, in a form agreed by the Engineer, shall be kept by the Contractor of the details of every pour of concrete placed in the Works. These records shall include class of concrete, location of pour, date of pour, ambient temperature and weather conditions during mixing and placing and concrete temperature at time of placing, moisture contents of aggregates, details of mixes, batch numbers, cement batch number, results of all tests undertaken, location of test cube sample points and details of any cores taken.

The Contractor shall supply to the Engineer four copies of these records each week covering work carried out the preceeding week. In addition he shall supply to the Engineer monthly histograms of all 28 day cube strengths together with accumulative and monthly standard deviations and any other information which the Engineer may require concerning the concrete placed in the works.

314. CONSTRUCTION JOINTS

Whenever concrete is to be bonded to other concrete which has hardened, the surface of contact between the sections shall be deemed a construction joint.

Where construction joints are shown on the drawings, the Contractor shall form such joints in those positions. The location of joints which the Contractor requires to make for the purpose of construction shall be subject to the agreement of the Engineer. Construction joints shall be in vertical or horizontal planes except in sloping slabs where they shall be normal to the exposed surface or elsewhere where the drawings require a different arrangement.

Construction joints shall be so arranged as to reduce to a minimum the effects of shrinkage in the concrete after placing, and shall be placed in the most advantageous positions with regard to stresses in the structures and the desirability of staggering joints.

Feather edges of concrete at joint shall be avoided and any feather edges which may have formed where reinforcing bars project through a joint shall be cut back until sound concrete has been reached.

The intersection of horizontal or near horizontal joints and exposed faces of concrete shall appear as straight lines produced by use of a guide strip fixed to the formwork at the top of the concrete lift, or by other means acceptable to the Engineer.

Construction joints formed as free surfaces shall not exceed a slope of 20 per cent from the horizontal.

The surface of the fresh concrete in horizontal or near horizontal joints shall be thoroughly cleaned and roughened by means of high pressure water and air jets when the concrete is hard enough to withstand the treatment without the leaching of cement. The surface of vertical or near vertical joints shall be similarly treated if circumstances permit the removal of formwork at a suitable time.

Where concrete has become too hard for the above treatment to be successful, the surface whether formed or free is to be thoroughly scrabbled by mechanical means or wet sand blasted and then washed with clean water. The indentations produced by scrabbling shall be not less than 10mm deep and shall not extend closer than 40mm to a finished face.

If instructed by the Engineer the surface of the concrete shall be thoroughly brushed with a thin layer of mortar composed of one part of cement to two parts of sand by weight and complying with Clause 411 all as set out in sub-clause 405(b) immediately prior to the deposition of fresh concrete. The mortar shall be kept just ahead of the fresh concrete being placed and the fresh layer of concrete shall be thoroughly and systematically vibrated to full depth to ensure complete bond with the adjacent layer.

No mortar or concrete may be placed in position on or against a construction joint until the joint has been inspected and passed by the Engineer.

315. EXPANSION AND CONTRACTION JOINTS

Expansion and contraction joints are discontinuities in concrete designed to allow thermal or other movements in the concrete.

Expansion joints are formed with a gap between the concrete faces to permit subsequent expansion of the concrete. Contraction joints are formed to permit initial contraction of the concrete and may include provision for subsequent filling.

Expansion and contraction joints shall be formed in the positions and in accordance with the details shown on the drawings or elsewhere in the Specifications.

316. WATERSTOPS

All references to waterstops include grout stops.

Waterstops shall be of the material and form shown on the drawings. No waterstop material shall be brought on the site until the Contractor has submitted full details of the materials he proposes to use, including samples, and these have been tested and approved by the Engineer. All samples shall be of adequate length for testing. Waterstops shall be made of materials which are resistant to chlorides, sulphates, or other deleterious substances which may be present in the environment of the Works.

Rubber waterstops may be of natural rubber and shall have an elongation at breaking stress of at least 500 percent at 25 degrees centigrade and shall allow a joint movement of at least 50mm.

Polyvinyl chloride (PVC) waterstops shall be extruded from an unfilled plasticised PVC polymer or copolymer which does not contain any reclaimed or scrap PVC. PVC waterstops shall have an elongation at breaking stress of at least 225 percent at 25 degrees centigrade and shall allow a joint movement of at least 10mm.

Low modulus waterstops shall be of rubber or PVC as described above but shall have an elongation of at least 200 percent at 25 degrees centigrade under a tensile stress of 6 N/mm^2 and shall allow a joint movement of at least 50mm.

Waterstops shall be supplied in lengths as long as possible consistent with ease of handling and construction requirements.

In rubber or plastic materials, joints other than butt joints shall be supplied ready made by the manufacturer. Butt joints shall be made on site in accordance with the manufacturer's instructions and with equipment supplied for the purpose by the manufacturer.

Waterstop material shall be stored carefully on site to avoid damage and contamination with oil, grease, or other pollutants. Rubber and plastic waterstops shall be stored in cool well ventilated places away from direct sunlight.

Rubber and plastic waterstops which are embedded in one side of a joint more than one month before the scheduled date of placing concrete on the other side, shall be protected from the sun.

Waterstops shall be firmly fixed in the formwork so that they cannot be displaced during concrete placing and shall be completely free of all dirt, grease, oil, etc.,

before placing concrete. Where eyelets are provided these shall be fully wired to the reinforcement and be the only means whereby the waterstop is fixed. In no circumstances shall a waterstop be punctured with nails etc. as a means of fixing.

Concrete shall be placed carefully round waterstops so as to avoid distortion or displacement and shall be fully compacted. Where waterstops lie in a horizontal or nearly horizontal plane the Contractor shall ensure that no voids are left on the underside of the waterstop.

Formwork around waterstops shall be carefully removed to avoid damage. If waterstops suffer any damage which cannot be properly repaired in-situ the Engineer may require a section of concrete to be removed and the waterstop replaced.

317. GROUTING OF POCKETS AND HOLES AND UNDERPINNING OF BASEPLATES

Pockets and holding-down bolt holes shall be thoroughly cleaned out using compressed air and water jet. Holes drilled by a diamond bit shall be roughened. The pockets and holes shall be filled with grout consisting of cement and clean fresh water mixed in proportion of two parts by weight of cement to one part by weight of water. The pouring of liquid grout shall cease as soon as each hole is filled and any excess grout on the surface of the concrete foundation shall be completely removed and the surface dried off before the next operation proceeds.

The space between the top surface of foundation concrete and the underside of the baseplates shall be filled with a special mortar made up in the following proportions:-

- Portland Cement ..... 50 kg.
- Fine aggregate ..... 50 kg.
- An additive acceptable to the Engineer to counteract shrinkage in proportions recommended by the manufacturer.

The special mortar shall be mixed with the lowest water-cement ratio which will result in a consistency of mix of sufficient workability to enable maximum compaction to be achieved.

The special mortar shall then be well rammed in horizontally below the baseplate and from one edge only until it is extruded from the other three sides. The mortar which has extruded shall then be rammed back to ensure complete support without voids.

318. REMEDIAL WORK TO DEFECTIVE SURFACES

If on stripping any formwork the concrete surface is found to be defective in any way, the Contractor shall make no attempt to remedy such defects prior to the Engineer's inspection and the receipt of any instructions which the Engineer may give.

Defective surfaces shall not be made good by plastering.

Areas of honey combing (of a mild nature) which the Engineer agrees may be repaired shall be cut back to sound concrete or to 75mm whichever is the greater distance. In the case of reinforced concrete the area shall be cut back to at least

25mm clear distance behind the reinforcement or to 75mm, whichever is the greater distance. The cavity shall have sides at right angles to the face of the concrete. After cleaning out with water and compressed air, a thin layer of cement grout shall be brushed on to the concrete surface in the cavity and it shall then be filled immediately with concrete of the same class as the main body but with aggregate larger than 20mm nominal size removed. A form shall be used against the cavity, provided with a lip to enable concrete to be placed. The form shall be filled to a point above the top edge of the cavity.

After seven days the lip of concrete shall be broken off and the surface ground smooth.

Surface irregularities which are outside the limits of tolerance set out in Clause 410 shall be ground down in the manner and to the extent instructed by the Engineer.

Severe honeycombing and defects other than those mentioned above shall be dealt with as instructed by the Engineer.

319. BENDING REINFORCEMENT

Unless otherwise shown on the drawings, bending and cutting shall comply with SRN 129.
The Contractor shall satisfy himself as to the accuracy of any bar bending schedules supplied and shall be responsible for cutting, bending, and fixing the reinforcement in accordance with the drawings. Any discrepancies should be brought to the attention of the Engineer prior to ordering the reinforcement.

Bars shall be bent cold by the application of slow steady pressure. At temperatures below 5 degrees centigrade the rate of bending shall be reduced if necessary to prevent fracture of the steel.

After bending, bars shall be securely tied together in bundles or groups and legibly labelled as set out in SRN 129.

Reinforcement shall be thoroughly cleaned and all dirt, scale, loose rust, oil and other contaminants removed before it is placed in the Works.

320. FIXING REINFORCEMENT

Reinforcement shall be securely fixed in position within a dimensional tolerance of 20mm in any direction parallel to a concrete face and within a tolerance of 5mm at right angles to a face, provided that the cover is not thereby decreased below the minimum shown on the drawings, or if not shown shall be not less than 25mm or the diameter of the bar, whichever is the greater. Cover on distribution steel shall not be less than 15mm or the diameter of the bar whichever is the greater.

Unless otherwise agreed by the Engineer, all intersecting bars shall either be tied together with 1.6mm diameter soft annealed iron wire and the ends of the wire turned into the body of the concrete, or shall be secured with a wire clip of a type agreed by the Engineer.

Spacer blocks shall be used for ensuring that the correct cover is maintained on the reinforcement. Blocks shall be as small as practicable and of a shape agreed by the Engineer. They shall be made of mortar mixed in the proportions of one part of

cement to two parts of sand. Wires cast into the block for tying in to the reinforcement shall be 1.6mm diameter soft annealed iron.

Alternatively another type of spacer block may be used subject to the Engineer's agreement.
Reinforcement shall be rigidly fixed so that no movement can occur during concrete placing. Any fixings made to the formwork shall not be within the space to be occupied by the concrete currently being placed.

No splices (laps) shall be made in the reinforcement except where shown on the drawings or agreed by the Engineer. Splice lengths shall be as shown on the drawings.

Reinforcement shall not be welded except where required by the Contract or agreed by the Engineer. If welding is employed, the procedures shall be as set out in SRN 937 for gas welding or SRN 919 for metal arc welding. Full strength butt welds shall only be used for steel complying with SRN 126, and if used on high yield deformed bars complying with SRN 126 the permissible stresses in the vicinity of the weld shall be reduced to those applicable to plain bars complying with that Specification.

Mechanical splices shall not be used unless the Engineer agrees otherwise.

The Contractor shall ensure that reinforcement left exposed in the Works shall not suffer distortion, displacement or other damage. When it is necessary to bend protruding reinforcement aside temporarily, the radius of the bend shall not be less than four times the bar diameter for mild steel bars or six times the bar diameter for high yield bars. Such bends shall be carefully straightened before concrete placing continues, without leaving residual links or damaging the concrete around them. In no circumstances will heating and bending of high yield bars be permitted.

Bars complying with SRN 127 or other high tensile bars shall not be bent after placing in the Works.

Before concrete is placed in any section of the Works which includes reinforcement, the reinforcement shall be completely clean and free from all contamination including concrete which may have been deposited on it from previous operations.

The Engineer's approval for concrete placing is to be sought in writing for each pour, leaving adequate time to inspect and rectify any defects noted in the formwork, falsework, reinforcement, scaffolding, concreting arrangements, etc.

4. FORMWORK

401. FORMWORK FOR CONCRETE

Definitions

Formwork means the surface against which concrete is placed to form a face, together with all the immediate supports to retain it in position while concrete is placed.

Falsework means the structural elements supporting both the formwork and the concrete until the concrete becomes self supporting.

A formed face is one which has been cast against formwork.

An exposed face is one which will remain visible when construction has been completed.

402. CONSTRUCTION OF FORMWORK AND FALSEWORK

Before construction begins, the Contractor shall submit to the Engineer, drawings showing details of the proposed formwork and falsework.

Formwork and falsework shall be so constructed that they will support the loads imposed on them by the fresh concrete together with additional stresses imposed by vibrating equipment and by construction traffic, so that after the concrete has hardened the formed faces shall be in the positions shown on the drawings within the tolerances set out in Clause 506.

Ground supports shall be properly founded on footings designed to prevent settlement.

Joints in formwork for exposed faces shall, unless otherwise specified, be evenly spaced and horizontal or vertical and shall be continuous or form a regular pattern.

All joints in formwork including formwork for construction joints shall be tight against the escape of cement, water and fines. Where reinforcement projects through formwork, the form shall fit closely round the bars.

Formwork shall be so designed that it may be easily removed from the work without damage to the faces of the concrete. It shall also incorporate provisions for making minor adjustments in position if required, to ensure the correct location of concrete faces. Due allowance shall be made in the position of all formwork for movement and settlement under the weight of fresh concrete.

Where overhangs in formwork occur, means shall be provided to permit the escape of air and to ensure that the space is filled completely with fully compacted concrete.

Formwork shall be provided for concrete surfaces at slopes of 30 degrees to the horizontal or steeper. Surfaces at slopes less than 20 degrees may be formed by

screeding. Surfaces at slopes between 20 degrees and 30 degrees shall generally be formed unless the Contractor can demonstrate to the satisfaction of the Engineer that such slopes can be screeded with the use of special screed boards to hold the concrete in place during vibration.

Horizontal or inclined formwork to the upper surface of concrete shall be adequately secured against uplift due to the pressure of fresh concrete. Formwork to voids within the body of the concrete shall also be tied down or otherwise secured against floating.

The internal and external angles on concrete surfaces shall be formed with fillets and chamfers of the sizes shown on the drawings unless otherwise instructed by the Engineer.

Supports for formwork for non-water retaining structures may be bolted to previously placed concrete provided the type of bolt used is acceptable to the Engineer. If metal ties through the concrete are used in conjunction with bolts, the metal left in shall not be closer than 50mm to the face of the concrete.

Supports for formwork for water retaining structures may be bolted to previously placed concrete provided the type of bolts and positions of fixing are acceptable to the Engineer. After concreting the Contractor shall remove all support bolts and seal all holes with well rammed cement/sand mortar containing approved waterproofing cement additive. Metal ties which would be left in the concrete shall not be permitted.

Formwork shall not be re-used after it has suffered damage which in the opinion of the Engineer is sufficient to impair the finished surfaces of the concrete.

Where circumstances prevent easy access within the form for cleaning and inspection, temporary openings for this purpose shall be provided through the formwork.

Shear keys shall be provided in all construction joints of the size and shape indicated on the drawings.

Where precast concrete elements are specified for use as permanent formwork, or proposed by the Contractor and agreed by the Engineer, they shall comply with the requirements of the Specification. Such elements shall be set true to line and level within the tolerances prescribed for the appropriate class of finish in Clause 506 and fixed so that they cannot move when concrete is placed against them.

403. PREPARATION OF FORMWORK

Before any reinforcement is placed into position within formwork, the latter shall be thoroughly cleaned and then dressed with a release agent. The agent shall be either a suitable oil incorporating a wetting agent, an emulsion of water suspended in oil or a low viscosity oil containing chemical agents. The Contractor shall not use an emulsion of oil suspended in water nor any release agent which causes staining or discoloration of the concrete, air holes on the concrete surface, or retards the set of the concrete.

In order to avoid colour difference on adjacent concrete surfaces, only one type of release agent shall be used in any one section of the works.

In cases where it is necessary to fix reinforcement before placing formwork, all surface preparation of formwork shall be carried out before it is placed into position. The Contractor shall not allow reinforcement or prestressing tendons to be contaminated with formwork release agent.

Before placing concrete all dirt, construction debris and other foreign matter shall be removed completely from within the placing area.

Before concrete placing commences, all wedges and other adjusting devices shall be secured against movement during concrete placing and the Contractor shall maintain a watch on the formwork during placing to ensure that no movement occurs.

404. 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 Table 5.1 and apply to ambient temperatures higher than 10 degrees centigrade. At lower temperatures or if cement other than ordinary Portland are involved, the Engineer may instruct that longer periods be used.

Alternatively, formwork may be removed when the concrete has attained the strength set out in Table 5.1, provided that the attained strength is determined by making test cubes and curing them under the same conditions as the concrete to which they refer.

Compliance with these requirements shall not relieve the Contractor of his obligation to delay removal of formwork until the removal can be completed without damage to the concrete.

Table 5.1 - MINIMUM PERIODS FOR FORMWORK REMOVAL

Position of Formwork	Min. period for temp over 10 degrees Centigrade	Strength to be attained
Vertical or near vertical faces of mass concrete	24 hours	0.2 C
Vertical or near vertical faces of reinforced walls, beams and columns	48 hours	0.3 C
Underside of arches, beams and slabs (formwork only)	4 days	0.5 C
Supports to underside of arches, beams and slabs	14 days	C
Arched linings in tunnels and underground works	24 hours	4 N/mm^2

Note: C is the nominal strength for the class of concrete used.

If the Contractor wishes to strip formwork from the underside of arches, beams and slabs before the expiry of the period for supports set out above, it shall be designed so that it can be removed without disturbing the supports. The Contractor shall not remove supports temporarily for the purpose of stripping formwork and subsequently replace them.

As soon as the formwork has been removed, bolt holes in concrete faces other than construction joints which are not required for subsequent operations shall be completely filled with mortar sufficiently dry to prevent any slumping at the face. The mortar shall be mixed in the same proportions as the fine aggregate and cement in the surrounding concrete and with the same materials and shall be finished flush with the face of the concrete.

405. SURFACE FINISHES ON FORMED SURFACES

Classes of Finish

The surface finish to be achieved on formed concrete surfaces shall be as shown on the drawings and defined hereunder:-

a) Class F1 Finish

This finish is for surfaces against which backfill or further concrete will be placed. Formwork may be sawn boards, sheet metal or any other suitable material which will prevent the loss of fine material from the concrete being placed.

b) Class F2 Finish

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 Class F2 finish shall be faced with wrought thicknessed 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.

c) Class F3 Finish

This finish is for surfaces which will be in contact with water flowing at high velocity, and for surfaces prominently exposed to view where good appearance is of special importance. To achieve this finish, which shall be free of board marks, the formwork shall be faced with plywood complying with B.S. 1088 or equivalent material in large sheets. The sheets shall be arranged in an approved pattern. Wherever possible, joints between sheets shall be arranged to coincide with architectural features or changes in direction of the surface.

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. Unfaced wrought boarding or standard steel panels will not be permitted for Class F3 finish. The Contractor shall ensure that the surface is protected from rust marks, spillages and stains of all kinds.

d) Curved Surfaces

For curved surfaces where F2 or F3 finishes are called for, the formwork face shall be built up of splines cut to make a tight surface which shall then be dressed to produce the required finish.

Alternatively, single curvature surfaces may be faced with plastic or plywood linings attached to the backing with adhesive or with escutcheon pins driven flush. Linings shall not bulge, wrinkle or otherwise deform when subjected to temperature and moisture changes.

406. TOLERANCES

All parts of formed concrete surfaces shall be in the positions shown on the drawings within the tolerances set out in Table 5.2.

In cases where the drawings call for tolerances other than those given in Table 5.2 the tolerances shown on the drawings shall take precedence.

Where precast units have been set to a specified tolerance, further adjustments shall be made as necessary to produce a satisfactory straight or curved line. When the Engineer has approved the alignment, the Contractor shall fix the units so that there is no possibility of further movement.

Table 5.2 - TOLERANCES

Class of Finish	Tolerances in mm (See Note)		
	A	B	C
F1	10	10	+ 25 to - 10
F2	5	10	+ or - 15
F3	2	5	+ or - 10

Note: The tolerances A, B and C given in the table are defined as follows:

1. Column A is an abrupt irregularity in the surface due to misaligned formwork or defects in the face of the formwork.

2. Column B is a gradual deviation from a plane surface as indicated by a straight edge 3m long. In the case of curved surfaces the straight edge shall be replaced by a correctly shaped template.

3. Column C is the amount by which the whole or part of a concrete face is displaced from the correct position shown on the drawings.

5. MASONRY

501. GENERAL

All masonry work shall be constructed from building stone as specified in Clause 725.

For culvert headwalls and other small works, the stone shall, unless otherwise specified, be rough dressed. For walls, facing and other exposed works the stone shall unless otherwise specified, be medium chisel-dressed.

502. WORKMANSHIP

The Contractor shall provide and use proper setting out rods for all work.

Stones shall be well soaked before use and the tops of walls shall be kept wet as the work proceeds. The stones 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 perpends, reveals and other angles of the walling shall be built strictly true and square.

The stones shall be bedded, jointed and pointed in mortar 1 to 3 in accordance with Clause 729 with beds and joints 9mm thick flushed up and grouted solid as the work proceeds.

All masonry work shall be cured in accordance with the relevant requirements of Clause 407.

503. CAST STONEWORK

Cast stone shall be as specified in Clause 735. Facing stones shall be brought up in courses to a height not exceeding 1 metre at a time, the concrete backing being then brought up and well incorporated into and round the backs of the stones and the projecting metal ties to ensure a complete bond. The stones shall be bedded and jointed as shown on the drawings.

All materials, moulds, mixing, casting and surface treatment, setting, jointing and pointing, and all centering, scaffolding and labour required to complete the cast stonework specified or as shown on the drawings, shall be included in the rates for such work.

6. MATERIALS

601. GENERAL

The approval in writing or otherwise by the Engineer of any materials shall not in any way whatsoever relieve the Contractor from any liability or obligation under the Contract and no claim by the Contractor on account of the failure, insufficiency or unsuitability of any such materials will be entertained.

a) All items shall be suitable for water works purposes and for use with cold water installation and operation being in a tropical climate.

b) All items hereinafter specified shall be to such other Standard or Specification which in the opinion of the Engineer provides for a quality of material and workmanship not inferior to the Standard Reference Number (SRN) quoted. The Standard or Specification must be submitted to the Engineer for approval before commencement of work.

c) All ferrous pipes and fittings shall be coated with a protective paint suitable for use in and transport through a tropical climate.

d) The Contractor shall supply to the Employer a certificate stating that each item supplied has been subjected to the tests hereinafter laid down and conforms in all respects to the said Specification.

e) The Contractor shall provide adequate protection to all piping, flanged items and valves so as to guard effectively against damage in transit and storage and ingress of foreign matter inside the valves.

f) All pipework and fittings shall be subjected to a works hydrostatic test pressure which shall be not less than twice the maximum operating pressure.

g) The Contractor should exercise diligence to provide the best material.

h) Where applicable the manufacturer's Specification should accompany all offers. The name of the manufacturer must in every case be stated.

j) Where necessary the Contractor shall provide rubber gaskets to comply with SRN 208 and all other bolts, nuts, washers, etc. to undertake jointing at fittings etc.

k) Any articles required under this Contract which are found to be faulty due to a crack, flaw or any other reason or is not in accordance with the Specification stipulated will not be accepted nor will the Employer be liable for any charges in respect of such an article. Where any such rejected article can, in the opinion of the Engineer, be rendered usable, the Contractor may deal with it accordingly and include it in the Contract at a price to be mutually agreed. Straight pipes which have been cut will be accepted at the discretion of the Engineer, provided the length is not less than 4 metres or two thirds of the standard length whichever is the lesser and will be priced pro-rata.

l) Wherever possible, samples of pipes and fittings shall be submitted for approval of the Engineer prior to the Contractor obtaining the total requirements.

602. GALVANISED PIPES AND SPECIALS

All piping shall conform to SRN 823 and SRN 903 for "Medium" Piping. The pipes shall be screwed and socketted, coupled or flanged.

All specials shall be of such dimensions as will mate with the piping supplied. Screw down stopvalves shall conform to SRN 826. Barrel nipples shall conform to SRN 823 and all other specials shall conform to SRN 824.

All pipes supplied shall be certified by the manufacturer to have been tested in accordance with the relevant Standard Specification.

603. DUCTILE IRON AND CAST IRON PIPES AND SPECIALS

All cast iron piping and fittings shall conform to the requirements of SRN 200.

Ductile iron pipes and fittings shall comply with SRN 202. Where required the pipes shall be protected as specified by the manufacturer of the pipes and shall be used as recommended by the manufacturer of the pipe.

Where the requirements include for the supply of flexible couplings the Contractor shall submit for approval by the Engineer full details of the type of joint offered and a full description of the method of jointing prior to arranging for the delivery of goods on site.

All flexible couplings shall be protected from corrosion by wrapping with Denso paste and tape or by some similar approved material.

The quality of metal used for the manufacture of the pipes shall be of good quality grey cast iron and subject to the various quality control tests as specified in the relevant Standards.

All piping and fittings shall be coated internally with cement mortar lining to SRN 211. Cement mortar lining shall not contain any constituents soluble in water nor any ingredient which could impart any taste or odour whatsoever to the water after sterilization and washing out of the mains. External protection to be as specified in SRN 258.

The flanges of straight pipes shall be at right angles to axis of the pipe and the faces of the flanges shall be parallel and machine finished.

The faces of the flanges of fittings shall be at right angles to the directional axis. The bolt holes shall be concentric with the bore and located symmetrically off the centre line.

In flanged pipework the holes in one flange shall be located in line with those in the other.

All flanges shall be drilled to SRN 207, unless otherwise detailed.

The weights of the pipe and fittings shall comply with the Specification in the relevant Standard.

604. STEEL PIPES AND SPECIALS

All piping shall be plain ended unless otherwise specified and suitable for use with flexible mechanical couplings. The grade of steel used shall comply with the requirements of SRN 213.

The pipes shall be welded or seamless and shall conform to SRN 210.

All the pipes shall be internally protected with cement mortar lining in accordance with SRN 212. External protection to be as specified in SRN 241.

All joints shall be of the flexible mechanical type and shall be supplied complete with all bolts, nuts, washers and joint rings as may be required. All metal parts of joints shall be adequately protected with rust-proof paint. The joints shall be protected from corrosion by wrapping with Denso paste and tape or by some similar approved material.

All fittings and specials shall be of such dimensions as will mate up with the piping supplied.

Flanged adaptors shall be pieces suitable for connecting a flanged gate valve etc. to the type of piping supplied and shall be supplied complete with all bolts, nuts, washers and joint rings.

The spigot ends of all Tees shall be suitable for connection to the pipework supplied using the aforementioned flexible mechanical joints. Branches shall be flanged with flanges drilled to NP 16 in accordance with SRN 207, unless otherwise detailed.

All flanges on specials shall conform to NP 16 in accordance with SRN 207, unless otherwise detailed.

All flanged joints shall be protected from corrosion by wrapping with Denso paste and tape or some similar approved material.

605. HIGH DENSITY POLYETHYLENE (HDPE) PIPES

HDPE Pressure Pipes and Fittings shall be manufactured using a pre-compounded blue pigmented PE100 resin, having a Minimum Required Strength (MRS) value of ≥ 10.0 MPa, at a service temperature of 20°C for a minimum design service life of 50 years.

The pipes and fittings shall be manufactured in accordance with EN 12201:2011, ISO 4427 / ISO 4437 or other acceptable International Standard.

The Pipes and Fittings shall comply with the following:

Pipes:	Material:	Polyethylene PE100 (MRS100), density ≥0.95 kg/dm³
	Colour:	**Blue**
		Black with Blue stripes
		Black with Blue outer coextruded layer

Pressure Rating: SDR 17 – PN10
SDR 11 – PN16

Supply Lengths: All pipe sizes up to and including OD 75 mm shall be supplied in coils of 50 or 100 meters. All pipes, OD 90mm and above shall be supplied in straight lengths not exceeding 12metres.

Fittings: Material: Polyethylene PE100 (MRS100), density ≥0.95 kg/dm³
Colour: Black or Blue
Type of Joint: Electrofusion / Spigot type for Butt Fusion / Compression (for sizes 110mm and below)
Pressure Rating: SDR 17 – PN10
SDR 11 – PN16

Diameters: *as per EN 12201-2*

PE 100 (MRS10), σ_{all} = 8.0 MPa			**PN 10.0**		**PN 16.0**	
Outside Diameter (d) (mm)	**Tolerance on OD (mm)**	**Maximum Ovality (mm)**	**SDR 17 Series 8**		**SDR 11 Series 5**	
			Min. WT (mm)	**Tolerance (mm)**	**Min. WT (mm)**	**Tolerance (mm)**
16.0	0.3	1.2	**-**	-	**-**	-
20.0	0.3	1.2	**-**	-	**2.0**	0.3
25.0	0.3	1.2	**-**	-	**2.3**	0.4
32.0	0.3	1.3	**2.0**	0.3	**3.0**	0.4
40.0	0.4	1.4	**2.4**	0.4	**3.7**	0.5
50.0	0.4	1.4	**3.0**	0.4	**4.6**	0.6
63.0	0.4	1.5	**3.8**	0.5	**5.8**	0.7
75.0	0.5	1.6	**4.5**	0.6	**6.8**	0.8
90.0	0.6	1.8	**5.4**	0.7	**8.2**	1.0
110.0	0.7	2.2	**6.6**	0.8	**10.0**	1.1
125.0	0.8	2.5	**7.4**	0.9	**11.4**	1.3
140.0	0.9	2.8	**8.3**	1.0	**12.7**	1.4
160.0	1.0	3.2	**9.5**	1.1	**14.6**	1.6
180.0	1.1	3.6	**10.7**	1.2	**16.4**	1.8
200.0	1.2	4.0	**11.9**	1.3	**18.2**	2.0
225.0	1.4	4.5	**13.4**	1.5	**20.5**	2.2
250.0	1.5	5.0	**14.8**	1.6	**22.7**	2.4
280.0	1.7	9.8	**16.6**	1.8	**25.4**	2.7
315.0	1.9	11.1	**18.7**	2.0	**28.6**	3.0
355.0	2.2	12.5	**21.1**	2.3	**32.2**	3.4
400.0	2.4	14.0	**23.7**	2.5	**36.3**	3.8
450.0	2.7	15.6	**26.7**	2.8	**40.9**	4.2
500.0	3.0	17.5	**29.7**	3.1	**45.4**	4.7
560.0	3.4	19.6	**33.2**	3.5	**50.8**	5.2

PE 100 (MRS10), σ_{all} = 8.0 MPa			PN 10.0		PN 16.0	
Outside Diameter (d) (mm)	Tolerance on OD (mm)	Maximum Ovality (mm)	SDR 17 Series 8		SDR 11 Series 5	
			Min. WT (mm)	Tolerance (mm)	Min. WT (mm)	Tolerance (mm)
630.0	3.8	22.1	**37.4**	3.9	**57.2**	5.9
710.0	6.4	24.9	**42.1**	4.4	**64.5**	6.6
800.0	7.2	28.0	**47.4**	4.9	**72.6**	7.4

Performance Characteristics

The pipes shall have the following basic minimum performance characteristics:

Parameter	Unit	Value
Average Density as per ISO 1183	Gm/cm^3	≥ 0.95
Melt Flow Index MFI 190°C / 50N as per ISO 1133	Gm/10 min.	0.4-0.55
Minimum Tensile Strength	N/mm^2	25
Elongation at Break	%	≥ 600%
E-Modulus (Modulus of Elasticity)	N/mm^2	1200
Minimum Radius of Curvature at 20°C		25 x OD
Linear Coefficient of Thermal Expansion (VDE 0304)	$°K^{-1}$	1.3×10^{-4}

Marking and Identification

Pipes shall be clearly and indelibly marked to show the following:

- Name of Manufacturer / Brand
- Nominal Diameter x Minimum Wall Thickness
- Material Classification (i.e. PE100)
- Standard Dimension Ratio and Pressure Rating (SDR17 PN10 or SDR11 PN16)
- Reference Standard of Manufacture (e.g. EN 12201)
- Date of Manufacture

Transportation, Storage and Laying of Pipes and Fittings

Before transporting HDPE pressure pipes the loading surface of the vehicle must be cleaned and free from projecting nails, screws or other sharp objects. The bottom layer of all pipes must as far as possible be in contact with the loading surface throughout their entire length and not project beyond it. The pipes must be secured from slipping and shall not be pulled over sharp edges when loading and offloading. Pipes shall not be dragged along the ground.

Pipes, fittings and coils shall be stored in such a way that they are completely protected from direct sunlight. When covered, they must be well ventilated to avoid accumulation of heat and resultant deformation. Transparent coverings shall not be used. The storage location shall be flat and shall, for pipes, support the pipes throughout their length. Stones and sharp objects shall not be present. Pipes shall not be stacked to a height exceeding 1m. The pipes must be secured at the sides to prevent them from rolling. Contact with harmful materials shall be avoided. As far as

possible, coils shall be stored in a horizontal position. The area shall be free of stones and sharp objects. If stored upright they must be secured to avoid tilting.

Prior to laying in trench the bed of the trench must provide support throughout the entire length of the pipe. The pipe shall not be laid directly on cohesive, rocky or stoney soil. Such material shall be over excavated to a depth of not less than 0.1m and shall be removed and replaced by non-cohesive soil or a special pipe support. This shall initially be recompacted and then the surface loosened on the day of and prior to laying.

Pipes supplied in coils and of up to 63mm diameter may be unrolled with the coil in the vertical position. For larger diameters an unwinding device shall be used. A turnstile can be used with the coil laid in a horizontal position on it or with the coil mounted vertically on a slow moving lorry. The pipe shall never be removed from a coil in a spiral manner as this may cause kinking. Should kinking nevertheless occur the Contractor shall cut the pipe on either side of the kink, prepare the ends, and then use an approved joint after laying. All costs of dealing with kinking shall be to the Contractor's expense. A minimum bending radii of 35 x the diameter shall be observed.

Joining Methods

A. Butt Fusion: The pipe shall be joined by the butt fusion procedure outlined in ASTM F 2620. All fusion joints shall be made in compliance with the pipe or fitting manufacturer's recommendations. Fusion joints shall be made by qualified fusion technicians.

B. Saddle Fusion: Saddle fusion shall be done in accordance with ASTM F 2620 or TR-41 or the fitting manufacturer's recommendations. Saddle fusion joints shall be made by qualified fusion technicians. Qualification of the fusion technician shall be demonstrated by evidence of fusion training within the past year on the equipment to be utilized on this project. *[Saddle fusion is used to fuse branch saddles, tapping tees, and other HDPE constructs onto the wall of the main pipe]* (ASTM F905).

C. Socket Fusion: Molded socket fusion fittings are only to be used for joining of HDPE pipe from 1/2 inch to 2" in size. Socket fusion shall be done in accordance with ASTM F 2620 or the fitting manufacturer's recommendations. Socket fusion is the process of fusing pipe to pipe, or pipe to fitting by the use of a male and female end that are heated simultaneously, and pressed together so the outside wall of the male end is fused to the inside wall of the female end. Qualification of the fusion technician shall be demonstrated by evidence of socket fusion training within the past year on the equipment to be utilized on this project. [*Socket fusion is not widely used, and the specifier may decide to prohibit its use*]

D. Electrofusion: Electrofusion joining shall be done in accordance with the manufacturers recommended procedure. Other sources of electrofusion joining information are ASTM F 1290. The process of electrofusion requires an electric source, a transformer, commonly called an electrofusion box that has wire leads, a method to read electronically (by laser) or otherwise input the barcode of the fitting, and a fitting that is compatible with the type of electrofusion box

used. The electrofusion box must be capable of reading and storing the input parameters and the fusion results for later download to a record file. Qualification of the fusion technician shall be demonstrated by evidence of electrofusion training within the past year on the equipment to be utilized for this project.

E. Mechanical:

- Mechanical connection of HDPE to auxiliary equipment such as valves, pumps, and fittings shall use mechanical joint adapters and other devices in conformance with AWWA Manual of Practice M55, Chapter 6.
- Mechanical connections on small pipe under 3" are available to connect HDPE pipe to other HDPE pipe, or a fittings, or to a transition to another material. The use of stab-fit style couplings is allowed, along with the use of metallic couplings of brass and other materials. All mechanical and compression fittings shall be recommended by the manufacturer for potable water use. When a compression type or mechanical type of coupling is used, the use of a rigid tubular insert stiffener inside the end of the pipe is recommended.
- Mechanical couplings that wrap around the pipe and act as saddles are made by several manufacturers specifically for HDPE pipe. All such saddles, tapping saddles, couplings, clamps etc. shall be recommended by the manufacturer as being designed for use with HDPE pipe at the pressure class listed in this section.
- Unless specified by the fitting manufacturer, a restraint harness or concrete anchor is recommended with mechanical couplings to prevent pullout.
- Mechanical coupling shall be made by qualified technicians. Qualification of the field technician shall be demonstrated by evidence of mechanical coupling training within the past year. This training shall be on the equipment and pipe components to be utilized for this project.

F. Joint Recording: The critical parameters of each fusion joint, as required by the manufacturer and these specifications, shall be recorded either manually or by an electronic data logging device. All fusion joint data shall be included in the Fusion Technician's joint report.

Testing

A. Hydrostatic leakage testing is recommended and shall comply with ASTM F 2164, ASTM F 1412, AWWA Manual of Practice M55 Chapter 9.

B. If the test section fails this test, the Contractor shall repair or replace all defective materials and/or workmanship at no additional cost to the Owner.

C. Pneumatic (compressed air) leakage testing of HDPE pressure piping is prohibited for safety reasons.

Cleaning and Disinfecting

A. Cleaning and disinfecting of potable water systems shall be in accordance with AWWA C651 and AWWA Manual of Practice M55 Chapter 10.

B. After installation and pressure testing, new water mains should be disinfected

according to AWWA C651.

C. The disinfection chemicals should be limited to less than 12% active chlorine. The duration of the disinfection should not exceed 24 hours.

D. Upon completion, the system should be thoroughly flushed with fresh water, and retested to verify the disinfectant chlorine level has been reduced to potable drinking water concentrations in all service water tubing and branch lateral pipes.

606. GATE VALVES

Gate valves shall comply with the requirements of SRN 501.

The gate valves shall be suitable for use in pipelines and for the operating pressure to a head of 160 metres of water (NP 16).

The gate valves shall be double flanged. The dimensions and drilling of flanges shall be in accordance with SRN 207. Flanges shall be machined flat. Flanges shall be NP 16 complying with SRN 207.

Spindles of the gate valves shall be provided with cast iron caps conforming to the requirements as specified under "Valve Caps" in SRN 501 or handwheels if so specified.

The spindles of the gate valves shall be of the non-rising type and screwed so as to close the valves when rotated in a clockwise direction. The direction of closing shall be clearly cast on the valve cap or handwheel.

The gate valves shall be subject to "Closed End Tests" in accordance with the procedure set out in SRN 501.

The gate valves shall be suitable for opening and closing against an unbalanced head by manual operation.

607. FIRE HYDRANTS

Fire hydrants shall be in accordance with SRN 509. They shall be for installation underground and shall be in accordance with SRN 509.

The spindle shall be provided with a cast iron cap conforming to dimensions under "Spindle Cap" in SRN 501.

The spindle of the fire hydrant shall be of the non-rising type and screwed so as to close the hydrant when rotated in a clockwise direction viewed from above. The direction of closing shall be clearly cast on the valve cap.

The flanged outlet of the outlet bend shall have a Bayonet Joint Outlet for a 63mm standpipe. The outlet of the hydrant shall be of the hooked type with hooks 112mm apart.

The outlet shall have a gun metal standpipe seating and be covered by a loose cast iron cap which shall be attached to the hydrant by means of a chain.

Both flanges shall be 63mm drilled to requirements of SRN 207.

The outlet bends shall be subject to a hydrostatic test in accordance with procedure set out in SRN 509 and shall be water-tight against a test pressure of 1.85 Pa. head of water.

608. AIR VALVES

The Contractor shall provide air valves to suit the site on which the main is located and the maximum water pressure specified. The body and cover of air valves shall comply with SRN 906 and SRN 916.

The body, cover, splash cowl and joint support ring of the air valve shall be of mechanite cast iron with flanges drilled to SRN 207.

The internal screwed isolating valve shall have the valve and seating of gun metal, operating screws of bronze, nuts of gun metal, and glands and cap of mechanite.

The large orifice valve shall have a vulcanite covered ball closing on a moulded dexine seat ring. The bush may be in gun metal.

The double orifice type of air valve shall comprise a small and large orifice unit with common connection to the main and screw down isolating valve to permit inspection of the valve. The spindle of the isolating valve shall be screwed so as to close the valve when rotated in a clockwise direction and be provided with a Spindle Cap to dimensions as specified in SRN 501.

Design of the air valves shall be such that the balls do not blow shut under any working or test conditions when large volumes of air are being released.

609. WATER METERS

All water meters upto 50mm size shall be of the rotary piston positive action type with all moving parts composed of non-corrosive material.

75mm diameter and over meters shall be of the inferential helix full flow type.

The body of the 12mm to 25mm size of meter shall be of brass, the larger sizes in cast iron. The external surface of the brass bodies shall be coated with baked enamel and the cast iron bodies shall be painted to suit.
The working chamber of the rotary type meter shall be made of bronze or similar non-corrosive material and the piston shall be in ebonite or similar material.

The working parts of the Helix type meter shall facilitate removal for repair or replacement without removing the meter body from the pipeline. The working parts shall be inter-changeable and the working chamber so designed as to be full of water under all conditions of flow.

The dial of the meter shall be of the direct reading type registered in cubic metres with suitable lid locking device.

The capacities of the piston type meter shall not be less than the following amounts per month:-

12mm meter	250 cubic metres
18mm meter	350 cubic metres
25mm meter	600 cubic metres
38mm meter	1100 cubic metres
50mm meter	1700 cubic metres

The Helix type meter shall be capable of continuous working with a head loss not exceeding 300mm at the following rates of flow:-

75mm meter	22.5 cu.m./hr
100mm meter	45 cu.m./hr
150mm meter	90 cu.m./hr

All meters shall be accurate to within $\pm$ 2% over the range of the meter upwards from the minimum flows given for each size:-

12mm	23 litres/hour
18mm	28 litres/hour
25mm	32 litres/hour
38mm	110 litres/hour
50mm	190 litres/hour
75mm	2.5 cu.m./hr
100mm	2.8 cu.m./hr
150mm	4.5 cu.m./hr

Meters above 150mm diameter should conform to manufacturer's specifications approved by the Engineer.
The 12mm and 18mm sizes shall be guaranteed to register commencing at 5 litres/hour.

The meters shall be tested to a head of not less than 16 bar.

610. STOP VALVES

All stop valves shall be in accordance with SRN 826. Samples of valves shall be submitted for test and approval to the Engineer.

611. CHECK VALVES (DIRECTIONAL VALVES)

Check valves shall comply with the requirements of SRN 505 with cast iron body and cover, gun metal doors with bronze facing rings and flanged connections in accordance with SRN 207, NP 16.

612. FLANGED JOINTS

All flanges on fittings and pipework where flanged connections are required must comply with the requirements of SRN 207 and drilled to NP 16, unless otherwise specified.

Inspection gaskets for flanged joints shall be rubber reinforced with cotton, 3mm thick and shall be in accordance with SRN 208. Bolts, washers and nuts for flanged joints shall be of mild steel complying with SRN 914.

613. PRESSED STEEL TANKS AND TOWERS

The pressed steel tanks (or similar approved), towers and associated materials and fittings shall comply with SRN 909 and SRN 863.

Detailed drawings of the steel tank should be submitted to the Engineer for approval prior to acceptance.

The pressed steel tank to SRN 909 (B.S. 1564 Type A(2) or similar approved) shall be supplied complete with:-

a) All stays, cleats, bolts, nuts, washers, jointing compound and associated materials and fittings.

b) Connections for inlet, outlet, washout and overflow.

c) Galvanised access ladder 450mm wide.

d) Steel roof cover to fit the tank complete with access manhole and mosquito-proof cowl ventilators.

e) Water level indicator.

Jointing material to the tank to be a non-toxic plastic compound which does not impart taste, colour nor odour to the water.

Connections to the tank shall be welded to the outside of the tank plate and drilled and tapped to suit flanges to SRN 207, NP 16 unless otherwise stated.

The cover to the tank shall be of mild steel cambered for external use and adequately supported by rolled steel or pressed steel bearers or trusses.

The tank tower shall be supplied complete with:-

a) Anchor bolts.

b) Bolts, nuts, washers and associated materials and fittings.

c) Access ladder 450mm wide extending from ground level to the top of the tank. Safety rings shall be at 1.2m centres.

The supports to the tank shall consist of steel joints designed to carry imposed load under each transverse joint and the two ends of the tank.

The columns of the tank shall consist of rolled steel joist sections or similar. Four such columns shall be provided with adequate bracing.

Internal surfaces of the tank shall be painted with approved non-toxic primer and non-toxic bituminous paint.

External surfaces of the tank and tower shall be painted with approved primer and approved bituminous aluminium paint.

614. PAINTS

All priming, undercoating and finishing paints shall be in accordance with SRN 877 or SRN 878 as appropriate.

The painting of all building works shall comprise a special paint recommended for external work while all other paints, plastic emulsion coating etc. are to be of an approved manufacturer. All paints, distempers etc. shall be delivered on site intact in the original drums or tins, and shall be mixed and applied in accordance with the manufacturer's printed directions. The only addition which will be allowed to be made will be liquid thinners, driers etc. supplied by the makers for the purpose.

All surfaces must be thoroughly cleaned down prior to painting and decorating work and no external painting shall be carried out in rainy weather. All paint must be thoroughly well worked on and excess of paint in any coat must be avoided.

All colours will be selected by the Engineer from the standard range of colours.

615. MARKER AND INDICATOR POSTS

Marker posts shall be erected at changes in direction of water mains as directed by the Engineer. Indicator posts shall be erected at valves and other fittings as directed.
Marker and indicator posts shall be embedded in concrete as shown on drawings and shall be vibrated precast reinforced concrete as per dimensions shown on drawings. They should be painted in colours as indicated on the drawings.

616. POLYETHYLENE (PALOTHENE, PEH) PIPES

Polyethylene High Density pipes shall comply with SRN 307 for testing, storage, handling, laying and backfilling. Contractor shall conform to requirement indicated for PVC pipes. Joints shall be required to sustain test pressures similar to which the pipe shall be subjected.

Contractor shall comply with all instructions issued by the manufacturers and shall submit full details of the type, class, dimensions and test pressures of the brass fittings to the Engineer for approval.

617. FILTER MEDIA

The grading of filter media shall be in accordance to the table of gradings shown on drawings.

Filter media must be free from fines which would clog the air spaces, and free from dirt, silt and all foreign matter.

The media shall be delivered in clean vehicles and if stored it shall be placed on a clean and firm surface and if it is liable to be contaminated, protected with sheets. Different sizes of media shall be kept strictly separate.

The uniformity coefficient as indicated in the drawings should be adhered to and Contractor to submit samples and carry out sieve analysis, organic content, friability tests, etc. to the satisfaction of the Engineer. These tests are to be carried out before the media is placed in filters. All costs arising to be borne by the Contractor.

618. 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 must be willing to admit the Engineer or his representatives, 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.

The information regarding the names of the suppliers may be submitted at different times, as may be convenient, but no source of supply shall be changed without the Engineer's prior approval once a supplier, source or material has been approved.

Samples of materials approved will be retained at the Engineer's office until the completion of the contract. Samples may be tested to destruction.

All materials delivered to site must be at least equal in all respects to approved samples, otherwise they shall be rejected. No special payment will be made for compliance with clauses specifying tests etc. to ensure quality control etc. unless specifically itemised in Bills of Quantities.

619. BUILDING STONE

All building stone shall be capable of withstanding when wet a crushing stress of 3.5 N/sq.mm. The source of stone shall be approved by the Engineer and stone supplied therefrom shall be free from magadi, overburden, mudstone, cracks, sandholes, veins, laminations or other imperfections.

The stone shall be chisel dressed into true rectangular blocks, with each surface even and at right angles to all adjoining surfaces, to the size specified. For exposed stonework the maximum permissible variation of any of the specified dimensions shall be 6mm provided that cut stone, supplied as 'rock face' stone may be hammer dressed on one face only, or on one face and one end, if in other respects it conforms with this specification. Stones shorter than 375mm will not be accepted.

Unless the Engineer allows otherwise the Contractor shall at his own expense provide and dress four 100mm cubes of stone for testing.

The stone shall be sound when tested in accordance with SRN 870 except that:-

i) The treatment shall be repeated for 10 cycles only; and
ii) The second criterion of failure shall be amended to allow for a loss of weight of not more than 20% of its original weight.

620. STONE DUST

Stone dust for blinding shall be blacktrap screened to the following grading:-

Passing 10mm sieve	100%
Passing No. 4 sieve	85% - 100%
Passing No. 100 sieve	5% - 25%

621. MURRAM

Murram shall be from an approved source quarried so as to exclude vegetable matter, loam, top soil or clay. The California Bearing Ratio of the murram, as determined for a sample compacted to maximum density (as defined under SRN 601) and allowed to soak in water for four days, shall not be less than 30%. This C.B.R. is a guide to quality only and the compaction in the work will be judged by density.

622. WATER FOR CEMENT TREATED MATERIALS

If water for the works is not available from the Employer's supply the Engineer's approval must be obtained regarding the source of supply and manner of its use. Water to be used with cement or lime shall be free from salt, oil, alkali, organic matter, and other deleterious substances. If the water is required to be tested, this shall be done in accordance with SRN 114: Tests for Water for Making Concrete, all to the cost of the Contractor.

623. CEMENT MORTAR

Cement mortar shall consist of proportions by volume as specified of Portland Cement and natural sand or crushed natural stone or a combination of both as specified in SRN 135 and SRN 136: Building Sands from Natural Sources. The constituent materials shall be accurately gauged and mixed in an approved manner.

Cement mortar shall be made in small quantities only as and when required, and any mortar which has begun to set or which has been mixed for a period of more than one hour shall be rejected.

624. HYDRATED LIME

Hydrated lime shall comply with SRN 801: Building Limes, and shall be of the semi-hydrated type.

625. CALCIUM CHLORIDE

Calcium chloride shall be of good industrial grade, and shall be obtained from an approved source.

626. LIME MORTAR

Lime mortar shall consist of proportions by volume as specified of hydrated lime and naturals and/or crushed natural stone or a combination of both as specified for cement mortar in Clause 729. The constituent materials shall be accurately gauged and mixed in an approved manner.

627. CEMENT-LIME MORTAR

Cement-lime mortar shall consist of Portland Cement, hydrated lime and natural sand or crushed natural stone or a combination of both, as specified for cement mortar in Clause 729. The constituent materials shall be accurately gauged and mixed by volume in an approved manner in the proportions specified.

Cement-lime mortar shall be made only in small quantities as and when required. Any mortar which has begun to set or which has been mixed for a period of more than two hours shall be rejected.

628. CEMENT GROUT

Cement grout shall consist of Portland Cement and water mixed in the proportion of one part by volume of cement and one and a half parts by volume of water. The grout shall be used within one hour of mixing.

629. CAST STONE

Cast stone shall be manufactured by an approved manufacturer to the shapes and dimensions shown on the drawings, and shall conform to the requirements of SRN 871: Cast Stone. It shall have a dense and even surface of the texture and colour detailed on the drawings or required by the Engineer. Where indicated exposed faces of the stone shall be formed of a specially graded mix. Metal bond ties of approved manufacture shall be cast in with the stone as shown on the drawings. Samples of the completed stone shall be submitted for the Engineer's prior approval.

All stones shall be protected from damage during transport and erection by means of cement slurry coatings or by other approved methods.

630. REINFORCEMENT FOR CONCRETE

Reinforcement which shall comply with the following Standards, covers plain and deformed bar reinforcement and steel fabric to be cast into concrete in any part of the Works but does not include prestressing tendons or any other embedded steel.

- SRN 126 for hot rolled plain bar and high yield deformed bar
- SRN 127 for cold worked steel bar
- SRN 128 for steel mesh fabric

All reinforcement shall be from an approved manufacturer and, if required by the Engineer, the Contractor shall submit a test certificate from the manufacturer.

All reinforcement for use in the Works shall be tested for compliance with the appropriate British Standard in a laboratory acceptable to the Engineer and two copies of each test certificate shall be supplied to the Engineer. The frequency of testing shall be as set out in the relevant Standard.

In addition to the testing requirements described above, the Contractor shall carry out additional tests as instructed by the Engineer.

Any reinforcement which does not comply with the Specification shall be removed from site.

All reinforcement shall be delivered to site either in straight lengths or cut and bent. No reinforcement shall be accepted in long lengths which have been transported bent over double.
Any reinforcement which is likely to remain in storage for a long period shall be protected from the weather so as to avoid corrosion and pitting. All reinforcement which has become corroded or pitted to an extent which, in the opinion of the Engineer, will affect its properties shall either be removed from site or may be tested for compliance with the appropriate Standard at the Contractor's expense.

<u>Dowel Bars</u>

Dowel bars and tie bars shall consist of mild steel, or deformed bars of high yield steel all complying with SRN 126 and they shall be free from oil, paint other than bond-breaking compound, dirt, loose rust and scale.

Dowel bars and tie bars shall be of sizes as shown on the drawings and directed by the Engineer, and shall be straight, free from burred edges, or other irregularities and shall have their sliding ends sawn or, if approved, sheared.

Bond breaking compound for dowel bars shall consist of 66 per cent of 200 pen bitumen blended hot with 14 per cent light creosote oil and, when cold, brought to the consistency of paint by the addition of 20 per cent solvent naphtha or other approved compound meeting the following requirements.

i) It shall not retard or in any other way affect the setting of concrete.

ii) The average bond stress on bars coated with the compound with half their length cast into concrete specimens and subject to pull out tests at 7 days shall not exceed 0.14 newtons per square millimetre and the total movement of the dowel bar relative to the concrete shall not be less than 0.25 millimetres at that stress. The concrete specimens shall be 150 millimetres by 150 millimetres in section and 0.45 metre long and made with the same mix proportions as used in the Works.

631. STRUCTURAL STEEL FOR WELDED WORK

Structural steel for riveted and welded work shall comply with the requirements of SRN 125: Structural Steel, SRN 126 : The Use of Structural Steel in Building and for Welded Work, SRN 125 : High Yield Stress and High Tensile Structural Steel, High Tensile (Fusion Welding Quality) Structural Steel for Bridges, etc. and General Building Construction.

632. JOINT PRIMER

Joint priming compound shall be entirely in accordance with the manufacturer's recommendations for the joint sealant to be used.

633. TIMBER

Timber shall be sound, well seasoned and entirely free from worm, beetle, warps, shakes, splits, and all forms of rot and deadwood. Where required, all timber shall be treated with creosote, as specified in SRN 872: Coal Tar Creosote for the Preservation of Timber or an alternative approved timber preservative.

634. WATER BARS

Water bars shall be "Dumbell" type and be of natural or synthetic rubber or extruded PVC. They shall be flexible, tough, elastic and durable and of dimensions detailed. They should be unaffected on contact with dilute acids or alkalis. Joints and junctions shall, when possible, be prefabricated by the manufacturer, but if made at site the manufacturer's instructions including recommended adhesives shall be followed and used. Samples shall be submitted for approval of the Engineer before use of any material.

635. CONCRETE BLOCKS

Solid and hollow concrete blocks for walling shall comply with SRN 904 in every respect.

All solid and hollow concrete blocks used in the walling must be capable of withstanding a crushing pressure of not less than 0.35 kg per square millimetre after 28 days. The blocks shall be cast in Metric sizes.

7. WORKMANSHIP

701. HANDLING OF PIPES AND FITTINGS

The Contractor shall exercise care in the handling of all pipes, specials, valves etc., to prevent damage to the structure surfaces and to the ends of the pipes.

702. LOADING AND UNLOADING

Normally loading and unloading of small diameter pipes and fittings can be undertaken by hand; where mechanical means are used care should be exercised to ensure that the handling methods do not damage the pipes and fittings.

703. STORAGE

The Contractor shall comply with the manufacturer's specification regarding the storage of pipes, fittings and valves. Where storage dumps are to be provided along the route of the pipeline, these will be subject to the Engineer's approval. The cost of so providing shall be borne by the Contractor and deemed to be covered by his rates in the Bill of Quantities.

704. TRANSPORT

The Contractor shall provide such transport arrangements as will effectively cater for the lengths of pipes provided and the material of the piping. Adequate support shall be provided so as to ensure that the piping and fittings are not subject to excessive movement.

705. EXAMINATION OF PIPES AND FITTINGS

The Contractor shall examine all pipes, valves, fittings and other materials to ascertain that they are in perfectly sound condition before commencing to lay the pipes, valves etc.

706. INTERFERENCE WITH FENCES, DRAINS AND OTHER SERVICES

The Contractor shall ensure the proper reinstatement of fences, drains, telephone lines, KP&L cables etc. where affected by his work. All services shall be adequately protected and propped to the satisfaction of the Engineer. The Contractor shall be liable for any damage caused to the services due to his failure to provide adequate protection.

707. METHOD OF EXCAVATION

The Contractor is deemed to have covered in his excavation rates all the work that is necessary in order to comply with the provisions of the Specifications in general and this Clause in particular.

a) The Contractor shall excavate the pipe trenches in the line and to the depths indicated on drawings or as indicated by the Engineer. Except where otherwise indicated on the drawings or directed by the Engineer, it is intended that the trench shall be excavated to such a depth as will allow of a minimum cover of 600mm over the top of the barrel of the pipe when

laid. All trenches shall be excavated in open cuttings and for trenching to uPVC piping, shall not be opened too far in advance of pipe laying.

b) For the purpose of measurement, the width of trench shall be taken as the nominated width for the particular size of sewer, irrespective of the width of trench the Contractor may choose to excavate.

Nominated trench width for:

75mm main	0.5m
100mm main	0.6m
150mm main	0.6m
200mm main	0.6m
225mm main	0.6m
250mm main	0.6m
300mm main	0.7m
400mm main	0.8m
500mm main	0.9m
600mm main	1.0m
700mm main	1.1m
800mm main	1.2m

For two or more pipes in the same trench the nominated width shall be the distance between the centres of the outer pipes plus the internal radii of the outer pipes plus 400mm.

c) Where the trench passes through grassland, arable land or gardens, whether enclosed or otherwise, the turf, if any, shall be carefully pared off and stacked, and the productive soil shall be carefully removed for a width of 600mm greater than the nominated trench width, or equal to the overall width of track of excavating machine, whichever is greater, and laid aside to be subsequently used in reinstating the surface of the ground after the trench has been refilled.

d) The bottom of the trench shall be properly trimmed off, and all low places or irregularities shall be levelled up with fine material. Where rock or large stones are encountered, they shall be cut down to a depth of at least 100mm below the level at which the bottoms of the barrel of the pipes or flanges are to be laid, and covered to a like depth with fine material, so as to form a fine and even bed for the pipes. The bottom of trenches to accommodate uPVC piping shall be hardened by tamping in gravel or broken stone in all soft spots. The bedding shall consist of soil which can be properly compacted to provide support for the pipe and to comply with Clause 809 b).

e) Joint holes shall be excavated to suit minimum dimensions as will allow the joints to be well and properly jointed.

f) The pipe trench shall be kept clear of water at all times as per Clause 321 of this Specification.

g) The Contractor shall, wherever necessary, by means of timbering or otherwise, support the sides of the trench so as to make them thoroughly secure, and afford adequate support to adjoining roads, land, buildings and property, during the whole time the trench remains open and shall remove such timbering when the trench has been backfilled. The cost of such timbering or other work shall be deemed to be included in the rates for excavation. In case the Contractor is instructed by the Engineer to leave any portion of such timber in position after backfilling the trench, he will be paid for it accordingly.

h) The clear width inside the timbering shall be at least 150mm in excess of the external diameter of the pipe being laid, in order to allow it to be freely lowered into position, in the trench without damage to the external protection.

i) Should the excavation be taken out to a greater depth than is specified the bottom shall be made good to the correct level with Class 15/20 concrete or other material approved by the Engineer. No payment shall be made for any over excavation carried out by the Contractor nor for the cost of filling up to required levels.

j) If a mechanical excavator is used by the Contractor, he shall indemnify the Employer against all claims for damage which in the opinion of the Engineer, may be caused by the use of this plant.

k) The Contractor shall fix Sight Rails for use with boning rods at intervals of not more than 30 metres and temporary Bench Marks related to the Survey of Kenya Datum shall be provided at such intervals as directed by the Engineer.

708. MAIN LAYING

a) Mains shall be laid in straight lines and/or smooth curves as indicated on the drawings. The vertical profile of the pipe shall be to even gradients. Any pipes not so laid shall be removed if so directed by the Engineer, and re-laid in proper manner at the Contractor's expense.

In laying the pipes and specials care shall be taken not to damage the protective linings and the pipes shall be handled with tackle if so directed by the Engineer.

The pipes and specials shall be checked for flaws before they are lowered into the trench. After the pipes or specials have been checked they shall be cleaned and set to proper gradient and line so that there is a continuous rise from each washout to air valve.

When laying uPVC pipes, final connection at any fixed joints shall be deferred until the majority of the pipeline has been covered with backfill.

b) Large diameter curves to mains shall wherever possible be formed by allowing for deflection at flexible joints, not exceeding 3 degrees, or as specified by the manufacturers.

c) In jointing of the pipes and specials the Contractor shall comply with the standards adopted for the various types of joints as specified.

d) In laying pipes and specials with flanged joints, flanges shall be brought together and bolted with the faces absolutely parallel. A rubber jointing gasket ring 3mm thick shall be used in each flange joint and one washer with and not provided for each bolt.
The bolts shall be tightened up gradually and equally in the customary manner in order to distribute the stress evenly over the flange. If it is found necessary to deviate slightly from the normal run of the flanged piping, the deflection shall be obtained by means of a bevelled gun metal ring washer between the flanges.

e) The Contractor shall fix the gate valves, air valves and washout pipes all in accordance with the drawings.

f) The Contractor shall, subject to approval of the Engineer, cut pipes to such lengths as directed. Pipes should be cut off clean and square with the axis. Cuts should be made with an approved cutting device dependant on the type of pipe specified. Ends of pipes should be tapered by means approved by the Engineer if mechanical joints are to be used.

g) Equipment for tapping off the mains under pressure may be employed in the making of service or branch connections. The Contractor is required to choose a suitable method for fixing of the ferrule to the type of pipe specified, to the Engineer's approval.

709. BACKFILLING OF TRENCH

a) When a section of the main has been jointed, the ends shall be temporarily closed with caps, plugs or flanges to prevent ingress of foreign matter into the pipe to the satisfaction of the Engineer. The trench shall be properly backfilled and rammed for its whole length so that the soil cover to the main shall not be less than 600mm except at joint holes which shall be kept clear of all backfilling, if necessary, by the use of timbering, so that each joint is left fully exposed for the Engineer's inspection. Special care shall be exercised when using surround to A.C. and uPVC pipes which shall be free from any stones and well compacted in layers to not less than 100mm above the crown of the pipe.

b) The Contractor's attention is drawn to the special requirements for bedding and sidefill to uPVC pipes. Clay should not be used. Soils which are of a granular nature and provide adequate support after compaction shall be used. If unavailable from excavated material the Contractor should provide suitable material for which an item in the Bill has been included.

With flexible pipes it is important that the sidefill should be firmly compacted between the pipe and the soil sides of the trench. The bedding material shall be placed in 75mm layers up to the crown of the pipe with adequate compaction and then to a minimum height of 100mm or two thirds of the pipe diameter. The progress of filling and tamping

should proceed equally on either side of the pipe so as to maintain an equal pressure on both sides.

c) Where a main is laid across a road or is in such a position as to interfere seriously with the normal use of the road, the Contractor may, with the consent of the Engineer and at his own risk, fill such holes as may be necessary. Due consideration is to be given to compaction of section of the trench across the road to prevent undue settlement. In the event of damage at this section the Contractor is required to re-excavate and repair the pipeline all at his own expense.

710. ANCHOR BLOCKS AND SUPPORTS

Concrete Class 15/20 shall be placed in anchor blocks at all changes of direction of the pipeline exceeding 6 degrees and wherever else required to withstand thrust resulting from internal water pressure e.g. at blank ends. Concrete in plinths shall be placed where specified.

711. CHAMBERS AND SURFACE BOXES

Gate valves, air valves and fire hydrants etc. shall be provided with suitable chambers or surface boxes in accordance with detailed drawings. In roads and footpaths the boxes shall have metal covers laid flush with the surface. Indicator posts to suit shall also be provided.

712. TESTING

a) The Contractor shall test as long a section of main as possible subject to the maximum length of open trench approved by the Engineer. The test shall be carried out within 12 working days of the completion of such section of the main.

b) The pipeline shall be adequately anchored during the test at stop ends or valves to prevent movement under the test pressures.

c) The test section shall be filled with water and great care should be taken to drive out all air through air valves, ferrules etc. The test pressure is to be at least 1.5 times the nominal working pressure for the class of pipe being tested and is to be applied for at least 2 hours.

d) The leakage from the mains and connections from each section tested shall be according to SRN 316, i.e. not exceeding 0.02 litres per millimetre of nominal bore per kilometre of pipeline per 24 hour per bar of applied pressure head.

The determine the rate of leakage, the Contractor shall furnish a suitable hydraulic test pump, pressure gauge, connections and water meter or other appliance, for measuring the amount of water pumped. The pressure shall be raised to the amount required and specified by the Engineer, and shall be so maintained for a period of not less than two hours or whatever longer period as required by the Engineer to examine every joint to satisfy himself that they are sound.

If the leakage is at a greater rate than that specified, the Contractor shall re-excavate the trench where necessary and shall re-make the joints and replace defective work until the leakage shall be reduced to the allowable amount.

e) The Employer shall charge the Contractor the cost of any couplings required to join up tested lengths of main if, in the Engineer's opinion, greater lengths could reasonably have been tested or if failure under test, requires the pipe to be cut, or other methods of laying should have been adopted.

Water used in testing the main shall be supplied by the Contractor. The Contractor shall carry out all work which may be necessary for making temporary connections to the existing mains to obtain water for testing at his own expense.

In carrying out the test for water tightness the Employer only shall authorize the operation of all valves, but the Contractor shall provide all the necessary labour to assist in the opening and closing of the valves to the Engineer's instructions, and he shall allow in his prices for all his expenses in connection with testing on completion.

The Engineer shall be the sole judge of water tightness.

713. CLEANING AND STERILISING THE MAIN

a) When a pipeline is complete and where applicable, has successfully passed the test, it shall be thoroughly washed out, using if possible, an open end. Thereafter it shall be sterilized by being filled with a suitable solution containing not less than 20 p.p.m. of free available chlorine or such other sterilizing agent as the Engineer shall approve. After standing for 24 hours the main shall again be washed out and refilled with mains water prior to the taking of bacteriological samples. The Contractor shall provide all necessary stop-ends, fittings and chemicals for this work.

b) Emptying and washing out of the pipes shall be done in such a manner as not to damage the trench or cause undue flooding of the vicinity, and the Contractor shall supply and use piping, specials and/or hose as may be necessary to facilitate the flow of water to the nearest drain or watercourse. Water used for washing out and sterilizing may be supplied by the Employer when a suitable supply is available but all expenses should be payable by the Contractor.

Before any section of the main is put into use, a bacteriological sample or samples will be taken by the Engineer's Representative and only on receipt of a satisfactory certificate from a Medical Research Laboratory or similar organisation will the main or section of main be permitted to be put into supply and be considered as having been substantially completed.

Any expenditure involved in providing facilities or materials for the taking of samples shall be included in the Contractor's Bided rates and the Engineer will specify and shall be the sole judge as to the number of samples required and the points at which they are to be taken.

The cost of the bacteriological examination will be borne by the Employer but if the sample or samples are not satisfactory, the cost of any subsequent analysis will be borne by the Contractor.

714. CLEARANCE OF SITE

The Contractor shall remove all surplus pipes, specials and other fittings from the site as directed by the Engineer. The site of works shall be levelled and all surplus excavation, debris, cut trees or bushes shall be carted to approved tip sites.

715. TESTING OF WATER RETAINING STRUCTURES

As soon as possible after completion of water retaining structures viz. storage reservoirs etc. they shall be tested for water retention by filling to the normal maximum level with water at a uniform rate of not greater than 2m in 24 hours.

When first filled, the water level should be maintained by adding of further water for a stabilizing period while absorption and antogenous healing take place. This period may be 7 days after which the level of the water surface should be recorded at 24 hour intervals for a test period of 7 days. The structure shall be considered satisfactory if, during this period the total permissible drop in level, after making due allowance for rainfall and evaporation, should not exceed 1/500th of the average water depth of the full tank, 10mm or another specified amount all in accordance with SRN 102. Water used in testing the structures shall be supplied by the Contractor. Sterilization of the structures is to be done as specified by the Engineer and sampling of water carried out similar to Clause 813.

This test shall be carried out before any backfilling has taken place.

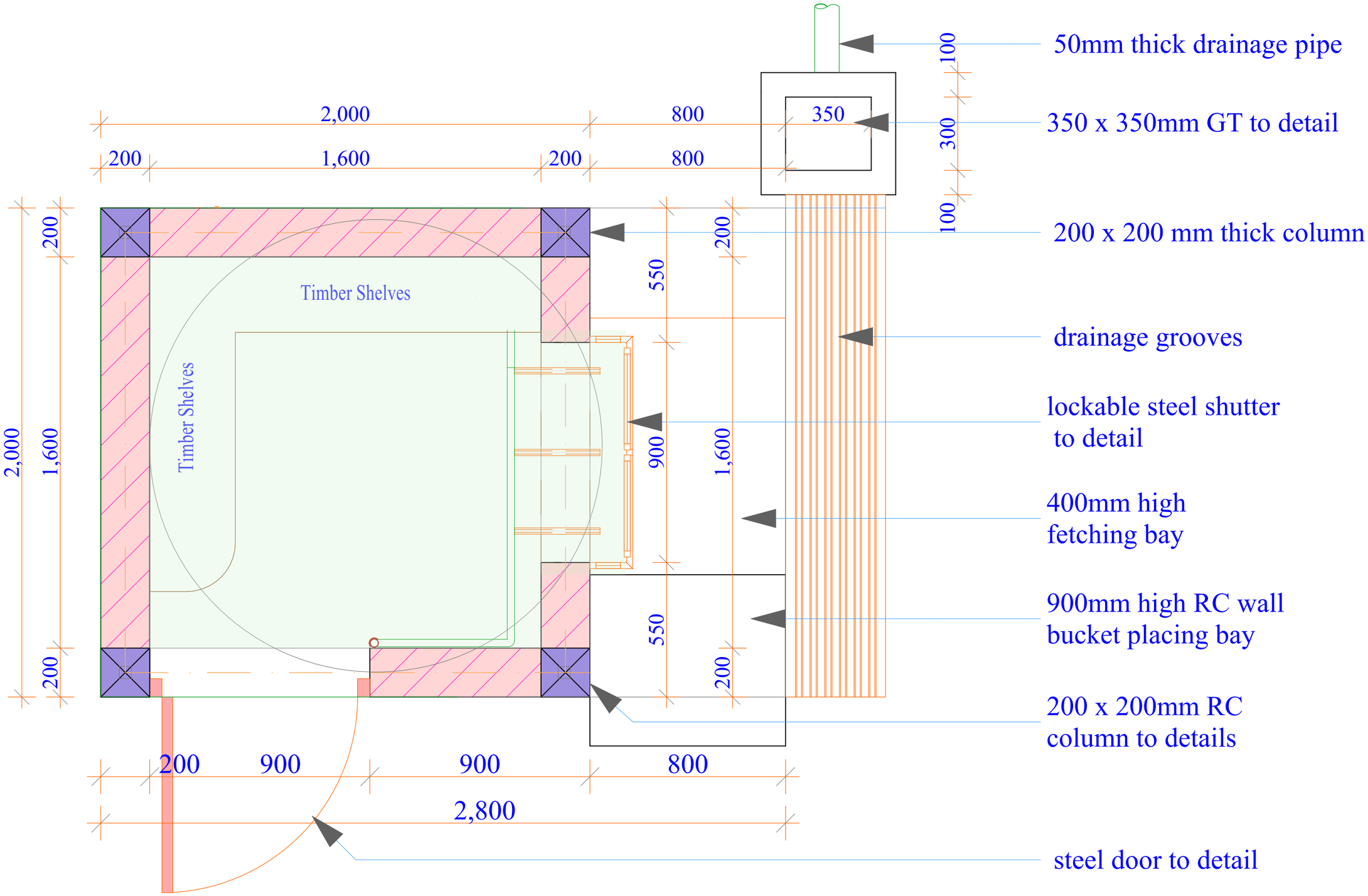
In the event of any water retaining structures failing to pass the test, the Contractor shall make good and re-test at his own expense.

716. STERILISATION OF WATER RETAINING STRUCTURES

A strong chlorine solution (about 200 milligrams per litre) shall be sprayed on all interior surfaces of the hydraulic structure. Following this, the structure shall be partially filled with water to a depth of approximately 30 centimetres. During the filling operation, a chlorine water mixture shall be injected by means of a solution feed chlorinating device. The dosage applied to the water shall be sufficient to give a chlorine residual of at least 50 milligrams per litre upon completion of the partial filling operation. Precaution shall be taken to prevent the strong chlorine solution from flowing back into the lines supplying the water. After the partial filling has been completed, sufficient water shall be drained from the lower ends of the appurtenant piping to insure filling the lines with the heavy chlorinated water.

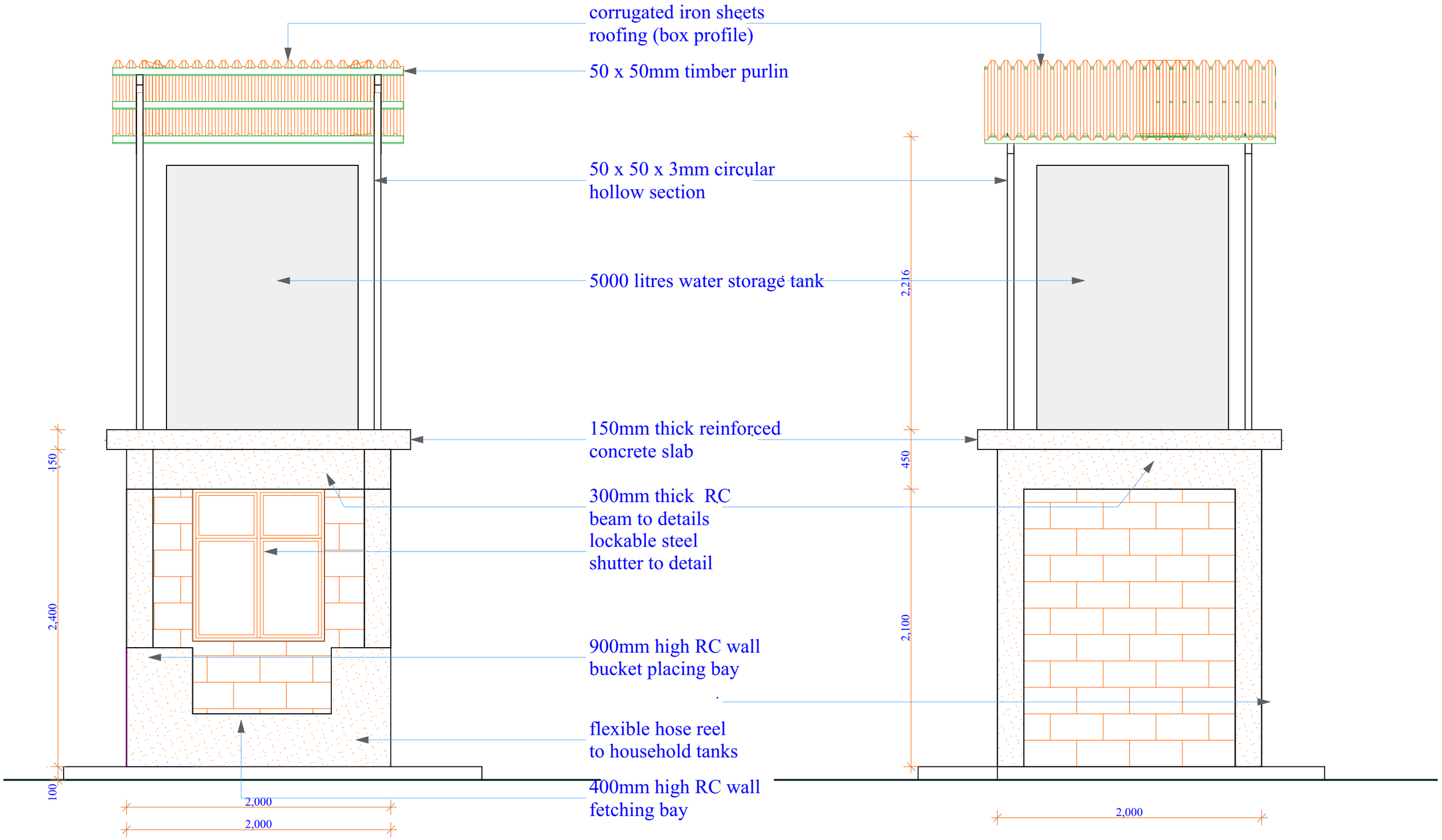
Chlorinated water shall be retained in the hydraulic structure and in the associated piping long enough to destroy all non-spore-forming bacteria and, in any event, for at least 24 hours. After the chlorine-treated water has been retained for the required time, the chlorine residual shall be at least 25 milligrams per litre. All valves shall be operated while the lines are filled with the heavily chlorinated water.

SECTION VII: DRAWINGS



FLOOR PLAN

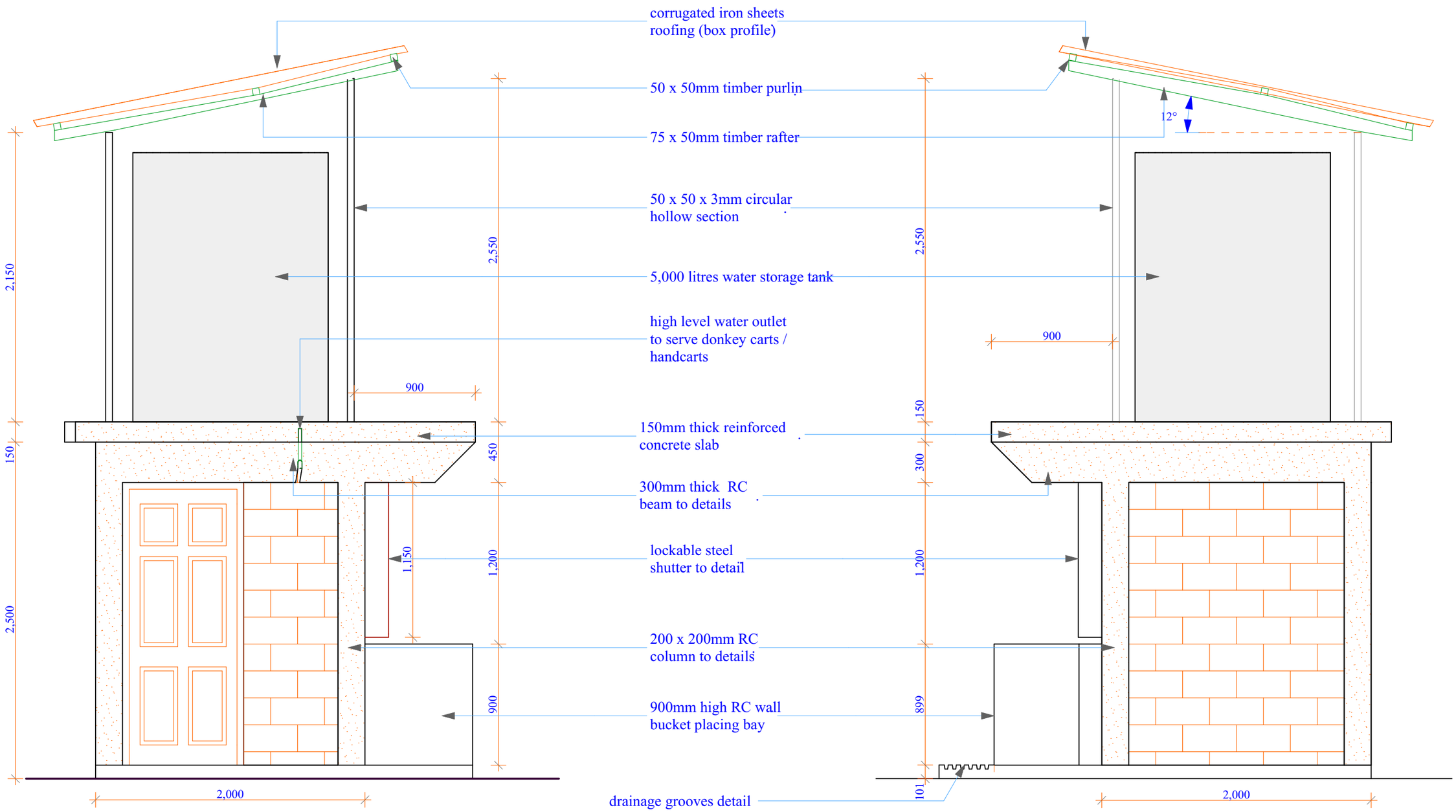
Project Title:	Client:	drg title:	Designed By	Checked By	Approved by	Scale / Date / page
WATER KIOSK (Type Closed)	MANDERA WATER AND SEWERAGE COMPANY		Edward Kung'u		Director, Department of Water Services, Mandera County Government	Date: may 2021



ELEVATION 01

ELEVATION 03

Project Title:	Client:	drg title:	Designed By	Checked By	Approved by	Scale / Date / page
WATER KIOSK (Type Closed)	MANDERA WATER AND SEWERAGE COMPANY		Edward Kung'u		Director, Department of Water Services, Mandera County Government	Date: May 2021



ELEVATION 02

ELEVATION 02

Project Title: WATER KIOSK (Type Closed)	***Client:*** MANDERA WATER AND SEWERAGE COMPANY	***drg title:***	***Designed By*** Edward Kung'u	***Checked By***	***Approved by*** Director, Department of Water Services, County Government of Mandera	***Scale*** ***Date:*** May 2021 ***page***

SECTION VIII: BILL OF QUANTITIES

TENDER NO.:

BORDER POINT 1 WATER PROJECT

GRAND SUMMARY OF PROPOSED WORKS

SECTION	DESCRIPTION		TOTAL AMOUNT Incl. VAT (Kshs.)
1	Preliminaries and Generals (Bill No. 1)		
2	Rehabilitation of Existing Water Supply System (Bill No. 2)		
3	Extension of 90mm Dia. Rising Main (Bill No. 3)		
4	100 m^3 Elevated Steel Tank (Bill No. 4)		
5	4 Nr Closed Water Kiosks(Bill No. 5)		
6	Water Distribution Mains (Bill No. 6)		
	Bills Total Inclusive of VAT	**(A)**	
	Add 5% of (A) for Contingencies	**(B)**	
	Bill Total Inclusive of Contingencies	**(C)**	

TENDER No.

BILL No. 1

PRELIMINARIES AND GENERALS

ITEM No.	DESCRIPTION	UNIT	QTY	RATE Kshs	AMOUNT incl. VAT Kshs
1	Allow for provision, erection and maintenance of Project Sign Boards at the sites indicated by the Engineer, within the Project Area and in accordance with the Conditions of Contract. The rate quoted by the Contractor to include for payment of all statutory charges to the relevant Authority and removal after completion of the Project.	Nr	2		
2	Allow for mobilization, demobilization and movement of the works site on Completion. Include for all equipment, temporary measures, machines, tools, materials, water and electricity supply etc. all as specified for execution of the Works	Item	L.S		
3	Allow for provision of performance security and insurance of works and contractors equipments and third party insurance (including Employer's Property) in accordance with the general conditions, Bidding Documents	Item	P.C		
4	Add _% for profits, administration, attendance upon, overheads etc. for Item 3 above (% to be as per Appendix to form of Tender)	%			
3	Allow for provision of "Genuine" laptops13.3 inch multi touch HD screen, Processor; Intel i7 1.8 GHz, 8 GB DDR4-2400 SDRAM, 512 GB Intel® SSD with Windows 10 genuine Operating Software and MS Office. Laptops to be used by the Project Engineer and Accountant fro the implementation of teh project	Nr	2		
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BILL No. 1 **PRELIMINARIES AND GENERALS**	
	Amount incl. VAT Kshs.
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Bill No. 1 Total Inclusive of VAT Carried to Grand Summary Sheet	

TENDER No.

BILL No. 2

REHABILITATION OF EXISTING WATER SUPPLY SYSTEM

ITEM No.	DESCRIPTION	UNIT	QTY	RATE Kshs	AMOUNT incl. VAT Kshs
	NOTE: **The rehabilitation works involve working on existing structures, appurtenances and other components of Border Point 1 Water Project.**				
1	**METHOD RELATED CHARGES**				
	The Existing Water Supply Network starts at Border Point 1 Water Intake Site. Sections of the water main have been heavily enchroached by vegetation and trees. The Contractor's rates should allow for any measures necessary to deal with the terrain, provision of access road to work sites, liason with the relevant authorities and local residents, payments of any required statutory charges to relevant authorities, etc. The costs for compliance shall be deemed to be covered in the Contractor's rates.				
	Specific conditions in execution of these Works are deemed to be included in the Contractor's rates. The Contractor will be required to submit Method Statement for execution of works under these specific conditions for approval prior to execution of the works. These include but are not limited to the following: i. No blasting will be permitted in these areas ii. The Contactor to maintain uninterrupted continuity of water supply in existing water distribution network by providing requisite make up pieces, fittings, temporary connections etc. iii. Minimal disturbance of vegetation and trees including reistatement to original status after completion of the works. iv. Safety hoarding, lighting, bands, warning signs, etc. to be maintained at all times. v. Allow for method related costs for dewatering of trenches.				
1.1	Cost relating to the above mentioned specific	Item	LS		
1.2	Allow for Liaison, facilitation with local residents and relevant authorities and payment for access, accidental damage, temporary access to working spaces during execution of the Works, etc.	Item	LS		
1.3	Allow for any other method related charges the tenderer feels may be required. These should be indicated below with pricing for each item				
	i)	Item	LS		
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TENDER No.

BILL No. 2

REHABILITATION OF EXISTING WATER SUPPLY SYSTEM

ITEM No.	DESCRIPTION	UNIT	QTY	RATE Kshs	AMOUNT incl. VAT Kshs
	ii)	Item	LS		
	iii)	Item	LS		
2	**3m WIDE MASONRY SUMP WELL**				
2.1	Provide all materials and allow for the removal of existing 90 mm diameter GI suction pipes and fittings within the existing masonry sump well before commencement of desilting of the well. Contractors rate to include safe storage of pipeworks and reinstatement after desilting works	Item	L.S		
2.2	Allow for the desilting of existing 3m diameter 9m deep masonry sump well. Contractors rate to include continuous removal of water in the well during the desilting works, spreading of removed silt around the existing sump well, leveling and compaction etc.	Item	L.S		
3	**PUMPING STATION**				
	Supply, installation, testing and commissioning of the following pumping set complete in all respect as required and consisting of the following;				
3.1	Diesel Engine driven centrifugal bareshaft pump set capable of delivering 15 m^3/hr of water against a total head of 100m complete with appropriate diesel engine, base plate and all necessary accessories as per specifications	Nr	1		
3.2	Supply, Transport to Site, Store in Secure Place, Install, Test and Commission pipeworks Including Jointing Material, Bolts, Gaskets, Threading Tape, Jointing Glues, etc. as Applicable				
	Suction Pipeworks (Approved GI Pipes & Fittings)				
(i)	90mm dia. GI Pipe, 6000mm long	Nr	8		
(ii)	90mm dia. GI Elbow	Nr	4		
(iii)	90mm dia. GI Union	Nr	2		
(iv)	90mm dia. GI Long Threaded Nipple	Nr	3		
(v)	90mm dia. GI Threaded Flange	Nr	1		
(v)	90mm dia. GI Foot Valve	Nr	1		
	Delivery Pipeworks (Approved GI Pipes & Fittings)				
(vi)	90mm dia. GI Pipe, 6000mm long	Nr	6		
(vii)	90mm dia. GI Elbow	Nr	3		
(viii)	90mm dia. GI Union	Nr	2		
(ix)	90mm dia. GI Long Threaded Nipple	Nr	3		
(x)	90mm dia. GI Threaded Flange	Nr	1		
(xi)	90mm x 90mm dia. GI Equal Tee	Nr	1		
(xii)	90mm x 25mm dia. GI Reducing Bush	Nr	1		
(xiii)	25mm dia. GI Pipe, 6000mm long	Nr	1		
(xiv)	90mm dia. Non Return Valve	Nr	6		
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TENDER No.

BILL No. 2

REHABILITATION OF EXISTING WATER SUPPLY SYSTEM

ITEM No.	DESCRIPTION	UNIT	QTY	RATE Kshs	AMOUNT incl. VAT Kshs
(xv)	80mm dia. Gate Valve	Nr	6		
(xvi)	90mm dia. GI Sockets	Nr	8		
3.3	Allow for locating and exposing existing 90mm dia. GI rising main and connection of delivery pipework. Include for supply and installation of all requisite pipeworks, fittings and appurtenance. All as directed by the Engineer	Item	L/S		
4	**PUMPING MAIN**				
	Removal of Defective Fitting and Appurtenances				
4.1	Provide all material, remove existing defective pipes, fittings and appurtenances from the existing pumping main and dispose to tip. All as directed by the Engineer				
(i)	50mm Dia. Single Orifice Air valves	Nr	3		
(ii)	90mm Dia. V.J Coupling	Nr	2		
(iii)	90mm dia. UPVC pipe	m	98		
	NOTE:				
	The rate for the above is deemed to include for the following:				
	i) Fixing requisite pipes of various diameters / material and fittings as make up piece to maintain continuity of flow in the system including removal of make up piece and transporting back to the store after installation of new appurtenances.				
	ii) Locating, identification and exposing of defective sections of water mains				
	Replacement of Defective Fitting and Appurtenances				
4.2	Supply, Transport to site, Install and Test the following Pipes, Fittings and Appurtenances:				
(i)	50mm Dia. Single Orifice Air valves	Nr	2		
(ii)	90mm Dia. V.J Coupling	Nr	2		
(iii)	90mm dia. UPVC pipe	m	98		
	Construction of New Chambers for Fittings / Appurtenances				
	Note:- Items for Work in this class shall include: - Excavation, preparation of surfaces, disposal of surplus excavated material, shoring sides of excavation, backfilling and removal of redundant services				
4.3	Provide all materials and construct Masonry walling AV Chambers, Internal Dimensions 1200mm x 1200mm. Include for supply and fixing of removable precast concrete covers, step irons, rendering of exposed blockwork etc. All as directed by the Engineer	Nr	2		
PAGE TOTAL CARRIED TO BILL COLLECTION PAGE					

TENDER No.

BILL No. 2

REHABILITATION OF EXISTING WATER SUPPLY SYSTEM

ITEM No.	DESCRIPTION	UNIT	QTY	RATE Kshs	AMOUNT incl. VAT Kshs
5	**MASONRY STORAGE TANK (CAPACITY 60 m^3)**				
5.1	Hack out loose mortar and plaster on the existing tank structure both internally and externally including spalled sections and prepare the surfaces for repair, depth not exceeding 50mm. All as directed by the Engineer	m^2	150		
5.2	Provide all materials and repair hacked out surface described in Item 5.1 above with approved mortar and epoxy plaster material thickness not exceeding 25mm. All as directed by the Engineer	m^2	150		
5.3	Prepare external surface of existing ground level storage tank for painting and apply 3 coats of exterior quality plastic emulsion paint	m^2	90		
5.4	Provide all materials and install protective wire mesh on existing vents for masonry walling storage tank. All as directed by the engineer	Nr	2		
5.5	Provide all materials, disconnect existing connections to the scour pipe of the storage tank and reconnect the tank to the 90mm dia. Gravity Water Main from elevated steel tank	ITEM	L/S		
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BILL No. 2 **REHABILITATION OF EXISTING WATER SUPPLY SYSTEM**	
	Amount incl. VAT Kshs.
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TENDER No.

BILL No. 3

EXTENSION OF RISING MAIN

ITEM No.	DESCRIPTION	UNIT	QTY	RATE Kshs	AMOUNT incl. VAT Kshs
	NOTE: **The existing pumping main is 90mm Dia. UPVC pipe, approximately 2.1 km long**				
	CLASS A: GENERAL WORKS				
A26	**TESTING OF WORKS**				
A261	Testing and Commissioning of the Pipeline including provision of all equipment, materials and works necessary for testing such as but not limited to Thrust Blocks, Anchor Blocks, Provision, Transportation and use and disposal of Water, Pipe Fittings,etc. Nominal bore n.e 200mm	m	400		
A262	Disinfection of Pipeline ; Flushing with clear water, filling with water containing 0.05g/l Calcium Hypochlorite, left for 24 hours. This includes supply of necessary Equipment, Materials, Chemicals and Water, Measurement of Residual Chlorine, all as specified and safe disposal of disinfecting water to Engineer's approval.	m	400		
	CLASS D: DEMOLITION AND SITE CLEARANCE				
D1	General site clearance along the pipeline alignment.	ha	0.2		
	Tree Cutting (Provisional)				
D2	Cut down trees, grub up roots and cart away to tips				
D21	Girth: 0.5 m - 1.0 m	Nr	1		
D22	Girth: 1.0 m - 2 m	Nr	1		
	Note:- Girth shall be measured 1.0m above ground level				
	PIPES, FITTINGS AND VALVES				
	CLASS I: PIPE WORK - PIPES				
I5	**Supply, Transport to site and store in secure place. Include supply of jointing materials, gaskets etc as applicable**				
	HDPE PN 12.5				
I5 - 1	Nominal Bore 90mm	m	400		
	Transport from Site Store, Lay and Joint Pipes in Trench, include for Excavation, Preparation of Surfaces, Disposal of Excavated Material, Shoring Sides of Excavation Trenches, Backfilling and Final Reinstatement				
I4	**HDPE PN 12.5**				
	Nominal Bore 90mm in Trenches				
I412.1	Depth not exceeding 1.5m	m	400		
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TENDER No.

BILL No. 3

EXTENSION OF RISING MAIN

ITEM No.	DESCRIPTION	UNIT	QTY	RATE Kshs	AMOUNT incl. VAT Kshs
	CLASS J: PIPEWORK - FITTINGS AND VALVES				
	Supply, Transport to site, store in secure place, lay and joint pipes in trench. Include supply of jointing materials, bolts, nuts, gaskets etc as applicable				
	GI / HDPE Pipes and Fittings				
J411	90mm Dia. UPVC Elbow	Nr	2		
J421	90mm x 50mm Dia. Saddle Clamp	Nr	1		
J431	90mm Dia. V.J Coupling	Nr	3		
J451	50mm Dia. Long Threaded Flange	Nr	2		
J81	50mm Dia. Gate Valve	Nr	1		
J861	50mm Dia. Single Orifice Air Valve	Nr	1		
	CLASS K: PIPE WORK - CHAMBERS AND PIPE WORK ANCILLARIES				
	Chambers, ducts, culverts, crossings, thrust, anchor blocks, reinstatement and others pipework ancillaries.				
	Note:- Items for Work in this class shall include:- - Excavation, preparation of surfaces, disposal of surplus excavated material, shoring sides of excavation, backfilling and removal of redundant services. - Concrete, Reinforcement, Formwork, Joints and Finishes. - Tips for disposal of excavated material or debris to be identified by the Contractor in liaison with the Local Authorities.				
K21	**IN SITU MASONRY CHAMBERS**				
K211.1	Provide all materials and construct Masonry Walling Chamber for Air Valve, internal dimensions 1200mm x 1200mm. Include for supply and fixing of removable precast concrete covers, step irons, compacted granular fill, rendering of exposed blockwork etc . All as directed by the Engineer and Depth n.e. 1.5m.	Nr	1		
K7	**REINSTATEMENTS**				
K731	Breaking up, Temporary and Permanent Reinstatement of MURRAM road with 300mm thick well graded stabilised gravel with 3% cement content base compacted in layers of 150mm thick using an 8-10 tonne roller to the satisfaction of the Engineer. All as directed by the Engineer. Contractor to allow for provision of requisite diversion signage, controls and safety precaution in his rates, nominal bore not exceeding 150mm	m	7		
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TENDER No.

BILL No. 3

EXTENSION OF RISING MAIN

ITEM No.	DESCRIPTION	UNIT	QTY	RATE Kshs	AMOUNT incl. VAT Kshs
	Other Pipework Ancillaries				
K82	Supply and fix marker posts along water Main Route, Road Crossings, change of direction, Air valves, Washouts, and valve chambers. All in accordance with specifications and as directed by the Engineer	Nr	3		
	CLASS L:- PIPEWORK - SUPPORTS AND PROTECTION, ANCILLARIES TO LAYING AND EXCAVATION				
L1	**Extras over excavation and backfilling for excavation in Rock. Rate to include carting away and disposal.**				
L11	**In pipe trench and chambers**				
L111.1	Excavation in trench for rock class "B"	m³	10		
L111.2	Excavation in trench for rock class "C"	m³	30		
L5	**Surrounds**				
L53	**Imported Selected Fill (Provisional)**				
	Provide, transport to site and place imported selected fill and compact in bed and surround to pipes as specified and where directed by the Engineer.				
L533	To pipes nominal bore not exceeding 200 mm	m³	40		
L54	**Mass Concrete Surround (Road Crossings)**				
L542	150mm thick Mass Concrete Surround Class 15/20 to pipe on murram road crossings, include for formwork, supports, vibrating, etc. as per Standard Drawings at locations as directed by the Engineer.	m	7		
L6	**Pipe Wrapping**				
L602	Supply "Denso Tape" Wrapping or approved equivalent. Bidder to include wrapping / jointing on murram road crossings in the pipe in two layers as directed by the Engineer.	m	7		
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BILL No. 3 **EXTENSION OF RISING MAIN**	
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TENDER No.

BILL No. 4

100 m^3 ELEVATED STEEL TANK AT BORDER POINT 1

ITEM No.	DESCRIPTION	UNIT	QUANTITY	RATE Kshs	AMOUNT incl. VAT Kshs
1	**ELEVATED BACKWASH TANK & TOWER**				
1.1	Supply and Transport to Site Pressed Steel Galvanised Steel Tank with Cover, minimum Net Storage Capacity 100m³ (size 6.1m x 4.88m x 3.66m) in accordance with Approved Specifications on and including 15m high galvanised steel U.B and U.C. section tower, including provision of Connections, Vents Base, Plates, Ladder and Platform on all 4 sides, etc. Note: Contractor to submit to the Engineer for approval, detailed design calculations and workshop drawings of all steel work from an approved and reputable Structural Steel Fabricator prior to fabrication and delivery of tank and tower.	Item	L.S		
1.2	Allow for the erection of Tank and Tower and all Assembling, Casting of foundation, Water Proofing, Welding, Drilling Holes, Cleats Bolts and Nuts, Cutting , Fixing Clamps, Ladder, Platform, Paint and all other associated works, all in accordance with Specifications. Contractors rate to include construction of appropriate foundations for the tank.	Item	L.S		
1.3	Allow for testing, cleansing and sterilising of the Tank and Pipework as specified.	Item	L.S		
2	**PIPES & FITTINGS**				
	Supply, Transport to Site, Store in Secure Place, Transport From Site Store, Install, Test and Commission. Including Jointing Material, Bolts, Gaskets, Packing, Jointing Glue, etc. As applicable				
	Inlet Pipework - Approved GI Pipe Fittings				
2.1	90mm dia. GI Elbow	Nr	2		
2.2	90mm dia. GI "Class D" pipe, 6000mm long	Nr	4		
2.3	90mm dia. GI Union	Nr	2		
2.4	90mm dia. GI Socket	Nr	2		
	Outlet Pipework - Approved GI Pipe Fittings				
2.5	90mm dia. Flanged Bellmouth	Nr	1		
2.6	90mm dia. GI threaded flange	Nr	1		
2.7	90mm dia. GI "Class C" pipe, 6000mm long	Nr	6		
2.8	90mm dia. GI Socket	Nr	5		
PAGE TOTAL CARRIED TO BILL COLLECTION PAGE					

TENDER No.

BILL No. 4

100 m^3 ELEVATED STEEL TANK AT BORDER POINT 1

ITEM No.	DESCRIPTION	UNIT	QUANTITY	RATE Kshs	AMOUNT incl. VAT Kshs
2.9	90mm dia. GI Union	Nr	2		
2.10	80mm dia. Gate Valve	Nr	1		
2.11	80mm dia. Water Meter (Kent or approved equivalent) with all requisite fittings for metering	Nr	1		
	Overflow and Scour Pipeworks - Approved GI Pipe Fittings				
2.11	110mm dia. Flanged Bellmouth (welded to the base of the tank with water tight joint)	Nr	1		
2.12	110mm dia. GI threaded flange	Nr	2		
2.13	110mm dia. GI "Class C" pipe, 6000mm long	Nr	10		
2.14	110mm dia. GI Socket	Nr	8		
2.15	110mm dia. GI Union	Nr	3		
2.16	110mm dia. Gate Valve	Nr	1		
2.17	110mm dia. Flanged spigot pipe, length 300mm with puddle flange 60mm from the spigot end (Puddle flange welded to tank panel)	Nr	1		
2.18	110mm dia. GI Bend	Nr	1		
3	**CHAMBERS**				
	Note: Items for work in this shall include:-				
	- Excavation, preparation of surfaces, disposal of excavated material, shoring sides of excavation, backfilling and removal of redundant services.				
	- Concrete, Reinforcement, Formwork, Joints, Finishes, Benching, etc.				
	=- Tips for disposal of excavated material or debris to be identified by the Contractor in liaison with the Local Authority.				
	Masonry Walling Chamber				
3.1	Provide all materials and construct Valve Outlet Chambers Internal Dimensions 1200mm x 1200mm depth not exceeding 1.5m. Include for supply and fixing of lockable mild steel checkered plate cover & step irons as directed by the Engineer	Nr	1		
3.2	-Ditto- but scour and overflow chamber internal dimension 1600 x 1200mm, depth n.e 1.50m	Nr	1		
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BILL No. 4 **100 m3 ELEVATED STEEL TANK AT BORDER POINT 1**	
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TENDER No.

BILL No. 5

CLOSED WATER KIOSKS - INSITU (2000mm x 2000mm)

ITEM No.	DESCRIPTION	UNIT	QUANTITY	RATE Kshs	AMOUNT incl. VAT Kshs
A	**SUBSTRUCTURE.**				
1.0	**Excavations (All Provisional)**				
1.1	Clear area of new construction of all undergrowth, small bushes, grab up all trees	m^2	15		
1.2	Excavate oversite to remove vegetable soil, load and cart away from site to contractor's dumping area as directed; Average 200 mm depth	m^2	16		
1.3	Excavate for strip foundation trenches commencing from stripped level: not exceeding 1.5 m deep	m^3	5		
1.4	Excavate for column bases commencing from stripped level: not exceeding 1.5 m deep	m^3	2		
1.5	Extra over all excavations for excavating in rock class II and III as described in the specification	m^3	3		
1.6	Return, fill and ram selected soil in foundations; well compacted in layers not exceeding 150 mm thick	m^3	3		
1.7	Remove surplus soil from site to a place approved by local authority	m^3	4		
1.8	Allow for upholding and supporting sides of excavations including all plunking and strutting	item	1		
1.9	Allow for keeping excavations free of water including any necessary pumping	Item	1		
2.0	**Foundation structures**				
2.1	**Mass concrete mix (1:3:6):in**				
2.1.1	50 mm Thick blinding under strip foundation	m^2	5		
2.1.2	50 mm Thick blinding under column bases	m^2	3		
2.2	**Vibrated reinforced insitu concrete class 25/20; with minimum cube crushing strength of 25N/mm² at 28 days;**				
2.2.1	Strip foundation	m^3	1		
2.2.2	Column bases	m^3	1		
2.2.3	Column starters	m^3	0		
2.2.4	100 mm Thick ground floor slab	m^3	1		
2.3	**Mesh Fabric Reinforcement**				
2.3.1	Mesh reinforcement No. A142 size 200 x 200 mm weighing 2.22 kg per square meter: in floor slab: including all necessary supports	m^2	8		
PAGE TOTAL CARRIED TO BILL COLLECTION PAGE					

TENDER No.

BILL No. 5

CLOSED WATER KIOSKS - INSITU (2000mm x 2000mm)

ITEM No.	DESCRIPTION	UNIT	QUANTITY	RATE Kshs	AMOUNT incl. VAT Kshs
2.4	**High Yield Tensile Reinforcements**				
	Fix High Yield TensileReinforcements including cutting, bending, hoisting, tying wire, spacing blocks and supporting in all positions				
2.4.1	8 - 12 mm Bars	KG	100		
2.5	**Sawn formwork: to**				
2.5.1	Sides of Strip footing	m	20		
2.5..2	Sides of column bases	m^2	2		
2.5.3	Sides of column starters	m^2	2		
2.5.4	Edges: slabs 75 - 150 mm girth	m	16		
3.0	**Substructure Walling and Filling**				
	Natural stone walling bedded in cement and sand mortar (1:4) with minimum stone crushing strength of 10N/mm²; including 20mm wide hoop iron at every course				
3.1	200 mm Thick foundation walling stone to approval	m^2	8		
3.2	**Hardcore**				
3.2.1	300 mm tick hardcore of approved inert material: well watered and compacted in 150 mm thick (maximum) layers	m^2	8		
3.2.2	50 mm Thick approved quality murram blinding to surfaces of hardcore	m^2	8		
3.3	**Anti-termite treatment**				
3.3.1	Termidor 25EC anti-termite chemical treatment: applied by approved professional pest control specialist: applied strictly in accordance with the manufacturer's instructions: 10 year guarantee	m^2	8		
3.4	**Damp Proof Membrane**				
3.4.1	Gauge 1000 polythene damp proof membrane	m^2	8		
B	**SUPERSTRUCTURE WORKS**				
4.0	**Reinforced Concrete Works**				
4.1	**Sawn formwork: to**				
4.1.1	Sides and soffits: beams and lintols	m^2	6		
4.1.2	Sides of columns	m^2	8		
4.1.3	Soffits of horizontal Suspended slab	m^2	10		
4.1.4	props to the under side of beam	No	10		
4.2	**Supply and fix steel bar in structural concrete work including all cutting, bending, hoisting, tying wire, spacing blocks and supporting all in position as necessary, assorted**				
4.2.1	8 - 12 mm Bars	KG	85		
PAGE TOTAL CARRIED TO BILL COLLECTION PAGE					

TENDER No.

BILL No. 5

CLOSED WATER KIOSKS - INSITU (2000mm x 2000mm)

ITEM No.	DESCRIPTION	UNIT	QUANTITY	RATE Kshs	AMOUNT incl. VAT Kshs
4.3	**Vibrated reinforced insitu concrete class 25/20; with minimum cube crushing strength of 25N/mm² at 28 days; in**				
4.3.1	Ring beams and lintols	m^3	5		
4.3.2	Columns	m^3	1		
4.3.3	150mm thick horizontal suspended slab	m^2	8		
C	**WALLINGS**				
5.0	**External walls**				
5.1	**Machine dressed natural stone walling bedded in cement and sand mortar (1:3) with minimum stone crushing strength of 7N/mm²; including 20mm wide hoop iron at every course**				
5.1.1	200 mm Thick	m^2	16		
5.2	**Damp proof course - Bituminous hessian base to BS 743 type A: or other equal approved damp-proof course: in cement/ sand (1:3) mortar**				
5.2.1	200 mm wide	m	8		
D	**ROOFING**				
6.0	**Structural Timber**				
6.1	**Sawn cypress first grade; pressure impregnated; thoroughly seasoned and treated with anti-termite; and other jointing accessories to structural engineer's details; timber to meet the following minimum strength criteria, bending 5N/mm², tension 3N/mm² and compression 6N/mm²**				
6.1.1	50 x 50 x 3mm thick steel stanchion fixed to the reinforced concrete column to approval	m	10		
6.1.2	75 x 50 mm timber rafter fixed to the steel stanchions	m	12		
6.1.3	20 x 50 mm timber batten fixed to the rafter to approval	m	9		
6.1.4	Nails	KG	2		
6.1.5	MRM box profile sheets available in white and clear; 12,000mm length x 810mm width.	LM	16		
E	**FIXTURES**				
7.0	**Fittings**				
7.1	**Door**				
7.1.1	Steel door to detail	No.	1		
7.2	**Window**				
7.2.1	Steel Bay window to details as per Architectural drawings	No.	1		
7.3	**Shelves**				
7.3.1	Timber shelves fix to the wall to details	Item	1		
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TENDER No.

BILL No. 5

CLOSED WATER KIOSKS - INSITU (2000mm x 2000mm)

ITEM No.	DESCRIPTION	UNIT	QUANTITY	RATE Kshs	AMOUNT incl. VAT Kshs
7.4	**Counters**				
7.4.1	Concrete counter at the bay window	Item	1		
F	**FINISHES**				
8.0	**Floor Finish**				
8.1	**Screed: cement and sand (1:4) on concrete: wood floated finished**				
8.1.1	25 mm Thick floor finish with red oxide inside the water	m^2	4		
8.2	**Non-slip floor finish**				
8.2.1	25mm thick rough cast floor finish at the fetching area	m^2	4		
8.3	**Internal wall finishes - Plaster: 12 mm cement/lime putty/sand: steel trowelled: on masonry or concrete: to**				
8.3.1	Walls and concrete surfaces	m^2	18		
8.3.2	soffits of suspended concrete slab	m^2	5		
8.3.3	Top of suspended slab with drainage grooves as per the technical drawings	m^2	5		
8.4	**Prepare surfaces: apply three coats of approved vinyl emulsion paint: on steel trowelled plaster: to**				
8.4.1	Walls and concrete surfaces internally	m^2	23		
8.5	**External wall finishes - External cement and sand(1:3) plaster: steel trowelled: on masonry or concrete: to**				
8.5.1	concrete columns and beam	m^2	8		
8.5.2	Keys to external wall	m^2	16		
8.5.3	Apply 2 coats of approved emulsion paint to the door and window	Item	1		
F	**PLUMBING WORKS**				
9.0	**Pipes and Fittings**				
9.1	**Supply and fix steel all plumbing materials as per the mechanical drawing**				
9.1.1	Pipe 25mm diameter PPR (3m lengths)	No.	3		
9.1.2	Gate valve 25mm dia. (Pegler)	No.	2		
9.1.3	Water meter 25mm diameter	No.	1		
9.1.4	Heavy duty taps 25mm diameter	No.	2		
9.1.5	Non-return valve 25mm diameter	No.	1		
9.1.6	Union 25mm diameter	No.	3		
9.1.7	Nipple 25mm diameter	No.	11		
9.1.8	Equal tee 25 mm diameter	No.	4		
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TENDER No.

BILL No. 5

CLOSED WATER KIOSKS - INSITU (2000mm x 2000mm)

ITEM No.	DESCRIPTION	UNIT	QUANTITY	RATE Kshs	AMOUNT incl. VAT Kshs
9.1.9	Elbows 25 mm diameter	No.	3		
9.1.10	Bend 25 mm diameter	No.	3		
9.1.11	Long threaded nipple 25 mm diameter	No.	2		
9.1.12	Black nut 25 mm diameter	No.	4		
9.1.13	Boss white 400g	No.	3		
9.1.14	Hemp thread	m	2		
9.2	**Storage Tank**				
9.2.1	Kentainer tank, 5000 liters or equivalent	No.	1		
9.2.2	Ball valve 25mm diameter	No.	1		
9.2.3	Metal platform to receive the tank to detail	No.	1		
9.3	**Soak pit**				
9.3.1	Soak pit internal size 1800mm diameter x 15,000 mm deep (average) to water level : filled with boulders as per engineers instructions : 1000 gauge polythene sheet on top end of boulders covered with 300mm layer of murram : 200mm thick coral block lining: 150mm vibrated reinforced concrete (Class	No	1		
10	**Miscellaneous Works**				
10.1	Provide all materials and connect the closed insitu water kiosk internal dimensions 2000mm x 2000mm to the proposed Water Distribution Network. All as directed by the Engineer	ITEM	L/S		
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BILL No. 5

CLOSED WATER KIOSKS - INSITU (2000mm x 2000mm)

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Total Inclusive of VAT for 1 Nr Closed Water Kiosk (2000mm x 2000mm)	
Total Inclusive of VAT for 4 Nr Closed Water Kiosk (2000mm x 2000mm)	

TENDER No.

BILL No. 6

90mm Dia. WATER DISTRIBUTION MAINS

ITEM No.	DESCRIPTION	UNIT	QUANTITY	RATE Kshs	AMOUNT Incl. VAT Kshs
	PIPES, FITTINGS AND VALVES				
	CLASS I: PIPE WORK - PIPES				
I7	**Supply, Transport to site and store in secure place. Include supply of jointing materials, gaskets etc as applicable**				
	HDPE PN 8				
I7-1	Nominal Bore 90mm	m	2,000		
	Transport from Site Store, Lay and Joint by butt fusion welding High Density Polyethylene Pipes in trench, include for Excavation, bed lining, jointing, installation and backfilling of the pipe trenches				
I7	**HDPE PN 8**				
	Nominal Bore 90mm in Trenches				
I712.1	Depth not exceeding 1.5m	m	2,000		
	CLASS J: PIPEWORK - FITTINGS AND VALVES				
	The rate quoted is provision and jointing of epoxy coated steel fittings to the water pipe networks				
J321.1	Install 90mm x 90mm junctions using 2 sluice valves and all epoxy coated fittings as directed by the engineer (All valves Type AVK - Denmark or approved equivalent)	Nr	4		
X	**Miscellaneous Works**				
X1	Allow for a Provisional Sum of 300,000 to connect BP1 Dispensary and BP1 Primary School to the proposed 90mm dia. Gravity Water Distribution Main. All as directed by the Engineer	ITEM	P/S		300,000.00
X2	Provide all materials and allow for consumer connections to the proposed water distribution network and construction of yard taps. All as directed by the Engineer	Nr	50		
X3	Provide all materials and allow for connection of the water kiosks at BP1 to the water distribution network. All as directed by the Engineer	Nr	3		
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BILL No. 6 **90mm Dia. WATER DISTRIBUTION MAINS**	
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SECTION IX: TENDER FORMS

A. Form of Tender

[date]

To: ***Chief Executive Officer—Mandera Water and Sewerage Company (MANDWASCO)***

We offer to execute the **PROPOSED IMPROVEMENT OF BORDER POINT 1 WATER PROJECT IN MANDERA EAST SUBCOUNTY.**

in accordance with the Conditions of Contract accompanying this Tender for the Contract Price

Kshs.....

In words.....

.....

.....

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

We are not participating, as Tenders, in more than one Tender in this Tendering process other than alternative Tenders in accordance with the Tendering documents.

Our firm, its affiliates or subsidiaries, including any subcontractors or suppliers for any part of the contract has not been declared ineligible by the Kenya Government under Kenya's laws or any other official regulations.

This Tender and your written acceptance of it shall constitute a binding Contract between us.

We understand that you are not bound to accept the lowest or any Tender you receive.

We hereby confirm that this Tender complies with the Tender validity and Tender Security required by the Tendering documents and specified in the Tender Data Sheet.

Authorized Signature:_____

Name and Title of Signatory: _____

Name of Tenderer: _____

Address: _____

B. Tender-Securing Declaration (Mandatory)

Date: *[insert **date** (as day, month and year)]*

Tender No.: *[insert **number of Tendering process**]*

Alternative No.: *[insert **identification No if this is a Tender for an alternative**]*

To: *[insert **complete name of Procuring Entity**]*

We, the undersigned, declare that:

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

We accept that we will automatically be suspended from being eligible for Tendering in any contract with the Procuring Entity for the period of time of *[insert **number of months or years**]* starting on *[insert **date**]*, if we are in breach of our obligation(s) under the Tender conditions, because we;

a) Have withdrawn our Tender during the period of Tender validity specified in the Form of Tender; or

b) Having been notified of the acceptance of our Tender by the Procuring Entity during the period of Tender validity,

   (i). Fail or refuse to execute the Contract, if required, or

   (ii). Fail or refuse to furnish the Performance Security, in accordance with the ITT.

We understand this Tender Securing Declaration shall expire if we are not the successful Tenderer, upon the earlier of;

1) Our receipt of your notification to us of the name of the successful Tenderer; or

2) Thirty days after the expiration of our Tender.

Signed: *[insert signature of person whose name and capacity are shown]* In the capacity of *[insert legal capacity of person signing the Tender Securing Declaration]*

Name: *[insert **complete name of person signing the Tender Securing Declaration**]*

Duly authorized to sign the Tender for and on behalf of: *[insert **complete name of Tenderer**]*

Dated on _____ day of _____, _____ *[insert **date of signing**]*

Corporate Seal (where appropriate)

C. Confidential Business Questionnaire

1 **Individual Tenderer or Individual Members of joint Ventures**

1.1 Constitution or legal status of Tenderer: [*attach copy*]

Place of registration: [*insert]*

Principal place of business: *[insert*]

Power of attorney of signatory of Tender: [*attach*]

Registration certificate [attach] current Business License [*attach]*

1.2 Total annual volume of construction work performed in two years, in Kenyan shillings as specified in the Tender Data Sheet; *[insert*]

1.3 Work performed as prime Contractor on works of a similar nature and volume over the last two years or as specified in the Tender Data Sheet in Kenyan Shillings. Also list details of work under way or committed, including expected completion dates.

Project name and country	**Name of client and contact person**	**Contractors Participation**	**Type of work performed and year of completion**	**Value of contract**
(a)				
(b)				

1.4 Major items of Contractor's Equipment proposed for carrying out the works. List all information requested below. Refer also to sub-Clause 12.3 of the Instructions to Tenderers.

Item of equipment	**Description, make, and age (years)**	**Condition (new, good, Poor) and number available**	**Owned, leased (from whom?) or to be purchased (from whom?)**
(a)			
(b)			
(c)			
(d)			

1.5 Qualifications and experience of key personnel proposed for administration and execution of the Contract. Attach biographical data. Refer also to sub-Clause 12.3 of the Instructions to Tenderers and Sub- Clause 10.1 of the General Conditions of Contract.

Position	Name	Years of Experience (General)	Years of Experience in proposed position
(a)			
(b)			

1.6 Proposed sub-contractor and firms involved. Refer to Clause 7 of General Conditions of Contract.

Sections of the Works	Value of subcontract	Subcontractor (Name and Address)	Experience in similar work
(a)			
(b)			

1.7 Financial reports for the number of years specified in the Tender Data Sheet.

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

1.9 Name, address, and telephone, e-mail address, and facsimile numbers of banks that may provide references if contracted by the Procuring Entity.

1.10 Information on current litigation in which the Tenderer is involved.

Other party(ies)	Cause of dispute	Amount involved
(a)		
(b)		

1.11 Statement of compliance with the requirements of sub-Clause 3.2 of the Instructions to Tenderers.

1.12 Proposed Program (work method and schedule). Descriptions, drawings, and charts, as necessary, to comply with the requirements of the Tendering documents.

2. **Joint Ventures**

2.1 The information listed in 1.1 – 1.11 above shall be provided for each partner of the joint venture.

2.2 The information in 1.12 above shall be provided for the joint venture.

2.3 Attach the power of attorney of the signatory (ies) of the Tender authorizing signature of the Tender on behalf of the joint venture.

2.4 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.

3. **Additional Requirements**

3.1 Tenderers should provide any additional information required in the **Tender Data Sheet** or to fulfil the requirements of sub-Clauses 12.1 of the Instructions to Tenderers, if applicable.

C. Integrity Declaration

UNDERTAKING BY TENDERER ON ANTI – BRIBERY POLICY / CODE OF CONDUCT AND COMPLIANCE PROGRAMME

1. Each Tenderer must submit a statement, as part of the Tender documents, in either of the two given formats which must be signed personally by the Chief Executive Officer or other appropriate senior corporate officer of the Tendering company and, where relevant, of its subsidiary in the Kenya. If a Tender is submitted by a subsidiary, a statement to this effect will also be required of the parent company, signed by its Chief Executive Officer or other appropriate senior corporate officer.

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

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

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

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

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

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

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

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

   a) Cancellation of the contract;

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

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

7. The Government of Kenya has made special arrangements for adequate oversight of the procurement process and the execution of the contract, and has invited civil society and other competent Government Departments to participate in the oversight. Those charged with the oversight responsibility will have full access to all documentation submitted by Tenderers for this contract, and to which in turn all Tenderers and other parties involved or affected by the project shall have full access (provided, however, that no proprietary information concerning a Tenderer may be disclosed to another Tenderer or to the public).

ANTI-CORRUPTION DECLARATION COMITMENT/ PLEDGE

(*Sections39, 40,41,42,43 & of the PPD Act, 2005)*

I/We/Messrs…….

of Street, Building, P O Box……

……..

Contact/Phone/E mail……..

declare that Public Procurement is based on a free and fair competitive Tendering process which should not be open to abuse.

I/We ..……..

declare that I/We will not offer or facilitate, directly or indirectly, any inducement or reward to any public officer, their relations or business associates, in connection with

Tender/Tender No ……..…….

for or in the subsequent performance of the contract if I/We am/are successful.

Authorized Signature.....

Name and Title of Signatory……

E. Form of Contract Agreement

This Agreement, made the [*day*] day of [*month*], [*year*] between [*name and address of Procuring Entity*] (hereinafter called "the Procuring Entity") and [*name and address of Contractor*] (hereinafter called "the Contractor") of the other part.

Whereas the Procuring Entity is desirous that the Contractor execute [*name and identification number of contract*] (hereinafter called "the Works") with the objectives of *[insert functional objectives of the works]* and the Procuring Entity has accepted the Tender by the Contractor for the execution and completion of such works and the remedying of any defects therein in the sum of *[contract price in words and figures]* (hereinafter called "Contract Price").

NOW THIS AGREEMENT WITNESSES 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, and they shall be deemed to form and be read and construed as part of this Agreement;

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

3. The Procuring Entity hereby covenants to pay the Contractor in consideration of the execution and completion of the Works and the remedying of defects wherein 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 _____

In the presence of: _____

Tendering Signature of Procuring Entity_____

Binding Signature of Contractor _____

SECTION X: FORMS OF SECURITY

A. Tender Security (Bank Guarantee)
(Optional)

*[If required, the **Bank /Tenderer** shall fill in this Guarantee form in accordance with the instructions indicated in brackets.]*

[insert bank's or insurance company's name, and address of issuing branch or office]

Beneficiary: *[insert name and address of Procuring Entity]*

Date: *[insert date]*

TENDER GUARANTEE No.: *[insert number]*

We have been informed that *[insert name of the Tenderer; if a joint venture, list complete legal names of partners]* (hereinafter called "the Tenderer") has submitted to you its Tender dated *[insert date]* (hereinafter called "the Tender") for the execution of *[insert name of Contract]* under Invitation for Tenders No. *[insert IFT number]* ("the IFT").

Furthermore, we understand that, according to your conditions, Tenders must be supported by a Tender Guarantee.

At the request of the Tenderer, we *[insert name of bank]* hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of *[insert amount in figures expressed in the currency of the Purchaser's Country or the equivalent amount in an international freely convertible currency]* (*[insert amount in words]*) upon receipt by us of your first demand in writing accompanied by a written statement stating that the Tenderer is in breach of its obligation(s) under the Tender conditions, because the Tenderer;

a) Has withdrawn its Tender during the period of Tender validity specified by the Tenderer in the Form of Tender; or

b) Does not accept the correction of errors in accordance with the Instructions to Tenderers (hereinafter "the ITT") of the IFT; or

c) Having been notified of the acceptance of its Tender by the Procuring Entity during the period of Tender validity;

   (i). Fails or refuses to execute the Contract Form, if required, or

   (ii). Fails or refuses to furnish the Performance Security, in accordance with the ITT.

This Guarantee shall expire;

a) If the Tenderer is the successful Tenderer, upon our receipt of copies of the Contract signed by the Tenderer and of the Performance Security issued to you by the Tenderer; or

b) If the Tenderer is not the successful Tenderer, upon the earlier of;

(i) Our receipt of a copy of your notification to the Tenderer that the Tenderer was unsuccessful, or

(ii) Thirty days after the expiration of the Tenderer's Tender.

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

_____

[signature(s) of authorized representative(s)]

B. Performance Bank Guarantee [Unconditional]

[The **Bank/successful Tenderer** providing the Guarantee shall fill in this form in accordance with the instructions indicated in brackets, if the Procuring Entity requires this type of security.]

[insert bank's or insurance company's name, and address of issuing branch or office]

Beneficiary: *[insert name and address of Procuring Entity]*

Date: *[insert date]*

PERFORMANCE GUARANTEE No.: *[insert Performance Guarantee number]*
We have been informed that *[insert name of Contractor]* (hereinafter called "the Contractor") has entered into Contract No. *[insert reference number of the Contract]* dated with you, for the execution of *[insert name of Contract and brief description of Works]* (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, a Performance Guarantee is required.

At the request of the Contractor, we *[insert name of Bank]* hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of *[insert amount in figures]* (*[insert amount in words])*, such sum being payable in the types and proportions of currencies in which the Contract Price is payable, upon receipt by us of your first demand in writing accompanied by a written statement stating that the Contractor is in breach of its obligation(s) under the Contract, without your needing to prove or to show grounds for your demand or 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 there under 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 expire not later than thirty days from the date of issuance of the Taking-Over Certificate.

[signature(s) of an authorized representative(s) of the Bank]

SECTION XI: APPLICATION TO PUBLIC PROCUREMENT ADMINISTRATIVE REVIEW BOARD

FORM RB 1

REPUBLIC OF KENYA

PUBLIC PROCUREMENT ADMINISTRATIVE REVIEW BOARD

APPLICATION NO…….OF…….….20……...

BETWEEN

…….APPLICANT

AND

……RESPONDENT *(Procuring Entity*)

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

REQUEST FOR REVIEW

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

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 of ……....20….……

SIGNED

Board Secretary

SECTION IX: EVALUATION CRITERIA

The tenders submitted by tenderers shall be evaluated in the following three (3) stages:

Stage 1: Preliminary Bid Responsiveness Assessment

No.	Completeness and Responsiveness Criteria	REQUIREMENT	YES	NO
1.	Form of Bid/Tender	1. Amount must be indicated 2. Properly fill and sign		
2.	Bid Security. The bidder shall furnish as part of its bid, a bid security of kshs: 200,000 Two Hundred Thousand shillings from a reputable commercial bank recognized by central bank of kenya	In original, unconditional **BANK/INSURANCE** guarantee in the amount and currency specified		
3.	Confidential Business Questionnaire	- Properly fill and sign - Provide all required information as applicable		
4.	Valid Tax Compliance Certificate	- Copy of Valid certificate		
5.	Copy of pin/VAT certificate	- Attach copy		
6.	Copy of National Construction Authority certificate (NCA 7) water works and building works must be accompanied by a valid annual practicing licence	- **Both certificate and annual practicing licence must be valid and subject to verification**		
7.	Certificate of Incorporation	- Copy of certificate **Certified by Commissioner of Oaths**		
8.	Copy of cr12 form-from reigistrar of companies and directors ID'S (for the last 12 months)	- Certified copy of CR12 must attach		
9.	Single Business Permit	- must be valid, stamped and signed from any county – subject to verification		
10.	Serialization	- All pages of the tender document submitted shall be sequentially serialized		

This will involve assessing whether bidders have complied with submission requirements and have also attached certified copies of mandatory eligibility and statutory documents. Evaluation at this stage will be conducted on **Yes/No**, and bidders are expected to show evidence of ALL required items so as to proceed to the next stage of evaluation.

Stage 2: Technical Evaluation Stage

Tenders will be evaluated to ensure that they are substantially responsive to the technical specifications and contract conditions stated in the Tender Document. The determination of a tender's technical responsiveness will be based on the contents of the tender itself, subject to any clarifications received in the preliminary examination

SN	Sub factor	REQUIREMENT			Maximum score	Awarded score
1		**EXPERIENCE**			**Max 5**	
	i.	Attach reference letters/contracts/completion certificates/purchase orders for different firms as evidences			2	
	ii.	Specific (local) experience in related works			3	
2		**CURRENT COMMITMENTS**			**Max 15**	
	I.	Similar completed works within the last 5 years			10	
	II.	Ongoing works with 50% completion			3	
	III.	On-going works similar works with less than 50% completion			2	
3		**KEY PERSONNEL**			**Max 30**	
	i)	Site Agent	Qualification	Bsc Civil Eng.	20	
				Nh. Diploma	15	
				Diploma	10	
				Certificate	5	
	ii)	Foreman	Qualification	Diploma	10	
				Certificate	5	
4		**PLANT AND EQUIPMENT**			**Max 15**	
	i.	Relevant Equipment (concerete mixer, vibrator, plumbing equipments)	Owned/Leased (Ma 10marks)		0-15	
5		**WORK METHODOLOGY**			**Max 15**	
			Program of works		0-5	
			Detailed Methodology		0-5	
			Proposed Equipmer Scheduling/Work statement.		0-5	
6		**FINANCIAL CAPACITY**			**Max 20**	
	i.	Audited financial reports for the last 3 years (2019,2020 & 2021)			10	
	ii.	Line of credit evidenced with certified letter/ statements from bank			5	
	iii.	Certified Bank statement (Last six months to the date of tender)			5	
		TOTAL			**MAX 100**	

A threshold of **70%** for the combined scores for both Technical and Financial will be applied and bidders who score above the same will be considered for award in relation to the prices offered. Bidders who shall score below 70% of the combined scores will be discontinued from further evaluation. The successfully evaluated bidder offering the lowest price will be awarded the contract.